

**BEFORE A HEARINGS PANEL OF THE GREATER WELLINGTON REGIONAL COUNCIL  
AND MASTERTON DISTRICT COUNCIL**

**IN THE MATTER** of resource consent applications to Greater Wellington Regional Council pursuant to section 88 of the Resource Management Act 1991

**AND**

**IN THE MATTER** of a Notice of Requirement to Masterton District Council pursuant to section 168, 168A and 181 of the Resource Management Act 1991

**BY** Masterton District Council

**FOR** the proposed upgrade of the Masterton Wastewater Treatment Plant

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**SUPPLEMENTARY STATEMENT OF EVIDENCE OF JAMES COOKE  
ON BEHALF OF MASTERTON DISTRICT COUNCIL**

**RESPONSE TO OFFICERS' REPORT**

**Subject Area: Hydrology and general water quality**

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## 1. INTRODUCTION

1.1 This supplementary evidence has been prepared in response to matters raised in the Officers' report, and in particular the officers' comments about:

- (a) the mixing zone; and
- (b) nutrient loads.

## 2. MIXING ZONE

2.1 I am responding to Section 12.4.4(a) of the Officer's report (Mixing zones) and specifically to the conclusion that:

*"Modelling by the applicant indicates the discharge will be reasonably (66-70%) mixed 200-400 metres downstream of the outfall and fully mixed by 800 metres downstream (450 metres upstream of Wardell's Bridge)", and that*

*"During summer when there is a direct discharge, a mixing zone of 200 m is considered appropriate against which to assess the s107 criteria."*

2.2 I disagree with the Officer's assessment that the modeling indicates the discharge will be reasonably well mixed (66-70%) by 200m. As shown in Table 31 of the AEE only 55% (half median flow) and 59% (median flow) mixing is achieved by 200m. As noted in my evidence (#5.23) I consider reasonable mixing to have occurred between 300m and 500m downstream of the discharge. At 300m 66% (half median flow) and 70% (median flow) will be achieved with a nominal dilution of 20 times.

2.3 As discussed in my evidence the minimum size of the reasonable mixing zone (**RMZ**) is where the contaminant is reasonably well mixed. However a key component of the concept is to look at what is reasonably required in order to achieve environmental objectives.

2.4 In my opinion, during summer when there is a direct discharge, a mixing zone of 300 m is appropriate against which to assess the section 107 criteria. A reduction to 200m is not necessary to achieve any relevant guideline or goal.

2.5 The Officer's report also recommends that:

*"There should be two mixing zones for when there is a direct discharge to the*

*river and at times of no direct discharge to the river”.*

- 2.6** Whilst I agree with the officers that the leachate from the land treatment system needs to be managed, I disagree with the above recommendation, which is stated as being based on:
- (a) concerns that leaching into the river via groundwater seepage underneath the land irrigation area and the base of the oxidation ponds will be unacceptable; and
  - (b) the need for periphyton streambed cover guidelines for aesthetics/recreation to be met in the reach adjacent to the land treatment area.
- 2.7** Others will address the first bullet point, however in my view the objective of the Officer’s recommendation (namely to ensure that the land treatment system discharge does not **cause** periphyton growth within the reach in question to reach nuisance levels can be managed by invoking a single reasonable mixing zone of 300m below the outfall. The goal should be to ensure that the direct and indirect discharges do not **cause** nuisance growths at times when nuisance growths are not occurring upstream. My reasons are set out below.
- 2.8** Invoking two mixing zones is unnecessarily complex and will cause confusion. The second mixing zone appears to be based on the assumption that leachate from the irrigation area will enter the Ruamahanga River along the total interface between the irrigation area with the River. Without knowledge of where the leachate will enter the River, the Officers have designated Wardell’s Bridge as the end of second mixing zone.
- 2.9** This is reasonable as modelling carried out by PDP shows that most of the leachate will enter the River within 450m (downstream) of the proposed outfall (see supplementary evidence by Graeme Profitt). The mixing study carried out by NIWA did not explicitly consider mixing of leachate so that if a receiving water standard were invoked to manage the effects of the leachate, then Wardell’s Bridge would be the preferred location to apply such a standard after reasonable mixing.
- 2.10** However despite proposing a second mixing zone at Wardell’s Bridge for the situation when the MWTP is not discharging, the Officers recommend that the periphyton guideline be met upstream of the end of the zone (technical review #61). While this is permissible under the RMA where it is consistent with sustainable management, it is

confusing because under most circumstances the standard or guidelines need only be met downstream from the end of the reasonable mixing zone.

