AFFCO wastewater treatment system resource consent hearing
Oral submission

THE WATER PROTECTION SOCIETY INCORPORATED

15th November 2016

INTRODUCTION

1. Good morning. My name is Chris Teo-Sherrell. I am the chairperson of the Water Protection Society.

2. Thank you for this opportunity to share with you views from the community that may not otherwise be expressed.

3. The Water Protection Society (WPS) was formed in 2014 as a reflection of the concern in our community about the degraded quality of waterways in this area, and through New Zealand, and the desire to see this change.

4. WPS has been, or is currently, involved in 5 different resource consent applications, including one successful appeal to the Environment Court of the Feilding Wastewater Treatment Plant Decision.

5. It is also involved in the recent request for a Declaration from the Court on whether or not the Regional Council is correctly implementing the One Plan with respect to the consideration of resource consents for intensive farming.

6. WPS currently has 43 members, although increasing membership has not been a focus of our activities on account of the time WPS has had to invest in participating in the above-mentioned resource consent processes. We believe we are the tip of the rock showing above the water in terms of broader public interest in the issue of water quality.

7. Before I go further, I should explain the page referencing system I have used in this submission as I make frequent reference to various documents that have been provided as part of this application process.

8. I have named the document and then indicated the page of the **on-screen** version and the paragraph on that page to which I am referring. For example, 'AEE App E Concept Design 12/50:3' means paragraph 3 on page 12 of the 50 page document named 'Concept Design' which was provided as Appendix E to the AEE. Alternatively the authors name has been used such as 's42A Horne 6/8:3' which refers to paragraph 3 on page 6 of Horne's 8-page s42A report. Occasionally, a slightly different format is used but I hope it will be clear in any case.

9. Also, to aid your understanding of this submission, I have adopted, as a useful shorthand, Ausseil's use of Q20 to refer to the 20th flow exceedance percentile.

10. And I will refer to the fully treated wastewater as 'effluent' in contrast to the untreated wastewater which I will refer to as 'untreated wastewater'. The applicant sometimes calls the treated wastewater 'meatworks effluent' and abbreviates it as 'MWE'.

11. WPS commends the Applicant for some of the measures it is proposing to implement such as:

- increasing the land area so more wastewater can be discharged to land;

- changing the discharge rules to help it avoid the adverse effects on the river that it acknowledges (AEE 41/97:2) are likely to be caused or contributed to by its discharge;

- adopting of deficit irrigation system rather than an indirect and uncontrolled discharge to the river that would result from an irrigation system based on applying more water than needed to reach field capacity.

12. However, there are a number of matters that we believe could improve the proposal further and help it avoid adverse effects and better achieve the aspirations of the community. I will now cover these in turn:

a) Greater utilisation of proposed land area for irrigation (para 13-45)
b) Using a greater area of land (para 46-51)
c) Discharge rules (para 52-82)
d) Groundwater (para 83-92)
e) Water quality (para 9-118)
f) Load Increases (para 119-121)
g) Planning (para 122-126)
h) Term (para 127-131)
g) Other Consents Needed (para 132-135)

GREATER UTILISATION OF PROPOSED LAND AREA FOR IRRIGATION

13. The AEE (14/97:3) points out that in total there is sufficient land included to safely discharge up to 331,775 m3/y of effluent onto land, but in practice, on average, only 179,300 m3/y will be discharged to that receiving environment. Effluent will be applied to land whenever conditions are suitable within the 'summer' period but the difference between total irrigation capacity (theoretical) and actual amount irrigated will relate to the availability of wastewater at times when irrigation is possible.

14. Hamish Lowe (9/50:1, AEE App E Concept Design) clearly describes the situation as follows:

'As indicated in comparison with the table above there is the ability to apply more MWE to land (maximum) than what is generated in an average year i.e. less total MWE is discharged in an average year than the maximum irrigation capacity available over the given land area. This is because as the summer irrigation occurs the amount discharged to land empties the storage pond more quickly than MWE from the plant fills it up, despite the large storage volume. The consequence is there is insufficient MWE to supply the maximum land application (irrigation) requirements when irrigation is actually possible.'

15. This seems to WPS to be the major defect of the proposed system. It means that extra pond volume would enable more effluent to be in storage at the start (1 Dec) of the irrigation period and this could be applied to land without increasing the land area.

16. The 331,775 m3/y of irrigation potential is greater than the anticipated future average annual flow of 307,400 m3/y given in Table 2.1 (AEE 4/97) meaning that, on average, all of the effluent could be discharged to land if it could be stored in advance of the need for it.

17. Using more of the Affco-owned land for storage may be of greater value than the limited irrigation potential of that land, even if the additional ponds were shallow and extensive which might be cheaper than deeper ponds of less water surface area.

18. WPS is aware that applying a higher quantity of effluent to the same area of land might result in nutrient limitations being exceeded. However, as a rough calculation, if 300,000 m3 of effluent were applied to 130 ha of land each summer, then using the average total phosphorus and total nitrogen concentrations given in Table 4.2 (AEE App E Concept Design 17/50) of 22 g/m3 and 133 g/m3, respectively, this would result in:

for Phosphorus (0.022 kgP/m3 x 300,000 m3/yr) / 130 ha = 51 kgP/ha/yr

and

for Nitrogen (0.133 kgN/m3 x 300,000 m3/yr) /130 ha = 307 kgN/ha/yr

19. 51 kgP/ha/yr is within the limit set for that nutrient while 307 kgN/ha/yr is a little higher than recommended for grazed pasture but well within the range of application rates appropriate for pasture or crops that are harvested and removed. If more of the land was used for cut and carry or cropping purposes, the level of nutrients applied in a greater volume of effluent need not be a problem.

