Before the Independent Hearings Panel
at Far North District Council

under: the Resource Management Act 1991

in the matter of: Submissions and further submissions in relation to the proposed Far North District Plan

and: 15c Rezoning General

and: **Lucklaw Farm Limited**

Statement of Evidence of James Mitchell Blyth (Hydrology and Water Quality)

Dated: 9 June 2025

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STATEMENT OF EVIDENCE OF JAMES MITCHELL BLYTH

INTRODUCTION

1 My full name is James Mitchell Blyth.

2 I am a Water Resource Scientist and Director at Collaborations, a small consultancy that works across a range of environmental, land and water science fields. I have 15 years' experience, including working internationally in over seven countries.

3 I have an MSc (1st Class Honours) from the University of Waikato. My thesis was on the ecohydrology of Whangamarino Wetland. I continue to be involved in a range of national projects relating to wetland hydrology, restoration and effects assessments.

4 Over the last 2 years, I have been involved in a number of hydrology and environmental related RMA projects, acting as a technical lead for Greater Wellington Regional Councils Proposed Change 1 (to the regional plan) to give effect to the National Policy Statement for Freshwater Management 2020 (NPS-FM 2020) and technical conferencing on greenfield developments through the fast track consenting process.

5 I have presented at council level hearings, Environment Court and provided technical evidence for High Court processes.

CODE OF CONDUCT

6 Although this is not an Environment Court hearing, I note that in preparing my evidence I have reviewed the code of conduct for expert witnesses contained in part 9 of the Environment Court Practice Note 2023. I have complied with it in preparing my evidence. I confirm that the issues addressed in this statement of evidence are within my area of expertise, unless otherwise noted. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

7 In my evidence I will briefly address:

7.1 An overview of the hydrology of the site covering the proposed Rangiputa development by Lucklaw Farms Limited.

7.2 A discussion on water sensitive design (WSD) principles and green infrastructure that should be integrated during the design phase,

7.3 A discussion on water quality risks associated with development zones A and B.

8 Further ecological detail of the lakes and wetlands near the site has been included in Ms Dixons statement of evidence[i] for Hearing Stream 11 - designations.

HYDROLOGY SUMMARY OF THE DEVELOPMENT SITE

9 The conceptual hydrology of the lakes and wetlands near the development site (identified in **Figure 1**) has been described in detail in my previous technical evidence (Blyth, 2025) presented to Far North District Council[ii] for hearing stream 11; designations.

