Before the Selwyn District Council

under: the Resource Management Act 1991

in the matter of: Proposed Private Plan Change 69 to the Operative District Plan: Lincoln South

and: **Rolleston Industrial Developments Limited**
Applicant

Summary of Evidence of Cathy Nieuwenhuijsen (Odour)

Dated: 23 November 2021

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INTRODUCTION

1 My name is Catherine (Cathy) Nieuwenhuijsen and I am a Senior Air Quality consultant at Golder Associates New Zealand Limited. I have nearly 20 years' experience in wide range of Air Quality Assessments.

2 Prior to providing my summary, I need to clarify my position on the likelihood of emergency pond use as I have covered in paragraph 20 in my evidence dated 4 November 2021. Following my summary, I also would like to comment on information regarding pond use received from Murray England (SDC) yesterday (22/11/21).

UPDATE TO PARAGRAPH 20 of EVIDENCE DATED 4 NOVEMBER 2021

3 In my evidence Paragraph 20, I have stated that I understand that failure events (of the significance considered in the Eastern Selwyn Sewerage Scheme (ESSS) resilience report) are likely to be a 1 in 20 year event. I now understand this to be an oversimplification. Following further conversations with a number of WSP colleagues I understand it would be very unusual for any well designed, installed, operated and maintained wastewater network to not perform as per the designer's intent and performance parameters (especially early in its operational life, e.g., the first 20 years). I understand that significant failures (of the type considered in the resilience report) due to 3rd party activities or acts of nature could occur, although are expected to be rare.

4 Following the early operational period, the level of inspection and preventative maintenance activities undertaken would maximise the likelihood of the wastewater network performing as per its design parameters. I understand that assessing the risk of failure without a detailed understanding of the infrastructure condition is not possible.

5 I understand the expected useful operational life of various components (pumps, valves, electrical systems, reticulation network etc.) of the wastewater network could range from 20 to 100 years depending on the component[1]. The changes to input flows and network operation over the life of the wastewater network could influence (e.g., reduce) the original design life and performance parameters. Maintenance and replacement of the wastewater networks components based on design life, remaining useful life, change of design and operational parameters, operational issues

[1] Nelson City Council, Wastewater Asset Management Plan 2018 – 2028. Available https://www.nelson.govt.nz/assets/Our-council/Downloads/asset-managment-plans/2018/2018-28-Wastewater-Asset-Management-Plan-6Dec2018.pdf last accessed 19/11/21.

and maintenance history, etc., as well as regular inspections would maximise its operational life.

6 Overall, I understand that a well-designed, installed, operated and maintained modern wastewater network has a low risk of a significant failure of the type considered in the resilience report.

7 Based on the above, I have considered odour effects based on the ponds being needed to be used in emergency situations once every twenty years and consider this a reasonable frequency consistent with the low risk described. I note my conclusions regarding odour would not change if pond use for these situations was a one in five year occurrence.

SUMMARY OF EVIDENCE OF CATHY NIEUWENHUIJSEN

8 In this summary of my evidence, I summarise my evidence in chief (dated 4 November 2021) which focuses on matters within my expertise, including odour effects from the current Lincoln wastewater tanks and pond and whether the existing 150 m setback (currently required by Rule C4.9.32 of the Selwyn District Plan) is required to prevent reverse sensitivity odour effects.

9 I reviewed the activities at the Lincoln Sewage treatment Plant (STP) in the vicinity of the blocks. The STP is no longer used to treat wastewater, instead it is used to buffer flows during storm (peak wet weather) events and is available for emergency wastewater storage. The 150 m setback was put in place when the STP was used to treat wastewater.

10 I understand there is currently no active consent for the use for the ponds for wastewater, and this is consistent with the use of these ponds for infrequent emergency use. (Information received yesterday indicates that the ponds are also used for non-emergency use and I have covered this from paragraph 16).

11 I considered the use of the ponds for dilute wastewater during peak flows for a storm event and also for emergency use. These are both relatively low frequency events.

12 The storm events that are the critical duration are the 12 hour events with a 1 in 5 year frequency. Emergency use of the ponds is expected to be a low frequency event and I have considered these based on a 1 in 20 year event.

13 For each of these STP uses, I have considered the potential odour effects associated with these uses.

14 For the use of the STP for dilute wastewater storage in storm events, due to the low volume entering the pond and short-term

nature of the storage in the tanks, I conclude that there is less than minor potential for offsite odour effects. Mr Bender agrees with the above assessment and has not raised any concerns relating to the normal operation of the ponds in wet weather events. My conclusion is maintained with the updated volumes provided yesterday (1230 m³ in a storm event compared to 700 m³ previous considered).

15 Regarding the use of the ponds for emergency use, this is expected to be a low frequency activity (estimated to be 1 in 20-year event) that may result in short term (up to a few days) of observable offsite odour. Therefore, when the ponds are used for emergency storage, while there is the potential for odour to be observed offsite, due to the low frequency and short-term nature of this, I do not consider that a 150m buffer is required to mitigate odour effects.

RECENT INFORMATION ON POND USE.

16 Logged information on Pond use for the last two years was provided by Mr England yesterday. This is attached. The pond appears to be used in an operation capacity rather than only for emergency use with 11 occasions within 17 months where wastewater was discharged into the pond. It was not understood the pond was used in this way prior to receiving this information.