20. The recently-received Van Oostrom report (Nov 2016) gives an up-to-date and detailed description of the treatment pond system at AFFCO. Van Oostrom (17/23:2) says that during the past 12 months (i.e. since

the 2014 improvements to the treatment system) the average nitrogen concentration of the effluent has been 78 g/m3 rather than the 120-140 g/m3 typical of earlier years.

21. If this is now the more accurate average, then applying 300,000 m3/yr of effluent on 130ha would result in an application of only 180 kgN/ha/yr which is well within limits for grazing land.

22. Another way of viewing this, is that, if the 78 gN/m3 is an accurate reflection of current and on-going effluent quality, only 94 ha of land is required to keep the N application rate below 250kg/ha/yr when applying 300,000 m3/yr of effluent.

23. Although this is a rough calculation that makes no distinction between the different soil types involved, it suggests that the only real constraint on applying more effluent as irrigation may be management capability and the effluent storage capacity available. The former is a matter of the manager having appropriate training and authority to implement necessary measures while the latter is a matter of the Applicant not externalising its costs onto the environment and community.

24. There may be scope for increasing the storage capacity of the existing ponds through raising the level of the sides using soil or concrete walling such as used in local flood banks. Table 1 of van Oostrom's report (11/23) indicates that there is a water surface area of 51,150 m2 at maximum water level. It is not clear whether this is the maximum safe or the maximum physically possible level, but assuming it is the maximum safe level, then increasing the pond sides by 1 m would add 51,150 m3 of storage capacity. This may considerably decrease the cost of providing additional storage compared with providing it all as new ponds.

25. Further, if it was not sought to divert absolutely 100% of the effluent to land but only 90 or 95%, then the volume of additional storage needed may be further substantially decreased. Providing for the most extreme circumstances (e.g the last 5 or 10% of effluent volume) that increases the amount of storage required by great amounts.

26. Such a diversion rate may allow there to be no discharge to the river except at, for example, river flow rates greater than 3x the median rate at all times of year rather than just in the 'summer'.

27. Another way to decrease the amount of additional storage available is to fully utilise the soil's ability to hold water. The current proposal is for only enough effluent to be irrigated for the soil water content to be brought to 5 mm less than field capacity at the end of the irigation event (AEE App E Concept Design 26/50:6).

28. This appears to WPS to be an unnecessary waste of irrigation potential

since it amounts to a further 6,500 m3 of effluent that could be discharged over the 130 ha available **on each occasion** (again not accounting for different soil types and recognising that it isn't applied to all 130 ha simultaneously).

29. Given the 5-day withholding period (s42A Horne 6/8:3) for stock to be readmitted to areas recently irrigated, this provides time for sufficient drainage to occur to avoid damage to soil from animal movement. Risks would be negligible on areas not used for grazing immediately subsequent to irrigation (i.e. where the withholding period is longer or where pasture or crops are harvested and removed).

30. Irrigating right up to full field capacity does very slightly increase the risk of drainage occurring as sometimes irrigation is quickly followed by rain.

31. David Horne (s42A Horne 6/8:6) has indicated that 178,000 m3 of additional storage would be required for all the effluent to go to land.

32. Lowe in his responses to questions arising from the pre-hearing meeting said (Lowe, to Tabitha Manderson, dated 5/2/2016, 2/5:3) that 182,000 m3 of additional storage volume would be required if the same land area is used while 161,000m3 would be needed if an additional 40 ha were available, again assuming 100% diversion to land.

33. The applicant has stated (p20/50:1 AEE App E Concept Design)

'The river discharge portion of ANZ's CLAWD system avoids the need for prohibitively large storage facilities.'

34. Assuming that the 'prohibitively' descriptor refers to cost (for there appears to be ample land area available), WPS believes that this claim is unfounded and will now show why it believes this.

35. Hamish Lowe has indicated (Evidence Lowe 31/32:4) that 180,000 m3 of additional storage could be provided at a cost of about $1.5M although this was almost double the cost calculated in his footnote 4 (Evidence Lowe 31/32). But let us accept the $1.5M estimate.

36. At Appendix 1 to this submission, there is a table showing the annual cost of servicing a loan of $1.5M on a constant annual repayment of capital and interest combined basis. It shows that for a 25-year loan, at 5% interest, the annual repayments would be about $106,000.

37. If the full 250 ha of extra land suggested (Evidence Lowe 31/32:4) to be required were actually needed, this would increase the total costs to $4.5M (Evidence Lowe 31/32:4).

38. Appendix 2 of this submission provides a table showing the comparable annual cost of a $4.5M loan as approximately $320,000.

39. The Applicant (Evidence Nuku 7/15:7) has indicated that Affco has an annual expenditure of about $186M at its Feilding plant. The $320K/yr to service a 25-year loan for a full land-based system would amount to 0.172% added expense. A $106,000 annual cost would increase total costs by just 0.057%.

