CENTRAL HAWKE'S BAY DISTRICT COUNCIL

COMMISSIONER HEARING

The following Hearing is to be held in the Council Chamber, Ruataniwha Street, Waipawa on:

Hearing Stream 1
Natural and Coastal Environment

9.00am Tuesday 15 March 2022

COUNCIL MISSION STATEMENT:

Our Vision for Central Hawke's Bay is a proud and prosperous district made up of strong communities and connected people who respect and protect our environment and celebrate our beautiful part of the New Zealand

Together we Thrive! E ora ngātahi ana!

Timetable

8.45am	Reporting Officers	In Person	20mins
9.35am	Clint Deckard (S115)	Zoom	15mins
9.55am	Will Foley (S109)	Zoom	15mins
10.00am	Ernslaw One Limited (S132, FS22) & Rayonier Matariki Forests (S85)	Zoom	15mins
10.20am	Royal Forest and Bird Protection Society NZ (Forest & Bird) (S75, FS9)	Zoom	20mins
10.50am	20 Minute Break		
11.10am	Water Holdings Hawke's Bay (FS29)	Zoom	15mins
11.20am	Hawke's Bay Regional Council (S11)	In Person	15mins
11.40am	New Zealand Motor Caravan Association (S101, FS24)	Zoom	15mins
12pm	Lunch		
1.00pm	Federated Farmers of New Zealand (S121, FS25)	Zoom	20mins
1.30pm	Royal Forest and Bird Protection Society NZ (Forest & Bird) (S75, FS9)	Zoom	20mins
2.15pm	Liz Munroe (FS28)	In Person	15mins

Order of Business

CENTRAL HAWKE'S BAY DISTRICT COUNCIL

A meeting of the District Plan Hearings Panel will be held in the Council Chamber, 32 Ruataniwha Street, Waipawa on **Tuesday 15 March 2022** commencing at **9.00am.**

PRESENT:	Commissioners Robert Schofield, Loretta Lovell, Roger Maaka, Tim Aitken, Kate Taylor, and Pip Burne	
IN ATTENDANCE:	Jessie Williams	[CHBDC - District Plan Hearings Administrator]
	Helen O'Shaughnessy	[CHBDC - Reporting Officer]
	Stella Morgan	[Sage Planning – Reporting Officer]
	Rowena Macdonald	[Sage Planning – Reporting Officer]
	Tiffany Gray	[CHBDC – Decision Writer]

1.0 KARAKIA / MIHI / INTRODUCTIONS

2.0 CLINT DECKARD (S115)

[Online]

a) Original Submission: https://www.chbdc.govt.nz/assets/Document-Library/Received-Submissions-on-the-Proposed-District-Plan/S115-Clint-Deckard.pdf

3.0 WILL FOLEY (S109)

[Online]

a) Original Submission: https://www.chbdc.govt.nz/assets/Document-Library/Received-Submissions-on-the-Proposed-District-Plan/S109-Will-Foley.pdf

5.0 ERNSLAW ONE LIMITED (S132, FS22) & RAYONIER MATARIKI FORESTS (S85)

Lynette Baish (Environmental Planner, Ernslaw One Limited) [Online]
Trish Fordyce (Rayonier Matariki Forests) [Online]

a) Ernslaw Original Submission: https://www.chbdc.govt.nz/assets/Document-Library/Received-Submissions-on-the-Proposed-District-Plan/S132-Ernslaw-One-Limited.pdf
b) Ernslaw Further Submission: https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/FS22-Enslaw-One-Limited.pdf
c) Rayonier Matariki Forests Original Submission: https://www.chbdc.govt.nz/assets/Document-Library/Received-Submissions-on-the-Proposed-District-Plan/S85-Rayonier-Matarki-Forests.pdf
d) Joint Evidence Submitter Evidence (attached, **pages 1 - 9**): https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/Hearing-Stream-1/S132-S85-Submitter-Evidence-Lynette-Baish-for-Ernslaw-One-Limited-S132-and-Rayonier-Matariki-Forests-S85-HS1.pdf
e) Joint Legal Submission (attached, **pages 10 - 14**): https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/Hearing-Stream-1/Ernslaw-and-Rayonier-Forests-legal-submission.pdf

6.0 ROYAL FOREST AND BIRD PROTECTION SOCIETY NZ (FOREST & BIRD) (S75, FS9)

Tom Kay (Forest & Bird) [Online]
May Downing (Legal Representation) [Online]

a) Original Submission: https://www.chbdc.govt.nz/assets/Document-Library/Received-Submissions-on-the-Proposed-District-Plan/S75-Royal-Forest-and-Bird-Protection-Society-NZ.pdf
b) Further Submission: https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/FS9-Royal-Forest-and-Bird-Protection-Society-of-New-Zealand-Incorporated.pdf
c) Legal Submission (attached, **pages 15 - 26**): https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/Hearing-Stream-1/Forest-and-Bird-PCHBDP-legal-submissions-9-March-2022-FINAL.pdf
d) Submitter Presentation notes (attached, **pages 27 – 38**)

7.0 WATER HOLDINGS HAWKE'S BAY (FS29)

Hugh Ritchie [Online]

a) Further Submission: https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/FS29-Water-Holdings-Hawkes-Bay.pdf

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8.0 HAWKE'S BAY REGIONAL COUNCIL (S11)

Gavin Ide (Principal Advisor Strategic Planning) [In Person]

a) Original Submission: https://www.chbdc.govt.nz/assets/Document-Library/Received-Submissions-on-the-Proposed-District-Plan/S11-Hawkes-Bay-Regional-Council.pdf
b) Submitter Statement: https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/Hearing-Stream-1/S11-Hawkes-Bay-Regional-Council-Submitter-Statement-HS1.pdf

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9.0 NEW ZEALAND MOTOR CARAVAN ASSOCIATION (S101, FS24)

Rayya Ali (Planning and Policy Advisor) [Online]

a) Original Submission: https://www.chbdc.govt.nz/assets/Document-Library/Received-Submissions-on-the-Proposed-District-Plan/S101-NZ-Motor-Caravan-Association.pdf
b) Further Submission: https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/FS24-New-Zealand-Motor-Caravan-Association.pdf

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10.0 FEDERATED FARMERS OF NEW ZEALAND (S121, FS25)

Rhea Dasent (Senior Policy Advisor) [Online]

a) Original Submission: https://www.chbdc.govt.nz/assets/Document-Library/Received-Submissions-on-the-Proposed-District-Plan/S121-Federated-Farmers-of-New-Zealand.pdf
b) Further Submission: https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/FS25-Federated-Farmers-of-New-Zealand.pdf
c) Submitter Evidence (Attached, **pages 39 - 53**): https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/Hearing-Stream-1/S121-Submitter-Evidence-Rhea-Dasent-for-Federated-Farmers-of-New-Zealand-S121-HS1-.pdf

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11.0 LIZ MUNROE (FS28)

[In person]

a) Further submission: https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/FS28-Liz-Munroe.pdf

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12.0 TABLED SUBMITTER STATEMENTS/EVIDENCE

a) Kāinga Ora - Homes and Communities (Kainga Ora) (S129, FS23) (attached, **pages 54 – 56**)
https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/Hearing-Stream-1/S129-Submitter-Statement-Kainga-Ora-S129-HS1.pdf

b) Transpower New Zealand Ltd (S79, FS18) (attached, **pages 57 - 63**)
https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/Hearing-Stream-1/S79-Submitter-Statement-Transpower-S79-HS1.pdf

c) Chorus New Zealand Limited (S117), Spark New Zealand Trading Limited (S118) & Vodafone New Zealand Limited (S119) (attached, **page 64**)
https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/Hearing-Documents/Submitter-Evidence-Chorus-117-Spark-118-Vodafone-119-Hearing-Stream-1.pdf

d) Kathryn Bayliss (S39) (attached, **pages 65 – 103**)
1: https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/Hearing-Stream-1/S39-Submitter-Statement-Kathryn-Bayliss-S39-HS1.pdf
2: https://www.chbdc.govt.nz/assets/Document-Library/District-Plan-Proposed/Hearing-Stream-1/S39-Submitter-Statement-2-Kathryn-Bayliss-S39-HS1.pdf

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13.0 CLOSURE

Before the Hearings Commissioners at Waipawa

Under:	The Resource Management Act 1991
In the matter of:	Proposed Central Hawkes Bay District Plan – Ecosystems and Indigenous Biodiversity

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STATEMENT OF EVIDENCE LYNETTE BAISH

Introduction

1. My name is Lynette Ann Baish. I have been an Environmental Planner at Ernslaw One Ltd (Ernslaw), Southern North Island Region since November 2021, and was a Senior Policy Planner at Horizons Regional Council since February 2017. I hold the qualifications of BA and Master of Resource and Environmental Planning (Massey). I am a member of the New Zealand Planning Institute. I have worked in resource management planning for 14 years.
2. I am presenting planning evidence on behalf of Ernslaw and Rayonier Matariki Forests (Rayonier).
3. I have read the Code of Conduct for Expert Witnesses issued as part of the Environment Court Practice Notes. I agree to comply with the Code and am satisfied the matters I address in my evidence are within my expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in my evidence.

Involvement in the Proceedings

4. Ernslaw have participated in key stages of the plan change process. James Sinclair, former Environmental Manager, had submitted to the draft District Plan. Ernslaw has worked with Council's ecologist Gerry Kessels to ground truth areas of SNA identified within Te Uri Forest. A submission (S132) and further submission (FS22) were provided in respect of the proposed District Plan, in particular, the Eco-systems and Biodiversity Chapter, and the proposed (SNA) planning maps.
5. Rayonier has also participated in key stages of the process. A submission (S85) was provided in respect of the Proposed District Plan as a whole.

Summary of the Primary Issues for Ernslaw and Rayonier (and the forest companies)

6. Ernslaw and Rayonier support, in principle, the provisions regarding Significant Natural Areas (SNA) and the Natural Environment Chapter, or any alternative or consequential relief that achieves the same outcome. The proposal is generally consistent with the objectives and policy direction of the Regional Policy Statement and the Regional Plan, as well as with statutory requirements to recognise and provide for the protection of significant areas of indigenous vegetation and fauna as a matter of national importance.
7. In particular, the crux of Ernslaw and Rayonier's submission was concerned with an apparent disconnect with the National Environmental Standard for Plantation

Forestry (NES-PF), and consequent lack of clarity as to which provisions should apply for the plantation forestry sector in relation to SNA's. Contemplating the Section 42A report of Stella Morgan, I'm partially satisfied that the clearer direction initially sought, has now been provided in relation to the provisions ECO-R4, ECO-R5 and ECO-R6, however the Note prefacing the Rule framework, needs to be rewritten. I support the proposal set out in the legal submission by Trish Fordyce.

8. Ernslaw and Rayonier are generally supportive of the policy framework and I consider that the majority of landowners would appreciate the benefits of provisions (ECO-P5, ECO-M3 and ECO-APP2), which give effect to the Principles of Biodiversity Offsets (where proposed in resource consent applications), policy (ECO-P7), which recognises landowners' stewardship and current management practices, and policy (ECO-P8), which provides assistance and incentives to landowners to maintain areas of significant indigenous vegetation and habitat. I have no further issues to raise in respect of these policies.
9. Ernslaw had submitted that the absence of a policy mandate to exclude stock from indigenous vegetation and habitat identified as SNA constitutes a critical gap in biodiversity protection. While I accept that councils cannot compel fencing of SNA to occur, I consider that it would be appropriate to include stock exclusion as a discretionary criterion for resource consents for activities affecting SNAs.
10. Rayonier and Ernslaw had submitted that only areas that are mapped as SNA should be subject to the higher level of protection accorded to SNA. I am of the view that protection of SNA's should be contingent on clear and accurate mapping of areas that are to be designated as SNA, an expectation that aligns with the proposed provisions for mapping and identification outlined in the Draft National Policy Statement Indigenous Biodiversity (NPS-IB). It is critical that landowners, prospective or otherwise, have access to clear and accurate information on land holdings.
11. Rayonier had submitted that an exemption be included in Criterion 6 of the Ecological Significance Determination Criteria for the Central Hawkes Bay District in respect of plantation forestry, and more specifically fireponds. The statutory definitions of wetlands are changing, and these changes will have a bearing on this issue. I concur with the legal submission of Trish Fordyce and her analysis and interpretation of the issue.

Alignment of the Proposed District Plan with the National Environmental Standards for Plantation Forestry 2017 (with regard to indigenous vegetation and SNA)

12. The NES-PF provides a national set of regulations that apply to land under plantation forestry. The regulations are intended to ensure that forestry activities including earthworks, harvesting, silviculture and quarrying, are managed appropriately and transparently, and that any effects beyond the identified permitted baseline are captured in a structured consenting regime to avoid, remedy or mitigate adverse environmental outcomes.
13. The NES-PF also contains provisions designed to safeguard any adverse effects on indigenous vegetation and habitat. Over the time a forest matures, upwards of 25 years, an exotic plantation can act as a nursery crop for a diversity of non-forest species. Many forests contain large areas of indigenous vegetation in gullies and areas that are inaccessible for forestry operations. Although these areas might be seen as non-productive, forestry companies, particularly those who are Forest Stewardship Council (FSC) accredited, appreciate the eco-system services provided by such areas of vegetation, particularly as habitat for indigenous fauna within the forest.
14. Regulation 93 sets out the circumstances in which indigenous vegetation can be cleared (including understory, failed crop areas, crop areas established within 5 years or where vegetation is overhanging tracks), and applies thresholds (not exceeding 1 ha or 1.5% (whichever is the greater) of the total area of indigenous vegetation) which apply to the clearance of large areas of indigenous vegetation within and adjacent to a plantation crop.
15. Indigenous vegetation clearance is not permitted to occur in Significant Natural Areas (SNA). Incidental damage to indigenous vegetation associated with plantation forestry activities, including to vegetation recognised as SNA, can occur as a permitted activity, subject to caveats on the extent of the damage. Regulation 94 outlines the circumstances where a resource consent will be required for indigenous vegetation clearance that would be beyond the scope of the permitted criteria, including clearance of any indigenous vegetation beyond the stated thresholds, or any incidental damage to SNA that would be detrimental to the values of the SNA, or which would compromise the ecological recovery of the damaged vegetation within an SNA.

16. While section 74 of the RMA requires that a district plan must be prepared in accordance with any regulations, NES-PF Regulation 6(2)(b) does provide for district plan rules to be more stringent if the rules recognise and provide for the protection of significant natural areas.
17. The proposed plan change concerning the Chapter *Natural Environment – Ecosystems and Indigenous Biodiversity*, did not contain an assessment of how the NES-PF is functioning within the District to regulate and protect areas of SNA and indigenous vegetation.
18. The proposed provisions also lacked clarity as to whether plantation forestry activities would be subject to the rules ECO-R4, ECO-R5 and ECO-R6, or whether the NES-PF would prevail.
19. The author of the Section 42A report, Stella Morgan, has clarified that the proposed district plan (PDP), does not seek to duplicate the provisions of the NES-PF; nor does the PDP seek to impose more stringent rules than the NES-PF.[1] Stella Morgan further notes, that the intention is that the PDP complement the NES-PF, and not replicate it.[2] I agree with this approach.
20. The 42A Report additionally states that where the NES-PF does not regulate activities, the ordinary PDP rules will apply.[3] For example, NES-PF Regulation 5(3) states that the regulations do not apply to vegetation clearance that is carried out before afforestation; and unless clearance within an SNA is for the purpose of forestry tracking, the NES-PF does not provide for the regulation of vegetation clearance within an SNA. I agree that where the NES-PF does not contain a rule for an activity, the assessment of that activity must therefore be subject to a rule in a district or regional plan, where that rule stipulates a regulatory requirement for the same activity. Where I take issue, is the manner in which the 42A report, appears to skim over the NES-PF in a way that muddles its provisions.
21. Stella Morgan proposes to clarify the standing of the PDP rules in relation to the NES-PF regime with a note referring specifically to Plantation Forest Activities.[4] Essentially, the note clarifies that, in the case of conflict with any rule in the Chapter, the provisions of the NES-PF will prevail, including in the case of vegetation clearance during or after afforestation, and with forestry activities

[1] Morgan, Stella. Officers Report: Natural Environment – Ecosystems and Indigenous Biodiversity. Para 5.3.9, p 22.
[2] Morgan. Para 5.3.17, p 23.
[3] Morgan. Para 5.3.17, p 23.
[4] Morgan. Para 5.3.17, p 23.

within, or near to SNA which are not affected by the rules in the Chapter. The note continues to describe where the NES-PF/PDP prevails, as the case may be, however this is not explained either succinctly or clearly. I believe a more concise note, linking back to the NES-PF to let the regulation speak for itself would work better.

22. I concur with the alternate, and much simplified wording presented in the legal submission of Trish Fordyce.

Exclusion of stock from Significant Natural Areas

23. The absence of provisions requiring the exclusion of stock from indigenous vegetation and habitat identified as SNA constitutes a critical gap in biodiversity protection. Biodiversity values would only further degrade where stock are allowed unmitigated access to areas of indigenous vegetation and habitat.
24. While territorial authorities may not be able to compel fencing of SNA to occur, in my view it would be appropriate to include stock exclusion as a discretionary criterion for resource consents for any activities affecting SNAs.
25. This would not be out of alignment with the proposed NPS-IB which recognises (Matter (h)), that "*disruption to indigenous fauna by people and their pets and livestock and changes that increase the risk of disruption*"[5] is a matter adversely impacting indigenous biodiversity.
26. The proposed NPS-IB therefore requires that regional councils must "*make or change their policy statements to specify where, how and when plans must provide for existing activities that may adversely affect indigenous biodiversity.*[6]
27. The proposed NPS-IB further requires that in providing for existing activities in their policy statements and plans, local authorities must *"(a) ensure the continuation of an existing activity will not lead to the loss, including through cumulative loss, of extent or degradation of the ecological integrity of any SNA; and b) ensure the adverse effects of an existing activity are of no greater character, intensity or scale than they were before the National Policy Statement commencement date.*[7]*"* I consider, and with particular reference to Matter (h), that this would include a situation where an area categorised as SNA remained accessible to stock.

[5] Draft National Policy Statement Indigenous Biodiversity (October 2019). Section 1.7(4)(h). P 9.
[6] Draft National Policy Statement Indigenous Biodiversity (October 2019). Section 3.12(2). p 23.
[7] Draft National Policy Statement Indigenous Biodiversity (October 2019). Section 3.12(3)(a), (b). p 23.

28. In my opinion, methods to achieve stock exclusion should be added to the assessment matters in ECO-AM2 in respect of the trimming and clearance of Indigenous Vegetation that is a discretionary activity pursuant to ECO-R3.
29. Council is not restricted to the matters identified in ECO-AM2, but may consider them (among other factors), and apply the consideration if, and where appropriate[8]. This would provide Council with the grounds to require fencing, or other means of exclusion, in cases where continued access by stock would be detrimental to areas recognised has having high conservation value, or which are rare, distinctive, and at risk.
30. I consider that this aligns with Stella Morgan's assertion that "*fencing could be offered or required as a condition of consent for activities affecting SNAs, but this would need to be considered on a case-by-case basis through the resource consent process.*"[9]
31. In summary, a discretionary consideration of stock exclusion in the assessment matters for discretionary trimming and clearance within an SNA, would enable the council to achieve a considerable gain for biodiversity protection within SNA's, and would further align the PDP with the proposed NPS-IB.

Biodiversity offsets

32. Ernslaw is supportive of the policy framework giving effect to biodiversity offsetting to achieve 'no net loss', or a 'net gain', for indigenous biodiversity where adverse effects cannot be avoided, remedied or mitigated.
33. The provisions (ECO-P5, ECO-M3 and ECO-APP2), give effect to the Principles of Biodiversity Offsets, and where proposed in resource consent applications, will bring appreciable benefits for landowner management and SNA protection.
34. I agree with the wording change proposed by Forest and Bird to cross reference between ECO-M3 and ECO-APP2.

Recognition of Landowners Stewardship

35. Ernslaw supports policy ECO-P7 which provides for the recognition of the efforts of landowners who maintain and enhance indigenous vegetation including weed management and pest control. Considerable resource is channelled into predator

[8] PDP, Assessment Matters, P ECO-13.
[9] Morgan, Stella. Officers Report: Natural Environment – Ecosystems and Indigenous Biodiversity. Para 5.3.48, p 27.

and pest control which has benefits for both crop management and indigenous flora, fauna and habitat.

36. I agree with the provision as proposed.

Non-regulatory Methods and Incentives

37. Ernslaw supports Policy ECO-P8, which provides assistance and incentives to landowners to maintain areas of significant indigenous vegetation and habitat.
38. I agree with the provision as proposed.

Mapping and Identification of SNA's

39. Rayonier and Ernslaw seek amendment of ECO-P2 to protect areas identified and mapped in the district plan as otherwise there is uncertainty for landowners (and potential landowners). This will ensure the PDP is in complete alignment with the NPS-IB[10] as well as provide necessary certainty for existing and prospective landowners and land managers, acknowledging that the identification and mapping of SNA is an ongoing, evolving process involving consultation, assessment, and identification, and one which is proposed to be repeated every two years, where practicable, to accurately reflect and incorporate SNA.
40. Stella Morgan asserts the review of SNA has limitations being a desktop review, with "some ground-truthing".[11] The identified and mapped SNAs are therefore acknowledged as representing most, but likely not all, of the District's significant indigenous vegetation or significant habitat. A lack of methods to protect areas outside of identified SNA could lead to significant environmental costs. This is why Rayonier and Ernslaw see future work in this area, including a future plan change, as imperative to continue to capture SNA's identified subsequent to this plan change, within a protective framework.
41. Rayonier and Ernslaw accept that the depletion of indigenous vegetation and habitat is a direct threat to many under-represented eco-system types, and that remaining flora and fauna is highly likely to be within the nationally threatened categories.
42. However, as stated in the PDP, except where high conservation values exist, and are mapped as SNA, the PDP seeks to accommodate a wide range of activities

[10] Draft National Policy Statement Indigenous Biodiversity (October 2019). Section 3.8(8). P20.
[11] Morgan, Stella. Officers Report: Natural Environment – Ecosystems and Indigenous Biodiversity. Para 9.3.9. p 55.

with appropriate standards to ensure adverse effects on significant indigenous vegetation and habitat are avoided, remedied or mitigated.

43. The provisions of the NES-PF, Regulation 93 highly limit and, clearly quantify acceptable and appropriate limits on clearance of indigenous vegetation and habitat in plantation forests.
44. I consider not only that mapping provides certainty, but additionally that all mapping must be searchable, and meet the requirements for presentation and mapping conventions outlined in the National Planning Standards (2019).

Before the Hearings Commissioners at Waipawa

Under: The Resource Management Act 1991

In the matter of: Proposed Central Hawkes Bay District Plan – Ecosystems and Indigenous Biodiversity

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SUBMISSIONS ON BEHALF OF ERNSLAW ONE LIMITED AND RAYONIER MATARIKI FORESTS

TRISH FORDYCE

Introduction

1. These submissions are made on behalf of Ernslaw One Limited (Ernslaw) and Rayonier Matariki Forests (Rayonier. Both companies submitted and or further submitted on the Proposed District Plan and both companies own and or manage plantation forests in the Central Hawke's Bay District.

2. Ernslaw and Rayonier have chosen to jointly present planning evidence by Lynette Baish and these submissions.

3. These joint submissions relate to the Ecosystems & Indigenous Biodiversity topic and will cover the following matters:
   a. The alignment with the National Environmental Standards for Plantation Forestry. 2017 (NESPF) in relation to the provisions of ECO I1and rules ECO-R4, ECO-R5 and ECO-R6.
   b. Exclusion of stock from SNAs-ECO-AM2.
   c. Mapping and identification of SNAs-ECO-P2.
   d. Inclusion of fire ponds -Criterion 6 of the ecological Significance Determination Criteria.

Alignment with the NESPF

4. The provisions of ECO-I1, its explanation and then the rules raised concerns for the forest companies. There is no mention of the provisions of the NESPF relating to plantation forestry and the clearance of indigenous vegetation within SNAs or any other clearance of indigenous vegetation. Furthermore, the explanation to ECO-I1 included the following comment:

   > " Council recognises there is a need to balance protecting and enhancing the District's indigenous biodiversity while allowing for rural landowners to **farm** their land effectively and efficiently". (my emphasis)

5. The explanation indicates that the ECO provisions would deal with provisions for farming of rural land and thus exclude provisions for forestry activities on rural land.

6. There is no indication in the proposed plan that the relevant provisions of the NESPF have been considered and the provisions in the proposed plan being assessed to consider it they would or would not be more stringent than the NESPF regulations.

7. Despite the Section 42A report recommending that the explanation to ECO-I1 is retained it is accepted that, at a minimum, there be a note in the proposed plan prior to the rule section making it clear where an activity is regulated by the

NESPF, the ECO rules do not apply, but where the activity falls outside the scope of the NESPF, the ECO rules apply.

8. The section 42A report suggests a note as follows:

"Note – Plantation Forestry Activities - In the case of conflict with any rule in this Chapter, the provisions of the NESPF apply instead of the rule. This specifically applies to vegetation clearance that occurs during or after afforestation outside of a significant natural area, for clearance of a forestry track within a significant natural area where the track has been used in the last 50 years, and 'incidental damage' within or outside a significant natural area. Vegetation clearance of indigenous vegetation that occurs before afforestation, or within a significant natural area (other than for clearance of an overgrown forestry track or incidental damage) is not controlled by the NES-PF, and the rules in this Chapter will apply. The NES-PF also imposes additional rules in relation to activities within, or near to, significant natural areas, which are not affected by the rules in this Chapter."

9. It is my submission that the proposed note does not provide clarity as to the applicability of otherwise of the relevant NESPF provisions. There is no specific reference to the relevant NESPF regulations, the reference to vegetation clearance "that occurs **during** or **after** afforestation outside of a SNA" introduces terminology not used in the NESPF, and not fully referring to all the circumstances when indigenous vegetation occurs only confuses matters.

10. With regard to indigenous vegetation clearance the NESPF provides for three important matters:
    a. First, Afforestation (new forestry) is not permitted at all within a SNA. (Reg.12)
    b. Secondly, with regard to a SNA, indigenous vegetation clearance of a forestry track, if used in the last 50 years, and clearance from incidental damage is permitted. No other clearance is provided for. (Reg. 93)
    c. Last, other indigenous vegetation clearance is permitted subject to specified circumstances and/or quantifiable areas. (reg.93). Reg.93 is appended to this submission.

11. It is proposed that the note be amended as follows:

    "Note-Plantation Forestry Activities-in the case of conflict with any rule in this Chapter, the provisions of the NESPF apply instead of the rule. In particular, afforestation must not occur in a SNA (Reg.12) , and clearance of indigenous vegetation in a SNA may only occur for clearing a forestry track that has been used within the last 50 years or is "incidental damage" (Reg. 93 (1) and 93 (4) (5)).
    Regulations 93 (2), (3) (4) and (5) set out the provisions relating to other clearance of indigenous vegetation."

Exclusion of Stock from SNAs

12. Ernslaw submitted on the ECO chapter and sought policy direction and regulatory mechanisms to exclude stock from SNAs. The recommendation in the Section 42A report is to reject the submission. I submit that the evidence of Lynette Baish be considered and accepted. Her planning evidence suggests adding "methods to achieve stock exclusion" to the assessment matters in ECO-AM2.

13. Such amendment would provide clear direction that when assessing a resource consent for trimming and clearance of indigenous vegetation “stock exclusion” could be considered.

Mapping and Identification of SNAs.

14. The forest companies sought that SNAs be **identified and mapped** in the District Plan. The Section 42A Report does not address the reason expressed in the submission that identification and mapping provides certainty for landowners. For plantation forestry, the companies can transpose the SNA maps onto forestry maps and have the certainty that those areas have regulatory restrictions when it comes to the potential clearance of any indigenous vegetation within the identified and mapped SNA. This certainty is required to ensure that forestry activities do not contravene the regulations and could lead to enforcement actions against the forest operators.

15. The submission does not request **ground truthing** before being proposed in a district plan. The existing process that preceded this proposed plan of identifying and mapping a SNA and then relying on the submission process to ensure the proposed boundaries of a SNA are correct would continue. In the future this would be by way of plan changes. It is not clear why a process that has preceded this proposed plan should not be continued in the future.

16. It is submitted that the request to have SNAs identified and mapped be accepted.

Criterion 6 ECO-PI

17. The submission of Rayonier requested that the last bullet point of criterion 6 which provides for the exclusion of “water supply storage, including stock water storage” be amended to include “fire ponds”. The reason for this is that “fire ponds” is a term used in forestry for the ponds created to collect water for use in the case of fire.

18. Often these ponds can end up with indigenous ecosystems. While a fire pond could supply water for fire purposes it is submitted that the normal understanding of water supply is one for human and or stock consumption purposes. The Council has seen fit to be specific that such supply can apply for stock purposes but the Section 42A rejects Rayonier’s request for clarity when it comes to firefighting purposes.

19. The process for identifying SNAs commences with the use of aerial photographs. In other districts fire ponds have been mistakenly identified as wetlands. It is submitted that for certainty and to ensure that there is no challenge in the future as to whether a fire pond would fall within the criterion that the submission by Rayonier be accepted.

20.

Evidence

21. Planning evidence is to be presented by Lynette Baish

Trish Fordyce

9 March 2022

BEFORE THE HEARINGS PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of the Proposed Central Hawke's Bay District Plan

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LEGAL SUBMISSIONS ON BEHALF OF THE ROYAL FOREST AND BIRD PROTECTION SOCIETY OF NEW ZEALAND INCORPORATED

HEARING STREAM 1: NATURAL AND COASTAL ENVIRONMENT

9 MARCH 2022

Royal Forest and Bird Protection Society of New Zealand Inc
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MAY IT PLEASE THE PANEL

INTRODUCTION

1. The Royal Forest and Bird Protection Society Inc (Forest & Bird) supports many aspects of the Proposed Central Hawkes Bay District Plan (Proposed District Plan). However, further changes are required for it to be said the Proposed District Plan meets the requirements of the Resource Management Act 1991.

2. These legal submissions provide the legal context and basis for Forest & Bird's position on Policy NFL-P5 – which Forest & Bird seeks is removed in its entirety.

3. The S42A Report recommends retaining Policy NFL-P5:

> To recognise the regional social and economic significance of water storage within ONF-4 (Mākāroro Gorge)

4. The section 42A Report justifies Policy NFL-P5 based on:[1]

    a. The purpose of the RMA set out in section 5.
    b. That it "provides a balanced judgement, in keeping with the purpose and principles of the RMA."
    c. Facilitating the Ruataniwha Water Storage Scheme (RWSS) – which had consents granted in 2014 but has not been (and is unable to be) implemented.