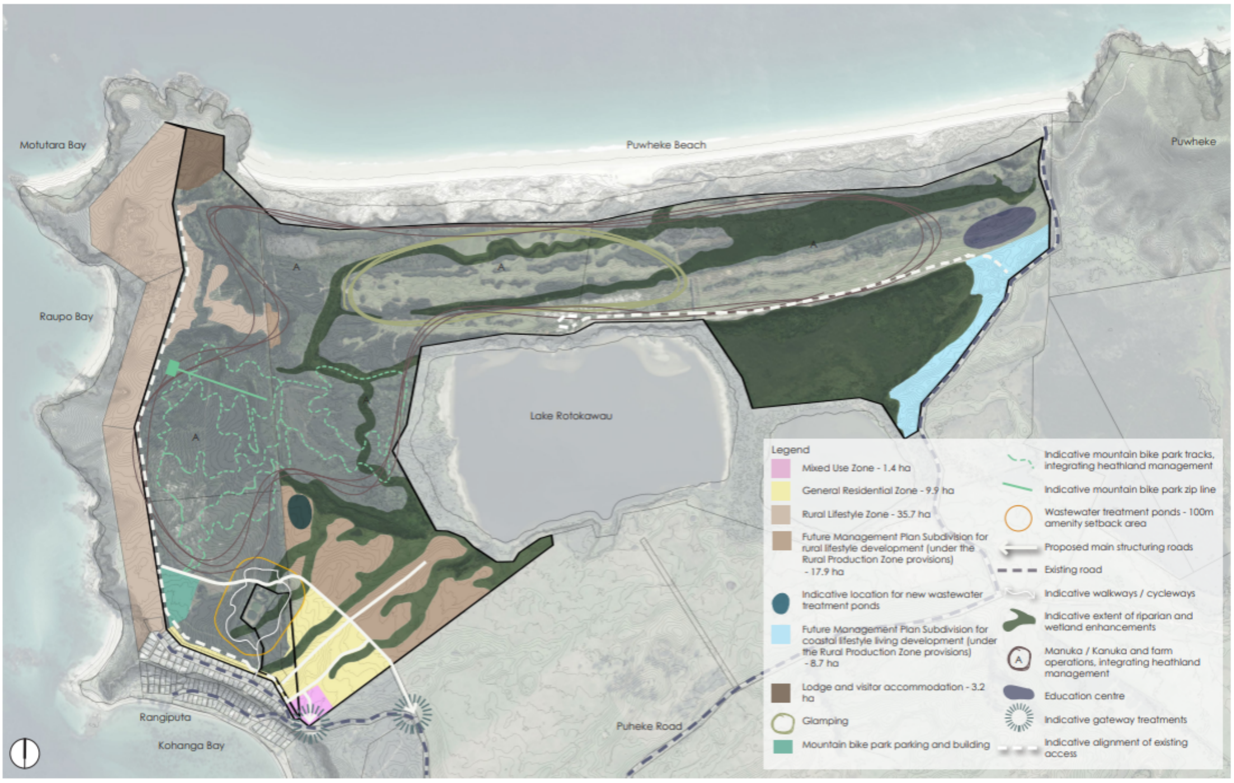

Figure 1. Conceptual development for Lucklaw Farms Limited[iii]

10 Generally, the Karikari Peninsula has been identified as having little groundwater storage due to the presence of podzolised soils with iron/silica pans that results in poor drainage and limited groundwater recharge to the deeper aquifer[iv].

11 Utilising Light Detection and Ranging (LiDAR) ground surface elevation information available for the Peninsula, as presented as topographical contours and flow lines in Appendix A of Blyth (2025)[ii], we have assessed the ephemeral and perennial flow paths that may exist, and identified the dominant sub-catchments (>1ha) that contribute to these flow paths.

12 This is presented in **Appendix A**, which shows the majority of surface water and shallow groundwater would flow towards the northeast of Rangiputa Coastal Settlement within development zones A and B[1] as also presented in Ms Gilberts evidence (Figure 1)[v].

13 This is supported by **Figure 2** below, which presents the stormwater drainage network in the Rangiputa Settlement. This shows that up to 50% of the existing settlements

[1] Note, development zones A and B generally follow property boundaries, however, encompass properties not owned by Lucklaw Farms Limited, primarily to the west. These areas have been included for consistency around mapping of the larger (>1ha) catchments and their relative flow directions.

dwellings and roads drain towards the northeast, through Lucklaw Farm. This is likely to be untreated (see paragraph 24 onwards).

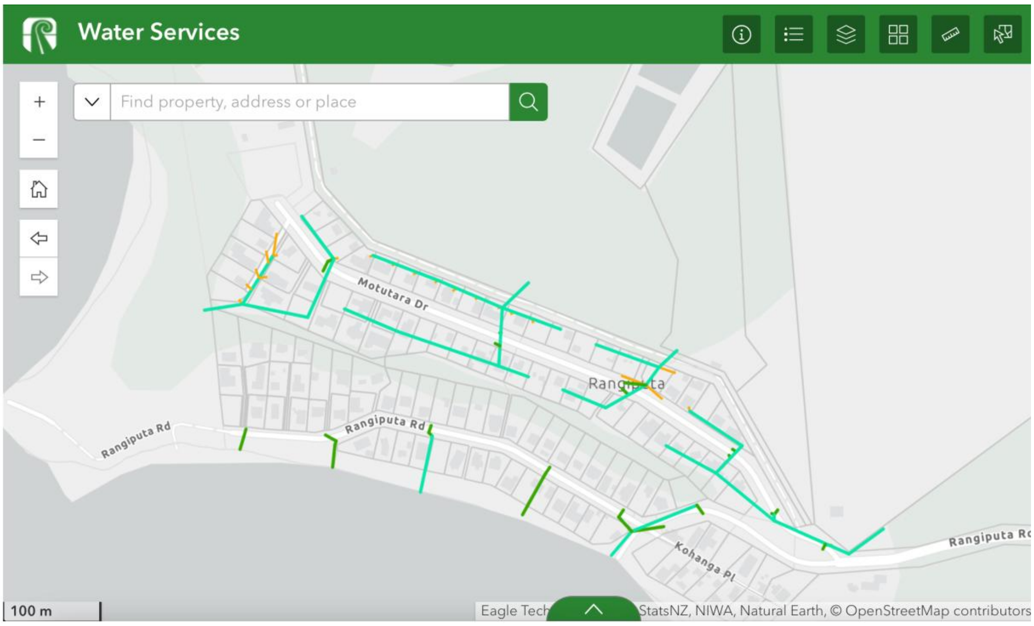

Figure 2. Rangiputa Settlement stormwater system (Far North District Council Map Viewer 2025)

14 It is reasonable to theorise that based on the topography and presence of the iron pan, these lakes and connected lacustrine wetlands[vi] would receive the majority of their hydrological inputs via direct rainfall, and the catchments localised surface water runoff (that may be ephemeral in nature) and some groundwater seepage from the shallow aquifer above the iron pans.