40. We have been told (Evidence Nuku 14/15:7)

'On top of all the other compliance requirements, such a significant cost at the present time and in the present industry environment would make the plant unprofitable and likely lead to its closure.'

41. WPS is not convinced that such a minute additional cost would compromise the viability of Affco's Feilding plant.

42. And we suggest that the costs associated with providing the storage required may be considerably less than estimated. This may well be the case if the aspects mentioned already - fully utilising the soil's water holding capacity, increasing the volume of existing ponds and not accommodating the most extreme 5 or 10% of effluent volumes, are taken into account.

43. WPS believes that MWRC has correctly identified that the Applicant has not demonstrated that it has idenitifed the best practicable option in stating (s42A Manderson 24/32:1)

'The applicant considers that the proposed design is consistent with all the best practicable options listed in Policy 14-4. I agree that these have largely been met, however as discussed previously while having identified the storage size that would be required to allow for full discharge to land to occur I have not seen sufficient evidence to agree that this can be fully discounted as being too expensive, as can be considered when applying the best practicable option assessment. Given the interest of many of the submitters to remove discharges from the river in entirety, the applicant may wish to present further consideration of this.'

44. WPS requests Commissioners to determine that the consideration of alternatives by the applicant has been inadequate and to require that the Applicant carry out modelling of storage space and land area required and associated costs to achieve such an outcome to demonstrate that it has indeed selected the best practicable option.

45. As a final point about providing more effluent storage volume, it has been highlighted (Evidence Lowe 12/32:2e) that, under the proposed system, the total discharge of effluent to the river at river flows below Q20 will be just 18,000 m3. WPS wonders what the cost would be to provide this amount of additional storage to enable all discharge below Q20 to be avoided and so guarantee that Affco's point source discharge is not contributing to adverse effects on the river and its users?

USING A GREATER AREA OF LAND

46. Whether additional land is actually required to be able to divert all, or nearly all, effluent from the river depends only on whether the land nutrient application limits can for complied with since the existing land is able to take all the water in the available effluent (AEE App E Concept Design 9/50:1).

47. Above, we have suggested that no further land is require if the current effluent quality is maintained and adequate management skill is applied.

48. Alternatively, arranging to irrigate more land may also enable the goal of full diversion to land to be achieved. The Applicant (Evidence Lowe 31/32:4) suggests up to 250 ha more land would be needed but it is difficult to understand why it should be so much. Even assuming the N concentration of the effluent is 133 g/m3 (rather than the 78 g/m3 suggested by van Oostrom based on more recent data), to keep within the N application limit for grazed pasture of 250 kgN/ha/yr would take

    (0.133 kgN/m3 x 300,000 m3/yr) / 250 kgN/ha/yr = 160 ha

    so requiring only an additional 27 ha (not counting buffers) over that already available.

49. It appears that only a portion of Byreburn farm is proposed to be used for irrigating effluent onto (the yellow areas in AEE App D Site Investigation 31/54). It has not been explained as to why other parts of the farm could not either be used for irrigation or be areas where stock are kept, using the area in yellow for cut and carry operations as much as necessary to avoid nutrient excess.

50. In particular, the Applicant (AEE App J Neighbouring Properties 2/2) identifies block numbered 1 as being 69ha of land owned by Byreburn Farms. This is adjacent to the area proposed to be irrigated. This isn't marked in blue on the earlier-mentioned map (AEE App D Site Investigation 31/54) so it is unclear whether this really is owned by Byreburn. However, there are numerous other areas nearby about which there is no such ambiguity.

51. WPS asks the commissioners to consider the ability of the applicant to increase the area of land to which effluent could be discharged.

DISCHARGE RULES

52. The discharge to river rules proposed by AFFCO are given (AEE 15/97 Table 2.3, AEE App E 21/50 Table 5.1) as :

    - no discharge between 1 Dec and 31 Mar except if land application is not possible and pond is 100% full, then up to 2000 m3/day can be discharged at river flows above 3x median (>20.913 m3/s).

- no discharge to river below median flow (7.59 m3/s) at any time of year

- from 1 April to 30 Nov, when the river flow rate is between the median and 20th flow exceedance percentile (16.193 m3/s), up to 3000 m3/day at a rate based on DRP load to the river

- from 1 April to 30 Nov, when the river flow rate is above the 20th flow exceedance percentile, up to 3,000 m3/day

53. Discharge is to be further constrained as explained at AEE 15/97:5

'There is to be a minimum of 3,800x dilution to ensure any increase in DRP concentration in the river is minimal'.

54. This is further explained in Hamish Lowe's answer (Lowe, to Tabitha Manderson, dated 5/2/2016, 4/5:4) to a question raised at the pre-hearing meeting where he states

'In order to ensure that DRP concentration in the river is not increased by more than 0.005 mg/L, it will be necessary for the concentration of the discharged wastewater to be reduced by dilution by a factor of 3,800.'

55. This assumes the effluent DRP concentration to be 19 g/m3.

19 g/m3 / 3,800 = 0.005 g/m3

56. There are several points of concern about this discharge regime:

57. Firstly, WPS agrees with the applicant (AEE App E Concept Design 20/50:2) that the more recent river flow dataset (1992-2013 rather than 1967-2005) is the more appropriate one to use as it is likely a better reflection of current, and a better predictor of near-future, flow patterns.

