

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of **PROPOSED PLAN CHANGE 1** to the Waikato Regional Plan – hearing of **BLOCK 1** topics

AND

IN THE MATTER of the hearing of the further submission by **WAIKATO REGION TERRITORIAL LOCAL AUTHORITIES COMPRISING THE WARTA GROUP** in relation to **BLOCK 1** topics

**STATEMENT OF EVIDENCE OF TIMOTHY NORMAN HARTY
ON BEHALF OF THE WAIKATO REGION TERRITORIAL LOCAL AUTHORITIES**

1. INTRODUCTION

1.1 My full name is Timothy Norman Harty. I am employed by GHD as the Waikato Region Business Development Lead, a position I have held since February 2018

Qualifications and experience

1.2 Previous roles that are relevant to the issues addressed in this evidence are as follows:

- (a) General Manager Service Delivery at Waikato District Council (“WDC”) from 2013 to 2018;
- (b) City Waters Manager for the Hamilton City Council (“HCC”) from 2009 to 2013;
- (c) Water and Wastewater Treatment Plants Manager for HCC from March 2006 to August 2009; and
- (d) Water Services Manager at the Waipa District Council (“WPDC”) from 2002 to 2006.

1.3 I am a Professional Environmental Engineer and hold a degree of Bachelor of Engineering (Environmental) from Canterbury University (1996). I am a Chartered Professional Engineer, a Member of the Institution of Professional Engineers of New Zealand and a member of Water New Zealand.

1.4 I have been involved in the water and wastewater industry in New Zealand for 23 years. During that time, I have been involved in a number of water and wastewater treatment plants and reticulation systems. This involvement has ranged from "hands on" operation of wastewater treatment plants and water and wastewater field network operation through to large project management and overall management of aspects of water, wastewater and stormwater operations and planning.

Purpose and scope of evidence

1.5 This evidence is presented as a representative of the Waikato Region Territorial Local Authorities Group ("WARTA"), which has been formed to present a common position on a number of key concerns that arise in relation to PC1. WARTA is not a submitter on PC1 but all of its constituent members are and WARTA lodged a further submission on behalf of the primary submitters that make up the group.

1.6 The purpose of this evidence is to illustrate the potential impacts of PC1 standards on municipal wastewater treatment plant ("WWTP") operations:

- (a) Based on my background as a council infrastructure manager; and
- (b) Drawing on the outcomes of a recent report GHD and Boffa Miskell Limited prepared for the Department of Internal Affairs ("DIA").

1.7 I was the project manager for the DIA study, which looked specifically at cost implications of upgrading WWTPs to meet the objectives of the National Policy Statement for Freshwater ("NPS-Freshwater").

1.8 In my role as City Waters Manager for HCC and subsequent role at Waikato DC, I sat on the Plan Change 1 Collaborative Stakeholders Group, as an Alternate Delegate for Local Government, thereby giving me insight into the development of Plan Change 1.

1.9 My evidence is structured as follows:

- (a) Primary concern with PC1 (Section 3);

- (b) DIA report – upgrades to WWTPs and offsetting (Section 4);
- (c) Stormwater considerations (Section 5); and

1.10 A summary of my evidence is contained in Section 2.

Expert Witness Code of Conduct

1.11 I have read the Code of Conduct for Expert Witnesses, contained in the Environment Court Consolidated Practice Note (2014) and I agree to comply with it. I can confirm that the issues addressed in this statement are within my area of expertise and that in preparing my evidence I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

2. SUMMARY OF EVIDENCE

2.1 As with the wider view of the WARTA Group, I am generally supportive of the rationale behind Plan Change 1 and its objectives to meet the Vision and Strategy for the River. However, there are, in my view, a number of areas of concern related to the Plan Change in its current form and these need to be addressed.

Need to recognise and provide for assimilative capacity and mixing

2.2 The failure of PC1 to recognise and provide for utilisation of the assimilative capacity of the Waikato and Waipa Rivers is a matter of primary concern. While it is recognised that there is a need to reduce the contaminant load in the rivers, the lack of clear recognition and provision for areas of mixing (i.e., an area of the river that enables the discharge to be assimilated with the flow), following discharges from WWTPs needs to be addressed.

2.3 If the targets and limits set through PC1 were to be applied directly at the point of discharge rather than following reasonable mixing, the impact on treatment costs for the relevant municipal authority would be huge.

