Before the Independent Hearings Panel
at Waimakariri District Council

under: the Resource Management Act 1991

in the matter of: Proposed private plan change RCP31 to the Operative Waimakariri District Plan

and: **Rolleston Industrial Developments Limited**
Applicant

Summary of evidence of Paul Michael Farrelly

Dated: 3 August 2023

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SUMMARY OF EVIDENCE OF PAUL FARRELLY

1 My full name is Paul Michael Farrelly.

2 I have a BE Civil Engineering (Hons) from the University of Canterbury. I started my career as a traffic and road safety engineer and have subsequently had over 25 years commercial experience working across a number of industries. Over the past 10 years I have worked in the energy and carbon field.

3 For the past four years I have worked for Lumen, an engineering consultancy, as a Principal Consultant in their dedicated energy and carbon team. Through this work, I am well versed in calculating GHG emissions. I have previously provided GHG evidence for several plan changes in the Selwyn District Council area.

4 GHG emissions are currently occurring on the PC31 land, because of the livestock (dairy cows) that are grazed on the land and their associated emissions. These emissions occur primarily from methane, which has a much greater (28 times) impact on global warming than carbon dioxide per ton of gas emitted. The removal of livestock from the land would support a reduction in GHG emissions.

5 PC31 will result in new emissions from the construction and occupation of dwellings and commercial buildings, and from travel undertaken by residents.

6 Over a 90-year life cycle, energy usage is currently the most significant source of emissions that occurs in residential developments in New Zealand, followed by the embodied carbon of building materials.

7 The type of houses envisaged in PC31 are relatively low on an emissions per m2 basis[1] compared to multi-storey apartments. This is because high embodied carbon materials (concrete and steel) are typically used to build multi-storey apartments, compared to stand alone houses (like those envisaged in PC31), that are primarily constructed of timber.

8 Lifetime energy usage emissions from stand-alone homes can be minimised through the specification of energy efficient homes, the elimination of natural gas/LPG in developments, and encouraging a high uptake of solar PV panels.

9 The potential for solar PV uptake is much greater on stand-alone single ownership homes - such as those envisaged in PC31 - compared to multi-storey apartments or medium density multi-level homes, or where a body corporate exists, due to the much greater

[1] https://iopscience.iop.org/article/10.1088/1755-1315/588/2/022064/pdf

ratio of usable roof area to floor area and a simplified ownership structure.

10 The developer has specified a requirement that dwellings are Electric Vehicle (*EV*) charging ready, which will support the uptake of EVs within the plan change area, and support GHG emissions reductions.

11 A reduction in emissions would also be supported by the introduction of public transport to the plan change area, which **Mr Simon Milner** has assessed can be provided.

12 PC31 proposes a mixture of residential and commercial development, with excellent pedestrian and cycleway connectivity through the development. This is advantageous from a GHG perspective as some day-to-day trips of PC31 residents will be undertaken using active travel modes.

13 The development of commercial areas in PC31 may also reduce the travel emissions of the existing residents of the Ōhoka area somewhat, who currently need to travel outside the area to access shops and other facilities.

14 The site has also been identified as suitable for a school, and provision for this is allowed within the plan change request. Should such a school be developed in PC31, this would reduce emissions associated with travelling to school.

15 Based on the evidence of **Mr Chris Jones**, the typical buyer targeted in this development, is a buyer who wishes to purchase in a rural suburb, relatively close to a major metropolitan centre.

16 I consider it reasonable to assume that if a prospective buyer is unable to find a suitable property in Ōhoka, they are likely to buy a similar property and are unlikely to choose a townhouse in Christchurch City. Given the relative value and availability of land, these buyers may need to buy further out from Christchurch. That could potentially result in a worse outcome from a GHG perspective compared to PC31.

17 Accounting for the points above, I consider that the PC31 development 'supports a reduction in GHG emissions' (as per NPS-UD Policy 1(e)) due to the removal of dairying activity from the land and I am satisfied that RIDL has undertaken practical steps to support a reduction in emissions arising from the development, such as tree planting throughout the PC31 area, the provision of off-road pathways through the development, the provision of two commercial areas, the allowance for a school to be built within PC31 and the specification of a requirement for dwellings to be EV charging ready.

RESPONSE TO SUBMITTER EVIDENCE

18 I have reviewed the evidence of Joanne Mitten on behalf of ECAN.

19 From a GHG perspective, Ms. Mitten focusses on the current lack of public transport to the PC31 area and a potential increase in future vehicle kilometres travelled (VKT), in paragraphs 105-118.

20 It is important to note that this is not the only GHG emission relevant to this assessment, and other factors as articulated in my evidence need to be considered when looking at the issue of GHG emissions.

21 Reducing VKT is a challenge experienced across New Zealand and is not a challenge that is not unique to this application. The evidence of **Mr Milner** concludes that there are viable public transport options to service the site in the future.

22 I consider that practical steps have been undertaken to mitigate potential impacts on VKT, and associated GHG emissions.

23 I have also had an opportunity to review the evidence of Mr Buckley and wish to address some of his points.

24 Mr Buckley has calculated a different figure for the emissions from the dairy farm. My evidence states 1,359t CO2-e per annum compared to Mr. Buckley's calculation of 1,221t. We are actually aligned here, but the reason for the difference is I had used a higher Global Warming Potential (GWP) value for methane in my calculations (28) vs the 25 that is used in the MFE emissions factors to reflect more up-to-date evidence on the warming potential of methane, as per point 53 in my evidence.