5. This is an incorrect approach. It is essentially a version of the overall broad judgement approach which the Supreme Court in *Environmental Defence Society Incorporated Inc v The New Zealand King Salmon Company Limited*[2] (*King Salmon)* has discontinued.

6. Forest & Bird's concern is with the approach of including a policy catered to one activity as opposed to developing policy based on higher order directions under the RMA.

[1] Officer's Report: "Natural Environment – Natural Features and Landscapes" (February 2022) at [6.3.7-6.3.9].
[2] [2014] NZSC 38 at [10].

7. These submissions outline the key aspects of the statutory framework before highlighting the issues with Policy NPL-P5.

STATUTORY FRAMEWORK

8. The provisions under the Proposed District Plan must:

    a. accord with and assist the Council in carrying out its functions under Part 2 of the RMA;[3]
    b. meet the requirements of section 32 of the RMA, including whether the policies and rules are the most appropriate for achieving the objectives of the Plan;[4]
    c. give effect to applicable national planning documents including the National Policy Statement for Freshwater Management 2020 (NPSFM);[5]
    d. give effect to the Regional Policy Statement within the Hawkes Bay Regional Resource Management Plan; and
    e. must not be inconsistent with a water conservation order or a regional plan for any matter related to a regional council function.[6]

9. Section 31(1)(b)(iii) of the RMA makes it a function of the district council to control land uses for the purpose of maintaining indigenous biological diversity. Case law confirms that this imposes a *duty* on councils and not a discretion.[7]

The role of Part 2

10. The role of Part 2 in decision-making processes for plan changes/plan reviews has been refined by the Supreme Court in *King Salmon*. Absent invalidity, incomplete coverage or uncertainty of meaning in the relevant higher order statutory planning documents, there is no need to refer back to Part 2 of the

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[3] Section 74(1)(a) and (b), RMA.
[4] Section 74(1)(e), RMA.
[5] Section 75(3), RMA.
[6] Section 75(4), RMA.
[7] *Ngati Kahungungu Iwi Inc v Hawkes Bay Regional Council* [2015] NZEnvC 50 at [29]: "This function is not optional – it is something a regional council is required to do, whether it be easy or difficult". *Property Rights in New Zealand Inc v Manawatu Regional Council* [2012] NZHC 1272 at [31].

RMA when determining a plan change.[8] This is because the higher order planning document is assumed to already give substance to Part 2.[9]

11. If one or more of the three caveats apply, reference to Part 2 may be justified. For example, where there is incomplete coverage and a policy document does not "cover the field", the decision-maker will have to consider whether Part 2 aids in dealing with the matter(s) not covered.[10]

12. If, in relation to a higher order planning document, there is conflict or tension between one or more provisions that pull in opposite and competing directions, the Supreme Court held that policies expressed in more directive terms will carry greater weight than those expressed in less directive terms.[11] For example, "avoid" is a stronger direction than "take account of".[12]

13. Where conflict remains after examination of policies, analysis should start with the relevant policy statement, albeit informed by section 5 of the RMA.[13] The Supreme Court has emphasised that section 5 is not a "primary operative decision-making provision."[14] It sets out the RMA's overall objective but is not a section under which particular planning decisions are made.[15]

REMOVAL OF POLICY NFL-P5 IS REQUIRED

RWSS consents are not authority to include NFL-P5

14. Forest & Bird's concern is Policy NFL-P5 identifies water storage in outstanding value areas as appropriate without proper consideration under the current and future planning frameworks. Whether an activity was appropriate under the past planning framework does not necessarily make it appropriate if considered again in the future. Such a presumption should not be built into the plan.

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[8] [2014] NZSC 38 at [85], [88].
[9] [2014] NZSC 38 at [30], [85].
[10] [2014] NZSC 38 at [88].
[11] [2014] NZSC 38 at [129].
[12] [2014] NZSC 38 at [129].
[13] [2014] NZSC 38 at [130].
[14] [2014] NZSC 38 at [130].
[15] [2014] NZSC 38 at [151].

15. The S42 Report relies on consents for the RWSS approved in 2014. It is incorrect to predicate plan provisions based on previously granted but unexercised resource consents. The findings relating to those consents are specific to evidence that was before a Board of Inquiry subject to different statutory requirements with different roles for decision-makers. For example, a district plan must "give effect to" higher order instruments pursuant to s 75(3) versus the requirements to "have regard to" such documents when considering resource consent applications pursuant to section 104.

16. Consents for the RWSS were considered under a different context. The planning context has changed significantly with the introduction of the NPSFM 2020.

17. Caution must therefore be applied in giving undue weight to unexercised consents.

An "overall broad judgement" is unavailable

18. The approach of developing policy to provide a "balanced judgement" in response to a particular activity is essentially an "overall broad judgement".

19. The effect of *King Salmon* is that lower order planning documents cannot depart from the direction provided by national policy instruments (including the NPSFM), even if it is considered that a regional or activity-specific context requires departure from the national-level instruments.

20. This was confirmed by the High Court in *Royal Forest and Bird Protection Society of New Zealand Inc v Bay of Plenty Regional Council*[16]. One of the policies in the Proposed Bay of Plenty Regional Coastal Plan unequivocally sought to avoid adverse effects in areas of high indigenous biodiversity. However, other policies recognised that it might be appropriate to grant consent for regionally significant infrastructure to locate in those areas in some circumstances. The Environment Court found that the provisions that recognised regionally significant infrastructure represented a "proportionate response" which gave effect to those tensions recognised by the NZCPS.

[16] [2017] NZHC 3080.

21. On appeal the High Court found that the "proportionate response" approach taken by the Environment Court was, in effect, a version of the "overall broad judgement approach" which *King Salmon* had done away with. The High Court said:[17]

> [The Environment Court] was suggesting that the benefits and costs of regionally significant infrastructure, seeking to locate in Indigenous Biological Diversity Areas A and that could have adverse effects on such areas, should be assessed on a case by case basis, having regard to all relevant factors. Given the majority's decision in King Salmon, this approach was not available to it.

22. These findings are equally applicable to areas of outstanding natural landscapes and features.

Implementing the Proposed District Plan's objectives

23. The s 42A Report has recommended amending the relevant objective applicable to outstanding natural features and landscapes, NFL-O1, in a way that is acceptable to Forest & Bird:

> NFL-O1 - Outstanding natural features and landscapes ~~that are important to the identity of the District~~ are retained and protected from inappropriate subdivision, use and development.

24. The policies of the Proposed District Plan must achieve this objective, and potential options for its achievement must be assessed using the tests in s 32, including assessing their efficiency and their effectiveness, and taking into account the risk of acting or not acting.[18]

25. In *King Salmon*, the Supreme Court held that where the term "inappropriate" is used in the context of protecting areas from inappropriate subdivision, use or development, the natural meaning is that "inappropriateness" should be assessed by reference to what it is that is sought to be protected. The Court referred to the wording of s 6(b), then went on to hold that:[19]

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[17] *Royal Forest and Bird Protection Society Inc v Bay of Plenty Regional Council* [2017] NZHC 3080, at [106].
[18] The S32 Report does not appear to have assessed the efficiency and effectiveness or costs and benefits of NFL-P5.
[19] *Environmental Defence Society v NZ King Salmon Ltd* [2014] NZSC 38 at [101].

> A planning instrument which provides that any subdivision, use or development that **adversely affects** an area of outstanding natural attributes is inappropriate is consistent with this provision.
>
> …
>
> …"inappropriate" should be interpreted in s 6(a), (b) and (f) against the backdrop of what is sought to be protected or preserved.

26. On that basis, Objective NFL-O1 can be taken to mean that the attributes and values of outstanding natural features and landscapes and outstanding natural character areas are to be protected from any subdivision, use or development that would *adversely affect* them.

27. ECO-O1 also provides as follows:

> Protect the District's areas of significant indigenous vegetation and /or significant habitats of indigenous fauna, particularly those within wetlands, braided rivers, and coastal margins, from activities that may adversely affect them.

28. The two objectives are expressed in specific and directive terms. In my submission, they do not provide flexibility and scope for choice.

29. The "Outstanding Natural Landscape Assessment Report" for the Mākāroro Gorge, referred to in the s 42A Report found that:[20]

> Research undertaken for the RWSS found a range of indigenous vegetation types in the upper gorge, including Black Beech Forest, Mountain Beech Forest, Podocarp Broadleaf Forest, Broadleaf Forest, Kowhai Broadleaf treelands scrub/tussockland and Broadleaf small leaved monocot scrub/cliffland. Aspects of these vegetation types are expected to occur through the gorge. An ecological assessment of the entire gorge length is expected to find it to be a Significant Natural Area that would warrant recognition under RMA s6(c).

30. The s42A report recognises:[21]

> The PDP response is not to regulate farming land use within identified landscapes, but instead focus on addressing those specific activities that pose the greatest threat to the landscape values present, which the Landscape Assessment Report has identified as mostly being one or more of the following: loss of indigenous vegetation cover, exotic plantation forestry, built development, and substantial earthworks, as well as activities that can damage cultural features/values within a landscape.

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[20]Appendix C to the Officer's Report: "Natural Environment – Natural Features and Landscapes (February 2022) at 48.

[21] Officer's Report: "Natural Environment – Natural Features and Landscapes (February 2022) at [4.3.15].

31. A water storage facility in the Mākāroro Gorge would encompass several of these activities which the S 42A Report regards as a "threat".

32. The s42A Report acknowledges that the Landscape Assessment Report has undertaken its assessment based on the RWSS dam not forming part of the 'existing environment'.[22]

33. The s42A report recognises, in its analysis of other NFL policies, that when considering existing activities in outstanding natural features and landscapes:[23]

> this should be tempered to only those existing land uses where the identified characteristics and values contained in the schedule in the PDP (NFL-SCHED6) are maintained.

34. This rationale should be carried through to analysis of NFL-P5. If a water storage facility were to be constructed in the Mākāroro Gorge, the characteristics and values of the gorge would not be maintained in accordance the objectives.

35. An interpretation of the objectives as providing for water storage in the Mākāroro Gorge where it would adversely affect the values and attributes of those areas would not be consistent with directive language of Objectives NFL-O1 and ECO-O1. It would involve reading down their clear wording. As discussed below, it would also fail to give effect to the relevant higher order planning documents.

The RPS

36. The Hawke's Bay Regional Policy Statement (RPS) is contained within the Hawke's Bay Regional Resource Management Plan (RRMP). It contains no direction on outstanding natural features and landscapes except for within the coastal environment which is addressed in the Regional Coastal Environment Plan. The relevant policy directions in the coastal environment are contained in the Section 32 Topic Report.[24]

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[22] Officer's Report: "Natural Environment – Natural Features and Landscapes (February 2022) at [6.3.3].
[23] Officer's Report: "Natural Environment – Natural Features and Landscapes" (February 2022) at [8.3.9].
[24] "Natural Features and Landscapes – Section 32 Topic Report" (May 2021) at [2.3.1].

37. Outside the coastal environment, it is therefore appropriate to look at the next document in the hierarchy, the NPSFM. The RPS and RRMP predate the NSPFM and do not provide complete coverage (falling within the *King Salmon* caveats).

The NPSFM

38. The National Policy Statement for Freshwater Management 2020 (NPSFM) came into force in September 2020. It is a relevant national policy statement for you to consider.[25]

39. The Proposed District Plan must "give effect to" the objectives and policies in Part 2 of the NPSFM. "Give effect to" means "implement."[26]

40. Important NPSFM directives for the purpose of this hearing include:
    a. Ensuring natural and physical resources are managed in a way that prioritises the health and well-being of water bodies and freshwater ecosystems **above** other considerations, including above the ability of people and communities to provide for their social, economic, and cultural well-being.[27]
    b. Freshwater is managed in a way that gives effect to Te Mana o te Wai.[28]
    c. The loss of river extent and values is avoided to the extent practicable.[29]
    d. The habitats of indigenous freshwater species are protected.[30]

41. While the NPSFM does not address outstanding natural character, features, and landscapes per se, it is nevertheless applicable. The NPSFM articulates matters of national significance that are relevant to achieving the purpose of the RMA in relation to freshwater management. While freshwater management is

[25] Section 74(1)(ea).
[26] [2014] NZSC 38 at [77].
[27] Objective 1, NPSFM.
[28] Policy 1, NPSFM.
[29] Policy 6, NPSFM.
[30] Policy 9, NPSFM.

largely a regional council function under s 30(1), district plans must not be inconsistent with regional plans or any matter specified in s 30(1).[31]

42. NFL-P5 diminishes the priority the NPSFM affords to the health and wellbeing of waterbodies and freshwater ecosystems. Freshwater is required to managed in a way that "gives effect to Te Mana o te Wai".[32] The integrated ki uta ki tai approach required by Te Mana o te wai requires both regional councils and territorial authorities to:[33]

    a. Recognise the interconnectedness of the whole environment, from the mountains and lakes, down to the rivers to hāpua (lagoons), wahapū (estuaries) and to the sea; and
    b. **Recognise interactions between freshwater, land, water bodies**, ecosystems, and receiving environments; and
    c. **Manage freshwater, and land use and development**, in catchments in an **integrated and sustainable way to avoid, remedy, or mitigate adverse effects,** including cumulative effects, on the health and well-being of water bodies, freshwater ecosystems, and receiving environments; and

43. The NPSFM prioritises the health and well-being of water bodies and freshwater ecosystems over other matters. Under the NPSFM, water storage is essentially a "third order priority."[34] Policy NFL-P5 provides an imbalance in favour of water storage generally, above other relevant activities and values.

44. Forest & Bird's position is that removing NFL-P5 is necessary to ensure the Plan aligns with the NPSFM directives. Reference to Part 2 of the RMA supports this interpretation, as discussed as follows.

Part 2 of the RMA

45. In terms of section 5, The Supreme Court in *King Salmon* observed that:[35]

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[31] RMA, s 75(4)(b).
[32] NPSFM, Policy 1.
[33] NPSFM, cl 3.5(1).
[34] Objective 1(c) "third, the ability of people and communities to provide for their social, economic and cultural well-being."
[35] *Environmental Defence Society v NZ King Salmon Ltd* [2014] NZSC 38, at [24d].

> …the use of the word "protection" in the phrase "use, development and protection of natural and physical resources" and the use of the word "avoiding" in sub-para (c) indicate that s 5(2) contemplates that particular environments may need to be protected from the adverse effects of activities in order to implement the policy of sustainable management; that is, sustainable management of natural and physical resources involves protection of the environment as well as its use and development. **The definition indicates that environmental protection is a core element of sustainable management, so that a policy of preventing the adverse effects of development on particular areas is consistent with sustainable management**.

46. Section 6 requires district councils to recognise and provide for the following matters of national importance:

    a. The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and **rivers and their margins,** and the protection of them from inappropriate subdivision, use, and development.[36]
    b. The protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development.[37]
    c. The protection of significant indigenous vegetation or significant habitat of indigenous fauna.[38]

47. The Supreme Court observes the language of section 6 as:[39]

> [u]nderscoring the point that preservation and protection of the environment is an element of sustainable management of natural and physical resources. Section 6(a) and 6(b) are intended to make it clear that those implementing the RMA must take steps to implement that protective element of sustainable management.

48. The direction to "recognise" the benefits of water storage in NFL-P5 undermines the protection element of sections 5 and 6 of the RMA.

49. The s42A Report acknowledges:[40]

> the requirement in section 6(b) of the RMA is to recognise and provide for the protection of outstanding natural features and landscapes from inappropriate subdivision, use and development which, in my view, indicates a presumption that such features and landscapes will be retained largely in their current state.

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[36] Section 6(a), RMA.
[37] Section 6(b), RMA.
[38] Section 6(c), RMA.
[39] *Environmental Defence Society v NZ King Salmon Ltd* [2014] NZSC 38 at [148].
[40] Officer's Report: "Natural Environment – Natural Features and Landscapes" (February 2022) at [8.3.12].

50. This is inconsistent with the 42A report's position regarding NFL-P5, which recognises and appears to support a potential change in an outstanding natural feature that would have a detrimental effect on characteristics and values.

51. The direction to "recognise" in Policy NFL-5 creates a presumption that water storage should occur and that it is appropriate within ONF-4. This is unsupported given:

    a. the important values identified in the Mākāroro Gorge which have been recognised under the Proposed District Plan; and
    b. that water storage recognised in Policy NFL-5 will give rise to inappropriate effects on the natural character and indigenous biodiversity values.

52. Removing Policy NFL-5 ensures the Proposed District Plan's policy framework is consistent with the directives for protection articulated under its objectives, the NPSFM, in accordance with its functions and Part 2 of the RMA.

Dated this 9th day of March 2022

May Downing

Counsel for the Royal Forest and Bird Protection Society of New Zealand Inc

Central Hawke's Bay Proposed District Plan

Hearing Stream 1: Natural and Coastal Environment

Speaking notes of Forest & Bird, submission S75 and further submission FS9

09/03/2022

1. My name is Tom Kay. I am the 'conservation advocate – freshwater' for the Royal Forest and Bird Protection Society of New Zealand Incorporated (Forest & Bird). I was previously Forest & Bird's 'regional conservation manager' covering Hawke's Bay responsible for the submission on the Central Hawke's Bay (CHB) Proposed District Plan.

2. Today I am speaking on behalf of Forest & Bird in relation to our submissions and further submissions on the Proposed District Plan.

3. Forest & Bird's submissions addressed many matters throughout the proposed plan, including seeking retention of provisions we support, seeking clarification of wording, and seeking amendments. All of our submission were intended to ensure the plan provides for the protection, maintenance, and enhancement of the natural environment, including the protection of significant natural areas (SNAs) and natural character, features, and landscapes.

4. The officer's s42A report recommends accepting many of the points raised in our submission. In some cases, it recommends declining the points raised. While we accept and agree with the officer in some of these cases, we do not agree with them all. Our presentation to the hearing commissioners today (and these notes) is intended to clarify and provide further explanation of our submissions, having considered the s42A reports.

5. We have presented these points in a table below, with the exception of NFL-P5 (Mākāroro Gorge), which is also addressed in legal submissions.

Submission point and provision	Comments on officer's position in s42A report	Further relief sought
S75.002 Definition of 'clearance'	While the part of Forest & Birds submission to separate point 'f.' into two points was accepted by the officer, it does not appear to have been carried through to the suggested amendments (Officer's Report: Natural Environment – Ecosystems and Indigenous Biodiversity, paragraph 4.5.1).	Ensure the officer's recommendation to accept the change is carried through and the definition reads: … e. drainage f. drilling or excavation g. discharge of toxic substances ~~g.~~ h. mob-stocking...
	We do not have any particular issues with the additional text provided to define mob-stocking, at this time. However, we note that it can be problematic to have a definition within a definition.	Consider using a separate definition for the term "mob-stocking".
S75.090 Definitions of 'biodiversity offsetting' and 'biodiversity compensation'	Forest & Bird remains concerned that the relationship and application of these terms with the term "Environmental Compensation" remains unclear, as does the need for an additional/separate term for renewable energy provisions. However, we understand this be addressed at a subsequent hearing.	N/A
S75.030 ECO-O2 'Maintain indigenous biodiversity within Central Hawke's Bay District'	We disagree with officer's position for the reasons set out in our original submission. We also consider the need for enhancement and improvement of remaining indigenous biodiversity is only increasing in the current context of a biodiversity and climate crisis. The RMA direction is also supplemented by numerous international obligations (e.g. United Nations Convention on Biological Diversity) and national and regional commitments/goals (e.g. PF2050, NZ Biodiversity Strategy, Hawke's Bay Biodiversity Strategy). It would be consistent with these ambitions, and would help achieve them, if the plan were to reflect an ambition and need to enhance biodiversity. We note this still provides for 'maintenance' as the minimum, with scope for 'enhancement' as an addition (this sort of policy direction is relevant to the non-regulatory methods that include restoration goals/actions). Policy direction is needed to make up for loss that has and continues to occur. We would accept alternative wording to that we had suggested.	Amend ECO-O2 to read: Maintain and enhance indigenous biodiversity within Central Hawke's Bay District. Alternatively Maintain, restore, and improve indigenous biodiversity within Central Hawke's Bay District.

S121.017 (Federated Farmers) FS9.17 (Forest & Bird) ECO-P2	The officer recommends amending ECO-P2 to read: "To protect areas of significant indigenous vegetation and/or significant habitats of indigenous fauna from the adverse effects of landuse and development, including earthworks and vegetation clearance~~.~~, whilst providing for limited trimming and clearance opportunities where it is necessary for the economic, social and cultural wellbeing of people and their health and safety.' We disagree with this recommendation. The widening of this policy to allow 'limited clearance' for 'economic and social wellbeing' could be broadly interpreted and lead to much more trimming and clearance than would be appropriate, and is inconsistent with s5 and 6 of the RMA. This amendment proposed by the officer is also inconsistent with their position at paragraph 9.3.5 of the Officer's Report: Natural Environment – Ecosystems and Indigenous Biodiversity: "…The policy as proposed in the PDP, in my view, clearly reflects the intent of section 6(c) and the rule framework or methods for achieving this (in this case the protection of significant indigenous vegetation and significant habitats of indigenous fauna) provide the tests or the thresholds for what is acceptable trimming and clearance, whilst still protecting the overall resource." and their recommendation at paragraph 9.4.1 that "Policies ECO-P2, ECO-P3, ECO-P4, ECO-P6, ECO-P7, ECO-P8 and ECO-P9 be retained as notified."	Reject Federated Farmers' submission and retain ECO-P2 as notified, viz: "To protect areas of significant indigenous vegetation and/or significant habitats of indigenous fauna from the adverse effects of landuse and development, including earthworks and vegetation clearance."
S75.031 (ECO-P1)	We accept the position of the officer and consider this policy should be retained largely as notified, though with a slight amendment for clarity.	Amend for clarity to read: **ECO-P1**

	We understand that the intent of this policy that indigenous vegetation or habitat for indigenous fauna set aside by Government statute or covenant, etc. (criterion 1) is not significant in terms of this policy unless another criteria is also met. However, as it currently reads it could be interpreted that areas that meet criterion 1 do not need to meet at least one other criteria.	To identify Significant Natural Areas (being areas of significant indigenous vegetation and/or significant habitats of indigenous fauna), in the District where they meet one or more of the criteria below and describe these areas in ECO-SCHED5 and show their location on the Planning Maps **(except ~~for areas~~ that ~~meet~~ where Criterion 1 is met, at least one other of Criteria 2-7 must also be met).**
S75.034 (ECO-P4)	The officer invited us to provide additional notes on why we think this policy should be changed to remove the qualifiers "large" and "intact". We consider these qualifiers do not accurately reflect the s6(c) requirement to "recognise and provide for... the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna". I.e. the RMA does not discriminate on the basis of size or 'intact-ness'. We also note S5(2)(c) of the RMA, which notes sustainable management includes "avoiding, remedying, or mitigating **any adverse effects of activities on the environment**" [emphasis added]. We also note that "large" and "intact" are arbitrary. The officer suggests the methodology for identifying SNAs, which included only areas over 0.5ha, justifies the qualifier "large". In our view, the method used to determine SNAs should not drive the wording of the policy – the policy should sit above the methodology. Therefore, we consider the wording below is more appropriate. The details of the method (i.e. what can practicably be mapped, etc.) is a detail that is worked out later, and should not be written into the plan. "ECO-P4 To avoid, remedy or mitigate adverse effects, including cumulative adverse effects of subdivision, use and development that would result in a loss of indigenous biodiversity values from:	Amend to read: "ECO-P4 To avoid, remedy or mitigate adverse effects, including cumulative adverse effects of subdivision, use and development that would result in a loss of indigenous biodiversity values from: 1. Clearance, modification, damage or destruction of ~~large~~ areas of ~~intact~~ indigenous vegetation or habitats of indigenous fauna; 2. Clearance of indigenous vegetation in and on the margins of Lake Whatuma, ~~and~~ other natural wetlands, and ~~braided~~ rivers – including braided rivers;"

	1. Clearance, modification, damage or destruction of ~~large~~ areas of ~~intact~~ indigenous vegetation or habitats of indigenous fauna;" We also continue to consider that recognition of all rivers (not just braided) is appropriate, particularly given the RMA s6 direction "recognise and provide for... the preservation of the natural character of ... **rivers and their margins**," [emphasis added]. A possible way to address our concern, without taking away the important recognition of braided rivers, would be to recognise both explicitly (see proposed amendment).	
S75.038 (ECO-R1) Trimming or clearance of indigenous vegetation...	Forest & Bird is concerned that the inclusion of "plantation Forest undergrowth" clearance as a permitted activity could result in adverse effects that are inconsistent with provisions on the protection of areas meeting the significance criteria in ECO-P1, and would be inconsistent with the NZCPS in the coastal environment. Plans can have rules that are more stringent than the NES-PF in both these circumstances. The s42A officer appears to be recommending two versions of a note ('Note 1') be added about the relationship of the Plan rules with the NES Plantation forestry. The first version note relates to where there is a conflict (paragraph 10.3.13/10.3.18) and the second version attempts to clarify when vegetation clearance is a permitted activity (paragraph 10.5.1). However only the former seems to be carried in to Appendix A amendments. Both of these recommendations are concerning because they consitute a more permissive approach and could result in the loss of vegetation and fauna that meets the criteria for significance in ECO-P1. For example, our understanding is that vegetation clearance can occur through "afforestation" (i.e. when using overplanting methods) such that separate clearance before afforestation would not be required.	Trimming or clearance of indigenous vegetation within Plantation forestry undergrowth should be excluded from Rule ECO-R1 so that it is considered under the subsequent rules. Add a note to clarify that Trimming or clearance of indigenous vegetation within Planted indigenous forestry is subject to NES-PF Regulations 93(2) and (3).
S75.039	An indigenous NZ tree takes a long time to exceed a diameter of 30cm at 1.4m above ground and can have important biodiversity values before reaching that	Amend ECO- R2 by adding the following permitted activity conditions for both Activity 1 and 2:

ECO-R2 Trimming or clearance of indigenous vegetation that has naturally re-grown on land that was cleared within the previous 15 years	size. We disagree with the officer's position that the rule shouldn't be strengthened. As it stands, a large area of regenerating native bush could be cleared in its entirety, or an area could effectively be cleared with only 'large' trees left. This is a serious loophole that means succession of large trees will never be able to occur as the understory (along with its valuable functions as habitat) can continually be cleared. It also means regenerating areas may never actually regenerate to their full potential as restoration is prevented by ongoing clearance (e.g. because trees take so long to reach 30cm in diameter and can be cleared before reaching that size). While we accept that some clearance can be permitted, conditions are needed to ensure that the adverse effects of doing so are no more than minor. In addition, if an area of vegetation has regrown in 15 years it could now qualify as an SNA and permitted activity conditions are needed to trigger an assessment through a consent process, for example: where larger tress are included within the regenerated area, clearance is of an area more than 500m^2, or clearance could conflict with Policy 11 of the NZCPS. We suggest the introduction of further permitted activity conditions to address these concerns	• The area cleared does not exceed 500m^2; and • The area to be cleared does not include any trees of 30cm in diameter measured at 1.4m from the highest point of ground level at the base of the tree; and • The area to be cleared is not within 50m of an SNA; and • Proof of previous clearance is provided (e.g. through LINZ aerial imagery) to the Council before trimming or clearance is undertaken; and • No part of the area to be cleared is within or within 10m of a natural wetland ; and • Any previous clearance of the area was undertaken lawfully; and • No part of the area to be cleared is in the Coastal Environment.
S75.040 (ECO-R3) ECO-R3 Trimming or clearance of indigenous vegetation inside any area of significant indigenous vegetation and/or significant habitat of indigenous fauna	We still have concerns with this rule, including: • We consider "and/or" should be retained in the rule topic heading as this ensures that areas that are significant for either vegetation or habitat are captured as how s6(c) is interpreted. Because this is a rule and not a policy for protection it needs to be worded so that both circumstances apply. Changing this to "and" as recommended by the s42A officer could result in the exclusion of areas that are significant. It should revert as notified to "Trimming or clearance of indigenous vegetation inside any area of significant indigenous vegetation **and/or** significant habitat of indigenous fauna (excluding natural wetlands)" (emboldened – i.e. it does not need to be "and")	Amend rule as follows:~~:~~ • Change the "OR" between condition a. and b. to "AND" • Delete Condition ii or amended so that it only applies where there is a risk to health and safety. • Delete Condition iii. • Conditions vi, vii, viii should only allow for this clearance where the activity it is required for was lawfully established.