WWTP upgrade costs

2.4 This significant cost would not, in my view, represent a prudent investment nor meet the tests required through the application of the “best practicable option” in terms of the Resource Management Act 1991 (“RMA”).

2.5 In 2018, the DIA delivered a report to Government that outlined the investment required for municipal WWTPs to meet the National Policy Statement for Freshwater Management 2014 (Updated 2017) (“NPS

Freshwater”) Attribute State B standard. GHD, alongside Boffa Miskell, undertook this work for DIA and I was part of the GHD team.

- 2.6 The output of the work demonstrated that a large number of plants within the areas covered by PC1 would require to be upgraded to meet Attribute State B standard and that the costs - estimated at between \$125 and \$210 million - would be significant.
- 2.7 It is important to note that the water quality requirements of PC1 are much more stringent than that of NPS FM Attribute B and, therefore, any WWTP upgrades would need to be focused on achieving an even higher standard, at a significantly higher cost, and potentially for no environmental gain.
- 2.8 To meet the much more stringent PC1 requirements at point of discharge at these sites (if that were required) would require the introduction of treatment processes currently not in general use for WWTPs in New Zealand. Significant research and analysis would be required to determine whether there is any practicable operating treatment process globally that would meet these standards and if so the costs would be expected to be several times greater than the cost to treat to NPS Freshwater Attribute B standards considered in the DIA report.

Importance of offsetting

- 2.9 Last, it is important to recognise the wider benefits that a clear and concise offsetting policy gives to the broader goals of the Vision and Strategy for the River.
- 2.10 The ability for councils and municipal WWTP operators to ensure that funds expended on the management and minimisation of the effects of WWTP discharges on the receiving environment are spent in a way that ensures the best environmental outcomes are achieved is of critical importance. It is my opinion that the development of a policy framework that supports this approach by allowing offsetting to occur in a managed and measured fashion but in a far wider set of circumstances than currently provided for by PC1 is extremely important.

3. PRIMARY CONCERN WITH PC1 - NEED TO RECOGNISE AND PROVIDE FOR ASSIMILATIVE CAPACITY AND MIXING

- 3.1 My evidence relates particularly to Table 3.11-1 and Objectives 1 and 3 of PC1. Table 3.11-1 sets short and long term water quality limits / targets for various parameters. Objectives 1 and 3, as presently worded per the

Officers' recommendations, are drafted in such a way that reductions in nitrogen, phosphorous, sediment, and microbial pathogens are required for the water quality limits / targets to be met / achieved in the short term and long term (80 years).

- 3.2 In that regard, I note that Objectives 1 and 3 would state the following if the Officers' recommendation is accepted:

"Objective 1

By 2096 at the latest, a reduction in the discharges of nitrogen, phosphorus, sediment and microbial pathogens to land and water results in achievement of the restoration and protection of the Waikato and Waipā Rivers, such that the 80-year water quality attribute states in Table 3.11-1 are met.

...

Objective 3

Actions put in place and implemented by 2026 to reduce diffuse and point source discharges of nitrogen, phosphorus, sediment and microbial pathogens, are sufficient to achieve the short-term water quality attribute states in Table 3.11-1."

Assimilative capacity

- 3.3 Neither of the above objectives make any mention of the assimilative capacity of the Waikato and Waipā Rivers to dilute contaminants and nor does Table 3.11-1. Nor do the policies of PC1 make any such mention
- 3.4 For context, the ability to utilise the assimilative capacity of the rivers is important with respect to point source discharges from WWTPs because conventional practice has always been to recognise a "zone of reasonable mixing" to recognise that the end-of-pipe discharge will be rapidly diluted (i.e., assimilated) within a relatively short distance of the discharge point with minimal physical environmental effects.
- 3.5 The conventional practice is to define some often-narrow envelope of acceptable water quality degradation when comparing water quality upstream and downstream of the point of discharge. These conditions typically provide for some acceptable mixing zone to enable the discharge to disperse across the river and ensure that monitoring results are not overly sensitive to the point across the river where samples are taken from. Mixing zones are also defined because regulation has typically not sought to control (or to have weaker controls on) areas in close proximity to the discharge point.