15 Understanding the sites permeability constraints, topography and hydrology is useful when considering Water Sensitive Design (WSD) principles in the initial stages of any proposed development, as working with the landscape and implementing best practice environmental design philosophy will ensure the best outcome for the receiving environment.

WATER SENSITIVE DESIGN (WSD) CONSIDERATIONS

16 WSD is an increasingly common practice in modern developments and quickly becoming the industry standard for best practice. Most major cities in New Zealand have WSD standards to follow; in particular, Auckland Councils GD04 was one of the first[vii].

17 The practice of WSD is not limited to a selection of green infrastructure, such as raingardens or permeable paving, but extends to the entire site, and should apply a set of principles to land development to reduce or minimise negative effects on the environment. The emphasis is on the appropriate location, layout and design of development[vii].

18 It is expected that any development proposed by Lucklaw Farms Limited within the Rangiputa Settlement will adopt WSD principles, seeking to *protect and enhance natural freshwater systems, sustainably manage water resources, and mimic natural processes to achieve enhanced outcomes for ecosystems and our communities[2].*

19 The proposed zoning changes would result in a change in landuse from primarily low intensity pastoral farming to mixed use (commercial), general residential and rural residential in zones A and B (as shown in Figure 1 and Appendix A).

20 Consideration of WSD would need to account for the varying density of these sites, and adopt best practice to mitigate potential increases in contaminant loads (discussed further in Paragraph 23 onwards).

21 At a high level, WSD practices are likely to include:

21.1 Minimising significant earthworks (cut and fill), working with the natural topography of the land and avoiding the infilling of ephemeral and perennial flow paths (see Appendix A) which will be enhanced through WSD principles such as through restoration planting proposed in Figure 1.

21.2 Adoption of low yielding material, such as coloursteel roofs or green roofs to minimise zinc and copper loading to the natural environment.

21.3 Planning the design of the site to incorporate the anticipated effects of climate change, with the Northland Region likely to experience an increase in large and intense storms, interspaced with longer dry periods[viii]. This may take the form of utilising swales and open channels (planted) to transmit water, bioretention (raingardens) and rainwater reuse and/or stormwater detention tanks.

21.4 Minimising the impervious footprint of the site and maintaining hydraulic neutrality, in order to reduce downstream erosion risks while maintaining the natural hydrograph[3].

21.5 Attenuation and treatment of all impervious areas from residential and commercial lots through to road runoff. This should follow a treatment train approach, starting at the source (for example, selection of roof material on a property), and consideration of all aspects of the stormwater cycle where treatment can occur on and off site.

21.6 Consideration of catchment scale treatment solutions, if possible, such as downstream constructed wetlands, which will add a final treatment and flood attenuation from developed areas upstream. These larger devices are also likely to treat stormwater runoff from areas outside of the greenfield footprint, such as the existing Rangiputa Settlement (see paragraph 13).

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[2] As defined in the Proposed Auckland Unitary Plan (AUP)[vii]

[3] Natural hydrograph refers to a graph of the existing rate of water flow during a storm event, and how this changes over time at a specific point in a stream or channel. Urban growth can result in a 'flashier' hydrograph that may have more rapid runoff with higher peak flows (due to impervious surfaces), while also reducing baseflows (due to reduced infiltration). WSD attempts to manage peaks through hydraulic neutrality, while also attenuating and slowing the flow of stormwater to mimic natural (or restored) systems.

22 The nature of the WSD design will require close discussion with local and regional councils, as traditionally, most green infrastructure devices are often vested to the relevant district council or three waters entity for ongoing maintenance. However, this varies by site, and by region and will need to be negotiated prior to finalisation of any WSD designs.

CONSIDERATION OF WATER QUALITY RISKS

23 Greenfield developments (primarily zone A) result in a change in landuse, and subsequently, a change in contaminant risks to the environment.