(excluding natural wetlands)	• The proposed conditions do not adequately account for cumulative effects (e.g. allows incremental clearance over years) • Clearance within a significant area should only be provided at the permitted level where it is for a valid reason and within limits to ensure that adverse effects are no more than minor. As proposed, compliance with condition (a) does not require a reason to clear vegetation. • The proposed limits and purposes are not sufficient to give effect to NZCPS • The purposes listed, while acceptable in some cases, need to be within appropriate limits. • We consider that 4 metres of clearance to construct a fence is excessive and that 2m is (more than enough and) appropriate to minimise effects on the significant area. As written the condition could encourage fences to be built into/through an SNA rather than at the edge (and even if 2m of clearance was permitted, this could provide for the reduction of the diameter of an SNA by 2m around its entirety. Indigenous vegetation clearance is unlikely to be required on the paddock side of a fence. The overall limit in condition a. should also apply to avoid substantial clearance being permitted so this sort of clearance doesn't readily occur. • Condition ii: vegetation should not be removed where it (e.g. deadwood, windfall) provides values to the SNA or where removal would cause damage that would out-weigh any benefit to the SNA. This condition should be deleted or amended so that it only applies where there is a risk to health and safety. • Condition iii. is inappropriate as these covenants are not established under the RMA and do not necessarily include measures for protection of the values of the SNA. • Conditions vi, vii, viii should only allow for this clearance where the activity it is required for was lawfully established	• Amend Condition ix. "required to construct new fences (including post holes) to exclude stock and/or pests from the area of indigenous vegetation, or to maintain existing fences, provided that the trimming or clearance does not exceed 2 metres in width ~~either side of the fence line~~; or"

	With respect to our amendment to ensure that both condition a. AND b. apply to all activities under this rule, we note it is not clear from the officer's report whether they agree with this change. In the officer's assessment it states they "do not agree" with the DOC request to make it "AND" (para 10.3.68). However, "AND" is included in their recommended changes at para 10.3.75.	
ECO-R4	It is unclear how a plan user determines that clearance under ECO-R4 is outside of an area of significant indigenous vegetation and/or significant habitat of indigenous fauna. This may require an assessment to ensure the area does not meet the criteria in ECO-P1. However, this may be difficult to manage at the permitted activity level for both those wanting to undertake the activity and for council enforcement. We also consider the conditions need rewording to ensure that large areas of vegetation are not cleared, with only the large trees left standing (we have also commented on this regarding ECO-R2).	For both permitted Activity 1 and 3 in ECO-R4: Clarify how a determination is to be made that the area is outside an area of significant indigenous vegetation and/or significant habitat of indigenous fauna (i.e. not only that it isn't listed as an SNA, but also that it doesn't *qualify* as one). Consider adding a condition to limit activities to "areas that do not meet the criteria in ECO-P1." Amend and add conditions as set out in respect of ECO-R2 above. Amend condition ii. b. "must only include areas of vegetation with ~~have an average~~ a canopy height of less than ~~6~~4 metres."
ECO-SCHED5	We are concerned that mapping of SNAs only occurred for areas over 0.5ha. While we appreciate comprehensive mapping is difficult, we consider this means strong tests are required for clearance/modification of indigenous vegetation	Amend permitted vegetation clearance rules to

	outside of scheduled SNAs (see our comments on the permitted rules for vegetation clearance). We also consider this means a clear and precautionary trigger is needed for a resource consent requirement, as noted by the officer "The approach to mapping SNAs, including only mapping areas greater than 0.5 ha, with a margin of error at most of +/-30m, and with assigned confidence criteria, combined with landowner consultation and opportunity to further refine prior to the public notification process, is an appropriate method of mapping for a District the size of Central Hawke's Bay. **Further scrutiny can be applied through a resource consent application, should one be required…"** [emphasis added]	1) ensure small areas are not cleared and cumulative effects of clearance are avoided as far as possible. 2) ensure a precautionary approach and clear trigger for resource consent is present in the plan.
S75.061 (NFL-P2) To allow activities within the District's outstanding natural features and landscapes where they are for existing land uses...	We are not opposed to the suggested wording from the s42A report but consider it could be clarified regarding what land use(s) of most relevance. Clarification is also required as to what an "existing" land use is. I.e. Is it the operative date of the plan? Is it lawfully established?	Amend to read: To allow activities within the District's outstanding natural features and landscapes where they are for: (1) existing land uses such as farming, (2) conservation purposes ~~and~~ (3) customary activities; and provided the activities maintain or enhance the identified characteristics and values in NFL-SCHED6 Clarify the requirements for how an 'existing land use' is determined.
S75.064 (NFL-P5)	We disagree with the officer's position and recommendation to retain NFL-P5. The Mākāroro Gorge has significant biodiversity and landscape values. These are recognised in part of its status as part of the Ruahine Forest Park, which is home to many of Aotearoa's indigenous species, including threatened species. We	Delete NFL-P5.

	have been deeply involved in the process of protecting the values of this area from the damage that would be done to these values through a dam and reservoir, including taking a case to the Supreme Court, which we won. This policy attempts to pre-empt and 'lock-in' an activity which, while consented, is not possible or appropriate for a variety of other reasons, including because of the recognised values in the Forest Park. This plan should not attempt to 'pave a way' for consenting of a similar proposal in future. See our original submission and legal submissions for further reasoning.	
S75.069 FS9.56 (CE-O2) "Protection of the natural character of the coastal environment of Central Hawke's Bay from inappropriate subdivision, use and development, and identify and promote opportunities for restoration or rehabilitation."	We are concerned with the officer's recommendation to amend this objective to refer to "natural <u>and rural</u> character". We disagree with the officer's position (at para. 5.3.4 - 5.3.5) that 'preserving natural character' means keeping something in its current state, including where that current state has been modified by rural activities. We consider that 'preservation' in this context means preservation of *remaining* natural character. Direction for 'restoration or rehabilitation' suggests the restoration of natural character where it has been degraded. This is supported by the Natural Character Assessment Report (para. 5.3.3 of the officer's report): "Overall, the coastal margin and adjacent inland area have seen a significant amount of terrestrial land cover modification through human intervention, with the majority of native vegetation having been cleared. Almost all the original native vegetation within the coastal environment has been lost, settlements have been introduced, grazing has been developed, drainage patterns have been modified and in some places the dunes have been intentionally recontoured to assist irrigation and farming activities. **These factors have diminished the natural character value from its natural state.**" [emphasis added].	Reject the suggestion of the officer and retain CE-O2 as notified.

	If natural character included existing activities/land uses, the "restoration" of natural character would not be possible. While there may be 'some merit' in a community recognising rural character for town planning or zoning, it should not be recognised alongside an RMA s6 matter. Policy 13 of the NZCPS notes: "…natural character is not the same as natural features and landscapes or amenity values and may include matters such as: a. natural elements, processes and patterns; b. biophysical, ecological, geological and geomorphological aspects; c. natural landforms such as headlands, peninsulas, cliffs, dunes, wetlands, reefs, freshwater springs and surf breaks; d. the natural movement of water and sediment; e. the natural darkness of the night sky; f. places or areas that are wild or scenic; g. a range of natural character from pristine to modified; and h. experiential attributes, including the sounds and smell of the sea; and their context or setting." While we accept this does include "a range of natural character from pristine to modified", it does not suggest the recognition of human-induced changes to land. Rather, it suggests the character of an area could be recognised even if it is degraded from its 'natural' state. Policy 14 of the NZCPS covers the 'Restoration of natural character'. It suggests "possible approaches" to restoration or rehabilitation include: i. "restoring indigenous habitats and ecosystems…	

	ii. encouraging natural regeneration of indigenous species, recognising the need for effective weed and animal pest management; or iii. creating or enhancing habitat for indigenous species; or iv. rehabilitating dunes and other natural coastal features or processes… v. restoring and protecting riparian and intertidal margins; or vi. reducing or eliminating discharges of contaminants; or vii. removing redundant structures and materials… viii. restoring cultural landscape features; or ix. redesign of structures that interfere with ecosystem processes; or x. decommissioning or restoring historic landfill and other contaminated sites…" None of these suggested approaches implies that elements of 'rural character' should or could be restored as part of the NZCPS direction on natural character. In fact, many elements and activities that might be recognised as constituting 'rural character' have been extremely damaging to 'natural character'. Suggesting that rural character is equivalent to natural character in the coastal environment could also lead to conflicts between (1) activities that may be consistent with 'rural character' and (2) the effects of such activities, which would be inconsistent with the preservation or restoration of natural character.	

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Hearing Stream 1 for the Natural Environment topic of the Proposed Central Hawkes Bay District Plan.

BY FEDERATED FARMERS OF NEW ZEALAND

TO Central Hawke's Bay District Council

Statement of Evidence

Rhea Dasent
On behalf of Federated Farmers

28 February 2022

INTRODUCTION

1. This Statement of Evidence is for Hearing Stream 1 for: *Natural and Coastal Environment* which covers Ecosystems & Indigenous Biodiversity, Natural Features & Landscapes / NFL-SCHED6, Open Space & Recreation, Public Access, Activities on the Surface of Water, Coastal Environment / CE-SCHED7, and Large Lot Residential.

2. My name is Rhea Jane Dasent and I am a senior regional policy advisor for Federated Farmers of New Zealand. I am authorised to speak on behalf of Federated Farmers.

3. I have thirteen years of experience in resource management issues to do with farming, having worked for Federated Farmers as a regional policy advisor since 2009. My role is to provide policy advice and advocacy on behalf of Federated Farmers members in processes arising under the Resource Management Act, Local Government Act and Local Government (Rating) Act. I analyse, submit, present at hearings and conduct Environment Court appeals on behalf of members. My work is informed and mandated by our elected representatives and local members. I also have practical farming experience, being currently employed on the family farm in the Hastings District.

4. I hold a Bachelor of Science Degree and a Bachelor of Arts Degree from Victoria University of Wellington, and I have previous experience as a resource consent officer working for local government.

5. My views are closely aligned with those of Federated Farmers, due to my personal farming background.

6. Federated Farmers is a voluntary membership-based organisation that represents farmers and other rural businesses. Federated Farmers has a long and proud history of representing the needs and interests of New Zealand's farmers and as such has a keen interest in the Central Hawke's Bay District Plan.

7. Federated Farmers made a submission and further submissions on the Natural Environment topic of the District Plan. These submissions are representative of our members' views and experiences with the management of the resources in the Central Hawke's Bay District and reflect the fact that these chapters of the proposed Plan will have a significant impact on our members' daily lives as farmers, members of the local community, and as land and water users. Farms are affected by the Ecosystems & Indigenous Biodiversity, Natural Features & Landscapes and Coastal Environments chapters because these resources have been overwhelmingly identified in the Rural Zone, and on properties that are actively used for farming. Farmers are affected by the Public Access chapter because of their location near waterbodies or the coastline.

8. I wish to acknowledge and support submissions made by individual members of Federated Farmers.

OVERALL POSITION

9. Federated Farmers submitted seeking that the natural environment resources are accurately mapped and ground truthed, objectives and policies recognise and provide for existing farming landuses, rule regimes enable normal farming activities to take place with permitted status, and that standards are fit for purpose.

10. Accurate mapping of the resources, such as location and extent of SNAs, ONFLs and the Coastal Environment, is vital in ensuring that farmers know exactly where the associated rules will apply. Individual landowner submissions will provide specific details on the accuracy of mapping. I urge the hearing panel to consider these submissions carefully.

11. Recognising and providing for farming land uses in objectives and policies acknowledges that many of these special landscape and biodiversity resources are found on rural zoned land, and on actively farmed properties. Many natural resources remain because landowners have made special efforts to retain them, such as for biodiversity sites and QEII covenanted sites. Farming and these natural resources can co-exist so long as provisions strike the right balance that enables existing land uses alongside the protection obligations under Section 6 of the RMA.

12. Federated Farmers want to continue farming as a permitted activity, because it was lawfully established and is a vital component in the people and communities of Central Hawkes Bay providing for their economic, social and cultural wellbeing. We want rules that are practical to implement on farm, with standards that are fit for purpose.

ECOSYSTEMS AND INDIGENOUS BIODIVERSITY

Definition of Clearance

13. Federated Farmers' submission point S121.232 sought amendments to the definition of clearance, in particular deletion of (f) *drilling or excavation*, (g) *discharge of toxic substances* and (h) *mob-stocking*.

14. The S.42a Report discusses in paragraph 4.3.22 that it would be useful to further define what mob-stocking is, and suggests using MacKenzie District Plan as an example:

> *'CLEARANCE*
> *in relation to indigenous vegetation means the felling, burning, removal, damage or destruction of the vegetation, including the following activities within the vegetation drip line:*
> *a. application of chemicals*
> *b. application of seed of exotic pastures*
> *c. burning*
> *d. changes to soils, hydrology, or landforms*
> *e. drainage*
> *f. drilling or excavation discharge of toxic substances*

g. mob-stocking (means confining livestock in an area in which there is insufficient feed and in a way that results in the removal of all or most available vegetation).
h. Overplanting'

15. Federated Farmers agrees with this amendment to (g). We are pleased that mob-stocking is recognised as being distinct from extensive grazing or livestock using trees as shelter and shade. Paragraph 4.3.22 notes that the Council has assured farmers that fencing of SNAs will not be required. A verbal assurance is not as reassuring as amending the provision. Perhaps this assurance can be cemented with a method in the Plan.

16. However we do not agree with the S42a Report's recommendation to reject our submission to delete points (f) and (g) nor its discussion in paragraph 4.3.21 that Federated Farmers has not provided evidence why these two extra points deviate from the 2019 Draft National Policy Statement for Biodiversity definition of *clearance*. It is our view that the Council has not provided sufficient evidence why these two extra points are needed for the Central Hawke's Bay District, when the nation-wide definition does not include them. Mr Kessels in Section 6.2 of Appendix C notes *… 'drilling or excavation' and 'discharge of toxic substances' …are reasonably anticipated activities that could have adverse consequences … and therefore should be retained within the definition.* However this still does not explain why a deviation from the NSIB is necessary for this district.

Planted Indigenous Vegetation

17. Federated Farmers submitted that planted indigenous vegetation (like domestic and ornamental garden planting, riparian and shelter planting, indigenous plantation forestry) should be excluded from the definition of *Indigenous Vegetation* (Sub point S121.237.*)* In a similar vein, we also sought that policy ECO-P1 exempts planted indigenous vegetation from being classified as an SNA (sub point S121.252) and Rule ECO-R1 be deleted as redundant should planted indigenous vegetation be exempted from the definition (sub point S121.028.)

18. In paragraph 4.3.59 the Section 42a Report says … *it is more appropriate to provide for exclusions within the rule framework as currently provided in the PDP rather than include them in the definition as sought by this submitter*. No further detail is provided as to why this may be the case. Paragraph 7.3.18 addresses the exemption from the ECO-P1 criteria, again noting the permitted rule and concluding *I do not consider the amendment as sought provides any particular advantage over the proposed approach*.

19. We are pleased that the report agrees that there is limited benefit in restricting the trimming or clearance of indigenous vegetation that has been planted and tended by people. Many farmers choose to plant native species in garden areas alongside driveways and tracks and around buildings, simply because they are beautiful and increase biodiversity like birds and insects. Native species

planted on riparian margins, retired land or around wastewater/effluent disposal sites serves the practical purpose of improving soil and water quality.

20. Even though it is a permitted activity under ECO-R1, this is still unnecessary regulation. Regulating this resource will not benefit the farmer, nor the council, nor the environment. Farmers will have to check rules before they do any work. Council will waste time monitoring and enforcing the rules for planted vegetation, instead of focusing on remnant or significant vegetation. The environment will not benefit from a focus on non-significant vegetation, nor from the disincentive it provides for planting new areas.

21. An easier method is to clearly exclude planted vegetation from the definition and from the SNA criteria. That way, it is outside the regulation and recognised as a resource that doesn't need District Plan intervention.

Objectives

22. Federated Farmers was satisfied that the proposed objectives were appropriate. However we did seek an additional objective that recognises some use of the resource is necessary for people and communities to provide for health and safety, and their wellbeings – which is evidenced by the range of permitted activities.

23. Our new objective (sub point S121.017) is discussed in the Section 42a Report starting in paragraph 5.3.77. The Report suggests an amendment to the policies to make clear the link between the permitted activity rules and the policy framework:

ECO-P2 To protect areas of significant indigenous vegetation and/or significant habitats of indigenous fauna from the adverse effects of landuse and development, including earthworks and vegetation clearance., <u>whilst providing for limited trimming and clearance opportunities where it is necessary for the economic, social and cultural wellbeing of people and their health and safety</u>.'

24. Federated Farmers supports this amendment to policy ECO-P2 as a way of addressing our submission point.

Policy ECO-P1

25. Federated Farmers sought amendments to policy ECO-P1 to require two or more criteria to be met before an SNA is classified (sub point S121.018.) We also seek two new exclusions from being classified as an SNA, being for: QEII covenanted sites; and planted vegetation.

26. The Section 42a Report addresses the number of criteria starting in paragraph 7.3.1. and says in paragraph 7.3.6 *Requiring a site to meet at least two of the criteria as sought by Federated Farmers submission, could result in a number of sites containing significant indigenous vegetation and significant habitats of indigenous fauna that would not qualify as SNA when they normally would…*

27. It concerns us that there are sites that only meet a single criterion, as this does not appear to be a robust winnowing process to separate the areas of true significance from areas that aren't significant. It concerns us more that there

is a discussion in paragraph 7.3.24 that suggests one interpretation is that the single Criterion 1 is met then the site is automatically an SNA: *It is not the intention of these provisions that a protection status on its own would qualify a site as significant. Not all protected land will necessarily meet the test for significance under s6(c) RMA.*

28. Criterion 1 is the most concern to Federated Farmers for two reasons:

    a. Protected land (specifically QEII covenanted land) is already protected more strongly than the district plan, yet SNA status will at best be an added layer of third party interest over private land, and at worst be contradictory to the terms of the covenant.

    b. Like the Section 42a Report, we consider that protection status does not mean that the vegetation and habitat is of significance. QEII covenanted land may be protected for historic archaeological reasons, as well as areas with high scenic, geological or recreational values, unrelated to biodiversity values.

29. The Section 42a Report's recommendation in paragraph 7.3.26 that an additional criterion must be met alongside criterion 1 goes part way to addressing our concern about number of criteria, but exacerbates our concern about covenanted sites becoming SNAs:

    ECO-P1 *To identify Significant Natural Areas (being areas of significant indigenous vegetation and/or significant habitats of indigenous fauna) in the District where they meet one or more of the criteria below and describe these areas in ECO-SCHED5 and show their location on the Planning Maps <u>(except for areas that meet Criterion 1, where at least one of Criterion 2-7 must also be met)</u>*

30. Protected sites must be excluded from being scheduled as SNAs. Private landowners feel very strongly about their covenanted sites. Landowners are protecting land not for their own gain. They are giving up the free use of that land for other things, like production or development. They are investing their own time and resources into it. They are protecting land for its inherent qualities, and for future generations to enjoy.

31. A study by the University of Waikato Institute for Business Research[1] for the QEII Trust has found that people who protect land are collectively spending an estimated $25 million of their own money (including the opportunity cost of not using the land in other ways) every year maintaining and enhancing their existing covenants. These landowners have made an estimated overall financial commitment of around $1.1 – $1.3 billion to establish and protect open space covenants.

[1] Frank Scrimgeour, Vijay Kumar, and Glenn Weenink, 2017 *Investment in Covenanted Land Conservation: A Report Prepared for Queen Elizabeth II National Trust.*

32. To include such sites in a District Plan SNA schedule casts doubt upon these dedicated landowners' abilities to protect these sites. It is saying "we don't trust you, so we must regulate you."

33. The District Plan should be satisfied that these covenanted sites already achieve the purpose of Section 6(c) of the RMA, and to avoid unnecessary duplication. To draw a comparison, the proposed District Plan is satisfied that hazardous substances are already well managed via the Hazardous Substances and New Organisms Act 1996, and therefore does not need to duplicate provisions:

34. The principal reasons section of the HAZS Chapter says *The District Plan takes the approach that hazardous facilities are generally managed adequately through the HSNO Act. Compliance with this legislation will generally ensure that any adverse effects arising from an accident or incident will be contained within the hazardous facility site…. The District Plan therefore seeks to avoid any duplication of regulation with the HSNO Act, and only contains rules in relation to Major Hazardous Facilities.*

35. A similar method and policy (sub point S121.027) is needed in the ECO Chapter to explain that sites already legally protected under different legislation are achieving the purpose of protecting areas of significant indigenous vegetation and significant habitats of indigenous fauna, and that the District Plan seeks to avoid duplication and therefore will only schedule and regulate sites that are not already legally protected.

Policies ECO-P2, ECO-P3 and ECO-P4

36. Federated Farmers sought deletion of policies ECO-P3 (sub point S121.021) and ECO-P4 (sub point S121.022) for the reason that avoiding adverse effects on significant vegetation was contrary to the permitted activity framework. Similarly, we sought that ECO-P2 is amended to provide for some limited activities to occur within SNAs (sub point S121.020.) The Section 42a Report recommends to reject all three of these submission pints.

37. It is the word *avoid* that Federated Farmers is most concerned about. *Avoid* adverse effects on SNAs and indigenous vegetation could mean *prohibit,* and would prevent many activities necessary for health and safety, and economic, social and cultural wellbeings.

38. The list of permitted rules recognise and provide for some appropriate activities, within limits, to occur that will have a minor detrimental effect on indigenous vegetation, that is balanced by the benefit of the activity. Adverse effects are not *avoided*, in that they are prohibited, rather the rule framework allows for a minor level of adverse effect. For example, trimming within SNAs is not completely avoided, it is allowed within a limit, say for the purpose of clearing branches away from a powerline under Rule ECO-R3(b)(i).

39. For policies ECO-P3 and ECO-P4, Federated Farmers is opposed to the use of the word *avoid,* if this means *to prohibit* adverse effects. Some level of adverse effect is acceptable as evidenced by the permitted activity rules.

40. Paragraph 9.3.5 of the Section 42a Report recommends to decline our submission on ECO-P2: *I do not agree the wording as proposed by Federated Farmers is helpful in achieving consistency between Policy ECO-P2 and the rule framework. In my view, the terminology 'inappropriate adverse effects' and 'appropriate activities' is confusing.*

41. Unfortunately, this is not helped by a typo in the Federated Farmers submission, where I inserted the word *inappropriately* in an inappropriate place! I should have typed *To protect areas of significant indigenous vegetation and/or significant habitats of indigenous fauna from the adverse effects of inappropriate landuse and development, including earthworks and vegetation clearance, while providing for some appropriate activities.* Please reconsider Submission point S121.020 with this more helpful wording.

Rule ECO-R3 - Within SNAs.

42. Federated Farmers submitted seeking amendments to ECO-R3 in sub point S121.030. The Section 42a Report discusses these starting paragraph 10.3.58.

43. We sought that an arborist was not needed in ECO-R3(b)(ii) to remove deadwood, windthrow or diseased vegetation. Requiring an arborist will likely delay or prevent such work being done. Either a suitable arborist may not be available and thus work is delayed, or the cost and trouble will mean the work goes in the too-hard basket for many landowners. The Section 42a Report in paragraph 10.3.71 says …*Rule ECO-R3(1)(a) provides for those smaller scale circumstances where an arborist may not be required.* This is good to know, and we agree it would allow landowners to do such work themselves within the 500m^2 area limit.

44. A change to ECO-R3(b)(iv) to allow landowners to trim or clear for pest control purposes is discussed in paragraph 10.3.72 of the Section 42a Report, with the recommendation: *required for pest control undertaken by or in conjunction with the Department of Conservation, Hawke's Bay Regional Council or Central Hawke's Bay District Council, or by landowners and personnel working with these organisations for this purpose; ~~and~~ or for removal of material infected by an unwanted organism under the Biosecurity Act 1993*. Federated Framers supports this recommendation.

45. Federated Farmers also sought for some more farming activities to be added to ECO-R3 as permitted, which was recommended to be accepted by the Section 42a Report in paragraph 10.3.73. Federated Farmers supports the addition of maintaining stock crossings and bridges, and firebreaks to ECO-R3(b)(vi). However with an increasing desire to protect water quality by constructing stock crossing and bridges, and stock exclusion fencing, permitting these as *new* activities is also necessary.

Rule ECO-R4 – Outside an SNA

46. Federated Farmers submitted that limits to trimming and clearance of indigenous vegetation outside SNAs are unnecessary, because the SNA regime more than adequately meets RMA Section 6(c) obligations (sub point S121.031.) Paragraph 10.3.89 of the Section 42a Report counters that *it recognizes and acknowledges the inherent limitations of a desktop assessment and therefore provides protection for remaining areas that may have been missed*.

47. Federated Farmers disagrees. With 542 SNAs identified, a pretty thorough assessment of significance has been undertaken, and the Council should be satisfied that it has done a comprehensive search for sites that will be protected as an RMA Section 6 matter. A rule with unlimited trimming and clearance of low-quality vegetation will enable people and communities to provide for their wellbeings.

ECO-R6 Wetlands

48. Federated Farmers sought that there be some permitted activities for wetlands, and identification of the wetlands so people know where the rule applies (sub point S121.033.)

49. In response to other submitters, the Section 42a Report acknowledges that there are some activities that will be appropriate within a wetland, and recommends in paragraph 10.3.97 to add Note 1 exempting wetland restoration work by DoC, HBRC or CHBDC, and in paragraph 10.3.107, Note 2 exempting operation, maintenance and upgrading of a network utility.

50. The exemptions in Note 1 need to extend to the same restoration activity undertaken by landowners. Landowners may be acting with QEII to restore their wetland, or be acting in accordance with the Regional Pest Management Plan controlling aquatic pests and weeds.

51. The exemptions in Note 2 need to extend to other activities such as for safety and to maintain existing infrastructure such as roads, tracks, bridges and fences. Indigenous vegetation within a wetland will not be limited to low-profile grasses or small plants, it could also refer to large bushes and trees. These may pose risk to falling on fences, across roads or paths, onto buildings. Clearance might be necessary for safe approach to bridges and stock crossings. An effects-based rule would recognise that the adverse effect of clearing to keep a powerline operational and safe, will be the same as clearance to keep a fence or road operational and safe.

NATURAL FEATURES AND LANDSCAPES

Significant Amenity Features.

52. Federated Farmers opposes Significant Amenity Features and submit they are deleted, along with NFL-O2, NFL-P6, NFL-P7 and NFL-P8. SAFs are not needed to meet Section 6(c) nor Section 7(c) RMA requirements, and will burden both the landowner and the Council for no benefit above what zoning already provides.

53. A perverse outcome is also created when land use restrictions aimed at enhancing amenity have the potential to work against other environmental priorities such as improving water quality or protecting significant natural areas for example. New central government regulations designed to accelerate improvements to water quality are going to require an increase in the earthworks being undertaken for stock exclusion fencing, putting in water reticulation infrastructure, new culverts and bridges and the new tracks required to reconnect the farm and ensure safe passage for farm vehicles. More will be coming with regards significant natural areas and the stock exclusion and pest management goals which are being sought for biodiversity purposes. SAFs place extra burden with undue delay, cost and uncertainty in having to meet additional amenity objectives and policies when seeking resource consents to achieve these national goals.

54. The Section 42a Report maintains that there are some qualities that lift these landscapes above their rural zoning in paragraph 7.3.2 … *whilst not worthy of recognition as 'outstanding', they are clearly distinguishable from normal rural landscapes*. Federated Farmers disagrees that this justifies a separate landscape classification. Risks to these SAFs will be no more than for the rest of the Rural Zone, and already managed according to the zone provisions. The specific values or associations mentioned in paragraph 7.3.3 like historic heritage and sites of significance to Maori are already managed by the HH and SASM chapters of the Plan, recreation via the OSR chapter, and nature by the ECO chapter.

55. Some councils have decided to delete significant landscape/amenity classification from their proposed District Plans: Otorohanga District; Kaipra District, and more recently Waikato District.

56. The hearing panel for the proposed Waikato District Plan made these findings in January 2022 in their Decision Report 10[2] for Significant Amenity Landscapes (SALs):

> *10.11 Our decision is to delete the SAL overlays in their entirety, including the policies in Chapter 3.4, along with SAL rules and maps. …*
>
> *10.12 Our reason for deleting the SAL overlay is that we see it as redundant. Removing the SAL policies and rules from the PDP will make no material*

[2] Independent Hearing Panel Decisions Report 10 for Landscapes, 17 Jan 2022, pg 24.

difference to maintaining landscape values, but it will avoid unnecessary costs to landowners.

….

10:20 We consider the zones effectively identify and recognise areas with different amenity values throughout Waikato District, and that the zone policies and rules manage these amenity values appropriately.

…

10.23 We consider that none of the SAL rules will materially enhance landscape amenity. We accept the evidence that these controls add unnecessary costs and inefficiency to farming activities and may have perverse outcomes.

57. The Hearing Commissioners decided to delete Visual Amenity Landscapes (VALs) from the Kaipara District Plan[3] in 2012:

While the landscapes identified as VALs are pleasant and clearly have amenity value, they are generally working landscapes that have been created by farming /pastoral activity, and there is little to distinguish one landscape that is a VAL from one which is not. Moreover we find that these landscapes are not at 'risk' of being lost to development and/or subdivision (given the provisions of the decisions version of the Kaipara District Plan).

The provisions applying to VALs as notified would lead to:

- *considerable uncertainty,*
- *time and cost re consenting processes re time and related costs for little or no benefit, and*
- *unnecessary burdens of compliance.*

That from a resource management perspective it is more appropriate not to identity VALs as this would better enable the people and communities of Kaipara to provide for their social, cultural and economic wellbeing by not having unnecessary regulation.

The costs of introducing VALs would outweigh any benefit and would fail the section 32 'test'.

58. This same reasoning can also be applied to Central Hawke's Bay District, the Significant Amenity Landscapes overlay and planning response should be deleted as an unnecessary and unduly onerous approach.

Farming and Rural Character

59. Federated Farmers submitted seeking recognition in the objectives and policies of the existing rural farming character where it occurs on ONFLs, and provision for existing farm activities to continue. Submission points S121.038, S121.039 and S121.040 seek this recognition and provision for farming in ONFLs.

[3] Commissioners Les Simmons and Greg Hill Decisions report for Variation 1 of the Kaipara District Plan, 1 May 2012, pg 3.

60. We support the Section 42a Report recommendation to amend Policy NFL-P2 to read:

61. *To allow activities within the District's outstanding natural features and landscapes where they are for existing land uses <u>such as farming, where they maintain the identified characteristics and values in NFL-SCHED6, and</u> for conservation purposes and customary activities.*

62. In conjunction with this amendment, we seek in sub point S121.047 that farming is noted as an existing land use in NFL Schedule 6 where it occurs on specific ONFLs. This will mean that farming is an identified characteristic so that policy NFL-P2 can be accurately carried out.

63. The Section 42a Report says in paragraph 10.3.3 recommends to reject this sub point, saying …*that the purpose of the schedule is to describe the features and identify and summarise their landscape values.* This is true, but an additional point as part of the values column of each ONFL can note if land uses such as farming are present, without detracting from the natural values. The individual landowner submissions will provide detail as to their farming land uses, and recognising this will help address their concerns about the ONFL classification interfering with their farming.

PUBLIC ACCESS

64. Federated Farmers has an interest in provisions for public access because farms are frequently located alongside rivers, lakes and the coast where public recreation occurs, and there is a perception that public access is freely available over farmland. This is often an education issue. The boundary between public land and private land is not always marked so it can be easy to stray onto private property. Some people do not know how to behave properly and leave rubbish, do not close gates, or let their dogs loose near livestock.

65. The District Plan has a role to play when it comes to making sure the public know where access is available, and when landowner permission is needed. Provisions for esplanades need to be sensible.

66. Federated Farmers submitted on policy PA-P1 (sub point S121.049) seeking amendments that provided more flexibility as to when an esplanade would be taken, similar to the Hastings District Plan approach. A waiver may be needed for safety (eg where the site is industrial) when a reserve is impractical (eg where the site has steep cliffs) or for financial reasons (eg if the Council does not have the resources to provide fair compensation.)

67. The Section 42a Report in paragraph 5.3.27 notes that waivers can currently be achieved under the existing rule framework. And in the next paragraph says *However I do consider that the existing policy and rule framework is not clear in this respect*.

68. Federated Farmers is pleased that waivers do apply, and agrees that better clarity is needed. We therefore support the Section 42a Report's recommended wording:

PA-P1 To ~~require~~ prioritise the establishment of esplanade reserves, esplanade strips or access strips when subdividing land adjacent to priority water bodies shown on the Planning Maps.

PA-P2 To provide for the waiving of requirements for esplanade areas (esplanade reserves, esplanade strips or access strips) ~~on non-priority water bodies~~, where appropriate.