- 3.6 While the assimilative capacity of the Waikato and Waipā Rivers with respect to WWTPs and stormwater discharges is recognised in PC1 in the “commercial, municipal and industrial use value”, this recognition has not been carried through to any objectives and policies. I note that Ms O’Callahan for WARTA and Mr Scrafton for Watercare have recommended that the values be deleted from PC1 for a number of reasons. I agree with those recommendations for those reasons.
- 3.7 Irrespective of whether the values are deleted or not, I consider that a key issue with PC1 is how it is likely to be used and interpreted by the Waikato Regional Council (“WRC”) and by others (e.g., submitters on notified applications for discharges from WWTPs) in respect of point source discharge consent applications and consent conditions.

Primary concern

- 3.8 The primary concern I have is that PC1 might be used to justify unreasonably restrictive consent conditions on point source discharges as, in the absence of clear provisions to the contrary, PC1 could end up being applied / interpreted as if mixing zones downstream of point source discharges are not relevant. In that regard, I note that there are a number of references in PC1 to the Waikato River being safe to swim in and take food from over its entire length, including the following one on page 13 (per the Officers’ “Tracked Version”):

“The restoration of water quality within the Waikato River so that it is safe for people to swim in and take food from over its entire length.”

- 3.9 This in turn could imply that the water quality limits / targets in PC1 have to be applied at the point of discharge, rather than after mixing and river dilution.
- 3.10 Such an approach, in many cases, would have only modest environmental benefits. On the other hand, it is likely to cause extraordinarily high financial costs to many local communities as discussed below.

4. **DIA REPORT – UPGRADES TO WWTPS AND OFFSETTING**

4.1 In August 2018, GHD in conjunction with Boffa Miskell Ltd issued a report “Cost Estimates for upgrading WWTPs to meet Objectives of the NPS Freshwater” for the DIA (the “DIA report”). The DIA report presented cost for upgrading WWTPs grouped by region. A key assumption made was that the NPS Freshwater Water Quality Attribute State B be met by the discharge from all WWTPs.

Upgrades required to achieve Attribute State B

4.2 Technical evaluation in this work concluded that a Biological Nutrient Removal (“BNR”) process with activated sludge and ultra violet disinfection was the only technology that could be expected to meet these standards consistently. For smaller plants (< 5,000 m³/day) this was varied to a Membrane Bioreactor (“MBR”) process due to it being more practicable at small scales.

4.3 The DIA report presents capital cost estimates for upgrades of 23 WWTPs in the Waikato Region of \$240 - \$360M (Table 16). Of these WWTPs, eleven fall within the area covered by PC1 (Waikato and Waipa Rivers downstream of Lake Taupo). Of these, only eight WWTPs were assessed as needing upgrades to meet NPS Freshwater Attribute B standards by the discharge water. The estimated capital costs for these eight plants were estimated at \$125 – 210M, broken down as follows:

WWTP	UPGRADE REQUIRED	ESTIMATED COST	Discharge Contribution
Cambridge, Waipa District Council	BNR	\$31 – \$46M	Small
Huntly, Waikato District Council	MBR	\$24 – \$36M	Small
Meremere, Waikato District Council	MBR	\$4 – \$6M	Small
Ngaruawahia, Waikato District Council	MBR	\$17 – \$25M	Small
Otorohanga, Otorohanga District Council	MBR	\$11 – \$16M	Moderate

Pukekohe (Friedlander Road), Watercare	BNR	\$10 – \$15M	Small
Te Kauwhata, Waikato District Council	MBR	\$12 – \$18M	Moderate
Tokoroa, South Waikato District Council	MBR	\$20 – \$30M	Large

PC1 water quality more stringent than NPS Freshwater

- 4.4 Of these eight sites, I have referenced seven against the PC1 water quality requirements in Table 3.11-1 (proposed PC1 requirements could not be determined for one site in Waikato District discharging to a lake).
- 4.5 At all sites, the PC1 water quality requirements are more stringent than NPS Freshwater Attribute B. At one site, some of the requirements fall in the range of NPS Freshwater Attribute B, but at many of the sites the PC1 requirements are more stringent than even NPS Freshwater Attribute A limits - often by a factor of more than ten times. Differences between requirements on annual median ammonia requirements are particularly severe.
- 4.6 For example, the ammonia limits for NPS Freshwater Attribute A include an annual maximum value of 0.050 mg/L whereas the corresponding PC1 short term requirements for the seven sites referenced vary between 0.008 – 0.134 mg/L, with only two sites allowed to exceed 0.033 mg/L.