58. However, there is inconsistency in the period from which the threshold values used in the discharge rules are derived. Table 4.3 (AEE 26/97) shows that the values of 7.59 m3/s and 16.193 m3/s are taken from the 1992-2013 river flow dataset but the 20.913 m3/s is taken from the 1967-2005 dataset.

59. There should be consistency and WPS requests that the 3x median value be changed to the 1992-2013 value of 22.772 m3/s.

60. Secondly, the discharge rate of up to 3000 m3/day when the river flow is between median and Q20 flow rates, during 'winter', seems inconsistent with the constraint of ensuring a minimum dilution factor of the effluent by the river of 3,800.

61. At the maximum river flow rate in this range, i.e. Q20 = 16.193 m3/s,

the maximum volume of effluent that is allowed to be discharged to the river under the 3,800x dilution factor constraint is

(16.193 m3/s x 86,400 s/d) / 3,800 = 368 m3/d

62. Similarly, at the minimum river flow rate in this range, i.e. median flow = 7.59 m3/s, the allowable volume of effluent discharge is

(7.59 m3/s x 86,400 s/d) / 3,800 = 173 m3/d

63. To put it another way, if 3,000 m3/d of effluent were to be discharged when the river flow rate was at Q20, the **increase** in DRP concentration due to the discharge would be

(3,000 m3/d x 19 g/m3) / [(16.193 m3/s x 86,400 s/d) + 3,000 m3/d]
= 0.041 g/m3

64. And at median river flow rate, a discharge of 3,000m3/d would **increase** the in-river DRP concentration by 0.087 g/m3.

65. These increases are massively above the 0.005 g/m3 limit set and in fact are well above the One Plan target for DRP in the river of 0.01 g/m3.

66. It appears that saying that up to 3,000 m3 of effluent can be discharged per day when river flow is between median and Q20 flows is at odds with the requirement to not increase the in-river DRP concentration by more than 0.005 g/m3.

67. This might lead to operators overlooking the constraint of not increasing the in-river DRP concentration by more than 0.005 g/m3 and allowing much more effluent to be discharged than should be, resulting in in-river DRP levels which could result in adverse effects being more than anticipated.

68. Therefore, WPS requests that clarity be provided by removing the 'up to a 3,000 m3/day' from the rule concerning discharge at river flows between the median and Q20 rates, during the 1 April to 30 November period.

69. WPS has had insufficient data available to it to be able to calculate whether discharges of between 173 to 368 m3/d, while the river flow is between median and Q20 rates, are sufficient to avoid the ponds from becoming full. WPS believes that the implications of this should be investigated and reported on before Commisioners make any decision on this application.

70. WPS's third concern with the discharge rules is with the selection of 0.005 g/m3 as the limit on the extent to which the discharge is to increase the in-river concentration of DRP. This limit appears to lack a

sound basis.

71. 0.005 gDRP/m3 is actually 50% of the assimilative capacity of the Middle Oroua River. That one discharger would be allocated such a high proportion of that capacity seems to WPS to be quite extraordinary and unacceptable. This will be addressed further under the section on Water Quality.

72. WPS's fourth concern with the discharge rules relates to the steps used to determine when wastewater will be discharged to land / storage / river described (AEE 34/97:4 to 35/97:1) as follows

'Step 1. Determining whether a discharge to land may occur by checking:

a. Whether the cumulative nutrient loading limit has been exceeded (i.e. has 60 kg P/ha/y already been applied to the area under consideration);

b. Whether the soil moisture is too high for safe irrigation (measured from climate data and/or soil moisture monitoring); and

c. Whether the current use of the land makes irrigation impracticable (e.g. stock in holding paddocks, harvest scheduled for cut and carry, etc.).

If all of these checks are negative then discharge to land may occur. If one or more of the checks are positive then no discharge will occur on the land to which these conditions apply, but discharge to a different area may occur if all checks are negative on that different area. If one or more of these conditions apply to the entire site, then no discharge to land will occur and the assessment proceeds to Step 2.

Step 2. Determining whether a discharge to the river may occur by reviewing the previous day's average flow (L/s) in the Oroua River at the Kawa Wool site. It is likely that this monitoring site will be changed to the Almadale Slackline site which is further upstream in the future to enable real time monitoring data to be used. For the purpose of conceptual design the existing Kawa Wool site data has been used. The potential for a discharge to water to occur is assessed by:

a. Whether the river flow is below median (MF, 7,590 L/s.) If yes then no discharge to the river may occur;

b. Whether the river flow is between MF and the 20th flow exceedance percentile (20FEP, 16,193 L/s.) If yes then the effects in the river due to dissolved reactive phosphorus (DRP) and soluble inorganic nitrogen (SIN) must be considered. Discharge to the river may occur at a rate which is determined based on the dilution factor of the river water; otherwise

c. Whether the river flow is higher than 20FEP. If it is then the effects in the river due to toxic levels of ammoniacal nitrogen (NH4-N) must be considered. On this basis discharge of up to 3,000 m3 /day of wastewater may occur.

If no discharge to the river may occur then proceed to Step 3.

Step 3. Wastewater will be stored in ponds for discharge, either to land or to the river, when conditions allow.'