69. In submission point S121.054, Federated Farmers seeks a new policy to provide education around public access. We also submitted on the topic of public access in the Coastal Environment chapter in sub point S121.058. The Section 42a Report discusses this in paragraph 5.3.55 and recommends the following amendment to method PA-M3:

PA-M3 Advocacy and Liaison Directly negotiating with landowners, as appropriate, to encourage them to voluntarily establish public access to and along the coast or priority waterbodies.; informing the public as to the location of public access to rivers, lakes and coast and educating the public that access over private land is only by the permission of the landowner.

70. Federated Farmers supports this wording and is satisfied it addresses our submission point.

COASTAL ENVIRONMENT

Farming and Rural Character.

71. Federated Farmers submitted seeking recognition in the objectives and policies of the existing rural farming character on the coastal environment zone.

72. Sub points S121.055, S121.056, S121.057, S121.059, S121.061, S121.062, S121.063 and S121.064 all ask for amendments to the proposed objectives and policies to include the existing farming land uses and rural character as a positive attribute of the Coastal Environment, and that proposed activities that are consistent with these attributes may continue. Sub point S121.065 seeks a new policy. Paragraph 5.2.3 of the Section 42a Report summarises all of these submission points nicely, and analysis starts in paragraph 5.3.1.

73. Federated Farmers agrees that the Council has an obligation to preserve character under RMA Section 6(a). We agree that identifying and mapping the coastal environment consistently with the Regional Council's Coastal Environment Plan is appropriate.

74. We also agree with the Section 42a Report's statements: 5.3.5 *The term 'preservation' indicates the need to maintain in the existing state. The vast majority of accessible land in the coastal environment area in Central Hawke's*

Bay is rural in character and farming land use predominates. On that basis, I consider that the existing rural/farming land use has contributed to the existing state of natural character of the coastal environment in the District. And 5.3.6 *In that sense, I accept that preserving existing natural character includes recognising and providing for the continuation of rural land uses, including existing farming activities – subject to constraints…*

75. We support the Section 42a Report's recommendation to amend Objective CE-O2 to include *natural* *<u>and rural</u>* *character* and amend Policy CE-P6 to include *<u>consistency with underlying zoning and existing land us</u>*e as matter 8.

76. However the objectives and policies need to go further to acknowledge farming in the coastal environment.

77. Objective CE-O1 includes the human aspect of small settlements recessed onto bays as a distinctive landform of the coastal environment, but omits the other human aspect that is just as, if not more prominent than small settlements, the surrounding farmland. If settlements are part of the landform, then why not farming?

78. This is an aerial of Aramoana beach settlement, which is recessed into a bay as acknowledged by CE-O1(5). The farmland surrounding the Aramoana settlement is the other definite feature of this coastal environment.

79. Up the coast further this is Pourere Beach, which again has surrounding farmland:

80. If settlements are acknowledged in CE-O1 as a distinctive feature of the Central Hawkes Bay coastline, then farming must be too. The extensive sheep and beef farms are an existing feature that makes the Central Hawkes Bay coastline what it is. We acknowledge that there has been a big reduction of coastal indigenous vegetation cover because of farming, but this is a legacy issue from previous generations which, in keeping with central government policies of the day, valued bringing land into active production more than preserving native bush. This is a function of different values over time.

81. Federated Farmers is concerned that if farming landuses and rural character are not acknowledged in objectives and policies as being part of the existing coastal environment, then normal farming activities may be stymied. The people that farm alongside the coast value their beautiful location, but they also need to make sure their farm can provide them with the means of earning a living and they can adopt modern farming technologies and methods. The increased desire for fencing and stock exclusion is one such activity that should not be prevented.

82. The Section 42a Report's discussion on CE-SHED7 (starting in paragraph 8.3.1) and recommendation to retain the High Natural Character Area 6 gives rise to an example of why it is necessary to acknowledge existing farm land uses. Paragraph 8.3.20 says that *a high natural character notation only comes into play at the time a resource consent is otherwise triggered* which is why objectives and policies must recognise and provide for existing farming land uses.

Rhea Dasent
for Federated Farmers
28 February 2022.

Under the Resource Management Act 1991

In the matter of the Central Hawkes Bay Proposed District Plan

Memorandum of counsel for Kāinga Ora – Homes and Communities

25 February 2022

Hearing Stream 1

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Memorandum of counsel for Kāinga Ora – Homes and Communities

1 As advised to the hearings administrator, Ms Williams, Kāinga Ora – Homes and Communities does not wish to be heard orally in relation to the matter in Hearing Stream 1 (**HS1**).

2 Below I set out its position in relation to two submission points in HS1.

S129.063

3 Kāinga Ora accepts the recommendations of the s 42A report-writer and supports the additional wording changes to NFL-I1.

S129.002

4 There appears to be some confusion in relation to the definition of "clearance" – relating to ecosystems and indigenous biodiversity.

5 As notified, the definition of "clearance" included by undertaking several listed activities in the vegetation drip line, one of which was "over-planting". Kāinga Ora sought the deletion of "overplanting" because it is inconsistent with "clearance" on its face, and not a word or concept that Kāinga Ora or its advisors have heard of before in relation to vegetation clearance or indigenous biodiversity. In other words, it is unclear what it means.

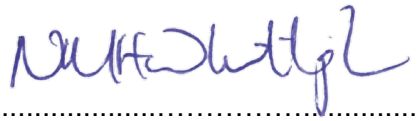
6 The s 42A report writer has recommended rejecting Kāinga Ora's submission. In doing so, she has not expressly referred to the opinion of the Council's consultant ecologist, Gerry Kessels of Bluewattle Ecology, who says:

> I am not familiar with the term 'over-planting' in the context of indigenous biodiversity and suggest that Kāinga Ora and Ngā hapū me ngā marae o Tamatea be invited to comment further on this issue in the context of significant natural areas.

7 There is nothing Kāinga Ora can add to its submission by way of further comment. It, like Mr Kessels, does not know what it meant by "overplanting". It is for the Council to comment further about its meaning in the context of the definition of vegetation clearance and indigenous biodiversity.

8 In the absence of further clarification is it submitted that it should be deleted.

Date: 25 Feburary 2022



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Nick Whittington
Counsel for Kāinga Ora – Homes and Communities

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28 February 2022

Central Hawke's Bay Proposed District Plan Hearing Panel
Central Hawke's Bay District Council

By email c/- Jessie Williams districtplan@chbdc.govt.nz

Dear Jessie,

Central Hawke's Bay Proposed District Plan 2022 Hearing Stream 1 - Natural and Coastal Environment: Hearing Statement for Transpower New Zealand Limited (submitter reference 79)

Transpower New Zealand Limited ("Transpower") writes in relation to Hearing Stream 1 Natural and Coastal Environment, that is scheduled to commence on Monday 14 March 2022.

There are a limited number of submission points of relevance to Transpower that are being considered as part of Hearing Stream 1 and, where relevant, Transpower generally agrees with the recommendations given in the Section 42A Report for this topic. On that basis, Transpower has not requested to be heard or filed evidence. That said, Transpower is available to respond to any questions the Hearings Panel may have.

For completeness Transpower records its position in respect of the relevant matters in the **attached** table.

Transpower respectfully requests that this letter be tabled for the Panel's consideration, to confirm its position in relation to its submission points and the Section 42A Report recommendations.

Should you require clarification of any matter, please contact Trudi Burney at Transpower (03 590 7126), or on the following email: Trudi.Burney@transpower.co.nz

Yours faithfully

Trudi Burney
Senior Environmental Planner

Attachment 1: Transpower's position in response to s42A recommendations, Central Hawke's Bay PDP Hearing Stream 1 Natural and Coastal Environment

Hearing 1: Natural and Coastal Environment				
Sub Ref	**PDP Reference**	**Relief Sought in Transpower's Submission**	**S42A Report Recommendation**	**Transpower's Response to S42A Report Recommendations**
ECO – Environment and Indigenous Biodiversity				
S79.062	ECO – Environment and Indigenous Biodiversity	Retain ECO-P1 as notified.	**Recommendation: Accept,** subject to amendments from other submissions. **S42A reference:** Paragraph 7.3.1. onwards outlines the considerations behind the recommendation to amend the policy. The primary purpose is to provide clarity on the application of the policy. The policy is amended as follows: *ECO-P1 To identify Significant Natural Areas (being areas of significant indigenous vegetation and/or significant habitats of indigenous fauna) in the District where they meet one or more of the criteria below and describe these areas in ECO-SCHED5 and show their location on the Planning Maps (except for areas that meet Criterion 1, where at least one other of Criteria 2-7 must also be met).*	Transpower accepts the recommendation. The purpose of the amendment is to provide additional clarity and avoid confusion from the way the policy was originally written. Transpower accepts the recommendation on the basis SNA's are identified and mapped.
S79.063	ECO – Environment and Indigenous Biodiversity	Retain ECO-P9 as notified.	**Recommendation: Accept** **S42A reference:** Paragraph 9.3.62 notes retention of the policy (on the basis all submitters have sought its retention). *ECO-P9 Policy* *To ensure that new nationally significant infrastructure is not located in areas of significant indigenous vegetation and/or significant habitats of indigenous fauna unless:* *a. There is a functional or operational need for the infrastructure to be in that particular location; and* *b. The route/site selection process has identified no practicable alternative locations.* *Where it is necessary to locate in these areas and where, despite the adoption of the best practicable option, there remain residual adverse effects, biodiversity offsetting measures should be proposed for the purpose of ensuring positive effects on the environment sufficient to offset any residual adverse effects of activities on indigenous biodiversity that will or may result from allowing the activity*.	Transpower accepts the recommendation on the basis the policy is recommended to be retained (as sought in the Transpower submission).

S79.064	ECO – Environment and Indigenous Biodiversity	Retain ECO-R3 as notified, and in particular clause (b)(i) and (vi).	**Recommendation: Accept in Part,** subject to amendments from other submissions. **S42A reference:** Paragraphs 10.3.67 and 10.3.75 outline recommended changes. The S42A reports recommends: - Amendment to the title (as follows in terms of deletion of 'or') to be more consistent with the PDP: *ECO-R3 Trimming or clearance of indigenous vegetation inside any areas of significant indigenous vegetation and~~/or~~ significant habitat of indigenous fauna (excluding natural wetlands)* - Replacement of *OR* with *AND* in relation to conditions to be complied with. - Retention of condition (b)(i) as notified: *required to achieve compliance with the requirements of the Electricity (Hazards from Trees) Regulations 2003; or* - Amendment to condition (b)(vi) as follows: *amendments: necessary to provide for the maintenance and safe and efficient operation of existing tracks, stock crossings and bridges, drains, firebreaks, formed public roads, private accesses, driveways, right of ways and walkways;*	Transpower accepts the recommendation on the basis the rule is largely retained as notified. It is noted the Resource Management (National Environmental Standards for Electricity Transmission Activities) Regulations 2009 applies given the rule applies to SNA's.
S79.065	ECO – Environment and Indigenous Biodiversity	Retain ECO-R4 as notified.	**Recommendation: Accept** **S42A reference:** *Para 10.3.89. Rule ECO-R4 applies to those areas of significant indigenous vegetation and significant habitat of indigenous fauna that may not have been captured by the district wide assessment….* *I am satisfied that Rule ECO-R4 and the thresholds as proposed are appropriate, and in the context of the wider rule framework will achieve the purpose of section 6(c) of the RMA being the protection of the District's areas of significant indigenous vegetation and significant habitats of indigenous fauna.*	Transpower supports the recommendation. The rule is recommended to be retained as notified and provides a permitted rule framework for works to trimming or clearance of indigenous vegetation outside an SNA.
S79.066	ECO – Environment and Indigenous Biodiversity	Amend Rule ECO-R6 to provide a discretionary activity status for tree trimming and clearance necessary to provide for the "*ongoing safe and efficient operation, maintenance and upgrading of network*	**Recommendation: Accept in Part** **S42A reference:** *Para 10.3.107. Electricity providers would fall within this definition as a 'lifeline utility' that includes 'an entity that generates electricity for distribution through a network or distributes electricity through a network'. Given these regulations, I agree that the stricter status of 'non-complying' for such activities, is not warranted. However rather than imposing a specific rule, to be consistent with the approach to NES-FM outlined above, I recommend adding a note that cross-references to these (NES-FM) regulations…*	Transpower accepts the recommendation. While Transpower's preferred approach is to amend the activity status from non-complying to discretionary, the recommended inserted note is accepted (noting the relationship between the PDP and NES-FM is not clear within the PRP).

		utilities, but excluding their expansion, where carried out by the respective network utility operator".		
FS18.13	ECO – Environment and Indigenous Biodiversity	Further submitter on Kainga Ora's original sub opposing the ECO chapter and proposing amendments. Transpower submitted that this be allowed in part in so far as it relates to clarity sought as to what constitutes a 'high natural character area' or a 'significant amenity feature.	**Recommendation: Reject** **S42A reference:** *Para 5.3.26. 'Transpower… also supports in part that part of the submission that seeks greater clarity as to what constitutes a 'high natural character area' or a 'significant amenity feature'. With respect to their concerns relating to the terms 'High Natural Character' and 'Significant Amenity Features', these are not terms used in this chapter (this matter is addressed in the Section 42A Natural Features and Landscapes Report, Key Issue 1 – Kāinga Ora (S129.063))'* From Section 42A Natural Features and Landscapes Report: *I disagree with Kāinga Ora's opposition to the terms 'high natural character areas' and 'significant amenity features' and am unclear what relief is being sought in this regard. 'Areas of high natural character' are clearly referenced in Policy 13(1)(c) of the NZCPS in relation to preserving the natural character of the coastal environment and are part of Council's response to section 6(a) of the RMA. Along with 'significant amenity features', both terms are identified in the expert assessments by Hudson Associates underpinning the development of NFL-SCHED6 and CE-SCHED7. 'Significant amenity features' are specifically referenced in the 'Introduction' to the NFL – Natural Features & Landscapes chapter as part of Council's response to section 7(c) of the RMA. In my view, both terms have RMA context, and are legitimately used in the PDP.*	Transpower accepts the recommendation and acknowledges the features are identified in the PDP.
FS18.14 (S75.030)	ECO-O2	Transpower oppose the Forest and Bird submission to amend ECO-O2 on the basis that there is no higher order policy directive (such as, for example, the draft NPS-IB) to require 'enhancement' of any non-significant indigenous vegetation.	**Recommendation: Accept** **S42A reference:** *Para 5.3.75. With respect to S75.030 Forest & Bird's proposed amendment I comment as follows: The RMA requires Councils, in giving effect to the purpose of the RMA, to recognise and provide for the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna as a matter of national importance (section 6(c), and to control the actual or potential effects of the use, development, or protection of land, for the purpose of (among other things) 'the maintenance of indigenous biological diversity' (s31(1)(biii)). The objectives in this chapter reflect this duty and, in my opinion, inserting the requirement for 'enhancement' into Objective ECO-O2, whilst maybe desirable, imposes significantly greater costs to*	Transpower accepts the recommendation to retain the objective as notified.

			landowners and the community that is not envisaged by the RMA and can be better addressed through other methods. *Para 5.3.76. For these reasons, I recommend S S64.054 Department of Conservation be accepted, S121.016 Federated Farmers S75.030 be accepted in part and S75.030 Forest & Bird's be rejected.*	
Natural Features and Landscapes				
S79.068	NFL-O1	Retain NFL-O1 as notified. Notwithstanding the lack of clarity between chapters, Transpower supports reference within the objective to 'inappropriate' as such reference is consistent with Section 6(b) of the RMA and recognises that not all development is to be avoided, rather the emphasis is on that which is inappropriate.	**Recommendation: Accept in Part** **S42A reference:** *Para 8.3.1. Forest & Bird's proposed amendment to Objective NFL-O1 to delete that part of the objective that states 'that are important to the identity of the District' on the basis that all outstanding features are to be protected, not just those deemed 'important'. I agree this could be inferred, but is not the intent. However, I consider that part of the objective to be unnecessary in any case, as the importance of the ONL/ONF has already been established by virtue of being deemed 'outstanding', and therefore consider that part can be deleted without altering the intent or effect of the objective.* *Para 8.3.2. For these reasons, I am comfortable recommending that Objective NFL-O1 be amended as requested*, (as follows) *NFL-O1 Outstanding natural features and landscapes ~~that are important to the identity of the District~~ are-retained and protected from inappropriate subdivision, use and development.*	Transpower accepts the S42A recommendation on the basis the proposed amendment does not undermine the NFL-O1 as notified.
S79.069	NFL – Policies	Retain policies in 'NFL - Natural Features and Landscapes' chapter. However, should a new 'Network Utilities' policy (as sought in another submission point) not be provided, Transpower seeks relief consistent with that sought in its earlier submission point seeking the new policy.	**Recommendation: Accept in Part** *To be revisited following NU – Network Utilities Hearing in relation to S79.026* **S42A reference:** *Para 8.3.3. The Transpower submission is supportive of the policies in the NFL – Natural Features & Landscapes chapter as notified (subject to the granting of relief sought elsewhere in their submission). Whilst there are no further submissions directly relating to this submission point, amendments are recommended in response to other submissions on specific provisions within this chapter, therefore this submission is accepted, but only 'in part'.* *Para 8.3.4. As the submission point requesting the addition of a new policy in the NU – Network Utilities chapter (S79.026) is yet to be addressed by Reporting Officers and the Hearings Panel (being allocated to a different Hearings Stream), I note that the decision on this submission point may need to be revisited at a later date.*	Transpower reserves its position on the recommendation on the basis the submission point will be addressed at subsequent hearings.
S79.070	Notes – NFL Rules	Retain 'Note' at start of 'NFL - Rules' stating:	Recommendation: **Accept** S42A reference:	Transpower supports the recommendation on the basis that the 'Note' is retained (which

		'Rules relating to network utilities within the identified ONL and ONFs are contained in the NU - Network Utilities chapter of the District Plan. The rules in this chapter do not apply to network utilities'.	*Para 9.3.1.The intent is for the NU – Network Utilities chapter of the PDP to largely operate as a standalone chapter for network utilities. The objectives and policies in the NU – Network Utilities chapter recognise the essential nature of network utilities and their functional and operational needs and seek to provide for them, while avoiding, remedying, or mitigating their effects.* *Para 9.3.4. Given the above, the approach is to rely on the NU – Network Utilities chapter provisions and not to apply the rules in the NFL – Natural Features & Landscapes chapter to network utilities – hence the 'Note' in the NFL chapter. I consider the clarification in the note at the start of the rules section that the rules in this chapter do not apply to network utilities is appropriate and assists plan interpretation, and therefore should remain.*	outlines the Network Utilities chapter is standalone).
Coastal Environment				
S79.087	CE – Coastal Environment	Retain the explanation accompanying CE-I1, specifically the reference to Policy 6 of the NZCPS.	**Recommendation: Accept** **S42A reference:** *Para 6.2.1. Transpower (S79.087) supports the reference to Policy 6 of the NZCPS within the explanation accompanying Issue CE-I1, on the basis the explanation appropriately recognises the role and importance of infrastructure. This is the only submission on this provision in the PDP – no further analysis is required.*	Transpower supports the recommendation on the basis the Issue is retained as notified.
S79.088	CE – Coastal Environment	Amend CE-O3 as follows: *'Activities that have a functional need (or operational need in respect of the National Grid) to locate in the coastal environment are provided for, ~~where they do not compromise other significant values in the coastal environment.~~'*	**Recommendation: Accept in Part** **S42A reference: Paragraph 6.3.4, 6.3.5, 6.5.1 & 6.6.1** *Para 6.3.4. It is clear from the above that, in addition to activities that have a functional need to locate in the coastal environment, technical and operational requirements are also required to be given due consideration where this is specifically in relation to the electricity transmission network. Therefore, in my view, it is appropriate and better gives effect to the NPSET to insert reference to 'operational need in respect of the National Grid' in both Objective CE-O3 and Policy CE-P5 (S79.088 & S79.089). This also better aligns with the provisions in the NU – Network Utility chapter, which reference operational requirements (e.g. Issue NU-I1, Objective NU-O2, and Policy NU-P2).* *Para 6.3.5. However, I do not support deleting the latter part of Objective CE-O3 (S79.088), which provides the limitation 'where they do not compromise other significant values in the coastal environment'. Objective CE-O3 is not solely there to provide for the electricity transmission network activities, and neither the NZCPS (nor the NPSET, for that matter) provide for activities to locate in the coastal*	Transpower does not support the recommendation as it only partly provides for the relief sought. However, Transpower reserves its position on this objective depending on the officer recommendations on Transpower's submission points and the final decision on the Network Utilities chapter. Transpower's submission sought that the Network Utilities Chapter be standalone, with all provisions relating to the National Grid contained within the one chapter.

			environment solely on the basis that they have a functional and/or operational need to locate there, without limitation. *Para 6.3.6. Forest & Bird submit that the amendments sought by Transpower could lead to the loss and degradation of other values within the coastal environment. I concur in respect of the deletion of the latter part of Objective CE-O3. In my view, when considering such activities, all matters should be considered in the round, and not doing so would be contrary to recognising and providing for other matters of national importance as contained in section 6 of the RMA. The functional and/or operational need to locate in the coastal environment should be considered alongside recognising and providing for the preservation of natural character, the protection of outstanding natural features and landscapes, areas of significant indigenous vegetation, and historic heritage etc.* *Para 6.3.7. Further, I concur with the amendment sought by Forest & Bird (S75.070) to include the words 'in appropriate locations' in relation to providing for activities that have a functional need to locate in the coastal environment, in that this aligns the objective with the wording in Policy 6(2)(c) of the NZCPS which states: 'recognise that there are activities that have a functional need to be located in the coastal marine area, and provide for those activities in appropriate places'.* Recommendation is to amended CE-O3 as follows: *CE-O3 Activities that have a functional need (or operational need in respect of the National Grid) to locate in the coastal environment are provided for in appropriate locations, where they do not compromise other significant values in the coastal environment.*	
S79.089	CE- Coastal Environment	Amend CE-P5 as follows: 'To recognise that there are activities which have a functional need **(or operational need in respect of the National Grid)** to locate and operate within the coastal environment and provide for those activities in appropriate places.'	**Recommendation: Accept** **S42A reference: Paragraph 6.3.4 & 6.4.2** Refer S42A reference provided in submissions point S79.088 above. Recommendation is to amended CE-P5 as follows: *CE-P5 To recognise that there are activities which have a functional need (or operational need in respect of the National Grid) to locate and operate within the coastal environment, and provide for those activities in appropriate places*	Transpower supports the recommendation on the basis it gives effect to the relief sought in Transpower's submission.

17 February 2022

Proposed District Plan Hearing Panel
Central Hawkes Bay District Council
PO Box 127
Waipawa 4240

By Email: c/- districtplan@chbdc.govt.nz

Dear Commissioners,

Proposed Central Hawkes Bay District Plan – Hearing Stream 1: Natural and Coastal Environment

I have been jointly engaged by Chorus New Zealand Limited (Chorus), Spark New Zealand Trading Limited (Spark) and Vodafone New Zealand Limited (Vodafone), collectively referred to as "the telecommunication companies" to provide expert planning evidence and advice on the Central Hawke's Bay Proposed District Plan Hearings process.

The telecommunication companies submissions on the Proposed District Plan have two submission points relevant to Hearing Stream 1. These concerned the introductory notes to the NFL-Rules section (submission points S117.057 (Chorus), S118.057 (Spark) and S119.057 (Vodafone)), and the retention of ECO-R3 (submission points S117.056, S118.056 and S119.056).

I am pleased to confirm that the two relevant Section 42A reports and recommendations have accepted the retention of the notes to the NFL-Rules section and accepted in part the retention of ECO-R3, with the reasoning provided is accepted by the telecommunication companies.

Therefore I have no further comment to make on Hearing Stream 1, however I am available to answer any queries or questions either in writing or via a videoconference that the Hearing Panel may have, should the Hearing Panel not agree with the recommendations made by the Council Officers.

Yours sincerely

Incite

Tom Anderson

Director/Principal Planner

tom@incite.co.nz

Kathryn Bayliss - Part 1. Statement for CHBDC District Plan, 1. Natural Environment – Natural Features and Landscapes

I, Kathryn Bayliss, thank you for allowing me to table my Statement, Evidence/Representations, and written material in support of my submission. The panel is welcome to contact me if they have any questions or wish to discuss anything.

I uphold my first Submission for the CHBDC Proposed May 2021.

1.
Natural Environment – Natural Features and Landscapes: Policy NFL-P5 (Mākāroro Gorge): NFL-P5 To recognise the regional social and economic significance of water storage within ONF-4 (Mākāroro Gorge). And Principal Reasons of the NFL – Natural Features & Landscapes chapter of the PDP, page NFL-10: The Mākāroro Gorge (ONF-4)....

I disagree with the Council Planners' (s42A) reports Recommendation for my submissions to be rejected.
I agree with the Mākāroro Gorge being recognised as ONF-4, an Outstanding Natural Feature.
I agree with the Mākāroro River being recognised as SAF-1, a significant Amenity Feature.

I seek deletion of both the policy Policy NFL-P5, Mākāroro Gorge, and associated text in the Principal Reasons around water storage in the Mākāroro catchment, (The Mākāroro Gorge, ONF-4, page NFL-10, second sentence). (i.e. delete: "That process confirmed the value of water storage for the District in terms of regional social and economic benefits prior to identification of the area as an Outstanding Natural Feature in the District Plan.")

The main reasons I still oppose NFL-P5 and the main reason given for it in the paragraph: The Mākāroro Gorge (ONF-4), page NFL-10, second sentence, ("That process confirmed the value of water storage for the District in terms of regional social and economic benefits prior to identification of the area as an Outstanding Natural Feature in the District Plan.")" is they are based on false information.

The District Plan can't have a policy based on a false principal reason. The Board of Inquiry did not confirmed the value of water storage for the District in terms of regional social and economic benefits.
The full documents for the Board of Inquiry into the Tukituki Catchment Proposal are available at:
https://www.epa.govt.nz/database-search/rma-applications/view/NSP000028

i.
Extracts:
"Final Report and Decision of the Board of Inquiry into the Tukituki Catchment Proposal Volume 1 of 3: Report and Decisions:
Social
The Board's findings
[1121] In the Board's view there must be an element of conjecture about whether the predicted social effects arising from the development of the RWSS will occur. For example, economic outcomes might not be assured at this stage and there is an element of uncertainty as to the precise extent that the Scheme would lead to intensification and/or transfer of farms.
[1123] On that basis the Board concludes that there will be both positive and negative social effects if the RWSS is

implemented. .....

Economics
The Board's findings
[1132] While the Board needs to consider the economic impacts on communities and the costs and benefits resulting from the scheme, it is not required (or able) to determine the financial viability of the scheme. Nor can it accurately determine the financial implications for farmers who join the scheme or the business people making consequential decisions. Those are commercial decisions for the parties involved."

Most of the factual findings of the Final Report and Decision of the Board of Inquiry into the Tukituki Catchment Proposal where not included in the District Plan so it seems illogical to include a false finding.
The consents to the Ruataniwha Water Storage Scheme lapse in 2024 so reference to it in the District Plan could become outdated then. Already the reports and research done for the Ruataniwha Water Storage Scheme are outdated as so much as changed worldwide since they were done and the future will be vastly different.

ii.
The majority of reports done for the Board of Inquiry into the Tukituki Catchment Proposal and the Ruataniwha Water Storage Scheme have disclaimers.
Most reports and forecasts, and forward-looking statements come with disclaimers.
e.g."As these forward-looking statements are predictive in nature, they are subject to a number of risks and uncertainties, many of which are beyond the control of us. As a result, actual results and conditions will differ materially from those

expressed or implied in this presentation. Given these uncertainties, no forward-looking statement should be relied upon by the recipient in considering the merits of any particular transaction.
No warranty is given to the achievement of the results expressed or implied by such forward-looking statements or that the assumptions underlying such forward-looking statements will in fact be correct.
Projection of economic benefits from major infrastructure projects can never be an exact science . They required assumptions to be made in relation to factors many years in the future the majority of which are beyond the control of developers and owners. Actual outcomes will vary from those currently assumed."

In 2016 Butcher Partners Ltd did an updated Report for the HBRC. "Ruataniwha Water Storage Scheme. Review of Regional Economic Impacts and Net present Value" March 2016. (The first Butcher Partners Ltd Report for the HBRC. Ruataniwha Water Storage Scheme was done in October 2012)
The original estimated capital costs of dam and infrastructure in October 2012 were $239.7 million. ($246 million including electricity reticulation and mitigation costs). By 2016 total revised capital costs were estimated to have increased to $333 million.
Net extra farm capital investment costs had increased from the original expected $356 million in 2012 to $556 million in 2016.
The above costs did not include development costs incurred by HBRC and HBRIC.

A recent example is the Waimea dam project. The Tasman District Council put out the Waimea Dam project for public

consultation in October 2017 with a forecast cost of $75.9m. When the decision to proceed with the dam was finalised in 2018 the estimated cost had risen to $104.5m. A year later there was a further increase of $29 million taking the then expected cost to $158m. The latest estimate of $185 million.

I have also supplied as evidence:
Ansar, A., et al., Should we build more large dams? The actual costs of hydropower megaproject development. Energy Policy (2014), http://dx.doi.org/10.1016/j.enpol.2013.10.069i.
(This includes irrigation and multipurpose dams).

There have been negative impacts since the RWSS was first promoted and years later shelved. These include large financial costs and loses of both public and private money, ongoing social conflicts and negative impacts on the wellbeing of some people. These will continue as long as there is a chance of a large water storage scheme being implemented in Central Hawke's Bay and will increase if any large water storage scheme is developed.

iii.
The Policy NFL-P5 (Mākāroro Gorge) does not follow the National Policy Statement for Freshwater Management 2020 :
(5) There is a hierarchy of obligations in Te Mana o te Wai that prioritises:
(a) first, the health and well-being of water bodies and freshwater ecosystems
(b) second, the health needs of people (such as drinking water)
(c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

To include a policy on the third of the hierarchy of obligations in Te Mana o te Wai and not the first then second is illogical.

