MEMO	Roaring40s Wind Power
To: The Expert Panel (Panel)	
From: Steve Harding Roaring40s Wind Power	
Subject: Southland Wind Farm – stream flows at water take locations	**9 December 2025**

This memo addresses Question 11 of Minute 3, issued on 4 December 2025, namely;

[11] Place the two years of flow records for the proposed water take sites into a longer-term context to indicate whether these records represent wet, average, or dry years

As explained in more detail below, the two years of available records at the proposed Southland Wind Farm water take sites for the Southland Wind Farm have been compared with other relevant and available records (longer term stream flow and rainfall). That analysis shows that the two year period of the stream level/flow data recorded at the proposed water take sites is essentially representative of the long-term record – i.e. can be considered an 'average' period of rainfall and stream flow.

Background

In paras 185-193 of the *Southland Wind Farm Technical Assessment #9 (Construction Effects)* a description of the water supply for the wind farm is provided. This section describes the water use requirements during the construction of the wind farm and the locations (on two streams) within the wind farm site where Contact Energy (Contact) proposes to take water from in order to meet those requirements, and provides a summary of the water flow within the streams at the two proposed water take locations.

The summary of the stream flow was based on two years[1] of stream level data recorded at those locations (which was converted to stream flow, based on rating curves developed from numerous stream flow gaugings). The question posed by the Panel is to determine the context of the two years of stream flow data – i.e. does the period of data collection reflect a wet, average, or dry period?

Appendix A contains a figure which identifies the key aspects referred to in this memo – and in particular, the locations of the stream flow monitoring sites (M1 and M2) where water is proposed to be abstracted during the construction of the wind farm – and locations of other sites where data records exist. For completeness, there is no other data available for monitoring sites M1 and M2 other than the two years of data provided with the application, hence the need to consider data from other sites.

The key aspects to be interpreted from the figure in Appendix A are;

- The Wind Farm Site is almost entirely in the Mimihau Stream catchment. Just a small portion on the western and southern part of the Wind Farm Site is in a different catchment, the Mokoreta River catchment
- Sites M1 and M2 are both within the Mimihau Stream catchment
- There are no other known or publicly available stream flow recording stations on the Mimihau Stream or within the Mimihau Stream catchment

[1] 29 March 2023 to 10 March 2025

- There are two long-term Environment Southland river flow monitoring stations near to the proposed Wind Farm Site; one is on the Mokoreta River (Mokoreta River at McKays Road), and the other is on the Mataura River (Mataura River at Seaward Downs)
- There is a meteorological monitoring mast on the Wind Farm Site, installed by Contact in May 2023 – which records rainfall (amongst other variables), and there is an Environment Southland rainfall station nearby, in the Mokoreta valley (Mokoreta at Mt Alexander).

Methodology

As there are no long-term stream monitoring records anywhere within the Mimihau Stream catchment, a specific analysis of long-term stream flow trends within this catchment is not possible. However, long term river flow records are available at two nearby locations, one on the Mokoreta River and one on the Mataura River – both sites being part of Environment Southland's river flow monitoring database. The Mimihau Stream and the Mokoreta River are tributaries to the Mataura River. The catchment area of the *Mataura River at Seaward Downs* stream monitoring location is over 5,100km^2. This compares to a catchment area of just 4.6km^2 for Site M1 and 12.4km^2 for Site M2. The vast difference in catchment areas would mean any relationships established on the Mataura River data would be accompanied by a high degree of uncertainty when extrapolating to the small catchments of sites M1 and M2.

The catchment area of the *Mokoreta River at McKays Road* stream monitoring site is 418km^2 and although this is still significantly larger than that of Sites M1 and M2 (and not in the same catchment as them), the location and characteristics of this catchment are very similar to that of the Mimihau Stream catchment. Therefore, this monitoring site is considered a better and more closely correlated data record to use as a means of establishing the context of the two-year data period within the long-term context. The record at this site is long – stretching back to 23/5/1981.

An alternative and complementary method is to undertake the analysis on rainfall data, rather than stream flow data. Given that rainfall and stream flow have a highly correlated relationship, using trends in rainfall can be used as a proxy for trends in stream flow. Rainfall has been collected on the wind farm site (at the Contact monitoring mast – see Appendix A) since May 2023 and at the nearby Environment Southland site *Mokoreta at Mt Alexander* for over 30 years. This long-term rainfall data record has been used to create a synthesised rainfall data record at the Contact monitoring mast location.

The correlation between the Mokoreta weather station and the onsite mast rainfall was generated by;

- Comparing the daily rainfall for both sites for the concurrent period.
- Binning the daily rainfall data at the two sites into separate conversion matrix.
- The ratio of the two matrices individual bins provides the average conversion ratio for site wind direction and total daily rainfall at Mokoreta which enables a synthetic daily rainfall to be generated for the on-site record prior to May 2023. The ratio from the appropriate direction and total daily rainfall bin for each daily rainfall record at Mokoreta is used to convert the record to the approximate daily site rainfall.

To ensure no seasonal bias, the data period has been clipped to complete years, over the period 1/12/1993 – 30/11/2025 – and this range has been used for all analysis to keep consistency between the different methods employed.

Results

The results of the analysis are summarised in Table 1.

Table 1 Stream flow and rainfall comparison

Comparison Site	Length of record analysed	Period in years	Data Gaps	Mean flow/rainfall	Mean flow/rainfall over period 29/3/23 to 10/3/25	Difference

Mokoreta River at McKays Rd (stream flow)	1/12/93 – 30/11/25	32	25 days (0.2%)	9.464 m^3/s	9.614 m^3/s	1.58%
Mokoreta at Mt Alexander (rainfall)	1/12/93 – 30/11/25	32	None	3.284 mm/day	3.407 mm/day	2.96%
Contact monitoring mast site (actual and synthetic rainfall)	1/12/93 – 30/11/25	32	None	4.897 mm/day	5.024 mm/day	2.59%

The different methods produce very similar results, and all suggest that the period between 29/3/23 – 10/3/25 was slightly wetter than normal, with results suggesting it was 1.6 - 3% wetter than normal during this period. This is such a small difference that it can be concluded, based on the analysis undertaken, the period of the stream level/flow data recorded within the proposed Southland Wind Farm at Site M1 and Site M2 is essentially representative of the long-term record – i.e. can be considered an average period.

As such, the summary of flow conditions at Sites M1 and M2, as described in Table 14 (*Mimihau Stream flow statistics. Period of record from 29 March 2023 to 10 March 2025*) in para 188 of the *Southland Wind Farm Technical Assessment #9 (Construction Effects),* copied below, represents average conditions.

Location	Catchment Area (km^2)	Mean flow (l/s)	Median flow (l/s)	95 percentile flow (l/s)
Site M1	4.6	153	115	65
Site M2	12.4	377	269	92

Kind regards

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Appendix A – Location of Monitoring Sites and Catchment Areas