73. WPS disagrees with this procedure in that we wish to see storage fully utilised before there is any discharge to the river. Only when the land

cannot be irrigated within the rules for discharge to land and when the storage volume is fully or nearly fully utilised should there be any discharge to the river at flows below Q20.

74. MWRC also queried the Applicant adopting the approach it has concerning where effluent is to be discharged to. The response (Issue 2 question and answer in Hamish Lowe's response to Jasmine Mitchell's request for further information on p2/67) was

'Management of storage to ensure there is available volume when it is needed is critical to the success of a CLAWD system. This is necessary to avoid a non-complying discharge to either water or land. This order of priority is considered to be appropriate for the AFFCO discharge application since extensive work has gone into the design of the water discharge regime to ensure that any discharge will have effects not more than those assessed in the resource consent application. As a result there is no environmental advantage gained by changing to a land-storage-water order of preference.'

75. WPS believes that storage should be used in preference to discharge to the river rather than the other way around. It could be nuanced so that the priority might change once storage capacity is 80% or 90% utilised to avoid the situation arising of Affco having no option but to breach its discharge to land or to water consent conditions.

76. Fifthly and finally among our concerns with the discharge rules is the selection of 1 Dec to 31 Mar as the no-discharge period when the river is flowing at below the 3x median rate.

77. Brown (s42A report, 44/53:2) states

'the peak annual periphyton biomass in the Oroua River tends to be April/May of each year and the removal of the discharge (below the 20th FEP) during these months would further reduce any potential risk of nuisance periphyton growth and associated effects on the life supporting capacity of the Oroua River.'

78. From Table 8 (s42A Brown 30/53) it can be seen that May was commonly the month of peak chl a concentration, from 2008-2016, upstream of the Feilding WWTP (downstream of Affco). It is expected that the biomass downstream of the Affco discharge point would be greater these levels. Also, with the effects of climate change increasing the length of periods of stable flow, in future, these maxima may well be exceeded (other things being equal). This is important because once biomass reaches the levels seen in Table 8 (e.g. 70 and 85 mg/m2) its ability to absorb nutrient and intercept sunlight are greater and so can grow rapidly. Thus, it may only be a few days short of exceeding the 120 mg/m2 critical level.

79. WPS supports the suggestion that the discharge to the river should not occur in April and May. This should be easy as ponds are close to empty at the end of March so there is plenty of storage space available. The river is still likely to be used recreationally in those months.

80. Olivier Ausseil says (Evidence, Ausseil 14/33:1) says

'The period when periphyton biomass exceeds the One Plan target does extend into April / May period, but only during dry years.'

81. That may well be true but it is also true that April and May are frequently dry months in the Manawatu district. Appendix 3 to this submission shows that during the 17 years from 1996 to 2012, 13 of the Aprils and 8 of the Mays were dry, defined as having at least 20 days with flows less than the median. This further supports including April and May as months when there should be no discharge to the river except when the river is flowing at above the 3x median rate.

82. WPS would suggest extending the no discharge below 3x median flow to also include November since in 8 out of the same 17 years, there were more than 20 days on which river flow was less than at the median flow rate in that month.

GROUNDWATER

83. There seems moderate uncertainty associated with the effects of the ponds and the irrigation on groundwater.

84. For example, the direction of groundwater flow has been inferred from measurements of the depth to groundwater and, based on this, the calculated height of the groundwater table above mean sea level. That

seems to be a common method widely accepted as appropriate. WPS's concern with it is that there were very few (about 10) measurements of depth to groundwater over a distance of 2,500m (AEE App A Figures 5/5).

85. Another example is that the applicant claims (AEE p16/97:2) that

'While there is an elevation in nitrogen concentrations in shallow groundwater close (~50 m) to the ponds, this elevation does not show up in samples from bores further away from the ponds'

86. This statement appears correct for nitrate-N (see the bottom right part of s42A Thomas Figure 4) but does not appear so for ammonium-N (see the top left part of the same figure).

87. Also, the applicant states (AEE p 16/97:2)

'Both nitrogen and phosphorus concentrations in shallow groundwater are variable at best, but typically higher up-gradient than they are down-gradient from the ponds'.

88. It appears from the Groundwater Compostion Data (AEE App I 4/6) that, for nitrogen, bores 325413 and 325416B greatly contribute to this impression. However, they both appear (comparing the figure at AEE App E Concept Design 43/50 and the figure at s42A Thomas Figure 3) to be in, or down gradient from, the area where FDE (farm dairy effluent) is spread pursuant to consent 106705 on the Byreburn farm. Consequently, they may be subject to elevated levels because of that rather than because of the irrigation of the meat works effluent. To include these bores in appraising up-gradient concentrations seems unwise.

89. Given the uncertainty about something as basic as the direction of groundwater flow and what influence ponds, FDE spreading and irrigation have on bore contaminant levels, WPS supports the call (s42A Thomas 11/13:4-12/13:1) for monitoring data to be obtained from additional bores to be drilled in the locations indicated in Figures 6 and 7 accompanying Neil Thomas's report.

90. However, WPS is of the view that the applicant has gone to reasonable lengths to try to estimate, from the data available, pond seepage and has reached reasonable conclusions about the extent of it.

91. WPS supports the view that the clay liners of the ponds need not, at this stage, be replaced by sythethetic liners provided that additional and continued monitoring is carried out to address these uncertainties.