Ruataniwha Water Storage Scheme and Te Mana o te Wai, and the natural environment:
"Actions of people / tangata can diminish the mauri and therefore the mana of a resource."
If the Ruataniwha Water Storage Scheme or similar scheme is developed the affected water bodies and natural, indigenous environments will have their mauri and mana destroyed or diminished by having people destroy them or rule over and control them. The affected water bodies will no longer be consider to have "natural" flows. The water will be impounded in the Makaroro River and the release of the water flow, amount, force, timing and water route will be controlled. A dam and reservoir on the Makaroro River, (or any other river), will destroy it and some of the surrounding public Ruahine Conservation Forest Park, natural ecosystems and habitats, flora and fauna. 185.18 hectares of ecologically significant indigenous vegetation and habitats would be flooded by the proposed reservoir (or covered over by associated infrastructure, including the dam structure, new access tracks and spoil disposal sites). Some of the flora and fauna in the area include birds, bats, native fish (including whitebait species) and eels are endangered already and will be put in further risk.
Rivers in their natural state are increasing rare in NZ and less than 1% of the world's rivers remain in their natural state. Wild and scenic rivers are valued for many reasons and their ecosystems are crucial for many of our threatened native species.
The Makaroro and Dutch Creek are probably CHB's most natural, pristine, highest quality rivers.
The Makaroro Storage Scheme could cause an environmental

catastrophe:
Deforestation and use of fossil fuels in construction and running of water storage scheme could cause a greenhouse gas explosion, adding to climate change, environment destruction, loss of biodiversity, natural and indigenous ecosystems.
More wetlands and braided river ecosystems will be destroyed. These also have an important part in absorbing flood waters, without them there will be an increased risk of more severe flooding.
Felling of about 193 hectares of trees and shrubs which absorb greenhouse gases while alive will release greenhouse gases when removed and decaying. Forests also have an important role in absorbing rain and preventing flooding.
Fossil fuels used for dam and distribution infrastructure by machinery and vehicles, increased electricity to run pumps etc will add to green house gases which contribute to climate change.
Increase in fertilisers, herbicides, pesticides, animals used in agricultural intensification will also add to green house gases, and the risk of further polluting the land and water and air. These could have negative consequences for people also.
Many other HB waterbodies will be affected by intensification and won't get any benefits from dam.
We must protect existing forests, restore forests and plant trees to help stop climate change and loss of biodiversity.
The value of intact forests is seldom highlighted.

Extract from the RWSS A5a-Cultural-Values-Assessment-Taiwhenua-o-Tamatea-and-Taiwhenua-o-Heretaunga-June-2012 copy.pdf :
3.6 A river is a living being. It has a mauri life force that weaves itself through the people, connecting the people with the river. Because it nurtures and sustains them it was given

the utmost respect. Any damage done to the river is harm done to the mauri of the river and harm done to the people.

iv.
Many recent studies are advising that we should view rivers differently and "Let them Speak for themselves".
These advise an approach that brings together mätauranga taiao with contemporary sciences to understand rivers as unique, dynamic living systems that include plants, animals and people, and seeks to balance life-enhancing exchanges among them, has the potential to lead to better outcomes for waterways, people and other life forms. This requires a shift from short-term, utilitarian, anthropocentric framings, because if rivers are more ancient and powerful than people, then all waterways have rights to flourish, not just those that are the focus of current human preoccupations.
(Refer to evidence supplied.)
"Let the Rivers Speak thinking about waterways in Aotearoa New Zealand" by Anne Salmond, Gary Brierley and Dan Hikuroa.
"Why we should release New Zealand's strangled rivers to lessen the impact of future floods." The Conversation. February 23, 2021
"Beware of the Zombie River." James Brasington.pdf

Proposed District Plan submission form

Remember submissions close on Friday 6 August 2021 at 5pm.

Clause 6 of the First Schedule, Resource Management Act 199.

Feel free to add more pages to your submission to provide a fuller response.

To: Central Hawke's Bay District Council

1. Submitter details

Full Name	Last BAYLISS	First KATHRYN	
Company/Organisation (if applicable)			
Contact Person (if different)			
Email Address	Kall@xtra.co.nz		
Address	116 Maharakeke Road RD1 Waipukurau	Postcode 4281	
Phone	Mobile	Home 06 8589900	Work

2. This is a submission on the Proposed District Plan for Central Hawke's Bay

3. ☐ I could ☑ I could not – gain an advantage in trade competition through this submission *(Please tick relevant box)*

If you could gain an advantage in trade competition through this submission please complete point 4 below:

4. ☐ I am ☐ I am not – directly affected by an effect of the subject matter of the submission that:

(a) adversely affects the environment; and (b) does not relate to trade competition or the effects of trade competition. *(Please tick relevant box if applicable)*

Note: If you are a person who could gain an advantage in trade competition through the submission, your right to make a submission may be limited by clause 6(4) of Part 1 of Schedule 1 of the Resource Management Act 1991.

5. ☐ I wish ☑ I do not wish – to be heard in support of my submission in person *(Please tick relevant box)*

6. ☐ I will ☑ I will not – consider presenting a joint case with other submitters, who make a similar submission, at a hearing. *(Please tick relevant box)*

7. Do you wish to present your submission via Zoom? ☐ Yes ☑ No

8. Please complete section below *(insert additional boxes per provision you are submitting on):*

The specific provision of the plan that my submission relates to:

See next pages

Do you: ☐ Support ☐ Oppose ☐ Amend *(Please tick relevant box)*

What decision are you seeking from Council?

Reasons:

see next pages.

Please note: All submissions will be treated as public documents and will be made available on Council's website. However, you may request that your contact details (but not your name) be withheld. If you want your contact details withheld, please let us know by ticking this box. ☑

The specific provision of the plan that my submission relates to:
① Pages NFL-4 and NFL 10, Policy NFL-P5 and Principal Reasons
about the Mākāroro Gorge (ONF-4) 2nd paragraph on page NFL10

I oppose both the policy NFL-P5 and principal reasons given for the water storage within ONF-4 (Mākāroro Gorge).
I am seeking Council to delete them both.

My reasons are:
The water storage within ONF-4 Mākāroro Gorge is an illegal dam.
The Board of Inquiry also found "that there was conjecture about whether the predicted social effects arising from the Ruataniwha Water Storage Scheme (RWSS) will occur" and "the economic outcomes might not be assured."
The information for the RWSS is outdated, speculative and conjecture. Much has changed since it was done.
More recent reports have said any smaller legal water storage facility on the same site is uneconomical and the site is unsuited to smaller volumes (see August 2020 Tonkin + Taylor CHB Water Security Project - Stage 1, Water Storage Options Assessment)
Costs have increased, it is difficult to get workers, and many people are realising the importance of caring for the natural environment.
In Hawkes Bay it has often been proven when irrigation water supplies are available corporate and industrial farmers take over family farms and there are negative social effects. There has been an increase in migrant labour and seasonal casual workers. School roles have fallen. With the change in farm ownership there can be conflicts with new farmers and their different approaches to farming.
Automation for many jobs will increase in future
Most economic reports have not taken into consideration the productivity benefits of conservation & biodiversity and environmental outcomes of not proceeding with the RWSS. Social benefits of improved water quality and quantity, less land use intensification, a ~~most~~ more natural environment to live in could be more benefit compared to a limited number of people who might get a financial benefit from water storage in the Mākāroro Gorge.

The specific provision of the plan my submission relates to:

(2) ECO- R2, R3, R4, R5, R6, pages ECO-7, 8, 9, 10, 11 ~~and~~
Clearance of indigenous vegetation.

I ~~do~~ oppose them.

I am seeking Council to prohibit clearance of indigenous vegetation except for ECO-R3,1b. (pages ECO-8, ECO-9). Trimming should be discretionary and limited also to ECO-R3 1b.

The reasons:

Manuka and Kanuka species should be given the same protection and status as other indigenous vegetation species. They are important indigenous colonising and nurse plants that grow quickly and provide ideal conditions for the establishment of other indigenous trees and shrubs.

Indigenous vegetation that has naturally re-grown is usually more adapted to the area than plantings by people. They help increase the biodiversity.

If allowing clearance of a limited area and size each year, the cumulative extent over years can be substantial. As there is only a small amount of remaining indigenous cover in CHB all must be protected.

Small, young sizes of indigenous vegetation needs to be allowed to grow and mature as it will eventually replace older vegetation that naturally dies.

ECO-P4 (page ECO-5) 2. Should include all water bodies.

We are encouraged by government, and HBRC, who provide some funding, to plant trees to help control erosion, reduce climate change, enhance our natural environment and help people connect with nature to improve their wellbeing. It has negative effects to allow any indigenous vegetation to be cleared. It affects the environment in many ways. Protecting naturally re-grown indigenous vegetation can save time, labour and money.

The provision of the plan that my submission relates to is
(2) EW P8 - P10, 11 Earthworks - hydrocarbon extraction activities;
pages EW-1 to EW-19, all references to hydrocarbon activities
The decision I am seeking from Council is to make
hydrocarbons, fossil fuels including coal, gas and oil mining activities
prohibited.
These produce greenhouse gas emissions and contribute to
climate change. Everyone is trying to reduce greenhouse
gas emissions and stopping reliance on them.
Oil, gas and coal can have huge negatives on our environment
and pose a big risk to our water, soils and air.
Extraction can increase earthquake risks.
Prospecting, exploration, extraction and use of fossil fuels
including hydrocarbons, gas, oil and coal can have a negative
effect on human and animal health and wellbeing.

Energy Policy ∎ (∎∎∎∎) ∎∎∎–∎∎∎

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Should we build more large dams? The actual costs of hydropower megaproject development ☆

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HIGHLIGHTS

- We investigate *ex post* outcomes of schedule and cost estimates of hydropower dams.
- We use the "outside view" based on Kahneman and Tversky's research in psychology.
- Estimates are systematically and severely biased below actual values.
- Projects that take longer have greater cost overruns; bigger projects take longer.
- Uplift required to de-bias systematic cost underestimation for large dams is +99%.

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Outside view

ABSTRACT

A brisk building boom of hydropower mega-dams is underway from China to Brazil. Whether benefits of new dams will outweigh costs remains unresolved despite contentious debates. We investigate this question with the "outside view" or "reference class forecasting" based on literature on decision-making under uncertainty in psychology. We find overwhelming evidence that budgets are systematically biased below actual costs of large hydropower dams—excluding inflation, substantial debt servicing, environmental, and social costs. Using the largest and most reliable reference data of its kind and multilevel statistical techniques applied to large dams for the first time, we were successful in fitting parsimonious models to predict cost and schedule overruns. The outside view suggests that in most countries large hydropower dams will be too costly in absolute terms and take too long to build to deliver a positive risk-adjusted return unless suitable risk management measures outlined in this paper can be affordably provided. Policymakers, particularly in developing countries, are advised to prefer agile energy alternatives that can be built over shorter time horizons to energy megaprojects.

1. Large hydropower dam controversy

The 21st Century faces significant energy challenges on a global scale. Population and economic growth underpin increasing demand for energy from electricity to transport fuels. Social objectives of poverty alleviation, adaptation and mitigation of climate change, and energy security present policy makers and business leaders with difficult decisions and critical trade-offs in implementing sound energy policies. Demand for electricity is, for example, slated to almost double between 2010 and 2035 requiring global electricity capacity to increase from 5.2 terawatt (TW) to 9.3 TW over the same period (IEA, 2011). Currently, the de facto strategic response to these big energy challenges is "big solutions" such as large hydropower dams. Are such big solutions in general and large hydropower dams in particular the most effective strategy, on a risk-adjusted basis, to resolve global energy challenges? Might more numerous small interventions be more prudent from the perspective of risk management and maximizing net present value even when they entail somewhat higher per unit cost of production?

Proponents of large dams envisage multiple benefits. A big step-up in hydropower capacity along with a long and varied list of corollary benefits: reducing fossil fuel consumption, flood control, irrigation, urban water supply, inland water transport, technological progress, and job creation (Billington and Jackson, 2006; ICOLD, 2010). Inspired by the promise of prosperity, there is a robust

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pipeline of new mega-dams being developed globally after a two-decade lull. The Belo Monte dam in Brazil, the Diamer-Bhasha in Pakistan, Jinsha river dams in China, Myitsone dam in Myanmar, or the Gilgel Gibe III dam in Ethiopia, all in various stages of development, are unprecedented in scale.

Large dams are, however, controversial because they exert substantial financial costs (World Bank, 1996; World Commission on Dams, 2000). Beyond the financial calculus, large dams have profound environmental (McCully, 2001; Scudder, 2005; Stone, 2011), ecological (Nilsson et al., 2005; Ziv et al., 2012), and social (Bakker, 1999; Duflo and Pande, 2007; Richter et al., 2010; Sovacool and Bulan, 2011) impacts. Stone (2011, p. 817) reports in *Science* that the Three Gorges dam in China is an "environmental bane" that will cost over USD 26.45 billion over the next 10 years in environmental "mitigation efforts". Despite their outsized financial and environmental costs, the purported benefits of large hydropower dams prove uncertain. For example, the World Commission of Dams (2000, p. 30) reported that for large hydropower dams "average [hydropower] generation in the first year of commercial operation is 80% of the targeted value"—a trend of which the recently completed Bakun hydroelectric project in Borneo is an alarming example (Sovacool and Bulan, 2011). Similarly, Duflo and Pande (2007) find adverse distributional impacts of large irrigation dams in India. Winners downstream come with losers upstream yielding a more modest, if any, net economic benefit.

The scale of contemporary large dams is so vast that even for a large economy such as China's the negative economic ramifications "could likely hinder the economic viability of the country as a whole" if the risks inherent to these projects are not well managed (Salazar, 2000). Similarly, Merrow et al. (1988, pp. 2–3) warn that "such enormous sums of money ride on the success of megaprojects [such as large dams] that company balance sheets and even government balance-of-payments accounts can be affected for years by the outcomes". Such warnings are not idle alarmism. There is mounting evidence in civil society, academic research, and institutional accounts that large dams have strikingly poor performance records in terms of economy, social and environmental impact, and public support (McCully, 2001; Scudder, 2005; Singh, 2002; Sovacool and Bulan, 2011; WCD, 2000). There are acrimonious, and as yet inconclusive, debates in scientific literature and civil society about whether large dams are a boon or a curse. Should we build more large hydropower dams? How confident can planners be that a large bet on a large dam will pay-off handsomely?

We investigate these questions with the "outside view" or "reference class forecasting" based on the literature on decision-making under uncertainty that won Princeton psychologist Daniel Kahneman the Nobel Prize in economics in 2002 (Kahneman and Tversky, 1979a, 1979b; Kahneman, 1994) extended and applied by Bent Flyvbjerg and colleagues to infrastructure projects (Flyvbjerg et al., 2003; Flyvbjerg, 2009). We present statistical and comparative evidence from the largest reference class to-date of actual costs of large hydropower dam projects (hereafter large dams unless stated otherwise). We find that even before accounting for negative impacts on human society and environment, the actual construction costs of large dams are too high to yield a positive return. Large dams also take inordinately long periods of time to build, making them ineffective in resolving urgent energy crises. Our evidence pertains primarily to large dams and the results cannot be applied either to smaller dams or other large energy solutions such as nuclear power without first building a separate "reference class" for other types of power generation technologies. Our findings, however, point towards the generalizable policy proposition that policymakers should prefer energy alternatives that require less upfront outlays and that can be built very quickly.

There is no doubt that harnessing and managing the power of water is critical for economies but large dams are not the way to do so unless suitable risk management measures outlined in this paper can be affordably provided. Building on literature in decision making under uncertainty in management, psychology, and planning research, this paper further provides public agencies (e.g. national planning and finance ministries, power and water authorities), private entrepreneurs, investors, and civil society a framework to test the reliability of *ex ante* estimates for construction costs and schedules of power generation alternatives. An impartial and rigorous application of the reference class forecasting methods proposed here can improve the selection and implementation of new investments.

2. Delusion and deception in large hydropower dam planning?

Our approach to address the debates about whether or not to build dams is to incorporate an evidence-based perspective that reflects how decisions among alternative options are actually made and on what basis. Theoretical and empirical literature on decision-making under uncertainty proposes two explanations—psychological delusion and political deception—that suggest decision-makers' forecasts, and hence ex ante judgment, are often adversely biased (Tversky and Kahneman, 1974; Kahneman and Lovallo, 1993; Flyvbjerg, 2003; Lovallo and Kahneman, 2003; Kahneman, 2011).

First, experts (e.g., statisticians, engineers, or economists) and laypersons are systematically and predictably too optimistic about the time, costs, and benefits of a decision. This "planning fallacy" (Kahneman and Tversky, 1979b; Buehler et al., 1994) stems from actors taking an "inside view" focusing on the constituents of the specific planned action rather than on the outcomes of similar actions already completed (Kahneman and Lovallo, 1993). Thus, for example, the estimated costs put forward by cities competing to hold the Olympic Games have consistently been underestimated yet every four years these errors are repeated. Biases, such as overconfidence or overreliance on heuristics (rules-of-thumb), underpin these errors.

Second, optimistic judgments are often exacerbated by deception, i.e. strategic misrepresentation by project promoters (Wachs, 1989; Pickrell, 1992; Flyvbjerg et al., 2002, 2005, 2009). Recent literature on infrastructure delivery finds strong evidence that misplaced political incentives and agency problems lead to flawed decision-making (see Flyvbjerg et al., 2009). Flyvbjerg et al. (2009, p. 180) further discuss that delusion and deception are complementary rather than alternative explanations for why megaprojects typically face adverse outcomes. It is, however, "difficult to disentangle" delusion from deception in practice. Using quasi-experimental evidence from China, Ansar et al. (2013) suggest that while better incentive alignment can help to lower the frequency and, to a lesser extent, the magnitude of biases, it does not entirely cure biases.

Be it delusion or deception, is decision-making in large hydropower dams systematically biased by errors in cost, schedule, and benefit forecasts? What is the risk that costs might outweigh benefits for a proposed dam? While the future is unknowable, uncertain outcomes of large investments can still be empirically investigated using "reference class forecasting" (RCF) or the "outside view" techniques (Kahneman and Lovallo, 1993; Flyvbjerg, 2006, 2008). To take an outside view on the outcome of an action (or event) is to place it in the statistical distribution of the outcomes of comparable, already-concluded, actions (or events). The outside view has three advantages: First, it is evidence-based and requires no restrictive assumptions. Second, it helps to test and fit models to explain why the outcomes of a reference class of

past actions follow the observed distribution. Third, it allows to predict the uncertain outcomes of a planned action by comparing it with the distributional information of the relevant reference class. The theoretical foundations of the outside view were first described by Kahneman and Tversky (1979b) and later by Kahneman and Lovallo (1993) and Lovallo and Kahneman (2003) as means to detect and cure biases in human judgment. The methodology and data needed for employing the outside view, or reference class forecasting, in practice were developed by Flyvbjerg (2006, 2008) in collaboration with first implemented in practice by Flyvbjerg and COWI (2004).

2.1. Three steps to the outside view

The outside view, applied to large dams for the first time here, involves three steps: (i) identify a reference class; (ii) establish an empirical distribution for the selected reference class of the parameter that is being forecasted; (iii) compare the specific case with the reference class distribution. We take a further innovatory step of fitting multivariate multilevel models to the reference data to predict future outcomes. Our technique is an important improvement in the methodology of the outside view that can be generalized and applied to other large-scale and long-term decisions under uncertainty. With de-biased forecasts managers can make empirically and statistically grounded, rather than optimistic, judgments (Dawes et al., 1989; Buehler et al., 1994; Gilovich et al., 2002).

The outside view—as implemented by Flyvbjerg (2006, 2008)—is not without limitations (see Sovacool and Cooper, 2013 for a discussion specifically about energy megaprojects). For example, RCF focuses on generic risk inherent in a reference class rather than specific project-level risk. We rectify against this limitation by fitting regression models in addition to using traditional RCF methods in the result section below. Sovacool and Cooper (2013, p. 63) further suggest that RCF may not provide sufficiently accurate indication of the risks of rare megaprojects the likes of which have never been built before. Such "out of the sample" problems are well noted in probability theory. They do not, however, deny the fundamental usefulness of RCF. If anything our results err towards conservative estimates of actual cost overruns and risks experienced by large dams.

2.2. Measures and data

Following literature on the planning fallacy (Sovacool and Cooper, 2013), the parameters central to our investigation and multilevel regression analysis is the inaccuracy between managers' forecasts and actual outcomes related to construction costs, or the cost overrun, and implementation schedule, or schedule slippage. Following convention, cost overrun is the actual outturn costs expressed as a ratio of estimated costs[1]; cost overruns can also be thought as the underestimation of actual costs (Bacon and Besant-Jones, 1998; Flyvbjerg et al., 2002). Schedule slippage, called schedule overrun, is the ratio of the actual project implementation duration to the estimated project implementation. The start of the implementation period is taken to be the date of project approval by the main financiers and the key decision makers, and the end is the date of full commercial operation.

Inaccuracies between actual outcomes versus planned forecasts are useful proxies for the underlying risk factors that led to the inaccuracies. For example, cost overruns reduce the attractiveness of an investment and if they become large the fundamental economic viability becomes questionable. Bacon and Besant-Jones (1998, p. 317) offer an astute summary:

> The economic impact of a construction cost overrun is the possible loss of the economic justification for the project. A cost overrun can also be critical to policies for pricing electricity on the basis of economic costs, because such overruns would lead to underpricing. The financial impact of a cost overrun is the strain on the power utility and on national financing capacity in terms of foreign borrowings and domestic credit.

Similarly, schedule slippages delay much needed benefits, expose projects to risks such as an increase in finance charges, or creeping inflation, which may all require upward revision in nominal electricity tariffs. Financial costs and implementation schedules, because of their tangibility, are also good proxies for non-pecuniary impacts such as those on the environment or on the society. Projects with a poor cost and schedule performance are also likely to have a poor environmental and social track record. A greater magnitude of cost and schedule overruns is thus a robust indicator of project failure (Flyvbjerg, 2003).

In taking the outside view on the cost and schedule under/overruns, our first step was to establish a valid and reliable reference class of previously built hydropower dams as discussed above. The suggested practice is that a reference class ought to be broad and large enough to be statistically meaningful but narrow enough to be comparable (Kahneman and Tversky, 1979b; Kahneman and Lovallo, 1993; Flyvbjerg, 2006). International standard defines dams with a wall height >15 m as large. The total global population of large dams with a wall height >15 m is 45,000. There are 300 dams in the world of monumental scale; these "major dams" meet one of three criteria on height (>150 m), dam volume (>15 million m^3), or reservoir storage (>25 km^3) (Nilsson et al., 2005).

From this population of large dams, our reference class drew a representative sample of 245 large dams (including 26 major dams) built between 1934 and 2007 on five continents in 65 different countries—the largest and most reliable data set of its kind. The portfolio is worth USD 353 billion in 2010 prices. All large dams for which valid and reliable cost and schedule data could be found were included in the sample. Of the 245 large dams, 186 were hydropower projects (including 25 major dams) and the remaining 59 were irrigation, flood control, or water supply dams. While we are primarily interested in the performance of large dam projects with a hydropower component, we also included non-hydropower dam projects in our reference class to test whether project types significantly differ in cost and schedule overruns or not. Fig. 1 presents an overview of the sample by regional location, wall height, project type, vintage, and actual project cost.

The empirical strategy of this paper relied on documentary evidence on estimated versus actual costs of dams. Primary documents were collected from *ex ante* planning and *ex post* evaluation documents of the

1. Asian Development Bank;
2. World Bank, also see World Bank (1996) and Bacon and Besant-Jones (1998);
3. World Commission of Dams (WCD), also see WCD (2000)[2];
4. U.S. Corps of Engineers;
5. Tennessee Valley Authority;

[1] Cost overruns can also be expressed as the actual outturn costs minus estimated costs in percent of estimated costs.

[2] Note that the World Bank, Asian Development Bank, and the WCD typically report cost data in nominal USD. We, however, converted these data, adapting methods from World Bank (1996: 85), into constant local currencies.

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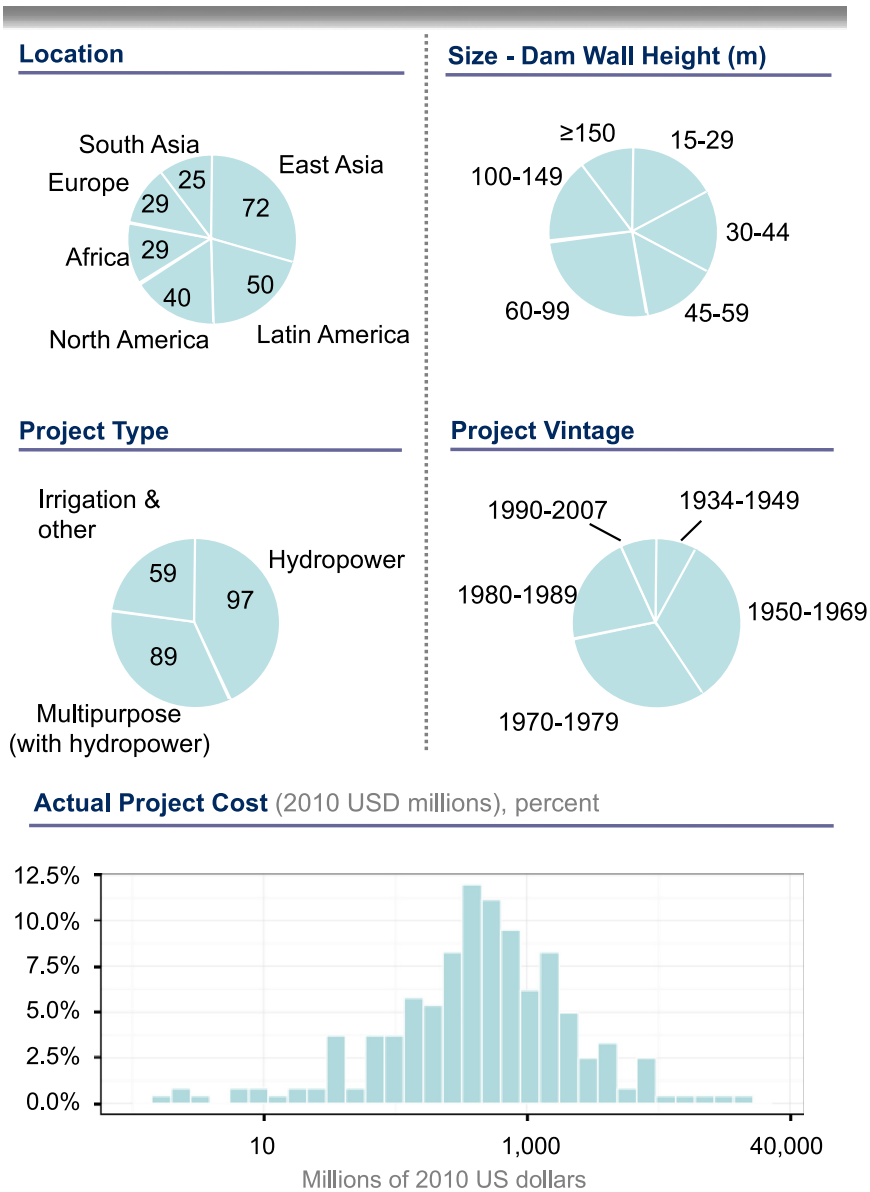

Fig. 1. Sample distribution of 245 large dams (1934–2007), across five continents, worth USD 353B (2010 prices).

6. U.S. Bureau of Reclamation, also see Hufschmidt and Gerin (1970),[3] and Merewitz (1973) on the U.S. water-resource construction agencies.

The procedures applied to the cost and schedule data here are consistent with the gold standard applied in the field—more detailed methodological considerations can be found in Flyvbjerg et al. (2002), Federal Transit Administration (2003), Pickrell (1989, 1992), World Bank (1996) and Bacon and Besant-Jones (1998) with which our data are consistent. All costs are total project costs comprising the following elements: right-of-way acquisition and resettlement; design engineering and project management services; construction of all civil works and facilities; equipment purchases. Actual outturn costs are defined as real, accounted construction costs determined at the time of project completion. Estimated costs are defined as budgeted, or forecasted, construction costs at the time of decision to build. The year of the date of the decision to build a project is the base year of prices in which all estimated and actual constant costs have been expressed in real (i.e. with the effects of inflation removed) local currency terms of the country in which the project is located. We exclude from our calculations debt payments, any *ex post* environmental remedial works, and opportunity cost of submerging land to form reservoirs. This makes comparison of estimated and actual costs of a specific project a like-for-like comparison.

2.3. Analyses

We investigated the magnitude and frequency of cost and schedule forecast (in)accuracies with a combination of simple

[3] Hufschmidt and Gerin (1970) report data on over 100 dams built in the United States between 1933 and 1967. The salient results of the study were that in nominal USD terms dams built by TVA suffered a 22% cost overrun; U.S. Corps of Engineers overrun was 124% for projects built or building prior to 1951, and 36% for projects completed between 1951 and 1964; while U.S. Bureau of Reclamation overrun was 177 per cent for projects built or building prior to 1955 and 72 per cent for all projects built or building in 1960 (Hufschmidt and Gerin, 1970: 277). Despite its large sample, Hufschmidt and Gerin (1970) do not report data broken down project-by-project. The validity and reliability of these data could not thus be established and were consequently excluded.

statistical (parametric and non-parametric) tests and by fitting more sophisticated multilevel regression models sometimes termed Hierarchical Linear Models (HLM).

Multilevel or hierarchically structured data are the norm in the social, medical, or biological sciences. Rasbash et al. (2009, p. 1) explain: "For example, school education provides a clear case of a system in which individuals are subject to the influences of grouping. Pupils or students learn in classes; classes are taught within schools; and schools may be administered within local authorities or school boards. The units in such a system lie at four different levels of a hierarchy. A typical multilevel model of this system would assign pupils to level 1, classes to level 2, schools to level 3 and authorities or boards to level 4. Units at one level are recognized as being grouped, or nested, within units at the next higher level. Such a hierarchy is often described in terms of clusters of level 1 units within each level 2 unit, etc. and the term clustered population is used." Important for a hierarchical linear model is that the dependent variable is at the lowest level of the nested structure. Multilevel models are necessary for research designs where data for observations are organized at more than one level (i.e., nested data) (Gelman and Hill, 2007). Failing to use multilevel models in such instances would result in spurious results (Rasbash et al., 2009).

With respect to our data on dams, projects are nested in the countries of their domicile. Like test scores of pupils from the same school tend exhibit within-school correlation, similarly outcomes of dam projects may exhibit within-country correlation that needs to be properly modeled using a multilevel model. We took this into account by modeling country as a first level random effect in a mixed effects multilevel model. The models were made parsimonious by using stepwise variable selection.

3. Results and interpretation

Our second step was to establish an empirical distribution for the cost forecast errors of large dams. We collected data on 36 possible explanatory variables, listed in Table 1, for the 245 large dams in our reference class.

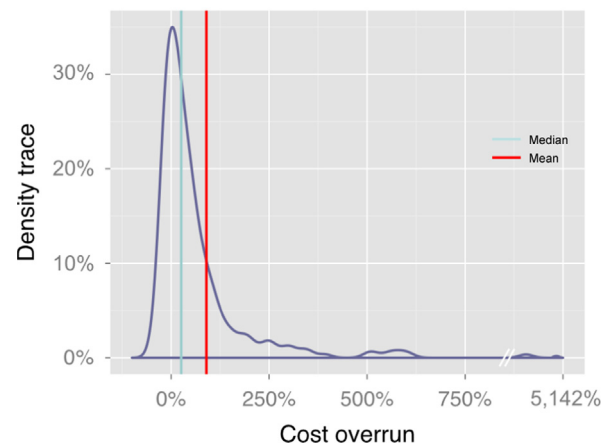

Fig. 2. Density trace of actual/estimated cost (i.e. costs overruns) in constant local currency terms with the median and mean (N=245).