25 However, since my evidence was produced, the NZ Ministry for the Environment (MFE) have, in mid July 2023, released updated emissions factors that now consider the higher GWP of methane.

26 Using these most up to date figures, the annual emissions from the dairy farm can be calculated to be 1,257t CO2-e.

26.1 Note - there are some other changes to the MFE factors that explain why the revised figures is not 1,359 as I had calculated, but I do not believe there is any value into delving into this detail.

27 MFE have also revised the emissions factors for electricity usage, and emissions per km since I developed my evidence.

27.1 The electricity factor has reduced from 0.12kg CO2-e/kWh to 0.0742. This reduction reflects the state of our national electricity generation mix now, as opposed to the figures that

were available when I prepared my evidence, that related to the 2020 year.

27.2 The average emissions factor for a private petrol vehicle has also reduced to 0.252kgCO2e/km from 0.265kgCO2-e/km, which reflects the fact that our cars, on average are becoming more fuel efficient as older vehicles reach end of life.

28 Based on a revised dairy farm emissions calculation of 1,257t and the most up to date emissions factors, my evidence (paragraph 61) can be revised as follows:

28.1 1,257 tons CO2-e is equivalent to the following:

(a) 5.0 million vehicle kilometres travelled in a typical NZ vehicle (using the MFE's default private petrol car emission factor (2023) per km of 0.252)

(b) The average annual electricity usage emissions of approximately 1,992[2] Canterbury households.

29 Regardless, Mr Buckley appears to have misinterpreted my evidence, including my comment in paragraph 141. The figures I provided were simply to put the GHG emissions of the dairy farm into perspective, not to suggest that future emissions would be lower in absolute terms compared to the current land use.

30 Mr. Buckley comments on 5.1m km being equivalent to 98,077 return trips to Christchurch. I'm not really sure what the point of this is as nowhere I have indicated that I believe the total PC31 GHG emissions from transport would be equivalent to 5.1m km. As above, the figure of 5.1m km is merely to put the dairy farm emissions into perspective.

31 I agree that the GHG emissions from transport would likely be greater than this, but we cannot predict with any certainty how, or where, people from the PC31 area would travel in future, and from a residential housing lifetime perspective we would need to consider emissions over a 90 year period, so an exercise to try and accurately calculate emissions over such a timeframe is somewhat futile.

32 Mr Buckley has then undertaken further calculations to compare the dairy farm emissions against the anticipated development emissions (infrastructure and house building) and future annual emissions (from energy use and transport).

[2] The average residential home in Canterbury uses 8,550kWh per annum – per Electricity In New Zealand, 2018, The Electricity Authority. Emissions per kWh are 0.0742kg CO2-e/kWh (latest MFE factors – July 2023)

33 Whilst this is an interesting exercise, I don't believe the requirement of NPS-UD is for a development to result in a net reduction in emissions compared to the current use.

34 Regardless, I have some question marks about the figures Mr Buckley has used in his calculations, as no sources have been provided. It is also inappropriate to use current emissions factors to model future emissions, when these factors are almost certain to reduce over time, and particularly in the case of transportation and electricity, as evidenced by the reductions in factors over the past 12 months (per my earlier comments).

35 Furthermore, one can only speculate on infrastructure emissions as we do not yet know the construction methods nor materials that will be used in developing the site infrastructure, so any assessment, such as that undertaken by Mr Buckley is very subjective.

36 Mr Buckley has also suggested that high density development near the centre of Christchurch City will result in lower GHG emissions than development at PC31.

37 Whilst an interesting observation, I do not believe we can compare the housing outcomes provided by PC31 with those of high-density dwellings in Christchurch.

38 Based on discussions with other experts, the households who will choose Ohoka, are not shopping between apartment or townhouse dwellings in Christchurch and a standalone dwelling in Ohoka. They are choosing between Ohoka and perhaps Pegasus or West Melton in Selwyn.

39 If we considered PC31 against comparable locations for 850 dwellings, such as Pegasus or Ravenswood or the outskirts of Rangiora – and where dairy farming is not the current land-use - and we assumed the houses built were the same and that the same infrastructure was required to develop the land then the relevant question is this:

39.1 Would the travel emissions from residents living in PC31 compared to the residents in the alternative location (eg. Pegasus) be greater than the emissions reduced by the removal of dairying activity (which we have already determined to be 5 million km per annum based on an average NZ passenger vehicle)

39.2 For PC31 to have a worse GHG outcome compared to the comparable alternative location, then each of the 850 households would need to travel an extra 5,900km per annum (assuming they drove the "average" petrol vehicle in the NZ vehicle fleet as at 2023).

39.3 As the vehicle fleet becomes more efficient, this "break-even" distance becomes even greater.

39.4 I think it highly unlikely that the average annual travel distance of households in PC31 would be that much higher than the same households in a comparable location.

40 At any rate, ultimately, the relevant statutory test here is "supporting reductions in GHG emissions" not "reducing emissions".

CONCLUSION

41 I consider that the PC31 development 'supports a reduction in GHG emissions' (as per NPS-UD Policy 1(e)) due to:

41.1 The removal of dairying activity and its associated emissions from the PC31 land.

41.2 RIDL taking practical steps in the design of PC31 to support a reduction in emissions arising from the development and occupation of dwellings and commercial buildings, and emissions arising from transportation.

Dated: 3 August 2023

Paul Michael Farrelly