

**BEFORE THE HEARING PANEL**

**IN THE MATTER** the Resource  
Management Act 1991 (the Act)

**AND**

**IN THE MATTER** of applications by  
Tararua District Council to Horizons  
Regional Council associated with **APP-  
1993001253.02** for resource consents  
associated with the operation of the  
Pahiatua Wastewater Treatment Plant,  
including earthworks, a discharge into  
Town Creek (initially), then to the  
Mangatainoka River, a discharge to air  
(principally odour), and discharges to land  
via seepage, Julia Street, Pahiatua

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**REPORT TO THE COMMISSIONERS**

**DR BRENT COWIE (CHAIR), MR REGINALD PROFFIT AND MR PETER  
CALLANDER**

**SECTION 42A REPORT OF DEBORAH ANNE RYAN – AIR QUALITY**

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**21 April 2017**

## A. INTRODUCTION

### Qualification and Experience

1. My full name is Deborah Anne Ryan.
2. I have a Bachelor's Degree in Biotechnology and Bioprocess Engineering from Massey University, Palmerston North (1991) and I am both a member of the Clean Air Society of Australia and New Zealand and a Certified Air Quality Professional with the Society. I am also certified under the Ministry for the Environment's Making Good Decisions programme for decision makers under the Resource Management Act.
3. I have 25 years' of experience in the air quality and resource management fields. I spent eight years as an Air Quality Specialist with the Manawatu-Wanganui and the Waikato Regional Councils. I have been employed as a Senior Air Quality Consultant with Jacobs New Zealand Limited (formerly Sinclair Knight Merz) for the last 15 years. I have extensive experience in air quality studies, in particular, preparing and reviewing a wide range of air quality effects assessments and in managing and reporting on air quality monitoring programmes. As an air quality specialist, I have been responsible for reporting and presenting specialist air quality advice to council resource consent hearings on multiple projects across the following sectors: industry; infrastructure; and government.
4. My experience with assessing the effects on air quality from wastewater related activities and other activities that give rise to odour effects includes: sewage treatment plants at Hamilton, Wanaka, Levin and Shannon; waste disposal to land at Tarras and Synlait Milk (Canterbury); meat or fish meal facilities at Te Aroha, Tuakau, Horotiu, Dannevirke, Oringi, Whanganui, Nelson, Mosgiel, Dunedin and Levin; fellmongeries at Whanganui, Shannon, and Green Island (Dunedin); and landfills including those with leachate storage at Bonny Glen, Levin, Hampton Downs, Southland and Te Aroha.

5. I have been contracted to provide specialist advice on air discharge consent matters to regional councils and District Health Boards (DHB) including the Manawatu-Wanganui Regional Council, the Waikato Regional Council, the Otago Regional Council, Waikato DHB and Health Southland. I was the principal author of the Ministry for the Environment's Good Practice Guide for Assessing and Managing Odour in New Zealand (2003) and I was contracted as the peer reviewer for the Ministry for the Environment's Good Practice Guide to Assessing Discharges to Air from Industry (2008). I also contributed to the updates of the above guides that were published in 2016.
6. I have read the Code of Conduct for Expert Witnesses as contained in the Environment Court's Practice Note (2014), and I agree to comply with it as if this hearing were before the Environment Court. My qualifications are set out above. I confirm that the issues addressed in this brief of evidence are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

### **Background**

7. The air discharge consent application by Tararua District Council (TDC) is applied for as a discretionary activity under Rule 15-17 of the One Plan for the Manawatu-Wanganui Region.

## **B. OUTLINE OF EVIDENCE**

### **My role**

8. I am engaged by the Manawatu-Wanganui Regional Council (Horizons) to provide technical advice on the air quality aspects for the application by the TDC for an air discharge permit for the Pahiatua Wastewater Treatment Plant ATH-2016200772.00.
9. I undertook a site visit to the Pahiatua treatment plant with Horizons staff on the 23<sup>rd</sup> of February 2017.

10. I have read the assessment of environmental effects (AEE) of the treatment plant discharges TDC supplied in support of its application for resource consents<sup>1</sup>. The AEE was prepared by OPUS and focused on water related matters including effects on the water quality of the Mangatainoka River and consideration of alternative methods of treatment and disposal.
11. I have read the s42A report prepared by Fiona Morton and the recommended conditions for the application, dated 21 April 2017. In my view, the recommended conditions are appropriate to address the potential adverse effects from the TDC discharges to air.