Table 1
Variables and characteristics used in multilevel regressions on construction cost overrun and schedule slippage.

Project-specific variables
Project features
Hydropower or non-hydropower large dam project (dummy variable)
New power station or station extension (dummy variable)
Size
Generator unit capacity (MW)
Total project generation capacity (MW)
Dam height for new hydropower station (meters)
Hydraulic head for new hydropower station (meters)[a]
Reservoir area created by project (hectares)[a]
Length of tunnels (kilometers)[a]
Cost
Estimated project cost (constant local currency converted to 2010 USD MM)
Actual project cost (constant local currency converted to 2010 USD MM)
Cumulative inflation contingency (percentage)
Time
Year of final decision to build
Estimated implementation schedule (months)
Year of start of full commercial operation
Actual implementation schedule (months)
Procurement
Estimated project foreign exchange costs as a proportion of estimated total project costs (percentage)
Competitiveness of procurement process, international competitive bidding amount as a proportion of estimated total project costs (percentage)[a]
Main contractor is from the host country (dummy variable)
Country variables
Country (second level to control for within country correlation)
Political regime of host country is a democracy (dummy variable)
GDP of host country (current USD)
Per capita income of host country in year of loan approval (constant USD)
Average actual cost growth rate in host country over the implementation period—the GDP deflator (percentage)
MUV Index of actual average cost growth rate for imported project components between year of loan approval and year of project completion
Long-term inflation rate of the host country (percentage)
Actual average exchange rate depreciation or appreciation between year of formal-decision-to-build and year of full commercial operation (percentage)
South Asian projects (dummy variable)
North American projects (dummy variable)

[a] Denotes variables with a large number of missing values not used for regression analysis.

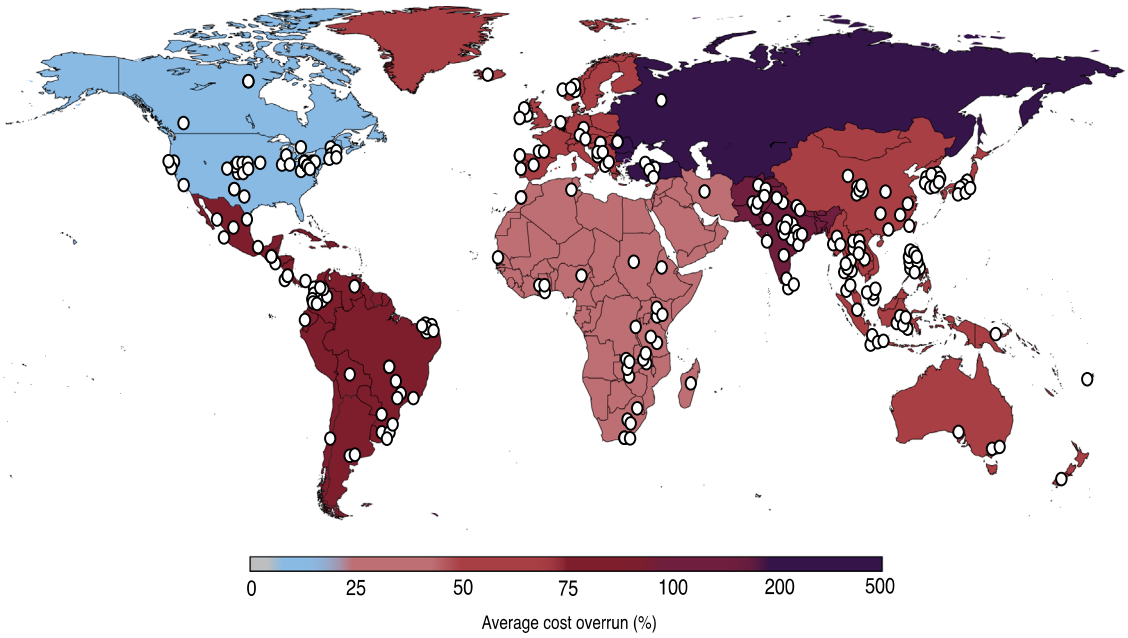

Fig. 3. Location of large dams in the sample and cost overruns by geography.

3.1. Preliminary statistical analysis of cost performance

With respect to cost overruns, we make the following observations:

1. Three out of every four large dams suffered a cost overrun in constant local currency terms.
2. Actual costs were on average 96% higher than estimated costs; the median was 27% (*IQR* 86%). The evidence is overwhelming that costs are systematically biased towards underestimation (Mann–Whitney–Wilcoxon $U=29{,}646$, $p<0.01$); the magnitude of cost underestimation (i.e. cost overrun) is larger than the error of cost overestimation ($p<0.01$). The skew is towards adverse outcomes (i.e. going over budget).
3. Graphing the dams' cost overruns reveals a fat tail as shown in Fig. 2; the actual costs more than double for 2 out of every 10 large dams and more than triple for 1 out of every 10 dams. The fat tail suggests that planners have difficulty in computing probabilities of events that happen far into the future (Taleb, [2007] 2010, p. 284))
4. Large dams built in every region of the world suffer systematic cost overruns. The mean forecasting error is significantly above zero for every region. Fig. 3 shows the geographical spread and cost overruns of large dams in our reference class. Large dams built in North America ($n=40$) have considerably lower cost overrun ($M=11\%$) than large dams built elsewhere ($M=104\%$). Although after controlling for other covariates such as project scale in a multilevel model, reported below, the differences among regions are not significant. We noted, three out of four dams in our reference class had a North American firm advising on the engineering and economic forecasts. Consistent with anchoring theories in psychology, we conjecture that an over-reliance on the North American experience with large dams may bias cost estimates downwards in rest of the world. Experts may be "anchoring" their forecasts in familiar cases from North America and applying insufficient "adjustments" (Flyvbjerg et al., 2009; Tversky and Kahneman, 1974), for example to adequately reflect the risk of a local currency depreciation or the quality of local project management teams. Instead of optimistically hoping to replicate the North American cost performance, policymakers elsewhere ought to consider the global distributional information about costs of large dams.
5. The typical forecasted benefit-to-cost ratio was 1.4. In other words, planners expected the net present benefits to exceed the net present costs by about 40%. Nearly half the dams suffered a cost overrun ratio of 1.4 or greater breaching this threshold after which the asset can be considered stranded—i.e. its upfront sunk costs are unlikely to be recovered. This is assuming, of course, that the benefits did not also fall short of targets, even though there is strong evidence that actual benefits of dams are also likely to fall short of targets (WCD, 2000; McCully, 2001; Scudder, 2005).[4]
6. We tested whether forecasting errors differ by project type (e.g., hydropower, irrigation, or multipurpose dam) or wall type (earthfill, rockfill, concrete arch, etc.). Pairwise comparisons of percentage mean cost overrun and standard deviations as well as non-parametric Mann–Whitney tests for each of the parameters show no statistically significant differences. We conclude that irrespective of project or wall type, the probability distribution from our broader reference class of 245 dams applies as in Fig. 2.
7. We analyzed whether cost estimates have become more accurate over time. Statistical analysis suggests that irrespective of the year or decade in which a dam is built there are no significant differences in forecasting errors ($F=0.57$, $p=0.78$). Similarly, there is no linear trend indicating improvement or deterioration of forecasting errors ($F=0.54$, $p=0.46$) as also suggested in Fig. 4. There is little learning from past mistakes. By the same token, forecasts of costs of large dams today are likely to be as wrong as they were between 1934 and 2007.

We also explored the absolute costs of large hydropower dams ($N=186$). A large hydropower dam on average costs 1800 million in 2010 USD with an average installed capacity of 630 MW. One MW installed capacity on average costs 2.8 million in 2010 USD.

[4] A more comprehensive inquiry into planned versus actual benefits of dams is postponed until a future occasion but data available on 84 of the 186 large hydroelectric dam projects thus far suggests that they suffer a mean benefits shortfall of 11%.

Fig. 4. Inaccuracy of cost estimates (local currencies, constant prices) for large dams over time ($N=245$), 1934–2007.

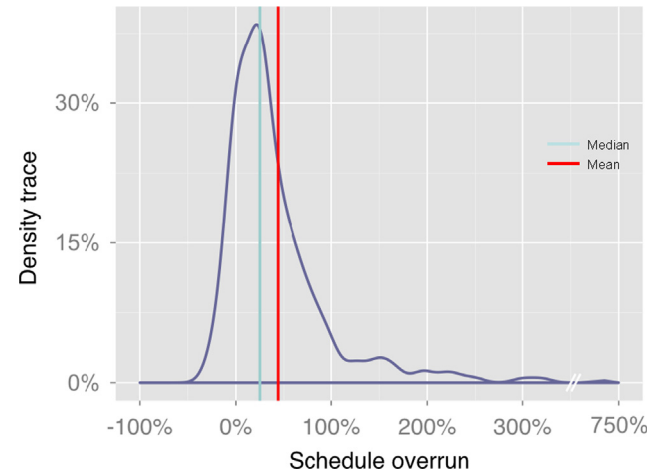

Fig. 5. Density trace of schedule slippage ($N=239$) with the median and mean.

A preliminary univariate analysis, which makes no attempts to take into account any covariates, shows that increase in the scale of a dam, e.g., measured as height of the dam wall, increases the absolute investment required exponentially, e.g. a 100 m high dam wall is four times more costly than a 50 m wall ($R^2=0.27$, $F=92.5$, $p<0.01$). An even stronger relationship can be seen between installed capacity MW and actual costs ($R^2=0.70$, $F=461.1$, $p<0.01$).

Furthermore, the rate of cost overrun outliers increases with increase in dam size either measured in installed hydropower generation ($r=0.24$, $p=0.01$) or wall height ($r=0.13$, $p=0.05$). Since there is a significant correlation between dam height and hydropower installed capacity ($r=0.47$, $p<0.01$), evidence suggests that larger scale in general is prone to outlying cost overruns. We further investigate the effects of scale on cost overruns by fitting multilevel models (Models 1 and 2) reported below.

3.2. Preliminary statistical analysis of schedule performance

Not only are large dams costly and prone to systematic and severe budget overruns, they also take a long time to build. Large dams on average take 8.6 years. With respect to schedule slippage, we make the following observations:

8. Eight out of every 10 large dams suffered a schedule overrun.
9. Actual implementation schedule was on average 44% (or 2.3 years) higher than the estimate with a median of 27% (or 1.7 years) as shown in Fig. 5. Like cost overruns, the evidence is overwhelming that implementation schedules are systematically biased towards underestimation (Mann–Whitney–Wilcoxon $U=29{,}161$, $p<0.01$); the magnitude of schedule underestimation (i.e. schedule slippage) is larger than the error of schedule overestimation ($p<0.01$).
10. Graphing the dams' schedule overruns also reveals a fat tail as shown in Fig. 5, albeit not as fat as the tail of cost overruns. Costs are at a higher risk of spiraling out of control than schedules.
11. There is less variation in schedule overruns across regions than cost overruns. Large dams built everywhere take significantly longer than planners forecast. North America with a 27% mean schedule overrun is the best performer. A non-parametric comparison using a Wilcoxon test ($p=0.01$) suggests that projects in South Asia have significantly greater schedule overruns ($M=83\%$) than rest of the world taken as a whole ($M=42\%$). We investigate this further with a multilevel model below (Model 3).
12. There is no evidence for schedule estimates to have improved over time.

We tested whether implementation schedules and project scale are related. A preliminary univariate analysis, which makes no attempts to take into account any covariates, shows that increase in the scale of a dam, e.g., measured as estimated cost of construction, increases the absolute actual implementation schedule required exponentially ($R^2=0.13$, $F=36.4$, $p<0.01$). Large scale is intimately linked with the long-term (see Model 2 below). The actual implementation schedule, reported here, does not take into the account lengthy lead times in preparing the projects. Dams require extensive technical and economic feasibility analysis, social and environmental impact studies, and political negotiations. The actual implementation cycles are far longer than the average of about 8.6 years, as shown in our data, that it takes to build a dam. These lengthy implementation schedules suggest that the benefits of large dams (even assuming that large dam generate benefits as forecasted) do not come "online" quickly enough. The temporal mismatch between when users need specific benefits and when these benefits come online is not to be downplayed (Ansar et al., 2012). Alternative investments that can bridge needs quickly, without tremendous time lags, are preferable to investments with a long lead-time and hence duration risk (Luehrman, 1998; Copeland and Tufano, 2004).

3.3. Multilevel regression analysis of cost and schedule performance

Means, standard deviations, and correlations of the variables used in the multilevel regressions are shown in Table 2.

We fitted multilevel regression models with projects nested by country as a second level to incorporate within-country correlation. The models were fitted using the "lme" procedure in the "nlme" package in R software. This function fits a linear mixed-effects model in the formulation described in Laird and Ware (1982) but allowing for nested random effects. The within-group errors are allowed to be correlated and/or have unequal variances. We found it necessary to transform variables to remove excessive skewness as noted in Table 2. Using stepwise variable selection, we are not only able to fit explanatory models for cost and overruns and estimated duration but also practicably parsimonious models for predicting them.

Table 3 summarizes the results from multilevel model examining predictors of cost overruns (Model 1). Model 1 identifies

Table 2
Descriptive statistics and correlations ($N=245$).

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. Cost Overrun[a]	2.0	3.6									
2. Schedule slippage[a]	1.5	0.7	0.17**								
3. Estimated schedule (months)[b]	73.1	33.8	−0.16*	0.23**							
4. Actual schedule (months)[b]	102.7	55.7	−0.27**	−0.43**	0.76**						
5. Year—decision to build	1971.1	13.2	−0.02	0.05	−0.21**	−0.25**					
6. Year—completion	1979.6	12.7	−0.14*	−0.10	0.03	0.08	0.94**				
7. Project type dummy	0.8	0.4	−0.14*	0.08	0.10	0.02	−0.02	−0.02			
8. Democracy dummy	0.4	0.5	0.00	−0.14*	0.16*	0.20**	−0.45**	−0.38**	0.00		
9. Estimated cost (USD MM 2010 constant)[b]	699.6	1215.5	−0.03	0.09	0.48**	0.37**	0.02	0.13*	0.37**	−0.04	
10. Actual cost (USD MM 2010 constant)[b]	1462.2	4032.5	−0.38**	0.02	0.50**	0.43**	0.02	0.17**	0.38**	−0.03	0.93**
11. Height of dam wall (m)[c]	77.3	51.6	−0.10	0.10	0.26**	0.17**	0.10	0.16*	0.34**	−0.03	0.51**
12. Installed hydropower capacity (MW)[b]	487.0	1255.3	−0.16*	0.19**	0.22**	0.08	0.13*	0.16*	0.69**	−0.14*	0.59**
13. Length of dam wall (m)[b]	1364.1	2061.9	−0.12	−0.07	0.25**	0.30**	−0.19**	−0.08	−0.07	0.08	0.37**
14. Tunnel length (m)[b]	3500.0	7869.5	0.13	−0.12	−0.04	0.16	−0.06	−0.01	−0.23	0.05	0.11
15. Manufactures unit value index CAGR[d]	6.0	5.4	−0.01	−0.03	−0.25**	−0.18**	−0.12	−0.18**	0.08	−0.08	−0.13
16. GDP (nominal USD B)[b]	1221.1	253.4	−0.05	0.25**	0.36**	0.17*	0.29**	0.37**	−0.13	0.13	0.19*
17. Per capita income (2000 constant USD)[b]	4132.8	5198.6	0.23**	0.15*	0.11	0.01	−0.37**	−0.40**	−0.07	0.48**	−0.07
18. Long-term inflation (%)[b]	17%	0.2	−0.29**	0.04	−0.09	−0.11	0.22**	0.19**	0.24**	−0.37**	0.13*
19. Forex depreciation (%)[e]	18%	70.3	−0.30**	−0.04	0.03	0.00	0.29**	0.29**	0.16*	−0.20**	0.21**
20. South Asia dummy	0.1	0.3	−0.25**	−0.18**	0.17**	0.26**	−0.04	0.07	−0.06	0.20**	0.11
21. North America dummy	0.2	0.4	0.28**	0.06	0.21**	0.13*	−0.57**	−0.55**	−0.09	0.52**	0.06

Variable	10	11	12	13	14	15	16	17	18	19	20
11. Height of dam wall (m)	0.51**										
12. Installed hydropower capacity (MW)	0.60**	0.47**									
13. Length of dam wall (m)	0.38**	0.03	0.13								
14. Tunnel length (m)	−0.01	0.05	−0.22	−0.18							
15. Manufactures Unit Value Index CAGR	−0.12	−0.08	−0.02	0.02	−0.02						
16. GDP (nominal USD)	0.19*	0.10	0.09	0.04	−0.29	−0.31**					
17. Per capita income (2000 constant USD)	−0.14*	−0.08	−0.11	−0.02	−0.09	−0.01	0.29**				
18. Long-term inflation (%)	0.22**	0.06	0.33**	0.07	−0.41*	0.15*	−0.03	−0.24**			
19. Forex	0.29**	0.09	0.29**	−0.02	−0.37*	−0.16*	0.00	−0.26**	0.64**		
20. South Asia dummy	0.19**	0.08	−0.03	0.20**	NA	−0.09	−0.01	−0.46**	−0.10	0.11	
21. North America dummy	−0.03	−0.10	−0.16*	0.19**	NA	−0.18**	0.33**	0.60**	−0.44**	−0.31**	−0.15*

[a] One over ($1/x$) transformed.
[b] Log transformed.
[c] Sq. rt. ($\sqrt{x}$).
[d] Cb rt. ($\sqrt[3]{x}$).
[e] $x^{0.25}$ transformed to remove excess skewness for regression analysis and to calculate correlations.
** $p<0.01$.
* $p<0.05$.

Table 3
Model 1—Significant variables for cost accuracy for large dam projects (constant local currency).

Variable	Regression coefficient	Standard error	*t*-Stat	2-Tailed significance
Intercept	1.402	0.185	7.560	0.000
Log estimated duration (months)	−0.100	0.041	−2.424	0.016
Log of country's long-term inflation rate (%)	−0.085	0.029	−2.930	0.005

Note: Dependent variable is cost forecast accuracy, which is the estimated/actual cost ratio (i.e. $1/x$ of the cost overrun to remove excessive skewness), based on 239 observations. Since the dependent variable in Model 1 is the inverse of the cost overrun a negative sign on the coefficients of both significant variables suggests that an increase in the estimated duration or long-term inflation rate increases the cost overrun.

the estimated implementation schedule and the long-term inflation rate in the country in which the project is built as highly significant variables. An increase in estimated duration of one year contributes to an increase in cost overrun of approx. 5–6 percentage points depending on the country whilst holding the inflation rate constant (see Fig. A1). Note that an R-squared measure, which is customary to report for single-level regressions as explained proportion of variance, cannot be applied to multilevel models (Recchia, 2010).[5] The usual diagnostics, based upon the model residuals, were satisfactory.

The first finding in Model 1 is that the larger the estimated implementation schedule the higher the cost overrun ($p=0.016$), with all other things being equal, is particularly noteworthy for two reasons.

First, Model 1 suggests that planners' forecasting skills decay the longer in the future they are asked to project the risks facing a large dam. Material information about risks, for example, related to geology, prices of imports, exchange rates, wages, interest rates, sovereign debt, environment, only reveal in future shaping episode to which decision-makers are "blind" ex ante (Flyvbjerg and Budzier, 2011). We discuss some qualitative case examples to illustrate this statistical result and its broader implications in the next section.

Second, preliminary analysis had suggested that estimated implementation schedules depend on the scale of a planned

[5] Recchia (2010, p. 2) explains further why a *R*-squared measure cannot be used for a multilevel model. A single-level model "includes an underlying assumption of residuals that are independent and identically distributed. Such an assumption could easily be inappropriate in the two[or multi]-level case since there is likely to be dependence among the individuals that belong to a given group. For instance, it would be difficult to imagine that the academic achievements of students in the same class were not somehow related to one another". Also see Kreft and Leeuw (1998) and Goldstein (2010).

investment—i.e. bigger projects take longer to build. Support of this preliminary result was found by fitting a multilevel model (Model 2) that examines the predictors of estimated implementation schedule. Model 2 shows that height ($p=0.02$), installed capacity (MW) ($p=0.02$), and length ($p=0.04$) of the dam wall are significant variables associated with the estimated implementation schedule. The effect of these covariates can be seen from the coefficients in Table 4: a greater height, installed capacity, or length contribute to longer implementation schedules. We interpret Model 2 as follows. Estimated implementation schedule acts not only as a temporal variable but also as a surrogate for scalar variables such as wall height (which is also highly correlated with installed capacity). The larger the dam, the longer the estimated implementation schedule, and the higher the cost overrun.

Taken together, the multilevel models for cost overruns and estimated schedule suggest that longer time horizons and increasing scale are underlying causes of risk in investments in large hydropower dam projects.

The second finding in Model 1 is that higher the long-term inflation rate of the host country the higher the cost overrun suffered by a dam ($p=0.02$). The long-term inflation rate was calculated by fitting a linear model to the log of the time series of the GDP deflator index of each country. The slope of this fitted line can be interpreted as the annual average growth rate of the log inflation for each country. This slope is a different constant for each country with some countries such as Brazil with a considerably higher long-term inflation rate, and hence greater propensity to cost overruns, than China or the United States. Moreover, this slope is stable in the short-run (it takes years of high or low inflation to change this slope) and hence our estimate can be assumed to be reliable predictor. Recall that the cost overrun is being measured in constant terms (i.e. with the effects of inflation removed); yet Model 1 suggests that the inflation trajectory of a country, which we interpret as a surrogate of the overall macroeconomic management, is an important risk when making durable investments. The multilevel model finally suggests that once country specific factors have been taken into account the factor that drives cost overrun is the planning horizon.

Finally, we fit a multilevel model (Model 3) to examine predictors of schedule overruns. Model 3 identifies the following significant variables: whether or not a country is a democracy; the per capita income of the country in 2000 constant USD in the year of the decision to build; the planned installed capacity (MW); and planned length of the dam wall (meters). Avid dam building countries in South Asia, at various stages of democratic maturity, have also one of the poorest schedule performances in building dams. We controlled for this fact by including a dummy variable for South Asia in the model as a covariate with an interaction effect with the democracy dummy. Democracy in South Asia is significant in explaining schedule overruns. The South Asia dummy, however, does not come out to be significant. The effect of these covariates and the interaction effect can be seen in Table 5.

First, democracies' forecasts about implementation schedules of large dams are systematically more optimistic than autocracies even after controlling for systematically higher schedule overruns in India and Pakistan. The size of the coefficient is large suggesting that political process has profound impact on the schedule slippage. We tested whether democracies take longer than autocracies to build large dams by fitting a model to explain the actual implementation schedule (Model 4). Model 4, summarized in Table 6, shows that effects of political regime on the actual schedule are not significant. In other words, while democracies do not take longer to build large dams than autocracies in absolute terms, democracies appear to be more optimistic. Given its vast scope, we defer a further investigation of this important result to a future inquiry. We note, however, that theories of delusion and deception in the planning of large infrastructure projects (Flyvbjerg et al., 2009) would interpret this as evidence of ex ante political intent among democratically elected politicians to present a rosier picture about large dams than they know the case to be.

Second, countries with a higher per capita income in constant 2000 USD in the year of decision to build tend to have lower

Table 4
Model 2—Significant variables for estimated construction schedule for large dam projects (months).

Variable	Regression coefficient	Standard error	*t*-Stat	2-Tailed significance
Intercept	3.444	0.197	17.464	0.000
Sq rt of dam wall height (m)	0.029	0.012	2.414	0.017
Log of dam wall length (m)	0.058	0.027	2.153	0.033
Log of hydropower installed capacity (MW)	0.016	0.007	2.141	0.034

Note: Dependent variable is log of the estimated construction schedule, based on 239 observations.

Table 6
Model 4—Significant variables for estimated construction schedule for large dam projects (months).

Variable	Regression coefficient	Standard error	*t*-Stat	2-Tailed significance
Intercept	−17.712	6.401	−2.767	0.007
Log of dam wall length (m)	0.105	0.029	3.567	0.001
Year of actual project completion	0.011	0.003	3.358	0.001

Note: Dependent variable is log of the actual construction schedule, based on 239 observations.

Table 5
Model 3—Significant variables for schedule slippage for large dam projects.

Variable	Regression coefficient	Standard error	*t*-Stat	2-Tailed significance
Intercept	0.405	0.163	2.483	0.014
Democracy dummy[a]	−0.134	0.055	−2.439	0.016
Log of country's per capita income in year of decision to build (constant USD)	0.065	0.019	3.334	0.001
Log of dam wall length (m)	−0.027	0.013	−2.081	0.039
Log of hydropower installed capacity (MW)	0.018	0.006	3.207	0.002
South Asia dummy	0.211	0.113	1.874	0.066
Democracy in South Asia interaction effect	−0.239	0.113	−2.114	0.036

Note: Dependent variable is $1/x$ of the actual/estimated schedule ratio, based on 239 observations.

[a] Dummy based on the Polity2 variably of Polity IV regime index. Score of +10 to +6=democracy; score of +5 to −10=autocracy.

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schedule overruns than countries with lower per capita income. We concur with the interpretation of Bacon and Besant-Jones (1998, p. 325) that "the best available proxy for most countries is [the] country-per-capita income…[for] the general level of economic support that a country can provide for the construction of complex facilities". This result suggests that developing countries in particular, despite seemingly the most in need of complex facilities such as large dams, ought to stay away from bites bigger than they can chew.

Third, the evidence appears to be contradictory with respect to scale. While a greater dam wall length contributes to a higher schedule overrun, a higher MW installed capacity has the opposite effect. Model 3 in Table 5 shows that the size of coefficients for the two significant variables related to physical scale—i.e. Log of dam wall length (m) and Log of hydropower installed capacity (MW)—is approximately the same but with the opposite sign.[6]

In attempting to interpret this result our conjecture is as follows. Dam walls are bespoke constructions tied to the geological and other site-specific characteristics. In contrast, installed capacity is manufactured off-site in a modular fashion. For example, the 690 MW installed capacity of the recently completed Kárahnjúkar project in Iceland was delivered with six generating units of identical design (6×115 MW). We propose that project components that require onsite construction, e.g. dam wall, are more prone to schedule errors than components manufactured off-site, e.g. generation turbines. Project designs that seek to reduce the bespoke and onsite components in favor of greater modular and manufactured components may reduce schedule uncertainty.

This conjecture is supported by Model 4 in Table 6, which shows that the actual construction schedule, in absolute terms, is significantly increased with an increase in the length of dam wall. In contrast, MW installed capacity does not have an effect on the absolute actual construction schedule suggesting that construction schedules are more sensitive to on-site construction than to components manufactured in factories. Note that lower installed capacity does not necessarily equate with a smaller dam. For example, it is not rare for a large multipurpose dam to have a low MW installed capacity when, for instance, the dam is primarily being used for irrigation or flood management purposes.

4. Qualitative case examples and policy propositions

The statistical results reported in the preceding sections show that cost and schedule estimates of large dams are severely and systematically biased below their actual values. While it is beyond the scope of this paper to discuss wider theoretical implications, the evidence presented here is consistent with previous findings that point to twin problems that cause adverse outcomes in the planning and construction of large and complex facilities such as large hydropower dams: (1) biases inherent in human judgment (delusion) and (2) misaligned principal-agent relationships or political incentives (deception) that underlie systematic forecasting errors. In the context of large dams, we argue that large scale and longer planning time horizons exacerbate the impact of these twin problems. We now present a few qualitative examples of risks large dams typically face to illustrate the statistical results reported above. We jointly draw on the statistical analyses and qualitative analyses to distill propositions of immediate relevance to policy.

Globally, experts' optimism about several risk factors contribute to cost overruns in large dams. For example, the planning documents for the Itumbiara hydroelectric project in Brazil recognized that the site chosen for the project was geologically unfavorable. The plan optimistically declared, "the cost estimates provide ample physical contingencies [20% of base cost] to provide for the removal of larger amounts [of compressible, weak, rock] if further investigations show the need" (World Bank, 1973). This weak geology ended up costing +96% of the base cost in real terms. Itumbiara's case is illustrative of a broader problem. Even though geological risks are anticipatable there is little planners can do to hedge against it. For example, exhaustive geological investigation for a large dam can cost as much as a third of the total cost (Hoek and Palmieri, 1998); at which point still remains a considerable chance of encountering unfavorable conditions that go undetected during the *ex ante* tests (Goel et al., 2012).

Policy proposition 1. *Energy alternatives that rely on fewer site-specific characteristics such as unfavorable geology are preferable.*

Similarly, in the Chivor hydroelectric project in Colombia, the planning document was upbeat that there will be no changes in the exchange rate between the Colombian Peso and the U.S. dollar during the construction period (1970–1977) stating, "No allowance has been made for possible future fluctuations of the exchange rate. This approach is justified by recent experience in Colombia where the Government has been pursuing the enlightened policy of adjusting [policy] quickly to changing conditions in the economy" (World Bank, 1970). In fact, the Colombian currency depreciated nearly 90% against the U.S. dollar as shown in Fig. 6.

Since over half the project's costs covers imported inputs, this currency depreciation caused a 32% cost overrun in real Colombian Peso terms. Currency exposure arises when the inputs required to build a project are denominated in one currency but the outputs in another, or vice versa. The outputs of dams, such as electricity, are denominated in the local currency. Similarly, any increases in tax receipts a dam may enable for the host government also accrue in local currency. A large portion of inputs to build a dam, particularly in developing countries, however, constitute imports paid for in USD. Since the USD liabilities also have to eventually be

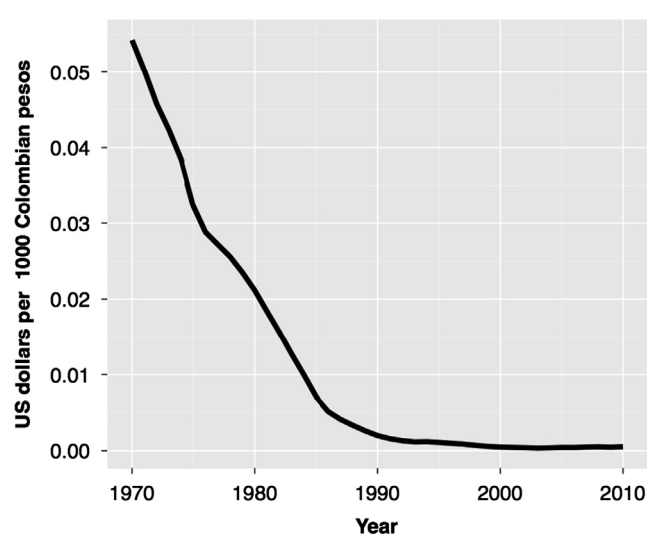

Fig. 6. Depreciation of the Colombian Peso 1970–2010.