92. For the small cost involved, a pond drop test as recommended by Rex Corlett in his letter (attachment 3 to s42A Manderson 2/4:1 point 3.2) coupled with calculating the water balance during a period when the untreated wastewater is 0 (e.g. during a period when the plant is shut-down for maintenance) or can be held out of specific ponds is supported

by WPS. These should be able to resolve the disagreement between experts on the extent of seepage from the pond.

WATER QUALITY TARGETS

93. Referring to the One Plan water quality targets for the Middle Orouoa water management sub-zone the Applicant states (AEE p16/97:6)

> 'The key potential environmental effects are those on the Oroua River and its water quality. Horizons One Plan specifies 17 parameter limits ("water quality targets") for the Mana_12b (Middle Oroua) water management sub-zone, within which the river discharge occurs, in its Schedule D. The proposed discharge regime is shown to be able to comply with those water quality targets.'

94. The reference to Schedule D should be to Schedule E but, in any case, WPS does not agree with the final sentence because the in-river DRP concentration is already at the One Plan target level (0.01 g/m3) upstream of the discharge point for flows below Q20 (AEE p27/97-28/97 Table 4.4).

95. MWRC has noted (s42A Manderson 20/32:8), correctly, that the proposed discharge does not meet the One Plan target for changes in DRP concentrations.

96. As a result of the high upstream concentration, any discharge of DRP at concentrations above 0.01 g/m3 will increase the in-river DRP concentration to a level above the One Plan target level.

97. Given the high DRP concentration in the effluent (19 g/m3), the addition of just 74 m3/d would be sufficient to raise the in-river concentration of DRP by 0.001g/m3 (10%) when the river is flowing at the Q20 rate while at the median flow rate just 35 m3/d would be have the same effect.

98. The Applicant says (AEE App G River AEE 28/41:1) the proposed discharge

> 'Results in a smaller increase in annual average DRP concentration increases at flows below Q20 : 0.0010 g/m3 , or 10% of the POP target. This represents an 88% reduction of the effects of the AFFCO discharge on in-stream DRP concentration increases compared with the 'current' scenario;'

and

> 'Compared with upstream, it results in an approximately 10% increase in in-river concentration at flows below Q20 , from 0.096 g/m3 upstream of the discharge (i.e. 4% under the OP target) to 0.0106 g/m 3 (i.e. 6% over the OP target);'

99. And elsewhere (AEE 64/97:4) the Applicant claims the effects of the

proposed discharge on in-stream dissolved nutrient concentrations (DRP and SIN) are predicted to be 87% less than under the current scenario.

100. That the proposed discharge will be better than the current one is commendable but it is not the most relevant comparison to be made. The most relevant is how it compares with the One Plan targets for water quality.

101. Given that the only study to date (AEE p29-30/97 Table 4.5-4.6) has found a large decrease in QMCI between upstream and downstream of the discharge point, admittedly under the current discharge regime, it seems ill-advised to allow the discharge to cause the DRP level to increase above the One Plan target level.

102. To be fair, the Applicant acknowledges (AEE 64/97:6 and very similarly at AEE App G River AEE 8/41:7) that

> 'although the effects of the discharge under the proposed scenario are predicted to be less than what they currently are, some increase over background is still expected, and it is not possible to assess with certainty whether or not this increase will result in exceedances of the OPOV periphyton biomass or cover targets. This is in part due to the lack of knowledge of the current effects of the discharge. For these reasons, further monitoring and modelling of periphyton growth in this reach of the Oroua River would be advisable when the proposed discharge regime is implemented.'

103. However, referring to the effects from all the activities for which consents are sought, the Applicant says (AEE 55/97:3)

> 'The individual effects are all not more than minor.'

104. That does not seem a reasonable conclusion to draw given the acknowledgement of uncertainty just referred to.

105. WPS agrees that the quote in paragraph 102 above that because of the uncertainty inherent in the modelling approach (e.g. from use of monthly data yet operating as a daily time-step model), whatever Commissioners decide on the discharge regime, on-going monitoring of periphyton biomass and cover should be incorporated into conditions. This should be monthly to coincide with the other river sampling. Even if direct discharge is to be close to zero there should be in-river monitoring because there are possible effects from diffuse discharge from the land on which the effluent would be irrigated.

106. WPS requests that the DRP assimilative capacity of the Oroua River not be allowed to be exceeded by any discharge from Affco.

107. The Applicant's Figure 8 (AEE App G River AEE 29/41) was superceded by Figure 2 (p4/14) of the additional information provided by Aquanet dated 29th Sept 2015. In the updated version, the median to Q20 river flow rate category was included and doing so showed that this was the category for which DRP already well exceeds the OP target level and that

the discharge would exacerbate this markedly. The effect on the <Q20 category appears to be lower but that is only due to there being no discharge below the median river flow rate.

108. Figure 4 (p5/14) of the Aquanet 29/9/2015 document shows that the increase in DRP, on a month by month basis, during periods when the river flow rate is between the median and Q20 is very close to 0.005 g/m3 in May, June, July and August. These are months when accrual periods in excess of 20 days commonly occur and so there would be ample time for periphyton to assimilate this DRP and grow to excessive levels.