24 The risk of increased urban contaminants from greenfield development due to permanent changes in landuse (from primarily rural catchments to increasingly urban) would vary depending on the catchment. The main changes would be:

24.1 Likely increases in metal loads (copper and zinc), hydrocarbons and litter.

24.2 Potential reductions in *E. coli* and sediment loads (assuming hydraulic neutrality) due to the removal of grazing animals and reduced erosion, and the development of a new wastewater network (excluding rural lifestyle zones)[4], creation of impervious surfaces, native planting and treatment of runoff that are associated with greenfield developments.

24.3 Potential reductions in nutrients such as nitrogen and phosphorus due to removal of animals and reduced erosion, although increased urban garden fertiliser use may offset some of these gains. This is difficult to quantify.

25 It is likely that the existing metal concentrations are low in the receiving freshwater and coastal environments, such as the wetland and lake complex. This assumption is based on the low dwelling density of the settlement and surface water drainage distance to the wetlands/lakes. While development would result in an increase in metal loads to these ecosystems, with appropriate WSD, selection of infrastructure to treat runoff, it would be unlikely that this would lead to ecosystem toxicity effects[5].

26 Any catchment scale treatment devices that may be incorporated as part of the development proposals, such as a downstream treatment wetland, are likely to capture stormwater runoff from some of the existing, untreated, Rangiputa Settlement. This would help to further reduce baseline metal loads to the environment.

27 Enhancement of the receiving environment through fencing, restoration planting and the creation of new habitat (with ecological enhancements proposed through the wetland complex) would provide further natural treatment to increase the environmental condition of the wider area.

28 However, as discussed in Ms Dixons primary evidence (Appendix A) for the designations hearing, Wells and Champion (2013) have identified the lakes are in moderate to poor condition[ix] in respect of water quality (being described as highly nutrient rich), and have significant presence of invasive Alligator Weed. While there is

[4] This assumed that the wastewater treatment system at Rangiputa is adequately designed to treat and discharge safely the additional loading from the development.

[5] Noting no water quality monitoring data exists of total or dissolved metals for the site, wetlands or lakes, and this may need to be corroborated with sampling.

no water quality data to confirm the reports conclusions, it is reasonable to assume that significant improvements in land management would also need to occur across the wider catchment to improve lake health, and that improvements may take decades to occur due to existing legacy effects and nutrients bound in lake sediments.

28.1 I would recommend that the community in this area consider developing a catchment management plan for the lakes and wetlands, working with other large landowners to identify ways to reduce their impact and enhance the receiving environment over time. I understand one of the larger farms (Rangiputa) is owned and operated by central government; Pāmu (formerly Landcorp).

29 The proposed *rural lifestyle* zone would result in a change of landuse from primarily low intensity pastoral farming[i] to lifestyle farming, with a greater density of dwellings and property sizes of 1-2 ha. While it is not known what stock units these lifestyle blocks will contain (if any), there will be an increase in onsite wastewater systems.

30 Regardless of the final wastewater system designs, disposal of wastewater (not solids) at each rural dwelling will most likely be via a drainage field appropriately designed for the low permeability of the soil. Planting (to further reduce nutrients) may occur near the disposal fields, however, this will be dependent on the system and the recommendations of the installer.

31 Septic tank effluent prior to entering a disposal field can be high in nitrogen (up to 40 mg/L). While concentrations are high, volumes are low, and dispersal through a well designed and maintained field can help spread the nutrient load and allow for bio-chemical processes to break down the nitrogen (to nitrate gas, or mineralisation into the soil for plant uptake).

32 GWRC (2000)[x] estimates a 4 person household could produce approximately 8.8 kg N ha year^{-1}, less than the typical leaching rate of New Zealand sheep and beef farms (10-30 kg N ha year^{-1})[xi].

33 Assuming an average property size of 1.5 ha, the approximate loading rate may be ~5.9 kg N ha year^{-1} from each property, excluding stock. It is therefore possible this landuse change would reduce nitrogen loading to the receiving environment than the existing landuse (beef farming). This would further be reduced by riparian planting and stock exclusion to wetlands and lakes as proposed in the spatial plan (Figure 1).

34 Finally, an additional consideration is the earthworks that will be required for the development of lots, roads, three waters and green infrastructure. Sedimentation during earthworks poses a significant risk to the receiving environment, where it is likely to settle within the lakes or wetlands permanently (rather than draining to the coast). Subsequently, all earthworks should have appropriate erosion sediment control plans (ESCP)'s that would also include the establishment of sediment ponds with automated flocculant dosing systems.