[6] Note that the dependent variable in Model 3 is forcast accuracy, the inverse of schedule overrun (i.e. $1/x$ of the schedule overrun or Estimated/Actual schedule). Thus a negative sign on the Log of dam wall length (m) suggests that an increase in wall length decreases the inverse of the schedule overrun. In other words, increase in wall length increases schedule overrun.

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paid in local currency, currency exposure consistently proves to be a fiscal hemorrhage for large projects.

Policy proposition 2. *Energy alternatives that rely on fewer imports or match the currency of liabilities with the currency of future revenue are preferable.*

Although, following convention, our cost analysis excludes the effects of inflation, planners ought not to ignore the risks of "unanticipated inflation" (Pickrell, 1992, p. 164). Episodes of hyperinflation in Argentina, Brazil, Turkey, and Yugoslavia caused staggering nominal cost overruns, e.g. 7-times initial budget for Brazil's Estreito dam (1965–1974), or 110-times initial budget for Yugoslavia's Visegrad dam (1985–1990), which had to be financed with additional debt. Effects of unanticipated inflation magnify the longer it takes to complete a project. For example, during the planning phase of Pakistan's Tarbela dam, it was assumed that inflation would not have a signification impact on the project's costs. The appraisal report wrote: "A general contingency of 7½% has been added in accordance with normal practice for works of this size and duration" (World Bank, 1968). The project, launched in 1968, was meant to start full commercial operation in 1976, but the opening was delayed until 1984. Actual cumulative inflation in Pakistan during 1968–1984 was 380%; the actual cost of the dam in nominal terms nearly four times the initial budget. In the case of Tarbela, unanticipated inflation was "a product of delays in a project's construction timetable and a higher-than expected inflation rate" (Pickrell, 1992, p. 164). For our reference class, 8 out of 10 large dams came in late with an average delay of 2.3 years. Moreover, forecasters expected the annual inflation rate to be 2.5% but it turned out to be 18.9% (averages for the entire sample). Large dams have a high propensity to face unanticipated inflation.

Policy proposition 3. *The best insurance against creeping inflation is to reduce the implementation schedule to as short a horizon as possible. Energy alternatives that can be built sooner and with lower risk of schedule overruns, e.g. through modular design, are preferable.*

Large dams are typically financed from public borrowing. While our calculations exclude debt-servicing, cost overruns increase the stock of debt but also the recurring financing costs that can further escalate if interest rates go up. The optimistic risk assessments of the costs of large dams are consistent with "explosive growth of Third World debt" (Bulow and Rogoff, 1990; Mold, 2012). For example, the actual cost of Tarbela dam, the majority of which was borrowed from external sources, amounted to 23% of the increase in Pakistan's external public debt stock between 1968 and 1984; or 12% for Colombia's Chivor dam (1970–1977) as shown in Table 7.

These case examples reinforce the essential message of our statistical results: bigger projects entail uncontrollable risks, which even when anticipatable cannot be adequately hedged. We do not directly negate the presence of economies of scale or learning curves—i.e. declining average cost per unit as output increases. Instead our argument is that any economies of scale embedded in large scale are being acquired for a disproportionately increased exposure to risk that can cause financial impairment. Companies and countries with insufficient capacity to absorb adverse outcomes of big bets gone awry often face financial ruin.

Table 7
Total stock of public net external debt (USD current, MM).

Year	Colombia	Pakistan
1968		3252.4
1970	1296.6	
1977	2699.6	
1984		9692.8
Debt increase over the implementation schedule	1403.0	6440.5
Cost of mega-dam over the relevant period (USD current MM)	Chivor dam	Tarbela dam
	168.7	1497.90
Cost of dam as percentage of debt increase	12.0%	23.2%

Policy proposition 4. *Energy alternatives that do not constitute a large proportion of the balance sheet of a country or a company are preferable. Similarly, policymakers, particularly in countries at lower levels of economic development, ought to avoid highly leveraged investments denominated in a mix of currencies.*

5. Forecasting the actual costs and schedules using reference class forecasting (RCF)

As discussed in the method section, the third step of the "outside view" or RCF techniques is to compare a specific venture with the reference class distribution, in order to establish the most likely outcome for the specific venture. Thus if systematic errors in the forecasts generated using the "inside view" of previous ventures are found, decision-makers should apply an uplift or downlift to the "inside view" forecast in order to generated a de-biased "outside view" forecast. For example, empirical literature has established that rail projects suffer a cost overrun of 45% on average (Flyvbjerg, 2008; also see Table 8). The 50th percentile cost overrun for rail projects is 40% and the 80th percentile is 57%. Based on these findings, RCF techniques suggest that decision-makers ought to apply a 57% uplift to the initial estimated budget in order to obtain 80% certainty that the final cost of the project would stay within budget (Flyvbjerg, 2008, p. 16). If decision-makers were more risk tolerant then they could apply a 40% uplift to the initial estimated budget but then there will remain a 50% chance that the proposed project might exceed its budget.

In line with the RCF techniques, the third and final step of our investigation on dams was to derive a good predictor of cost and schedule overruns for proposed large dams based on the distributional information of the reference class. This predictor serves to "correct" the systematically biased *ex ante* cost and schedule estimates by adjusting them upwards by the average cost or schedule overrun (see Kahneman and Tversky, 1979b; Flyvbjerg, 2006, 2008).

First, using traditional RCF (Flyvbjerg, 2006, 2008), we traced the empirical distribution of cost and schedule overruns of large dams. Second, we use multilevel Models 1 and 3, described above, for predicting cost and schedule overruns. Models 1 and 3 prove to be practicably parsimonious models for two reasons: First both models are fitted with variables known *ex ante*. Second, both models were successfully fitted with only a few significant variables making it practicable to collect the data needed to make a prediction. For example, Model 1 on cost overruns has only two significant variables—estimate schedule and the long-term inflation rate of the host country. Data on both these variables is readily available for any proposed large dam making it possible to predict the cost overrun before construction begins. We illustrate the usefulness of our predictive models with an example below.

With respect to cost overruns, using traditional RCF (Flyvbjerg, 2006, 2008), we find that if planners are willing to accept a 20% risk of a cost overrun, the uplift required for large dams is +99% (i.e. ~double experts' estimates) as seen in Fig. 7; and +176%

Table 8
Comparing large dams with other infrastructure asset classes.

Category	Types of projects	Mean cost overrun	Applicable capital expenditure optimism bias uplifts (constant prices)	
			50th percentile	**80th percentile**
Roads	Motorway, trunk roads, local road, bicycle facilities, pedestrian facilities, park and ride, bus lane schemes, guided buses	20%	15%	32%
Rail	Metro, light rail, guided buses on tracks, conventional rail, high speed rail	45%	40%	57%
Fixed links	Bridges, tunnels	34%	23%	55%
Building projects	Stations, terminal buildings		4–51%[a]	
Standard civil engineering			3–44%[a]	
Non-standard civil engineering			6–66%[a]	
Mining projects		14%[b]		
Thermal power plants		6%[c]		
Large dam projects	Large hydropower, large irrigation, flood control, multipurpose dams	**90%**	26%	**99%**
Nuclear power plants		207%[d]		109–281%[d]

[a] Based on Mott MacDonald (2002).
[b] Based on Bertisen and Davis (2008).
[c] Based on Bacon and Besant-Jones (1998, p.321), included for an approximate comparison purposes only, reference class probability distribution not available.
[d] Based on Schlissel and Biewald (2008, p.8) review of the U.S. Congressional Budget Office (CBO) data from Energy Information Administration, Technical Report DOE/EIA-0485 (January 1, 1986).

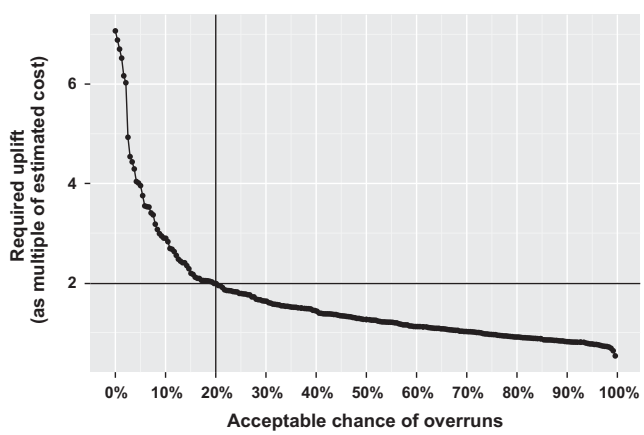

Fig. 7. Required uplift for large dam projects as function of the maximum acceptable level of risk for cost overrun, constant local currency terms (N=245).

including unanticipated inflation. If planners are willing to accept a 50–50 chance of a cost overrun, the uplift required is 26% (32% outside North America).

In terms of cost overruns, Fig. 7 also illustrates that large dams are one of the riskiest asset classes for which valid and reliable data are available. Compare, for example, Fig. 7 with reference class forecasts previously conducted for rail, road, tunnel, or bridge projects (Flyvbjerg, 2006, 2008) also summarized in Table 8.

Second, using our multilevel Model 1 we were able to derive predictions for cost overrun (in constant local currency) and schedule overrun respectively.

Experts estimate, for instance, that Pakistan's Diamer-Bhasha dam, whose construction began shortly after the 2010 floods, will cost PKR 894 billion (~USD12.7B in 2008 prices and exchange rates and about 9% of Pakistan's 2008 GDP) (WAPDA, 2011). The dam is forecasted to take 10 years from 2011 and become operational in 2021. Using our first approach, the reference class forecast for cost overruns suggests that planners need to budget PKR 1,788B (USD25.4B) in real terms to obtain 80% certainty of not exceeding the revised budget. Including the effects of unanticipated inflation the required budget is PKR 2,467B (USD35.0B) or about 25% of Pakistan's 2008 GDP. A future sovereign default in Pakistan owing to this one mega-dam is not a remote possibility.

Using our second approach, our multilevel Model 1 predicts that given the 10 year estimated duration and a long-term inflation rate of about 8% the expected (average) cost overrun of a large dam in Pakistan will be 44% (PKR 1,288B or USD 18.3B). Combining the two methods, a conservative estimate for the cost overrun on the Diamer-Bhasha dam is 44% at which point there remains a 4 in 10 chance of the revised budget being exceeded. Note, however, that if a dam of dimensions similar to Diamer-Bhasha were being built in the US, Model 1 predicts that it would only suffer a cost overrun of 16%, which the much larger US economy could absorb without any lasting damage.

We applied a similar two-pronged forecast of schedule slippage. Using our first approach, the reference class forecast for schedule slippage suggests that planners for large dams around the world need to allow for a 66% schedule overrun to achieve 80% certainty that the project will be completed within the revised implementation schedule. Since Diamer-Bhasha is expected to take 10 years to build (2011–2021), planners need to adjust their schedule estimate upwards to nearly 17 years (i.e. an actual opening date of 2028). Using our second approach, our multilevel Model 3 predicts that given that the dam's final decision to build was made in Pakistan by a democratically elected government, when the per capita income was USD 497 in 2000 constant dollars, a dam wall length of 998 m, and an installed capacity of 4500 MW, the expected outcome is a 60% schedule overrun. Thus, using either approach, Diamer-Bhasha can be expected to only open in 2027 when there remains a 20% risk of further delay. Pakistan is facing an energy crisis today (Kessides, 2011). A dam that brings electricity is 2027 will be a little late in coming.

Note, however, that if a dam of dimensions similar to Diamer-Bhasha were being built in the US (with its high per capita income of approximately USD 38,000), Model 3 predicts that it would face a schedule slippage of a mere 0.05%. Recall that per capita income

is a useful proxy for the economic support that a country can provide for the construction of complex facilities. This suggests that rich and not developing countries best attempt very large energy projects, such as large dams. Even so, richer countries should also consider alternatives and should adopt the risk management measures of the outside view illustrated here to choose prudently among energy alternatives.

Using their "inside" cost estimates, the net present benefits to cost ratio of the dam according to experts is 1.43 (WAPDA, 2011). Even assuming experts' calculations about potential benefits are accurate, although this is a doubtful assumption, the de-biased cost forecasts require an uplift of 44–99% in constant prices suggest that the benefits to cost ratio will be below one. The Diamer-Bhasha dam is a non-starter in Pakistan. This is without even discussing potential effects of inflation and interest rates, potential social and environmental costs, and opportunity cost Pakistan could earn by committing such vast amount of capital to more prudent investments.

Our reference class forecasting techniques suggests that other proposed large dam projects such as Belo Monte, Myitsone, or the Gilgel Gibe III among many others in early planning stages are likely to face large cost and schedule overruns seriously undermining their economic viability. Large dams also exert an opportunity cost by consuming scarce resources that could be deployed to better uses, sinking vast amounts of land that could have yielded cash flows and jobs from agricultural, timber, or mineral resources. Risks related to dam safety, environment, and society further undermine viability of large dams. Decision-makers are advised to carefully stress test their proposed projects using the risk management techniques of the outside view proposed here before committing resources to them.

The outside view techniques applied to large dams above have broader application in energy policy by helping public agencies (e.g. national planning and finance ministries, power and water authorities), private entrepreneurs and investors a framework to improve upfront selection among alternatives. The problems of cost and schedule overrun are not unique to large hydropower dams. Preliminary research suggests that other large-scale power projects using nuclear, thermal, or wind production technologies face similar issues. Our research of large hydropower projects reveals that there is a serious dearth of valid and reliable data on the risk profiles of actually completed energy projects across the board. Much of the data in existing literature are drawn from surveys and interviews of dubious validity. At times, interest groups, seeking to promote a particular kind of scale or technology, also report distorted data. There is thus an urgent need to empirically document, in a comprehensive global database, the risk profiles of energy infrastructure assets of large, medium, and small scales across production technologies. For example, comparing the likely actual cost, schedule, and production volumes of a large hydropower dam project versus an on-site combined heat and power generator.

We propose that prior to making any energy investment, policy makers consult a valid and reliable "outside view" or "reference class forecast" (RCF) that can predict the outcome of a planned investment of a particular scale or production technology based on actual outcomes in a reference class of similar, previously completed, cases. Rigorously applying reference class forecasting to energy investments at various scales and production technologies will yield the following contributions:

- Create transparency on risk profiles of various energy alternatives, from not only the perspective of financial cost and benefit but also environmental and social impact—hard evidence is a counter-point to experts' and promoters' oft-biased inside view.

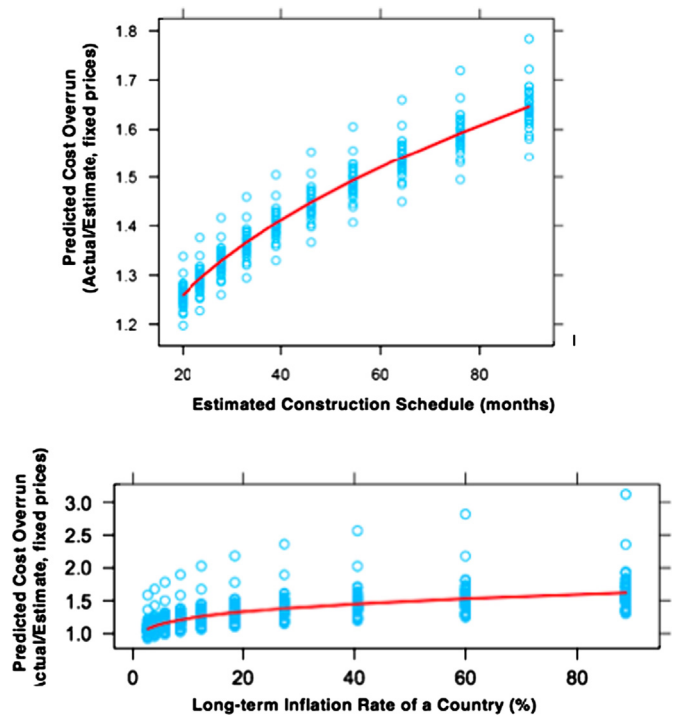

Fig. A1. .

- Improve resource allocation through outside-in view to estimate costs, benefits, time, and broader impacts such as greenhouse gas emissions incurred in building a project and emission created or averted once a project becomes operational.

A comprehensive global dataset that can create such transparency on risk profiles of energy alternatives does not yet exist. We have sought to bridge this precise gap by providing impartial evidence on large hydropower dam projects. As a venue for further research we hope valid and reliable data on the actual cost, schedules, benefits, and impacts of other production technologies will become available to enable comparative analysis with novel implications for theory and practice.

Appendix A. Visual representation of Model 1 (reported in Table 3)

See Fig. A1.

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Anne Salmond, Gary Brierley and Dan Hikuroa

Let the Rivers Speak
thinking about waterways in Aotearoa New Zealand

Abstract

This article explores deep underlying assumptions about relationships between people and the planet, and how these translate into very different ways of relating to waterways in Aotearoa New Zealand. In te ao Māori – ancestral Māori ways of living – rivers and lakes are the tears of Ranginui, the sky father, mourning his separation from Papatūānuku, the earth mother, and people are their descendants, joined in complex whakapapa that link all forms of life together. In modern ways of thinking, on the other hand, ideas such as private property, resource management and ecosystem services can be traced back to the Genesis story of God's gift of 'dominion' to Adam and Eve over fish, birds, plants and the earth itself, including waterways, in which all other life forms are created for human purposes.

In successive Waitangi Tribunal claims, iwi have disputed these assumptions in relation to fisheries, tribal lands and rivers, and, in world-leading legislation, the Whanganui River has been declared a legal person with its own rights. In this article, the authors discuss different ways in which the rights of rivers *as rivers* might be understood in scientific terms, investigating the 'geomorphic rights' of the Whanganui River, for instance, and how rivers as living communities of land, water, plants, animals and people might be understood through 'river ethnography', an approach that aligns a wide range of natural and social sciences with mātauranga taiao – ancestral knowledge of other living systems. They also consider how current policy discussions might be informed by such framings, so that river communities across Aotearoa New Zealand may be restored to a state of ora – life, health, abundance and prosperity.

Keywords water rights, whakapapa, Waitangi Tribunal, awa tupua, mātauranga taiao, commodification, reciprocity, Te Awa Tupua Act, the commons

In Aotearoa New Zealand, since first European settlement in the early 19th century differing assumptions about the relationships among land, sea and ancestors have collided and been contested.

Before the first Europeans arrived, accounts taught in the whare wānanga or ancestral schools of learning traced the origins of the cosmos to a primal surge of energy:

Nā te kune te pupuke
Nā te pupuke te hihiri
Nā te hihiri te mahara
Nā te mahara te hinengaro
Nā te hinengaro te manako
Ka hua te wānanga
Ka noho i a rikoriko
Ka puta ki waho ko te pō Nā te kore i ai
Te kore te whiwhia
Te kore te rawea
Ko hau tupu, ko hau ora Ka noho i te atea
Ka puta ki waho ko te rangi e tū nei
Te ata rapa, te ata ka mahina
Ka mahina te ata i hikurangi!

From the source of growth the rising
From rising the thought
From rising thought the memory
From memory the mind-heart
From the mind-heart, desire
Knowledge becomes conscious
It dwells in dim light
And Pō (darkness) emerges ...
From nothingness came the first cause
Unpossessed nothingness
Unbound nothingness
The hau of growth, the hau of life
Stays in clear space
And the sky emerges that stands here.
The early dawn, the early day, the mid-day
The blaze of day from the sky!
(Te Kohuora of Rongoroa, in Taylor, 1855)

From that first surge of energy, thought, memory, the mind-heart, desire and knowledge emerged. As knowledge became conscious, the world took shape in te kore, nothingness, and te pō, darkness, through aeons of ancestral space-time. When the winds of life and growth began to blow, the sky and the earth emerged. At first Ranginui the sky father and Papatūānuku the earth mother were one being, locked together, and as their children were born they lay cramped between them, living in darkness. Frustrated and constricted, they decided to separate their parents, and one after another they tried until at last Tāne, the ancestor of forests, lay on his back and pushed them apart. As Rangi wept for his wife, Papatūānuku sent up mists to greet him, and Rangi's tears became rivers and lakes, bringing life to the land (Te Rangikaheke, 1849).

> … the introduction of ideas of land as 'property' owned by individuals or corporations … cut through the intricate, entangled strands of whakapapa (ancestral connection) that wove people, land, waterways and the sea together.

In this cosmological account, water is a source of ora (well-being and abundance). The water cycle is placed at the heart of the relationship between sky father and earth mother,[1] who eternally exchange mist and rain, giving life to their children – the ancestors of forests (Tāne-mahuta), wild food plants (Haumia-tiketike), cultivated food plants (Rongo-mā-tāne), the ocean and waterways (Tangaroa), winds (Tāwhiri-matea) and people (Tū-matauenga). When Tāwhiri-matea, enraged by his brothers' violence against their parents, attacks his brothers, only Tū-matauenga stands strong. Because of Tū's courage his descendants, human beings, inherit the mana (ancestral power) to harvest the offspring of his brothers – birds and forest foods, wild and cultivated plants, fish and other creatures. Because they are kinfolk, though, they must ask permission from Tū's brothers in the seasonal rituals of fishing, birding, agriculture and other forms of harvest. The aim is to keep these exchanges in balance, so that the life force of birds, fish, plants and people remains strong and healthy (mauri ora). If particular species became depleted (mauri noho), those who have the right to conduct such rituals placed a rāhui or ritual restriction on them until their life force had recovered.

In this way of living, kin groups moved across land, waterways and the coast in seasonal cycles, harvesting particular foods as they became abundant. Rights to take particular species were passed down genealogical lines and through relationships of alliance and friendship, tangling across the landscape in overlapping patterns of seasonal residence and harvest. Only by staying close to land and sea and lighting one's fires (ahi kā) could these relationships (which involved both rights and responsibilities to care for other life forms) be kept 'warm', instead of lapsing and going 'cold' (ahi mātaotao).

Since the first Europeans settled in Aotearoa, these kin-based ways of living have been radically disrupted. Most fundamentally, the introduction of ideas of land as 'property' owned by individuals or corporations, fragmented into measured, bounded areas by survey and

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mapping, in which almost all rights can be exchanged with strangers for a price, cut through the intricate, entangled strands of whakapapa (ancestral connection) that wove people, land, waterways and the sea together.

This way of understanding was first enacted by the first explorers and surveyors who were sent to Aotearoa to grid the land by latitude and longitude, quantify it and cut it into 'blocks', irrespective of mountains, rivers and valleys; abstract it and empty it of life and people. The notion of land as a commodity was authorised by the Old Land Claims Commission following the signing of the Treaty of Waitangi between Māori kin group leaders and the British Crown in 1840; enforced by acts of confiscation following the New Zealand Wars in the early 1860s and by the establishment in 1865 and operation of the Native Land Court; and enacted by the incremental assumption of the rights of the nation state to 'manage' all 'resources' in Aotearoa, most recently in the Resource Management Act 1991. These ideas about the rights of human beings, in particular 'civilised' people, to control land, waterways and the ocean were also underpinned by ancient cosmological framings, including the origin story recounted in the Book of Genesis, in which God creates Adam and Eve in his own image, telling them to be 'fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth' (King James Bible, Genesis 1:28).

If one examines the emergence of modern ideas about private property, their cosmological underpinnings are obvious. In *Two Treatises of Government,* for instance, John Locke devotes the first treatise to arguing about Adam's rights over land, sea and people, based on this biblical passage. While he does not dispute that God granted Adam and Eve dominion over fish, plants and animals (a unilateral, 'command and control' relationship), Locke contends that this did not extend to other human beings. Dominion over land and sea could not thus be claimed by absolute monarchs as Adam's inheritors, but rests in humankind in general. In Locke's framing, the origin of private property can be traced back to the act of an individual investing his own labour in improving and cultivating the land and 'enclosing it from the common' (Locke, 1821).[2]

Likewise in his *Commentaries on the Laws of England,* William Blackstone, the influential 18th-century British jurist, cites the Genesis story:

> In the beginning of the world, we are informed by holy writ, the all-bountiful Creator gave to man 'dominion over all the earth, and over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth.' This is the only true and solid foundation of man's dominion over external things. (Blackstone, 1770, book 2, p.18)

At the same time, Blackstone expands on Locke's account of how private property and 'civil society' developed:

> It was clear that the earth would not produce her fruits in sufficient quantities without the assistance of tillage; but who would be at the pains of tilling it, if another might watch an opportunity to seize upon and enjoy the product of his industry, art, and labour?
>
> Had not therefore a separate property in lands as well as movables been vested in some individuals, the world must have continued a forest, and men have been mere animals of prey, which, according to some philosophers, is the genuine state of nature …
>
> Necessity begat property; and, in order to insure that property, recourse was had to civil society, which brought along with it a long train of inseparable concomitants, – states, government, laws, punishments, and the public exercise of religious duties.

In the Treaty of Waitangi Act 1975, the Waitangi Tribunal was specifically prohibited from recommending the return or purchase of private land, or from inquiring into historical breaches of the Treaty relating to commercial fisheries …

Ideas of ancestry are still significant here, tracing the origins of human 'dominion' over land, sea and other species back to God's gift to Adam and Eve, and 'sovereignty' to those who share God's attributes of judgement and wisdom (ibid., introduction, p.48).[3] Land, sea and other life forms are not seen as kinfolk, however. Rather, these are understood as the passive recipients of human labour, which 'improves' and encloses the land, converting it into private property which can be traded on a market.

At the same time, in Blackstone's formulation, waterways largely escaped this framing. Like light and air, water was in a 'state of nature' and part of 'the commons' (ibid., book 2, p.13):[4] 'For water is a movable, wandering thing, and must of necessity continue common by the law of nature; so that I can only have a temporary, transient, usufructuary, property therein' (ibid., p.18).[5] Nevetheless, according to Blackstone, if a man fouls a waterway shared with his neighbour, or diverts it so that this neighbour loses the use of that water, this is an injury to be redressed under the law. Interestingly, this restraint upon the use of fresh water was not given legal force when British law was introduced to Aotearoa New Zealand. Rather, the freedom of a person to use their own land (understood as private property) overrode Blackstone's framing of their responsibility to protect the rights of their

neighbours to the use of fresh, free-flowing streams and rivers.[6]

This powerful emphasis on private property was also evident in the processes established to give Māori kin groups redress against the Crown for breaches of the Treaty of Waitangi. In the Treaty of Waitangi Act 1975, the Waitangi Tribunal was specifically prohibited from recommending the return or purchase of private land, or from inquiring into historical breaches of the Treaty relating to commercial fisheries (s6(4A) and (7)). Only Crown land, forests or other properties, as well as taxpayer funding, could be recommended as remedies for these breaches.

Nor was the Tribunal given powers to inquire into historical breaches of the Treaty until 1985, hot on the heels of the election of a Labour government. At the same time, however, the government embraced neo-liberal economics, including an extensive programme of privatising state properties, including forests, fisheries and lands. Almost immediately there was a series of clashes with Māori. In June 1985, for instance, Matiu Rata, then the minister of Māori affairs, wrote a letter to the Tribunal claiming that the Treaty rights of his Muriwhenua people had been breached by the Crown's presumption that their rights to their ancestral fisheries had been extinguished. A quota management system for Aotearoa New Zealand fisheries had been proposed which assumed that fish stocks in New Zealand's territorial waters were 'owned' by the Crown, quantifying the stocks of particular species and turning them into quotas to be traded on the market. In 1987 the Muriwhenua kin groups lodged a claim with the Waitangi Tribunal that succeeded in establishing that their rights to their ancestral fisheries, guaranteed under the Treaty, had never been legally extinguished (Waitangi Tribunal, 1988). As a result, a significant proportion of quotas in the new quota management system was awarded to Māori kin groups around the country.

While this Waitangi claim was fought on the grounds that the Crown's claim to 'own' New Zealand fisheries was unfounded, the remedy was still framed in terms of property rights, including both cash and quotas. These gave only partial compensation and did little to restore fish stocks to a state of ora. In the case of rivers, in keeping with Blackstone's dictum that water is part of the commons, however, the Crown did not claim to 'own' these waterways, but to govern them on behalf of the people of New Zealand. In the case of the Waikato River, the longest river in Aotearoa, when the government proposed to build a power station at Huntly adjacent to the Māori Queen's marae in the early 1970s (Whittle, 2013), this assumption was also contested. As Robert Mahuta, the Māori Queen's brother, declared in 1975, 'Noo taatou te awa. Noo te awa taatou. E kore e taea te wehe te iwi o Waikato me te awa. He taonga tuku iho naa ngaa tuupuna. E whakapono ana maatou ko taa maatou, he tiaki i taua taonga moo ngaa uri whakatupu' (The river belongs to us. We belong to the river. The Waikato people and the river cannot be divided. It is a treasure handed down from the ancestors. We believe it is our role to take care of this treasure for future generations) (Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010, preamble).

> In successive Treaty claims against the Crown, iwi challenges against modern framings of relations among land, waterways and people have become increasingly fundamental.

This idea of the river as a treasure, the lifeblood of the earth mother from whom the ariki (high chiefs) of Waikato-Tainui descend, was powerfully expressed in a waiata composed by Tāwhiao, the second Māori King, farewelling his ancestral lands, confiscated (raupatu) by the Crown after the wars of the 1860s:

> I look down on the valley of Waikato
> As though to hold it in the hollow of my hand ...
>
> See how it bursts through
>
> The full bosoms of Maungatautari and Mangakawa,
>
> Hills of my inheritance:
>
> The river of life, each curve
>
> More beautiful than the last,
>
> Across the smooth belly of Kirikiriroa,
>
> Its gardens bursting with the fullness of good things,
>
> Towards the meeting place at Ngāruawahia
>
> There on the fertile mound I would rest my head
>
> And look through the thighs of Taupiri.
>
> There at the place of all creation
>
> Let the King come forth.
>
> (quoted in Muru-Lanning, 2010, p.45)

In the event, when the Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act was passed in 2010 as partial reparation for the confiscations, it was agreed that authority over the river should be shared between Waikato-Tainui kin groups and the Crown. In the preamble to the act, the ancestral relationship between these kin groups and the river was legally recognised: 'To Waikato-Tainui, the Waikato River is a tupuna (ancestor) which has mana (prestige) and in turn represents the mana and mauri (life force) of the tribe. Respect for te mana o te awa (the spiritual authority, protective power and prestige of the Waikato River) is at the heart of the relationship between the tribe and their ancestral river.' The history of the disruption of this relationship was also recorded in the act's preamble, from the decision of Governor Grey to send an iron steamer down the river in 1862 to invade the Waikato and the confiscations that followed, to the Crown's assumption of

jurisdiction over the river and the harm done to the Waikato by 'farming, coal mining, power generation schemes, the discharge of waste, and domestic and industrial abstraction'.