Meeting PC1 requirements could require technology not generally in use in New Zealand

- 4.7 To meet the much more stringent PC1 requirements at point of discharge at these sites (if that were required) would require the introduction of treatment processes not currently in general use for WWTPs in New Zealand. Significant research and analysis would be required to determine whether there is any practicable operating treatment process globally that would meet these standards and, if so, the costs would be expected to be several times greater than the cost to treat to NPS Freshwater Attribute B standards considered in the DIA report.
- 4.8 Even recognising the assimilative capacity of the rivers by providing for reasonable mixing may not result in the limits / targets being met. In that

regard, I note Mr Hall's evidence for Watercare where he stated the following:

"5.10 *Such low target values in Table 3.11-1 would cause problems in that municipal wastewater treatment plants contain relatively elevated concentrations of ammonia in their treated wastewater discharge. Whilst wastewater treatment technology is improving all the time, even the PWWTP¹ (which is a modern state-of-the-art treatment plant) has a consented 90%ile concentration limit of 2.3 mg/L for total ammoniacal nitrogen. To achieve the proposed short and long term target at Tuakau (the closest water quality target site) contained within Table 3.11-1 of 0.003 mg/L in the Waikato River, a dilution of at least 766 fold would be required.*

5.11 *At low summer low flows, a dilution of only 736 fold, assuming reasonable mixing with the entire Waikato River flow, will be available at the end of the granted 35 year consent for the Pukekohe discharge (in 2052). As a result, under these worst case conditions, the water quality target of 0.003 mg/L will not be able to be met⁵. In my view, given this limit cannot be achieved under worst case summer conditions, it is not appropriate that it be used to assess the environmental effects of point source discharges of treated wastewater."*

4.9 Irrespective of the doubts I have expressed as to practicability and extraordinary cost, upgrades of WWTPs are unlikely to have any material impact on water quality in any event due to the ongoing discharges from diffuse discharges associated with current and historic human land use as well as ongoing natural discharges.

4.10 This significance in cost would not, in my view, represent a prudent investment, nor would it satisfy the tests required through the application of the best practicable option in terms of the RMA.

Offsetting options

4.11 While I note that offsetting is provided for in Policy 11 of PC1, which is to be addressed in the Block 2 hearings, I nevertheless provide some brief comments below on the potential importance of a sound offsetting policy. I have included the comments to foreshadow that WARTA may provide more detailed evidence in the Block 2 hearings on the importance of offsetting.

4.12 It is probable that greater environmental benefits can be obtained from a given level of financial investment by offsetting diffuse discharges rather than requiring unjustifiably expensive upgrades to WWTPs. In order to ensure best practicable outcomes for the money spent, such options must be considered and may well be selected.

¹ A reference to Watercare's Pukekohe WWTP.

An example – Cambridge WWTP

- 4.13 An example of such a proposal is contained in GHD draft report “Cambridge WWTP - Option 3, Offsetting Options for Managing Wastewater Discharge” Jan 2019, which recommends fencing and riparian planting as offset mitigation associated with the Cambridge WWTP discharge.
- 4.14 In summary, the issue with the Cambridge WWTP was that the level of investment required for a conventional upgrade of the WWTP fails to provide a measureable improvement in the receiving environment, whereas an offsetting proposal has been developed which would in all likelihood markedly improve the wider river environs, particularly through the delivery of Waikato River Authority projects. The advantage of the offsetting is its ability to implement actions that can remove more contaminants than a traditional WWTP can whilst meeting other goals and objectives set through other statutory processes (such as the Vision and Strategy for the River).
- 4.15 Another element of the DIA report that is relevant in this context is the high level analysis completed on the relative contribution of WWTPs to overall receiving water quality.
- 4.16 Each WWTP was classified as being a small, moderate or large contributor based on the WWTP discharge rate relative to flow and other sources of nutrient in the catchment based on land use (these are listed in the table in section 4.3). The point of this analysis was to recognise that expensive upgrades to WWTPs may not always be the best investment for achieving a change in receiving water quality when there are other greater sources of nutrients.