- 2.11 Unlike the other effects managed under section 107 of the RMA, periphyton growth occurs whether a point source is discharging or not (though it may be stimulated by a continuous discharge).
- 2.12 Any effects of the scheme (wastewater direct discharge plus leachate) can be managed more simply by having a single zone of reasonable mixing, the end of which is 300m below the outfall.
- 2.13 With respect to periphyton, the draft consent condition (7 in the Officer's report) is that:
- "From 1 November 2011, after reasonable mixing, the treated wastewater discharge **shall not give rise to** ...((h) any heterotrophic or nuisance periphyton growths"*
- 2.14 In order for the discharge to "give rise to" (cause a nuisance growth) it would need to be established that downstream of the mixing zone there are nuisance growths at times that would not have occurred but for the discharge. The best way of ascertaining this is to compare periphyton growths in the river upstream of both the direct and the indirect discharges with those in the river immediately downstream of the reasonable mixing zone.
- 2.15 A change to the wording may be necessary to make it clear that this is the intention. Furthermore, if the condition were intended to apply to the discharge to land as well that would need to be made clearer.
- 2.16 I agree with Officers recommendation that nutrient concentration should continue to be monitored at Wardell's Bridge. Dr Hickey will address the nature of the parameters chosen and their value.
- 2.17 Whilst monitoring of instream nutrient concentrations is valuable, I do question the rationale for instream *standards*. The focus is on managing an effect, that is being done via the discharge regime. The discharge to the river does not involve any specific treatment system for nutrients and therefore requiring it to meet a particular numerical standard in the river is pointless.

- 2.18** The focus should be on the environmental outcome, rather than debating which number is consistent with that outcome.
- 2.19** At times when there is no discharge to the river, the officers are concerned to ensure that the land treatment system and pond leakage do not cause significant elevation of nutrient concentrations. I agree that it is important to monitor upstream and downstream concentrations to check that. However if there is to be a numerical standard then it would need to be established that the concentration chosen is critical in terms of nuisance growths.
- 2.20** If a numerical standard is imposed, but there is no evidence that the discharge is causing significantly more algal growth downstream of the mixing zone than upstream of the discharge then it would not be reasonable to take enforcement action.
- 2.21** In my opinion the best approach would be to use the comparison between upstream and downstream concentrations as basis for assessing the cause of any **effects** rather than as a performance standard.

### **3. NUTRIENT LOADS**

- 3.1** I also respond to the recommendation in the Officer's report (Section 12.4.4. d) that:

*“the setting of maximum daily loads for dissolved reactive phosphorus and dissolved inorganic nitrogen in the effluent that would apply year-round when effluent is being discharged into the river.”*

- 3.2** I disagree with the above recommendation which is based on the rationale stated in the Technical Review that:

*#82 (c) “The applicant has proposed a very high maximum instantaneous discharge rate that at times could result in a significant increase in mass nutrient loads currently discharged to the river (Table 5), with potential for flow-on effects in downstream waters such as Lake Onoke.”, and,*

*#90 “Lake Onoke, some 68 km downstream of Homebush, is the ultimate receiving environment and is showing signs of eutrophication, a key reason why we recommend restrictions on the mass nutrient loads discharged from the Masterton WWTP. “*

- 3.3** I disagree with the recommendation for the reasons set out below.

- 3.4** As shown in my evidence (Figure 5) I estimate that the existing MWTP discharge accounts for between 3% (wet year) and 8% (dry year) of the total phosphorus discharged into Lake Onoke on an annual basis.
- 3.5** The future nutrient loads from the plant will be considerably less than present because of retention in clay soils and uptake by pasture within the land treatment system.
- 3.6** Given that there is little, if any evidence that current loads from the plant are causing any adverse effects on Lake Onoke, and given that overall loads will be reduced, there is no justification for the proposed limits.
- 3.7** Eutrophication in downstream waterbodies such as Lake Onoke is not governed by large nutrient inputs on any one day, but rather by cumulative effects (as pointed out in Section 90 of the Technical Review).
- 3.8** In any case during summer low flows, when the effects of dissolved nutrient inputs to downstream waterbodies would be expected to be at their maximum, the proposed upgrade will result in the phosphorus inputs (for example) to Lake Onoke attributable to the MWTP decreasing from about 43% to less than 2.5% (#5.8 of my evidence).
- 3.9** The evidence of Dr Chris Hickey (#3.5, 5.7, 5.8, 6.55, 6.58, 6.66, 6.69, 9.6, 9.24) clearly showed that Lake Onoke is rapidly flushed even at summer low flows (5.5d) and that this flushing probably controls algal abundance.
- 3.10** The setting of daily maximum dissolved nutrient loads will result in no discernible environmental benefit but will place significant constraints on the operation of the scheme.

Dr James Cooke  
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23 February 2009