35 Consideration of the length of the development period and storm intensity/duration at the Karikari Peninsula would guide the sizing of the sediment ponds, that could be oversized to hold and settle larger storm events (i.e. 5-10 year ARI) to further reduce the environmental risk during earthworks to these highly valued ecosystems[i].

CONCLUSIONS

36 The conceptual hydrology of the Rangiputa development proposed by Lucklaw Farms Limited is one driven primarily by rainfall and ephemeral surface water runoff, and some groundwater seepage towards low lying areas. The presences of iron pans in the area limit deep groundwater recharge, and it's likely that runoff in the proposed development areas would drain towards the wetland and lake complex to the north east.

37 Adoption of WSD principles in the sites design would be considered best practice, and planning should consider working with the sites topography to enhance the natural environment. Climate change risks should be included in the design to ensure a resilient development that minimises its environmental footprint. Treatment of contaminants should consider a treatment train approach, including low yielding source materials (i.e. roofs) through to promoting infiltration, detention, and treatment via green infrastructure of all impervious surfaces prior to any offsite discharge. Larger catchment scale treatment devices, such as a constructed wetland, may also offer opportunities for treatment of some of the existing Rangiputa Settlement.

38 Enhanced planting and fencing of ephemeral and perennial watercourses will improve biodiversity and further treat water prior to entering the wetland/lake complex. A catchment management plan for the wider drainage system would also be useful as a long-term restoration goal for the freshwater environment, and ultimately, the coastal receiving environment.

39 Appropriate WSD and environmental enhancement would help to mitigate the effects of the proposed change in landuse from low intensity pastoral farming to rural lifestyle and general residential/commercial. This would require a comprehensive ESCP to mitigate sediment discharges during earthworks, and adoption of a best practice development approach to minimise effects, but ultimately seek to enhance the receiving freshwater environment.

Dated: 9 June 2025

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James Mitchell Blyth – Director at Collaborations

[i] Dixon, M. 2025. Statement of Evidence of Melanie Robyn Dixon (Ecology) – hearing 11 (designations) – Lucklaw Farms Limited S551. Far North District Plan Change.

[ii] Blyth, J. M. 2025. Statement of Evidence of James Mitchell Blyth (Hydrology) – hearing 11 (designations). Lucklaw Farms Limited S551. Far North District Plan Change.

[iii] Glibert, B. 2025. Puwheke Preliminary Spatial Strategy RevD. Final Draft. Prepared by Bridget Gilbert Landscape Architecture and Earl Design.

[iv] Northland Regional Council. 1991. Aupouri Peninsula Water Resources Assessment. Technical Report

[v] Gilbert, B.M. 2025. Statement of evidence (Landscape) – hearing 15c Rezoning. Far North District Plan Change.

[vi] Wildlands. 2011. Ranking of the top wetlands in the Northland Region – Stage 4 – Ranking for 304 wetlands. Prepared for Northland Regional Council. Report 2489.

[vii] Lewis, M., James, J., Shaver, E., Blackbourn, S., Leahy, A., Seyb, R., Simcock, R., Wihongi, P., Sides, E., & Coste, C. (2015). Water sensitive design for stormwater. Auckland Council Guideline Document GD2015/004. Prepared by Boffa Miskell for Auckland Council..

[viii] NRC. 2016. Climate change impacts in Northland. https://www.nrc.govt.nz/environment/climate-action/climate-change-in-northland/future-impacts/#:~:text=an%20increase%20in%20annual%20average,for%20Northland%20as%20a%20whole

[ix] Wells R. and Champion P. 2013: Northland lakes ecological status 2013. National Institute of Water and Atmospheric Research Ltd, Hamilton, New Zealand. 294pp. Prepared for Northland Regional Council. Available at: https://www.nrc.govt.nz/media/j0rhu04q/northlandlakesecologicalstatus2013s328s416.pdf

[x] Greater Wellington Regional Council (GWRC). 2000. Guidelines for on-site sewage systems in the Wellington Region. WRC/RP-G-00/47.

[xi] Journeaux, P. 2019. Modelling of Mitigation Strategies on Farm Profitability: Testing Ag Package Regulations on-Farm. Prepared for Ministry for the Environment. Independent Agriculture & Horticulture Consultant Network

APPENDIX A – CATCHMENTS >1HA

Rangiputa hydrological catchments >1 ha

Project:	FNDC	Author	TN
Client:	Lucklaw	Date	28/05/25
Ref:	005	Size	A3

Collaborations