

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

Statement of Evidence of Cathy Nieuwenhuijsen (Odour)

Dated: 4 November 2021

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STATEMENT OF EVIDENCE OF CATHY NIEUWENHUIJSEN

INTRODUCTION

- 1 My full name is Catherine (Cathy) Elizabeth Nieuwenhuijsen.
- 2 I am a Senior Air Quality consultant at Golder Associates New Zealand Limited, now owned by WSP. I have a degree in Chemical and Process Engineering and I am a Certified Air Quality Professional. I have nearly 20 years' experience in wide range of Air Quality Assessments.
- 3 With regards to odour assessments, I have:
 - 3.1 been a project manager and a technical lead in preparing assessments for various chicken farms, including Brinks Poultry (Canterbury and Waikato) and Cobb Vantross poultry farm (Waikato).
 - 3.2 been an internal technical reviewer for a number of other assessments, including Lamond Poultry (a free-range layer farm) in Christchurch, and working for potentially affected neighbours in undertaking a review of two meat chicken farms in Canterbury.
 - 3.3 been the technical lead and Project Manager of assessments on Rendering sites, including Hawkes Bay Proteins and Tuakau Proteins.
 - 3.4 worked as Environment Canterbury's expert for the review of a composting operation, including attending Environment Court Mediation.
 - 3.5 assisted with assessment of odour and contaminants from Ravensdown's three fertiliser factories and several Alliance meat processing operations, including rendering/fellmongering and wastewater treatment plants.
 - 3.6 significant atmospheric dispersion modelling experience and have been technical lead on numerous air quality assessments involving complex dispersion models. These include assessment of energy plants, milk powder driers, pyrolysis plants, generators, and refinery emissions.
- 4 With regard to odour assessments in the context of this plan change, I was the project manager and technical lead for the assessment of the odour effects (Golder 2021)¹ that was prepared in

¹ Golder (2021) Letter C Nieuwenhuijsen to J Lewes. Golder Ref 20438027-004-L-Rev0.

response to a request for further information (RFI) relating to the Lincoln South Plan change area.

- 5 I am familiar with the plan change application by Rolleston Industrial Developments Limited (*the Applicant*) to rezone approximately 190 hectares of land on Springs Road, Lincoln to enable approximately 2,000 residential sites and a small commercial zone.

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 7 of the Environment Court Practice Note 2014. 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, except where relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

- 7 The scope of my evidence is an assessment of odour effects on the PC69 land, specifically the need or otherwise for housing to be setback from the former Lincoln sewage treatment plant (the STP). I have only considered the current anticipated use of the plant and not potential future uses.
- 8 I have prepared the attached letter report (**Appendix A**) incorrectly dated 16 February 2020 (but issued on 16th February 2021) (Golder 2021). This letter was prepared in response to a RFI for PC69. This letter covers the use of the STP for storage in storm (peak wet weather) events.
- 9 In preparing my evidence, I have reviewed and considered the following:
 - 9.1 Novo Group report– Request for Change to the Selwyn District Plan prepared for: Rolleston Industrial Developments Limited. April 2021;
 - 9.2 Aqualink report – Application to use land for a community wastewater management pond – Assessment of Environmental Effects. Report dated 18 Apr 2019;
 - 9.3 Council’s Section 42a Report prepared by Mr Nick Boyes; and
 - 9.4 The odour peer review prepared by Mr Chris Bender.

- 10 My evidence will provide a summary of the letter report, followed by updates to my assessment and response to the conclusions in **Mr Bender's** and **Mr England's** evidence regarding odour effects and the potential for reverse sensitivity.

SUMMARY OF LETTER REPORT FOR PC69

- 11 In summary, my letter report provides a review of the potential odour effects from the Lincoln Sewage treatment plant (STP) operations on the proposed Lincoln South Plan Change area and whether the existing 150 m setback for housing (currently required by Rule C4.9.32) is still required to prevent reverse sensitivity odour effects.
- 12 Key points include the following:
- 12.1 The Lincoln STP consisted of sequential batch reactor (SBR) tanks and an oxidation pond to treat the wastewater prior to discharge. However, the activity was only permitted under CRC210644 until 31 March 2013. The Lincoln STP is no longer used for sewage treatment. Instead, the tanks and pond associated with the Lincoln STP are used to buffer flows to the Pines Wastewater treatment plant (WWTP) during storm events (peak wet weather) and the tanks and pond are made available for emergency wastewater storage events.
 - 12.2 The flow buffering involves temporary storage of dilute wastewater in the tanks with overflow into the pond if required.
 - 12.3 For high rainfall events, based on the evaluation of flows by WSP (2020), for the 1-in-5-year annual reoccurrence interval (ARI) over a 12-hour period, a conservative estimate of 700 m³ of dilute wastewater is generated beyond the capacity of the pump station. This has previously been determined by WSP as the critical storm duration and hence is expected to result in the highest requirement for temporary storage. In this event, tanks will be filled first. The tanks have capacity of up to 600 m³ with the remaining 100 m³ discharged into the pond.
 - 12.4 For the PC69 area, due to the use of tanks for short-term wastewater storage in high-rainfall events, the freshness of the wastewater, and the distance (190 m) to the residential area, it was concluded that the storage of wastewater in the tanks was likely to result in less than minor odour effects
 - 12.5 With regard to the pond use, the natural capacity of the pond to provide the oxygen required by the dilute wastewater is

expected to result in a less than minor potential for offsite odour effects.