109. If Affco wants to discharge as much DRP to the river as it proposes it should have to get upstream sources to decrease their contribution. This approach is necessary if the assimilative capacity limits, set in the One Plan through public consultation and court processes, are not to be exceeded.

110. Such an approach to resource management has been taken by Environment Canterbury in its Air Plan and in the NES Air Quality with respect to PM10.

111. With the longer dry (accrual) periods between heavier rain events predicted for this area as a manifestation of climate change, the One Plan targets will likely prove too high (as there will be longer time for periphyton to assimilate nutrients and grow before sloughing off or being washed away). Hence a precautionary approach should be adopted here.

112. In connection with the number of monitoring sites in the river, Brown (s42A Brown 46/53:2-3) states

'the current upstream and downstream monitoring points within the Oroua River would not capture the effects of this land discharge as the monitoring is focused on the point source discharge which would have the upstream point capturing some of the effects from the activity as a whole (i.e. the land irrigation areas).

I would therefore recommend the inclusion of an additional two (four sites in total) monitoring sites to capture the effects of the land discharge on the river. These sites being:

☐ Oroua River upstream of the land irrigation area (control);

☐ Kiwitea Stream (to enable assessment);

☐ Oroua upstream discharge point (control for point source discharge); and

☐ Oroua downstream discharge point (assessment of effects for the point source discharge).

113. WPS is of the view that this is a sensible approach to take and that the effects on the river of the whole activity should be monitored rather than just those of the point source discharge. Although it might seem onerous for the Applicant to have to also monitor the Kiwitea Stream, this is

necessary because it enters the Oroua at approximately the point where the land proposed to be used by Affco ends. If data is not obtained for the Kiwitea it will be unclear whether effects are due to it or to Affco's discharge to land.

114. WPS also supports the call (s42A Brown 50/53:1) for monthly monitoring of periphyton but requests that this continue through the term of the consent whatever that is set to be as circumstances (upstream contaminant loads, effluent contaminant loads, frequency of long accrual periods etc) can change. However, if after 5 years no effects have been detected then the frequency of sampling might reasonably be decreased to bi-monthly through the discharge period and just once towards the end of the no-discharge period.

115. Ausseil says (Evidence Ausseil 33/33:4 (i.e. his para 126))

'With regards to the periphyton monitoring, I note Mr Brown's recommendation that periphyton monitoring be undertaken monthly for a period of three years. This monitoring would present the advantage of providing a robust dataset on which to base an overall assessment against the One Plan targets and NPSFM Attribute State (which require a minimum of 3 years of monthly data). However, the significant cost associated with such monitoring needs to be balanced against the finding that the period of the year during which the AFFCO discharge may cause significant effects (as in causing or contributing to cause exceedances of the One Plan targets) on periphyton growth is limited to April and May, and the view I express that the risk of the "proposed" discharge regime causing significant effects in April or May is low. On that basis it may be equally effective but significantly cheaper to focus any periphyton monitoring be focused on the critical April/May period.'

116. WPS doesn't agree with the suggestion of focussing periphyton monitoring on April and May because long accrual periods can occur throughout the year and periphyton is capable of growing excessively in winter as well as in summer. This has been demonstrated by the proliferation in the nearby Manawatu River in September 2011 that led to the review of the PNCC discharge consent. It seems reasonable to believe that the periphyton community composition in the Oroua River would be similar to that in the Manawatu River and so equally capable of winter blooming.

117. During 1996-2013, accrual periods in the Oroua of 20 days or longer occurred 4 times in June, 5 x in July, 6x in August, 8x in September, 8x in October and 11x in November. On 22 of those occasions the accrual period exceeded 30 days and the longest accrual period ended in August 2003 at 80 days. So there are plenty of occasions when periphyton could proliferate during the 'winter' period outside of the April-May.

118. So not only should nutrient levels be kept as low as possible at all times but monitoring should occur throughout the discharge period and throughout the duration of the consent.

LOAD INCREASES

119. The Applicant indicates (AEE 64/97:1) that the proposed discharge regime is predicted to result in about a 10% increase in the total annual volume of effluent and the total annual load of contaminants discharged to the river, compared with the current scenario. However, the timing of the proposed discharge to the river is different from the current scenario.

120. This change in timing is likely to result in smaller environmental effects in the vicinity of the discharge but WPS believes that distant downstream effects should also be considered – it all ends up at estuary and in-shore marine area. Some nutrients discharged during high river flows will be adsorbed or assimilated prior to reaching the distant reaches. They will then be capable of being subsequently metabolised and released at later times when flow rates are quite diffferent and so effects may be delayed.

121. The Applicant has attempted to assess the cumulative effects of the Affco discharge and the Feilding WWTP discharge as well as the contribution of the Affco discharge to the nutrient loads in the Manawatu River but it has not translated the latter into effects on the lowest reaches of the Manawatu River nor on the near-shore coastal zone.

PLANNING

122. WPS is of the view that One Plan Policy 3 should be applied, not Policy 4, in assessing this application. Policy 5-3 of the One Plan states:

'Ongoing compliance where water quality targets* are met

(a) Where the existing water^ quality meets the relevant Schedule E water quality targets* within a Water Management Sub-zone*, water^ quality must be managed in a manner which ensures that the water quality targets* continue to be met beyond the zone of reasonable mixing (where mixing is applicable).