### **Scope**

12. My evidence relates to the assessment of effects on air quality from the discharges to air from the Pahiatua Wastewater Treatment Plant. I describe the activity, and the potential sources of discharges to air. I then address submissions raising issues of air quality and I overview the possible effects on the environment from the discharge to air. I note that the AEE includes upgrades to the treatment plant. I understand that the upgrades have already taken place. I provide recommendations for conditions that, in my view, are appropriate to address the potential adverse effects from the treatment plant's air discharges.

### **C. THE ACTIVITY**

13. The Pahiatua Wastewater Treatment Plant is north of Pahiatua Township. Figure 1 is a location map showing the nearest residential properties at around 120 meters to the south-southeast of Pond 1 on Hamilton Street. The site is surrounded by rural land to the west, north and east. Background odour in the area will consist of typical rural odours potentially including stock effluent. All residential properties in the vicinity would be considered highly sensitive to odours of an offensive nature, such as septic or anaerobic odours from wastewater, which have the potential to occur under abnormal operating conditions at the treatment plant.

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<sup>1</sup> OPUS, Pahiatua WWTP - Discharge of Treated Wastewater, December 2015 (note this report relates to a S92 response for ground seepage)

**Figure 1** Pahiataua Wastewater Treatment Ponds Location



14. The Pahiataua Wastewater Treatment Plant serves around 2400 people (2013 census) and currently consists of three oxidation ponds discharging to the Mangatainoka River via Town Creek. The ponds are facultative oxidation ponds with mechanical aeration in Pond 1 and Pond 2. Anaerobic biological activity will occur in the sludge and at lower levels in the water in the ponds.
15. I understand that upgrades to the treatment plant have been undertaken to improve the water discharge quality. The upgrades include:
  - a. An at grade primary screen;
  - b. A contact tank for coagulation;
  - c. A lamella plate clarifier; and
  - d. UV disinfection.

16. Figure 2 shows the at grade primary screen, which was installed in 2014 to reduce the solids loading on the ponds. Solids are stored as shown in the photograph, with collection in a waste bin covered with a tarpaulin.

**Figure 2** Primary Screen Installed at Pahiatua (February 2017)



17. Figure 3 is a photograph of the treatment plant showing the contact tank, clarifier, UV treatment and waste solids storage tank.

**Figure 3** Pahiataua Treatment Plant (February 2017)



18. In my view, the potential sources of air discharge as part of this consent application include of odour from the:
- a. Inlet works, primary wastewater screening and associated solids storage and handling;
  - b. Treatment ponds;
  - c. Contact tank;
  - d. Clarifier including solids handling and storage;
  - e. Filtration systems;
  - f. A proposed wetland; and
  - g. Removal of pond sludge (as and when required).

19. OPUS states that the ponds were de-sludged and clay-lined in the early 2000s.
20. Odorous compounds can be discharged from all operations, particularly where untreated wastewater is exposed to air, including the inlet works (primary screen) and Pond 1. The inlet works are commonly one of the most significant odour sources, particularly for sites where the wastewater has travelled long distances, or the sewer system design is such that the waste has long dwell times within pipes and anaerobic conditions are allowed to form within the wastewater. Anaerobic biological activity results in pungent and offensive odorous compounds, particularly hydrogen sulphide and mercaptans, which have a high potential to create adverse effects from odour off-site.

#### **D. SUBMISSIONS RECEIVED**

21. The applications were fully publically notified with eleven submissions received. Kahungunu ki Tamaki nui-a-rua was the only party that mentioned air discharges in their submission. The submitter sought a requirement for TDC to carry out “dispersion monitoring” for the air discharge consent. In my view, compliance with conditions of the general form as I set out in Section F below will ensure that monitoring and controls at the wastewater treatment plant are adequate to address the submitter’s concern relating to monitoring air discharges.

#### **E. EFFECTS ASSOCIATED WITH THE ACTIVITY**

22. Odour is a subjective issue and the effects can be difficult to assess. The Ministry for the Environment (2016) has published guidelines for assessing and managing odour<sup>2</sup>. The Ministry recommends tools for odour assessment for existing activities, which include: complaint records; industry or regional council experience with the discharge; community consultation; and odour annoyance surveys. Whether an odour is assessed as having an adverse effect is dependent on the frequency, intensity, duration and offensiveness of any odour events.

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<sup>2</sup> Ministry for the Environment, *Good Practice Guide for Assessing and Managing Odour*, November 2016.