In this case, the remedies included a recognition of 'te mana o te awa' (the mana of the river), along with an agreement that the Crown would work with the Waikato-Tainui kin groups to restore their 'mana whakahaere' (governance, authority, jurisdiction) over the Waikato River and bring these groups together to protect te mana o te awa.

In successive Treaty claims against the Crown, iwi challenges against modern framings of relations among land, waterways and people have become increasingly fundamental. In the case of the Te Urewera Act 2014, for instance, the mana of Tūhoe's ancestral lands in the former Te Urewera National Park, including waterways, was given a higher priority than the mana of people. In this act, Te Urewera is declared to be a legal entity, inalienable and independent. As Tamati Kruger, a leader of the Tūhoe people, has declared, 'The Urewera owns itself'. This understanding is elaborated in the background section of the act:

> Te Urewera is ancient and enduring, a fortress of nature, alive with history; its scenery is abundant with mystery, adventure, and remote beauty. Te Urewera is a place of spiritual value, with its own mana and mauri. Te Urewera has an identity in and of itself, inspiring people to commit to its care …
>
> Te Urewera expresses and gives meaning to Tūhoe culture, language, customs, and identity. There Tūhoe hold mana by ahikāroa [long having their fires alight on the land]; they are tangata whenua [land people] and kaitiaki [guardians] of Te Urewera. (Te Urewera Act 2014, s3)

In their guardianship of Te Urewera, Tūhoe kin groups have rejected ideas of human dominion over land and waterways as reflected in the doctrines of sovereignty, property rights and possessive individualism. Historically, although Tūhoe were promised considerable autonomy by the Crown, these promises were broken. Their territory is relatively remote, mountainous and forested, and a heartland for the preservation of tikanga (ancestral customs) and te reo, and their expressed ambition is to govern their own affairs in their own way on their own lands. Decisions about the future and uses of Te Urewera are made by consensus at hui on marae, rather than by voting, for instance.

In their guardianship of Te Urewera, Tūhoe kin groups have rejected ideas of human dominion over land and waterways as reflected in the doctrines of sovereignty, property rights and possessive individualism.

This same kind of thinking is also evident in the Te Awa Tupua (Whanganui River Claims Settlement) Act 2017. Like Waikato-Tainui, the Whanganui iwi have kept their 'fires alight' by maintaining marae along the length of their ancestral river, the third longest in New Zealand. Like the Waikato, too, there is extensive non-Māori settlement on the river, with the city of Whanganui around the river mouth. In their Tribunal hearings, Whanganui kin groups have demonstrated their ongoing relationship with the Whanganui River, arguing that their life and well-being and that of the river are inextricably entangled. As a Whanganui elder, Turama Thomas Hawira, lamented:

> It was with huge sadness that we observed dead tuna [eels] and trout along the banks of our awa tupua [ancestral river]. The only thing that is in a state of growth is the algae and slime. Our river is stagnant and dying. The great river flows from the gathering of mountains to the sea. I am the river, the river is me. If I am the river and the river is me – then emphatically, I am dying.[7]

In their Treaty settlement, the Whanganui kin groups insisted on honouring the rights and life of the river. In the event, their relationship with the river was recognised in the act, which declared that 'Te Awa Tupua [literally, a river from the ancestral realm] is a legal person and has all the rights, powers, duties, and liabilities of a legal person' (s14(1)). In this act, two individuals, one appointed by the Crown and one by the Whanganui iwi, were established as Te Pou Tupua, the human face of Te Awa Tupua, authorised to act in the name of the river to protect its health and well-being, using funding dedicated for this purpose.

Like the Te Urewera Act, this act was world-leading in acknowledging the legal rights and responsibilities of a territory in the first instance, and a river in the second, in relation to those of people. The framing of it is still anthropocentric, however, since it defines the river as a legal person. In effect, this diminishes the mana of the Whanganui, since, in ancestral understandings, waterways emerge from the exchange of rain and mist between sky and earth, and are more ancient and powerful than people. At the same time, setting up Te Pou Tupua as its 'human face' limits the river's agency, its independent power to act, by providing the river, like children or those who are incapacitated, with guardians who speak and act in its name. Likewise, framing the mana of the river as 'rights' fails to respect the principle of reciprocity (utu), which aims to generate ora through balanced exchange. When this balance fails, this leads to a state of mate (illness, failure, death), which is arguably

what has happened to waterways across Aotearoa New Zealand.

This limited legal framing has inspired attempts in New Zealand to explore what it might mean for a river (or a territory) to have its own life, in its own terms, with its own rights to health and well-being. In the case of the Whanganui River, for instance, a recent article arising from the Te Awaroa: Voice of the River project (Salmond, Tadaki and Gregory, 2014) has explored the rights of the river by juxtaposing 'geomorphic understandings of a river's agency' with 'ancestral Māori relations to the river based upon mutual co-dependence (reciprocity)'. The aim of this exercise is to bring together ancestral insights with the findings of contemporary geomorphological science to assist in restoring the health, well-being and life force of the Whanganui river, along with other waterways across the country.

In this article, the authors give a bleak view of the impact of utilitarian and 'command and control' framings of rivers as introduced to Aotearoa through colonial processes:

> Notions of progress and improvement brought about the wholesale clearance of native vegetation, the drainage of wetlands, and the creation of large grassland areas for pastoral farming. Rivers were treated as drains or sewers, conduits for the disposal of waste with a seemingly limitless capacity for self-cleansing and self-renewal.
>
> Impacts on rivers from mining, forestry, sawmilling, pastoral farming, flax milling and the operation of tanneries, dairy factories, and meat works were accentuated in the 20th century by the implementation of a 'command and control' management ethos.
>
> Major hydroelectricity schemes, irrigation projects, and artificial stop banks (levees) transformed virtually all alluvial rivers in the country. Civil engineers were tasked with harnessing the powers of nature for human benefit, straightening, diverting, and culverting rivers to separate them from people. Catastrophic biodiversity losses ensued. Channels and harbours filled with sediment, pollutants and contaminants, and aquifers and waterways were depleted beyond sustainable limits. (Brierley et al., 2018, p.2)

Drawing on ancestral Māori framings, the [Te Awaroa] team focused on hearing 'the voice of the river', the behaviour and health of the river over time, as reflected in 'river stories'.

Extractive approaches, one-way relationships and radical failures of reciprocity have resulted in fundamental ecological damage to many waterways across New Zealand. After exploring Māori ideas about relations between rivers and people, seven geomorphic 'rights' are described that a river *as a river* might enjoy in its quest for ora: a right to flowing water; a right to transport sediment; a right to be diverse; a right to adjust; a right to evolve; a right to operate at the catchment scale; and a right to be healthy (ibid., p.4), and these rights are applied to the Whanganui River in a case study.

In the 1960s, as the authors note, the headwaters of the Whanganui River were diverted by the Tongariro Power Scheme, without consultation with Whanganui kin groups and in spite of their protests:

> The turbulent, glacial-blue flows of the Whakapapa River were reduced to a trickle, transferring 97% of its water. An iwi representative, Gerrard Albert, later described it: '… the head of our river has been cut off, and it no longer exists as a whole river … and so we continue to bleed as a people, as it bleeds as a river .' (ibid.)

This scheme has had powerful impacts on the river, diminishing its rights to flowing water, to transport sediment, to operate at catchment scale and to be healthy. This river, with its deeply incised headwaters and confined valleys, has little room to move, and this has been further constrained by stopbanks, the drainage of wetlands and the clearance of riparian vegetation. Further downstream, the impacts of flooding have become increasingly severe, with residents in parts of Whanganui city having to be relocated.

In the article, the authors trace powerful resonances between the insights of mātauranga taiao (ancestral knowledge of the living world) and contemporary geomorphological science, and argue that by working together, these can enrich understandings of rivers as living systems with unique properties, and assist in devising better ways of handling the relations between people and waterways. What happens, however, if rivers are not regarded by Māori as ancestors, or if the relationships between kin groups and waterways have been radically disrupted?

In the case of another river studied by the Te Awaroa team, the Waimatā River on the east coast of the North Island, Māori occupation of its upper reaches largely ceased soon after European settlement. In order to understand the long-run life of the river, its geomorphological character, the arrival of Māori and European settlers, their uses of and impacts on the river system, and its ecological history were investigated. This approach, styled 'river ethnography', aims to bring together a wide range of disciplines (including history and the social sciences) with mātauranga taiao (ancestral knowledge of living systems) in an attempt to explore the Waimatā River as a living community through time, with its land, water, plants, animals and people. Drawing on ancestral Māori framings, the team focused on hearing 'the voice of the river', the behaviour and health of the river over time, as reflected in 'river stories'.

The inquiry began by exploring the relationship between land and the river. Like the Whanganui River, the channel of the Waimatā is confined and acts as a flume, transporting sediment and waste materials from source to the ocean. From its headwaters the river runs through highly erodible, steep country, through forests, pastoral farmland and suburbs, where it joins the Taruheru River to become the Tūranganui River, the shortest river in Aotearoa New Zealand, which runs through Gisborne city and the port (Cullum, Brierley and Marden, 2016).

Unlike the Whanganui and Waikato rivers, in ancestral Māori times the upper reaches of the Waimatā were largely used as a highway to the east coast and for access to forest resources, and were not permanently settled (Phillips and Salmond, 2017). During the early phase of European settlement the land around the river passed into European control and then ownership, and Māori occupation of the upper and mid catchment largely ceased (Gundry, 2017). No doubt for this reason, the Waimatā has not been subject to a specific Treaty claim, although several kin groups have submitted statements of their ancestral relationships with the river as part of the Treaty claim process. Occupation continued on the northern banks of the Tūranganui, however, where the Waimatā joins the Taruheru and flows into the sea. Both the local hapū, Ngāti Oneone, and their ancestral river experienced major impacts, including the development of the port along with other industrial uses; the relocation of their marae, Te Poho-o-Rāwiri; the blasting of Te Toka-ā-Taiau, a sacred rock near the mouth of the river; and the loss of Te Wai o Hīharore, a place set aside in ancestral times so that inland kin groups could go fishing, declared an inalienable fishing reserve by the Native Land Court in 1875 (Phillips and Salmond, 2017, pp.4, 21).[8]

The introduction of pastoral farming by European settlers in the mid and upper reaches of the Waimatā catchment led to the clearance of hill and riparian vegetation, severe erosion, and major flooding in the lower reaches of the river and Gisborne city, so that major engineering works were carried out to divert the mouth of the river into a separate channel from the port.

> The kin networks that bind people with other living systems resonate with the science of complex networks, key to understanding many 'wicked problems' of our time, in which the exchanges between people, land, rivers, plants, animals, the sea and the atmosphere are inextricably entangled and mutually implicated.

Nevertheless, the lower Waimatā has been heavily used for recreational purposes, with rowing, kayaking and more recently waka ama paddling as major activities. With the introduction of plantation forestry in the headwaters and mid reaches of the river in the late 1960s to deal with severe erosion, followed by recent clear-felling, the lower reaches of the river have been affected by aggradation and flooding, putting these activities at risk.

Finally, the team examined the ecological history of the river, and the impacts of these activities over time upon plants, animals and people, many of which have been devastating (Salmond, 2017). The research process, which involved interviews with many individuals with different kinds of knowledge about the life of the river, from local residents to iwi members, foresters, farmers, scientists, local body engineers, and waka ama and kayak paddlers and rowers, was a way of empowering different voices to speak *from* as well as *about* the life of the river. Once the reports were written, meetings to share their findings with local communities were held. With no formal Treaty process to draw specific attention to the degradation of the river and the associated risks to local people, and a short-term utilitarian approach that largely ignores the downstream impacts of upstream activities, the Waimatā River had been relatively neglected. This is despite a close relationship between local residents and the lower reaches of the river, and the fact that it runs through Gisborne city and port. The public meetings were very well attended, including by those who had participated in the research process, and many of those present expressed a strong desire to play an active role in ensuring a healthy future for the river.

Here, too, an approach that brings together mātauranga taiao with contemporary sciences to understand rivers as unique, dynamic living systems that include plants, animals and people, and to seek balanced, life-enhancing exchanges among them, has the potential to lead to better outcomes for waterways, people and other life forms. This requires a shift from short-term, utilitarian, anthropocentric framings, because if rivers are more ancient and powerful than people, then all waterways have rights to flourish, not just those that are the focus of current human preoccupations.

Here one can begin to glimpse the strength of ecological perspectives based on ancestral Māori insights as well as contemporary sciences. In Aotearoa New Zealand, after perhaps 80 million years of independent evolution[9] – aeons of ancestral space-time – the first human beings arrived. Human occupation is brief, beginning about 800 years ago. As the saying goes, 'Toi tū te whenua, whatungarongaro te tangata' – the land stands, while people come and go; the land, with its rivers, mountains and forests, is indeed more ancient and powerful than

people. Just as the tears of Ranginui and the mists of Papatūānuku bring life to the world, Tangaroa, the ancestor of the sea, is also the ancestor of waterways and their creatures, confounding the division between the marine and river sciences, since water itself and so many life forms move between them. The kin networks that bind people with other living systems resonate with the science of complex networks, key to understanding many 'wicked problems' of our time, in which the exchanges between people, land, rivers, plants, animals, the sea and the atmosphere are inextricably entangled and mutually implicated. When waterways become ill and polluted, people also fall ill, with very high rates of water-borne diseases in parts of Aotearoa. As Whanganui people say, 'If the river is dying, so am I'. In such a situation, the fragmentation of disciplines and radical divisions between the 'natural' and 'social' sciences make little sense, since human activities have profound impacts on all the other life forms, including losses of biodiversity, the degradation of rivers and the ocean, and climate change; and these transformations in turn have profound implications for human communities.

At present, freshwater policy is under active debate in Aotearoa New Zealand. It will be fascinating to see how far the challenge to possessive individualism, property rights and short-term profits proceeds in practice. The framing that defines human interests in terms of 'fresh water' rather than waterways is already laden with utilitarian assumptions, since it is precisely the process of abstracting, enclosing, quantifying and pricing that leads to the commodification of 'the commons', whether this is applied to land, fish stocks or water. Likewise, talk of 'ecosystem services' is underpinned by the idea that springs, wetlands, streams and rivers were created to serve human purposes, denying the need for reciprocity and life-enhancing exchanges. The emphasis on waterways as living systems or communities, more ancient and powerful than people, on the other hand, resonates with mātauranga taiao and the findings of contemporary science, and is more likely to lead to healthy, sustainable relations between people, waterways and other life forms into the future.

Te Hauora o te Wai is understood as the fundamental right of a river to flourish *as a river*, with clean water, plentiful flows and flourishing ecosystems.

A move towards these kinds of perspectives should be possible in Aotearoa New Zealand. This will require some conceptual shifts, for instance in the Resource Management Act (RMA), which aims to promote the 'sustainable management' of 'resources' in Aotearoa by:

> managing the use, development, and protection of natural and physical resources in such a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while –
> (a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
> (b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
> (c) avoiding, remedying, or mitigating any adverse effects of activities on the environment. (s5(1), (2))

Here the emphasis is still on the 'management' of 'resources' for human uses.

One key instrument in the RMA, the national policy statements, state objectives and policies for matters of national importance, such as coastlines, forests and water. These national policy statements must be given effect in regional policy statements, and regional and district plans. In 2014 the National Policy Statement for Freshwater Management was released. In the 23 years since the RMA was first enacted, reliance on it to protect waterways had clearly failed. Assertions that the 'market' would drive positive change in the management of waterways proved misguided, and faith that technology would provide solutions had yet to deliver.

Predictably, the National Policy Statement for Freshwater Management provided direction to manage water quality and quantity, using techno-scientific rationales. Nevertheless, this national policy statement took a significant step by acknowledging the Treaty of Waitangi as the underlying foundation of Crown and Māori relationships, and recognising 'Te Mana o te Wai' in setting freshwater objectives. Te Mana o te Wai, inspired by precedents in the Waikato and Whanganui River acts, recognises a range of tāngata whenua values, including the kin relationship through whakapapa between iwi and hapū and the natural environment, including fresh water, and that as kaitiaki, iwi and hapū have a reciprocal obligation to ensure that freshwater ecosystems are healthy (including human health).

In an appendix to the national policy statement, Te Mana o te Wai is further elaborated by defining these relationships in terms of Te Hauora o te Wai – the health and mauri of the water; Te Hauora o te Tangata – the health and mauri of the people; and Te Hauora o te Taiao – the health and mauri of the environment. Te Hauora o te Wai is understood as the fundamental right of a river to flourish *as a river*, with clean water, plentiful flows and flourishing ecosystems. Once that is secured, people can derive health and sustenance from the waterway (Te Hauora o te Tangata), in ways that ensure Te Hauora o te Taiao, wider ecosystem and environmental health.

In the 2017 amendment of the policy statement, Te Mana o te Wai was further defined as 'the integrated and holistic well-being of a freshwater body' and as an integral part of freshwater management (Ministry for the Environment, 2017, p.7).[10] This was a major step towards placing particular waterways at the heart

of freshwater management approaches in Aotearoa. When the current coalition government comprising Labour, the Greens and New Zealand First was formed in late 2017, fresh water was identified as an issue of urgent public concern. As a result, the minister for the environment, David Parker, initiated an Essential Freshwater reform programme, which included a critical reappraisal of the National Policy Statement for Freshwater Management.

This review included the establishment of Kāhui Wai Māori – the Māori Freshwater Forum – who in their April 2019 report to the minister argued that Te Mana o te Wai offers a positive way forward in realising better outcomes for waterways in Aotearoa New Zealand. They framed the kaupapa (issue) in terms of mana atua–mana tangata–mana whenua, the relationships between the mana of creator ancestors, people and the land. They proposed that obligations are first 'to the water, to protect its health and its mauri'; second, 'providing essential human health needs such as drinking water'; and third, 'for other consumption provided that such use does not adversely impact the mauri of freshwater'. The first obligation aligns with Te Hauora o te Wai, the second with Te Hauora o te Tangata, and the third with Te Hauora o te Taiao.

Although the relative order of particular hauora may vary in different formulations, the mauri and mana of the waterways always comes first. If the values articulated in Te Mana o te Wai can be effectively integrated with practical objectives for the care of waterways across Aotearoa New Zealand, there is a real chance that degraded waterways can be returned to a state of health, prosperity and abundance.

Although it is never explicitly stated, and indeed has been vehemently denied by successive governments, the underlying assumption is that a form of ownership rights to water exists in Aotearoa New Zealand. In contrast, ancestral Māori philosophies take it for granted that humans belong to Papatūānuku, earth mother, not the other way round, and that waterways arise from the living relationship between earth and sky. So, although recognition of Te Mana o te Wai in the National Policy Statement for Freshwater Management is a significant step forward, incorporating a Māori approach and privileging the use of Māori knowledge, the policy statement is still linked with legislative instruments based upon ancient Western ideas about a divine gift to Adam and Eve of command and control over 'nature', which also underpin 19th-century definitions of 'property rights' and 20th-century ideas about 'resource management' and 'ecosystem services'. It tries to reconcile two different ways of framing reality, with no guidance about how to negotiate the contradictions between them, or the significant power imbalances that have marginalised Māori understandings of relationships between people and waterways over time.

Indeed, conceptual framings are key to the future of waterways in Aotearoa and elsewhere. While notions of a 'holistic' ecological lens are often envisaged, they have proved exceptionally difficult to meaningfully capture, let alone apply (Capra, 1983). Fragmentation continues to reign supreme, satisfying vested interests while marginalising more generative and inclusive prospects. Working across worlds, on the other hand, enhances our capacity to envisage and create new ones. In Aotearoa, where lived realities already inform legislative, scientific and technical endeavours, there is an opportunity to recognise that each and every river is a living community with its own hauora, mauri and mana, where water, land, plants, animals and people are inextricably entangled, shaping each other across the generations in kin-based exchanges. At the same time, automated monitoring and measurement procedures, alongside ethnographic inquiries, present unprecedented capacities to tell the stories of each river, recorded through system-specific forms, rates and patterns of adjustment, and the study of long-run relationships and interactions of these life forms at the catchment scale (Brierley et al., 2013; Fryirs et al., 2019).

Such convergent place-based framings highlight the potential to generate insights into the emergent properties of each waterway, fostering a genuine prospect to live with rivers in ways that respect bonds of mutual interdependence, reciprocity and co-evolution. Exciting legislative and scientific endeavours are increasingly in hand as we envisage encounters that weave across laws, narratives and data sets, between people, plants, animals and rivers, letting the rivers speak, restoring vitality to the lifeblood of the land.

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1 For an elegant account of the fundamental role of the water cycle in making the planet habitable for people, plants and animals, see Mauser, 2012.

2 Book 2, chapter 5, section 32: 'As much land as a man tills, plants, improves, cultivates, and can use the product of, so much is his property. He by his labour does, as it were, enclose it from the common.'

3 'In general, all mankind will agree that government should be reposed in such persons, in whom those qualities are most likely to be found, the perfection of which is among the attributes of Him who is emphatically styled the Supreme Being; the three grand requisites, I mean, of wisdom, of goodness, and of power: wisdom, to discern the real interest of the community; goodness, to endeavour always to pursue that real interest; and strength, or power, to carry this knowledge and intention into action.'

4 'But, after all, there are some few things, which, notwithstanding the general introduction and continuance of property, must still unavoidably remain in common; being such wherein nothing but an usufructuary property is capable of being had; and therefore they still belong to the first occupant, during the time he holds possession of them, and no longer. Such (among others) are the elements of light, air, and water.'

5 'The proprietor of each bank of a stream is the proprietor of half the land covered by the stream; but there is no property in the water. Every proprietor has an equal right to use the water which flows in the stream; and, consequently, no proprietor can have the right to use the water to the prejudice of any other proprietor.'

6 For a discussion of Blackstone's dictum and the doctrine of 'public trust' in relation to the governance of waterways in Aotearoa, see Salmond, 2018.

7 Turama Thomas Hawira, brief of evidence for the Whanganui District Inquiry (do B28), 11.

8 Many of these wider impacts are documented in Coombes, 2000; Waitangi Tribunal, n.d.; Spedding, 2006.

9 Zealandia separated from Gondwanaland in the late Cretaceous period: Mortimer et al., 2017.

10 'Upholding Te Mana o te Wai acknowledges and protects the mauri of the water. This requires that in using water you must also provide for Te Hauora o te Taiao (the health of the environment), Te Hauora o te Wai (the health of the waterbody) and Te Hauora o te Tangata (the health of the people)' (p.7).

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Why we should release New Zealand's strangled rivers to lessen the impact of future floods

February 23, 2021 11.01am NZDT

Shutterstock/Tracey McNamara

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When two West Coast rivers flooded on the same day in 2019, the Waiho tore down a bridge and cut off local communities for 18 days, and the Fox eroded a landfill, exposing 153 tonnes of rubbish that contaminated beaches more than 100km away.

A flood on the Rangitata River during the same year severed road, rail and power connections along the east coast of the South Island and cut a 23km path to the sea through prime dairy country.

We shouldn't be surprised when our rivers break their banks — that's just a river being a river. Current management practices in Aotearoa treat rivers as static, in the hope of making them more predictable.

But this can lead to disasters.

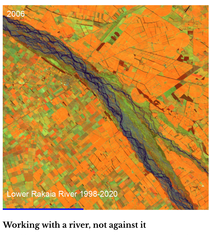
The recently announced reform of the Resource Management Act (RMA) is an opportunity to address river confinement, but it isn't enough. We need to change the way we think about rivers.

By forcing rivers into confined channels, we are strangling the life out of them and creating "zombie rivers".

Unless we change management practices to work with a river, giving it space to move and allowing channels to adjust, we will continue to put people and rivers on a collision course.

When flood risk is managed poorly, disadvantaged groups of the population are often disproportionately impacted. Given climate change predictions of more extreme floods and drought, the problem will only get worse.

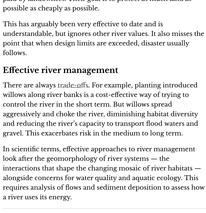
Read more: *Letting rivers run wild could reduce UK flooding – new research*



Working with a river, not against it

A healthy river is resilient, constantly adjusting its path and regenerating habitats, with significant capacity to self-heal and recover from disturbance.

Although New Zealanders associate with the ecological and cultural values of living rivers, such as ancestral connections and places of food gathering (mahingai kai), our management practices continue to treat rivers as unchanging. This reflects a colonial approach that tries to confine rivers within defined corridors to maximise the availability of land and manage flood risk.



Photogrammetric and satellite images from identical positions show how a section of the Ngaruroro River, in the Hawke's Bay, changed between 1950 (left) and 2020 (right). NZ Aerial Photography (via Retrolens), 0940/1 (1950) and Google Earth/Digital Globe (2000)... Author provided

River confinement in New Zealand is the result of both engineering works such as stop banks, intentionally focused on flood defence, and the slow creep of agricultural encroachment. Current river management practices are funded by targeted rates paid by landowners. Their goal is to protect as much land as possible as cheaply as possible.

This has arguably been very effective to date and is understandable, but ignores other river values. It also misses the point that when design limits are exceeded, disaster usually follows.

Effective river management

There are always trade-offs. For example, planting introduced willows along river banks is a cost-effective way of trying to control the river in the short term. But willows spread aggressively and choke the river, diminishing habitat diversity and reducing the river's capacity to transport flood waters and gravel. This exacerbates risk in the medium to long term.

In scientific terms, effective approaches to river management look after the geomorphology of river systems — the interactions that shape the changing mosaic of river habitats — alongside concerns for water quality and aquatic ecology. This requires analysis of flows and sediment deposition to assess how a river uses its energy.

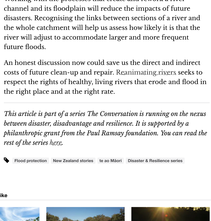
Read more: *When dams cause more problems than they solve – removing them can pay off for people and nature*

When a river has space to move, it dissipates its energy. This builds its capacity to recover from disturbances and maintain a dynamic but stable state. Constraining a river's flow into a restricted space concentrates flow energy, increases flood magnitude and accentuates problems downstream.

Rather than forcing a river into a defined place (which also often limits people's access to it), more responsive and low-impact practices would embrace a harmonious relationship with dynamic, living and adjusting rivers.

Reframing environmental law

Just as landowners often perceive wetlands as potential farm land once drained, planted river margins are sometimes considered "wasted" land. Agricultural encroachment removed more than 11,000 hectares of braided river bed on the Canterbury Plains between 1990 and 2012.



Changing flows of the braided Waimakariri river between 1942 and 2020. Author provided

The current wording of the Resource Management Act (RMA) allows this, as its definition of river bed assumes a static river channel. This is clearly inappropriate for braided rivers, which have multiple shifting channels.

That said, we are cautiously optimistic about reframing the RMA to promote more judicious choices of land for development.

Reducing the impacts of future disaster

International studies show that allowing a river to self-adjust is cheaper and more effective than active interventions that force a river into a particular place.

Europe and Japan have a long history of confining rivers. Once management practices start on this path, they become locked into progressively building more and more expensive hard engineering structures. Many rivers in Aotearoa New Zealand are less modified than those in other parts of the world. Changing management practices now can have a significant positive effect.

Contemporary scientifically-informed approaches to river management directly align with te ao Māori, wherein practices respect ancestral connections, living with rivers rather than seeking to control them. This presents an opportunity for regenerative relations to living rivers, recognising and enhancing their mana so they can function unimpeded.

Although rivers in Aotearoa are well described and we have some of the best databases and monitoring practices, this does not mean we are giving effect to the principle of Te Mana o te Wai, which aims to respect the natural need of a river to adjust as a living entity.

Working with the processes that create and rework a river channel and its floodplain will reduce the impacts of future disasters. Recognising the links between sections of a river and the whole catchment will help us assess how likely it is that the river will adjust to accommodate larger and more frequent future floods.

An honest discussion now could save us the direct and indirect costs of future clean-up and repair. Reanimating rivers seeks to respect the rights of healthy, living rivers that erode and flood in the right place and at the right rate.

This article is part of a series The Conversation is running on the nexus between disaster, disadvantage and resilience. It is supported by a philanthropic grant from the Paul Ramsay foundation. You can read the rest of the series here.

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Beware the zombie river

18 July 2019

James Brasington

New Zealanders are in danger of creating "zombie" rivers, not because of nutrient overloading, but because we're locking our waterways into position between stopbanks and impounding their headwaters.

Professor James Brasington, inaugural holder of the Waikato Regional Council Chair of River Science at the University of Waikato, says we risk the creation of zombie rivers because too often we prevent them from finding their own course and treat them as a means to simply to get excess water out to sea as fast as possible.

He'll be talking about his research as part of the University of Waikato Hamilton Public Lecture Series, on Tuesday 6 August. Professor Brasington is a geomorphologist who researches the processes that control the form, structure and function of rivers and their catchments. "If we put our rivers into straight-jackets, they lose the diversity of form and process that are fundamental to the creation of thriving ecosystems," he says. "Instead we should make space for rivers to erode their corridors, flood naturally in areas that are of less value which will in turn, reduce risks in more sensitive areas. We must work with natural processes to reduce the flood risk and support healthy river ecosystems."

The river scientist is a pioneer of new technologies that are enabling him and his colleagues to collect novel datasets to better understand how rivers are formed and change over time. "We now can use remote sensing to capture the complex 3D structure of rivers. We use aerial surveys and satellites to create detailed models of rivers that capture the sand and gravel particles that shift and form them through time. This

information helps us understand what drives the evolution of rivers through floods and how they create the complex mosaic of habitats within their floodplains."

Professor Brasington's research seeks to synthesise these technological advances with numerical models to shed light on how rivers might behave in a future shaped by a changing climate and shifting patterns of land use.

He joined the University of Waikato in late 2017 from Queen Mary University of London and has previously worked at the University of Canterbury in New Zealand, and the universities of Hull, Cambridge and Wales before that. His PhD focussed on catchment modelling in the Nepal Himalaya and since then he has worked on rivers in many mountain environments, including the European Alps and Pyrenees, the high Himalaya, the US Rockies and New Zealand's Southern Alps.

His research has attracted competitive funding from a wide range of sponsors, including the UK Natural Environmental Research Council, the Leverhulme Trust, the US Department of Defence, UK and New Zealand government departments and their executive agencies, and a broad range of industrial partners. He recently returned from the Tibetan plateau where he and other scientists in an international team were studying the effects of overgrazing on soil erosion and river dynamics.

Professor Brasington's lecture, Tales from the Riverbank: shining new light on riverscapes, takes place on Tuesday 6 August at 5.45pm in the Academy of Performing Arts at the University of Waikato.