17 For each of the logged events I have estimated the BOD_5 loading on the pond in comparison to both the expected natural oxygen availability as well as the indicative design loading for an unaerated facultative pond this size. This comparison provides an indication of how easily the wastewater oxygen demand can be met by the pond and therefore the likely odour potential. Where full strength wastewater is expected to enter the pond, an BOD_5 of between 200 to 300 g/m³ has been assumed. Where the use occurred during a wet weather event, I have assumed an estimated dilute wastewater stream with a BOD_5 of 85 g/m3.

18 In most cases the BOD_5 loading for each of the logged events is below the expected natural oxygen capacity of the pond without considering any available aeration. For the occasions where the BOD_5 demand is greater than the expected natural oxygen, the BOD_5 demand is well below that that an aerated facultative pond of this size would be designed to meet.

19 On the worse case events logged in the 17 months available, there was 200 to 300 kg/day of BOD_5 load on the pond for a period of 7 days. As a facultative pond of this size would be designed to treat 760- 1850 kg/BOD5 /day, the loading is several times lower than it would be expected that a pond of this size could treat. Given this loading, it is considered unlikely that the pond would go anaerobic

and therefore is unlikely to result in long term odour discharges due to this use.

20 However, a low level of localised odour may occur during and just after periods where the pond is receiving undiluted wastewater that exceeds the ponds available oxygen. This odour potential will be reduced by the recently installed aerators which can provide additional oxygen to assist in meeting the BOD_5 demand.

21 Given the events logged are typical in both frequency and volume of what is expected to occur, i.e in the order of 1 week in 17 months where the expected natural DO of the pond would be exceeded, a small setback distance to houses from the pond edge (in the order of 50 m) may be appropriate to avoid localised odour at house locations.

22 However, depending on the level of aeration being provided by the recently installed aerators this may not be required. If the aerators provide sufficient oxygen in combination with the expected natural oxygen level, then short term odour effects are expected to be minimised to the extent that a setback distance may not be required.

23 Until yesterday there was little information available on the pond use beyond the emergency and storm event use previous addressed in my evidence. Using the limited data, I have provided my expectation of the indicative scale of likely odour effects due to the pond use. Prior to determining whether a setback is required, and if so, what distance this should be, it would be useful to understand the expected future use of the pond and the frequency of the various events that are expected to result in wastewater being stored in the pond.

Dated: 23 November 2021

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Cathy Nieuwenhuijsen

Attachment 1 Lincoln Pond use date from M England SDC (22/11/21) (Golder additions shaded in grey).

Date	Sign in	Sign out	Comment	m3 Discharged	Reason for discharge	BOD5 estimate		Estimated Duration	Event exceeds natural DO	Event exceeds indicative pond daily design capacity
						g/m3	kg	hours	Estimate of 133 kg	Estimate of 730-1850 kg/day
4/03/2020	11:55	12:15	Turn off flumes - flow into pond	29	Allendale pump failure	200 to 300	6 to 9	0.0	no	no
7/05/2020	7:30	7:45	Open Valve to pond & turn off flumes	316	Odour prevention	200 to 300	63 to 95	8.4	no	no
7/05/2020		16:00	Divert stopped							
10/06/2020	8:30	8:35	Divert flow into pond	272.5	Odour prevention	200 to 300	55 to 82	5.7	no	no
10/06/2020	2:00	2:30	Put flow back to P/S							
29/06/2020	8:45	9:00	Divert flow into Pond	858	Rainfall event, high flows	est. 86	est. 74	7.6	no	no
29/06/2020		16:30	Divert stopped							
8/11/2020	11:30	11:40	Close valve - Open pond	1566	Rainfall event, high flows	est. 86	est. 134	22.3	yes	no
9/11/2020	9:30	10:15	Close Pond							
8/03/2021	15:00	15:30	Divert flow into pond	2	Valve Testing	200 to 300	0 to 1	0.5	no	no
15/04/2021	5:00	5:15	Put flow into pond	472	Odour prevention	200 to 300	94 to 142	29.1	yes	no
16/04/2021	10:00	10:30	Put flow back to normal							

Date	Sign in	Sign out	Comment	m3 Discharged	Reason for discharge	BOD5 estimate		Estimated Duration	Event exceeds natural DO	Event exceeds indicative pond daily design capacity
						g/m3	kg	hours	Estimate of 133 kg	Estimate of 730-1850 kg/day
31/05/2021	17:50	18:10	Open Valves to pond	2448	Flood event	est. 86	est. 210	22.3	yes	no
1/06/2021	16:10	16:30	Closed valves into pond							
2/06/2021	11:30	11:40	Put flow into pond	5120	Plant breakdown - process recovery	200 to 300	1024 to 1536	134.5	yes	no
8/06/2021	2:00	2:15	Put flow back to P/S							
9/09/2021	10:40	10:55	Divert LLD into pond	968.4	Emergency repair breakdown -	200 to 300	194 to 291	22.7	yes	no
10/09/2021	9:25	9:40	Open valve to p/s & closed to pond							
19/10/2021	11:00	11:45	Open valve to pond + collect sample P/S	1954.5	High tradewaste loading	uncertain				