23. In considering the effects on air quality, the applicant noted that potentially odorous compounds include ammonia and hydrogen sulphide, and that odour can often result when organic material is being decomposed under anaerobic conditions. There have been historical odour complaints at the Pahiatua site; which I discuss below. The applicant noted in the AEE that if odour incidents arise in future, then mitigation would be updated and the site subject to compliance with a management plan.
24. My review of the potential effects on the environment of air discharges has been undertaken by considering the potential sources of odour discharge to air from the wastewater treatment operation; the controls in place; the potential failures of controls; the odour complaint and compliance history; and the mitigation and management required to ensure the potential for objectionable effects from odour is low.
25. During the site visit to Pahiatua I noted a discernible odour in the immediate vicinity of the treatment plant and discharge outfall, but this was contained within a small area and not discernible beyond the boundary. The screened solids storage area at Pahiatua had a low level of odour.
26. Horizons advised me that twenty-four complaints regarding odour from the Pahiatua plant were received in the period April 2003 to January 2004. I am advised that these complaints correlated with the desludging and recommissioning of the ponds following liner installation. I was further advised that twenty-three odour complaints were also received from February 2005 to December 2005. I understand on advice from Horizons that this period was associated with low dissolved oxygen (DO) levels in the pond/s and subsequent commissioning of aerators, which were added to increase the pond DO levels.
27. The Regional Council also advised me there were two complaints in September 2014 that correlated with commissioning of new aerators that stirred up sludge. Horizons staff noted that these later complaints were dealt with directly by the TDC.

28. The Horizons' monitoring officer advised that over the last five years of monitoring, he has not detected an odour either within the site itself or beyond the property that he deemed to be objectionable<sup>3</sup>.
29. Odorous compounds can discharge from all operations at the plant, either where untreated wastewater is exposed to air, and/or where wastewater becomes anaerobic. In addition, stored waste solids by nature are odorous with the potential for anaerobic conditions to occur.
30. I consider the key aspects that require management and maintenance to minimise or avoid the potential for adverse odour effects are:
- a. the primary screen and screenings storage area;
  - b. maintaining the wastewater/effluent in an aerobic state throughout the ponds and the additional treatment stages including wetlands;
  - c. handling and storage of clarifier sludge; and
  - d. pond desludging and sludge storage and handling activities.
31. At Pahiatua there is a relatively short travel distance in the sewer system (estimated at a maximum of 3 kilometres). Dwell times should therefore be relatively short. I note that the storage of the inlet screenings is not particularly well sealed. Frequent removal and/or improved sealing of the screenings storage may be needed to avoid offensive odours beyond the boundary, particularly during warm weather.
32. I discussed the solids storage activities at Pahiatua with the Horizons' monitoring officer during our site visit. The officer advised that solids storage had not been associated with any adverse effects from odour at the site, so I have not made any specific recommendations relating to solids management practices at the site. Solids management should, however, be monitored to ensure it does not become an issue, and approaches to control odour should be identified in the site operation and management plan (OMP).

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<sup>3</sup> E-mail, Fiona Morton, Horizons Regional Council, June 2016

33. Odour from well aerated oxidation ponds will be minimal, provided sufficient dissolved oxygen (DO) is maintained in the upper pond layer. Anaerobic biological activity will occur in the sludge and potentially the lower water level in the pond, but if operating within design loadings and correctly operated to maintain oxygen levels in the upper level, foul odours are generally not discharged from oxidation ponds. OPUS stated that at least one aerator will be operated in each of Pond 1 and 2. No information on how aeration is managed to ensure sufficient DO was provided in the AEE. I recommended that a programme of monitoring DO at representative location/s, sufficient to manage aeration be developed by the TDC and incorporated into a site management plan that addresses air discharge aspects of the wastewater treatment operation.
34. The third main aspect with potential for offensive odour is pond desludging and sludge storage. As noted previously, anaerobic conditions can be present at lower levels within ponds and within sludge that can release sulphides and other compounds when disturbed. Pond desludging has resulted in odour complaints being received at Pahiatua. I recommend that this aspect also be addressed in the site management plan.

## **F. CONCLUSION**

35. In summary, the treatment plant including the upgrades, incorporate equipment items and activities that require management and maintenance to avoid conditions where offensive or objectionable odours arise.
36. To address the potential effects of odour from the plant, I support conditions of consent to address the following:
  - a. No odour across the property boundary resulting in offensive or objectionable effects.
  - b. Maintenance of a complaint log.
  - c. Notification to the Regional Council of any complaints received
  - d. Ensuring dissolved oxygen (DO) in the pond is kept positive.
  - e. Notification of any pond desludging works, including methodology and duration.

- f. Provision of an Operation and Management Plan for the wastewater treatment plant, detailing inspections, management procedures of primary screenings and other solid wastes and procedures for monitoring and managing pond sludge levels.
37. I consider that provided the applicant complies with conditions that include the above criteria, then any odour from the operation will be likely to have an effect on the environment that is no more than minor.
38. I have viewed the conditions in Appendix one of Ms Morton's report relating to the air discharge permit. I consider that these conditions address the points noted above (a-f).