12.6 I note that aerators are now installed in the pond; these appear to have been installed recently, as the first aerial photograph they are visible in is dated December 2020. I do not have the specifications of the aerators, but these are likely to increase the oxygen available at the inlet of the pond and reduce the sludge build-up in this area. The aerators are unlikely to increase the odour potential of the pond compared to my original assessment, and indeed are likely to reduce the odour potential.

- 13 Therefore, the current use of the Lincoln STP was concluded to be unlikely to result in offsite odour at the PC69 area and no restrictions on land use in the Lincoln South subdivision are considered necessary to mitigate against reverse sensitivity to odour during high rainfall events.
- 14 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.

RESPONSE TO SECTION 42A REPORT

- 15 With regard to the emergency use provisions raised by Mr Bender and Mr England, I have reviewed the resilience planning document² referred to by Mr Bender. The land use application (CRC193742 – currently on hold) also describes the use of the STP.
- 16 In the resilience planning document, simulations of operational scenarios including failure of critical wastewater pipelines, pump stations and treatment plant are modelled to determine the resilience of the network capacity. A criteria of 8 hours storage has been applied to allow time for repair/diversion to be undertaken. The Lincoln STP pond and tanks are included as part of the network storage capacity.
- 17 As Mr Bender describes, the tanks and ponds can be used for emergency situations, including failures in either the rising mains wastewater pipes or in the pump stations between Lincoln and the Pines WWTP. The resilience planning document evaluates the situations listed by Mr Bender and Mr England (excluding peak wet weather flows evaluate earlier in this evidence).
- 18 Simulations of various failure scenarios were undertaken to determine whether the network has sufficient capacity to hold the

² WSP/OPUS/Stantec. Eastern Selwyn Sewerage Scheme Resilience Planning
Prepared for Selwyn District Council 16 September 2019.

wastewater for 8 hours. There was no evaluation of the likelihood of the scenarios in this report.

- 19 To assist with determining the potential for odour effects I have consulted with my colleague, Adam Wheeldon, a WSP technical principal and pipe condition specialist who also has experience in wastewater networks, and he estimated that for a recently installed, well-designed, and maintained system, failures of the kind evaluated in the resilience report, are likely to be an approximately 1 in 20 year event if not less frequently. When considering odour effects, I would consider this to be a very low likelihood.
- 20 As far as I am aware there have been no major failures of the network to date.
- 21 To determine the level of odour effect likely in the emergency evaluated in the resilience report, I have considered the wastewater discharged into the pond in an event. In the worse scenario for discharge into the pond (Scenario 2– Selwyn Road Rising Main Failure), the pond would receive wastewater 3 hours after the event (due to network and Lincoln SBR tanks capacity).
- 22 In the period up to the 8 hour timeframe considered, the pond is stated to receive 21% of the available residual capacity. I estimate this to be 4,200 m³ based on the 20,000 m³ residual pond capacity reported. On the basis that this is undiluted wastewater with an BOD₅ of 200 to 300 g/m³, this is a BOD loading of 870 to 1,260kg BOD₅.
- 23 Following the repair of the system, wastewater would be pumped out of the pond and tanks, either to Pines WWTP or potentially to the Christchurch network.
- 24 The amount of wastewater discharged into the pond, the period of time that wastewater was stored in the pond, and pond conditions prior to the wastewater being discharged into the pond as well as ambient factors will contribute to the pond's response to the wastewater.
- 25 While the pond is not regularly receiving any wastewater and therefore any emergency loading would be a shock load, to quantify the wastewater load it is useful to consider what BOD load this size pond would be treating if it were operating as facultative pond.
- 26 Using an indicative design specification (EPA 2011)³, loading for an unaerated facultative pond is typically between 22 and 56 kg

³ [Principles of Design and Operations of Wastewater Treatment Pond Systems for Plant Operators, Engineers, and Managers \(epa.gov\)](https://www.epa.gov/sites/default/files/2014-09/documents/lagoon-pond-treatment-2011.pdf)
<https://www.epa.gov/sites/default/files/2014-09/documents/lagoon-pond-treatment-2011.pdf>

BOD₅/1,000m²/day. For the 33,000 m² pond area, this is a daily load of between 730 and 1850 kg BOD₅. Therefore, the emergency load is consistent with a single day of load expected.

- 27 The inflow would occur without the pond having a bacteria population that would consume that load, however I do not expect there to be a significant lag in the pond's biological system to adapt to the increase in BOD demand. Therefore, I estimate that there may be odour observed offsite perhaps up to a period of a few days for the pond top layer to clarify and for natural oxygen transfer at the surface of the pond to resume.
- 28 Overall, I consider the use of the pond for emergency storage may potentially result in observable odour beyond the boundary. However, due to the likely infrequency of this event and the expected relatively short term nature of the odour, I consider that the risk of odour is acceptable and maintaining the 150 m setback is not required to mitigate against infrequent short term events such as these.

CONCLUSIONS

- 29 I have considered the odour potential from the Lincoln STP and whether maintaining a 150m setback is justified for the current operation of this site. I have considered the use of the ponds for storage during storm (peak wet weather) events and as contingency storage for wastewater network resilience.
- 30 For storm events, I consider that the pond has sufficient capacity to provide the oxygen demand required such that there is likely to be less than minor potential for offsite odour effects. When the ponds are used for emergency storage, there is the potential for odour to be observed offsite, but 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.

Dated: 4 November 2021

Cathy Nieuwenhuijsen