5. STORMWATER

- 5.1 The major contaminants in urban stormwater are sediments, heavy metals, total nitrogen and phosphorous (“TP” and “TN,” respectively). The PC1 provisions do not appear to be directly relevant to urban stormwater discharges, although I understand there is no specific exclusion provided in PC1. Through the Collaborative Stakeholders Group, which I was involved in, stormwater was specifically excluded from discussions regarding point source discharges and therefore PC1; it was pushed into “the next iteration.” Accordingly, I understand that PC1 should not look to manage stormwater, so it is important that that is made clear in the document.

- 5.2 If PC1 did apply to urban stormwater discharges, it is not clear how the PC1 median limits for TN and TP would be applied. If this was done on a median over time basis, the median stormwater discharge would be zero (dry) and the criteria would not be relevant. That is because the median flow over a time basis in stormwater discharge is zero (there is no discharge as dry weather is a much more common condition than wet weather) and hence there could be no construed risk of non-compliance with contamination limits.
- 5.3 I recommend that PC1 be clarified so as define "median" as being over a time basis as this is the most reasonable interpretation and intention. If this was done on a median flow weighted basis then it could theoretically constrain stormwater discharges, although measurement and enforcement would be impracticable. That is because the median flow over a flow weighted basis would mean stormwater is discharging at a flow rate such that half the annual volume is discharged in frequent small events below that median flow, and half of it is discharged in a few large events above that median flow.
- 5.4 Measurements in order to even roughly estimate such median flow are not generally undertaken and would be relatively high cost to even define the basis for measurement. Measurement of the contaminant discharge associated with this median flow would be even more expensive and the relevance of this measure in terms of river environmental health would be low. It is unlikely that this is the interpretation intended by the authors so I recommend that this be clarified.
- 5.5 PC1 controls for over 95% E.coli levels are, however, likely to be influenced by stormwater discharges. From a stormwater perspective, the 95% condition is the flow rate which is exceeded for 18 days per year. This would typically be a wet but relatively minor rain event where flushing of sediments and contaminant discharge including E.coli would be low.
- 5.6 However, it is difficult to envisage how this criteria could be monitored or enforced in a stormwater environment. E.coli is not traditionally treated in stormwater as it is considered a natural contaminant from birds and animals. The only commonly used stormwater treatment process which would have a beneficial impact on E.coli levels would be a wetland type treatment but this also attracts bird life and, with it, further contamination.

6. **CONCLUSIONS**

- 6.1 In my opinion, PC1 lacks clarity with respect to recognising the importance of the assimilative capacity of the Waikato and Waipa Rivers and providing for its use by way of dilution. That is of particular relevance in relation to recognising the importance of mixing zones that rapidly dilute point source discharges from WWTPs.
- 6.2 My (and WARTA members') primary concern is that, in the absence of clear provisions to the contrary, PC1 is likely to be interpreted and applied:
- (a) On the basis that mixing zones downstream of point source discharges are not relevant in assessing compliance with relevant standards which would imply that the water quality limits / targets in PC1 have to be applied at the point of discharge, rather than after mixing and river dilution; and
 - (b) As a result, could (indeed, is likely to) be used to justify unrealistic and unreasonably restrictive consent conditions on point source discharges.
- 6.3 Such an approach, in many cases, would have only modest environmental benefits. On the other hand, it is likely to result in an extraordinary financial imposition on many local communities as discussed above.
- 6.4 PC1 includes water quality targets / limits that are more stringent than NPS Freshwater Attribute State A. Upgrades to WWTPs to achieve the targets / limits at the point of discharge (if that were required by PC1) would require introduction of treatment processes currently not generally applied in New Zealand for WWTPs. Significant research and analysis would be required to determine whether there is any practicable operating treatment process globally that would meet these standards and if so the costs would be expected to be very significant.
- 6.5 Even if the PC1 targets / limits applied after mixing zones (which in my opinion they should) the targets / limits may still not be able to be achieved per the Pukekohe WWTP example I referred to above from Mr Hall's evidence.
- 6.6 I consider that a sound offsetting policy is required as it is probable that greater environmental benefits can be obtained from a given level of financial investment by offsetting diffuse discharges rather than requiring

unjustifiably expensive upgrades to WWTPs that may not even be able to achieve the limits / targets in PC1.

Timothy Norman Harty

25 February 2019