(b) For the avoidance of doubt:

(i) in circumstances where the existing water^ quality of a Water Management Sub-zone* meets all of the water quality targets* for the Sub-zone* (a) applies to every water quality target* for the Sub-zone*

(ii) in circumstances where the existing water^ quality of a Water Management Sub-zone* meets some of the water quality targets* for the Sub-zone* <u>(a) applies only to those water quality targets* that are met</u> '

123. MWRC (s42A Manderson 19/32:4) states

'Within the Middle Oroua Zone the One Plan targets are not met for DRP..'

124. WPS believes this is incorrect for DRP above the Affco discharge point as shown by Table 4.4 (AEE p27/97-28/97) as mentioned earlier.

125. It is not logical to consider reaches further down the water management sub-zone than the discharge point in question when considering whether targets are met or not. To do so would allow Affco's discharge to not continue to meet the targets (which are met upstream) on account of discharges further downstream. It would be like saying, 'Oh well, it gets badly polluted in the end anyway so it doesn't matter if you exceed the targets further upstream at your discharge point even though above your discharge the targets are met'.

126. So WPS believes, with respect to DRP, the conclusion (s42A Manderson 19/32:7) that 'the proposal is largely consistent with policies 5-3 and 5-4 in relation to the direct discharge to water.' seems unfounded. Policy 5-3 is the applicable policy and it is not met by allowing the discharge to take the annual average DRP concentration at flows below Q20 to a level above 0.01 g/m3.

TERM

127. The Applicant has a number of consents associated with the operation of its plant (AEE 18/97 Table 3.1). Table 3.1 shows when consents were granted and that they all expire on 1/7/2029, which is a common catchment expiry date (CCED).

128. Common catchment expiry dates were set in the One Plan to provide an opportunity to consider all the discharges in a catchment simultaneously and to be able to allocate the assimilative capacity of waterways in an integrated way rather than on a first-come, first-served basis or on the basis of a right to pollute to some lower level than has historically been the case.

129. In this catchment, besides all of Affco's other consents expiring on 1/7/2029, the Feilding WWTP's consent will expire in about 2027. Also, Halcombe and Cheltenham applications have been received and the Hato Paoro College application is being developed. Finally, Kimbolton is due on 1/9/2019. I hope you can see the opportunity to bring all the point source discharges in this Water Management Sub-zone into alignment and allow for them to all be considered together in 2029.

130. Like Ngati Kauwhata, WPS cannot support a very long term consent being granted, despite the improvements being proposed.

131. We support the 12-13 year term considered appropriate by MWRC (s42A Manderson 25/32:7) in light of various uncertainties but add to this the argument that all dischargers should be working towards working together, through integrated consideration of their consents, to ensure that the assimilative capacity of the Oroua is not exceeded from its source to its confluence with the Manawatu. Thus, we recommend that the term be set so it expires in 2029.

OTHER CONSENTS REQUIRED

132. The applicant states (AEE 10/97:3)

> 'No additional resource consents are needed for the proposal to which this application relates.'

133. From Table 3.1 (AEE p18/97) it appears that although the Applicant is consented to compost the paunch discharge (consent numbers 105045 – composting, 105042 - discharge of composted material to land and 105043 - discharge to air), there is no comparable authorisation of the composting of pond sludge material.

134. Rule 14-22 enables composting to be carried out as a permitted activity but only if it is of green waste. Assuming that pond sludge is not permitted to be spread directly to land, it would have to be composted

and this will be covered by Rule 14-30 as a discretionary activity.

135. WPS requests that this matter be investigated and if a consent is required that the necessary action be taken.

136. We thank you again for this chance to share our views on how Affco can improve its proposal to meet our members' desires for a clean, swimmiable river, that harbours all the forms of life one would expect in the numbers one would expect in a waterway of this kind that isn't adversely affected by neighbouring land uses or use of the water itself.

137. We hope this contribution will be helpful to you in your consideration of this application.

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APPENDIX 1

Annual cost for AFFCO of servicing a loan of $1.5M for additional storage pond construction

Constant capital repayment each year

total cost ($)	Life span (years)	interest rate	year	amount owing at start of year	principal repayment ($) (constant)	interest payment ($)	**total annual principal and interest payment ($)**
1,500,000	25	0.05	1	1,500,000	60,000	75,000	**135,000**
	25	0.05	2	1,440,000	60,000	72,000	**132,000**
	25	0.05	3	1,380,000	60,000	69,000	**129,000**
	25	0.05	4	1,320,000	60,000	66,000	**126,000**
	25	0.05	5	1,260,000	60,000	63,000	**123,000**
	25	0.05	6	1,200,000	60,000	60,000	**120,000**
	25	0.05	7	1,140,000	60,000	57,000	**117,000**
	25	0.05	8	1,080,000	60,000	54,000	**114,000**
	25	0.05	9	1,020,000	60,000	51,000	**111,000**
	25	0.05	10	960,000	60,000	48,000	**108,000**
	25	0.05	11	900,000	60,000	45,000	**105,000**
	25	0.05	12	840,000	60,000	42,000	**102,000**
	25	0.05	13	780,000	60,000	39,000	**99,000**
	25	0.05	14	720,000	60,000	36,000	**96,000**
	25	0.05	15	660,000	60,000	33,000	**93,000**
	25	0.05	16	600,000	60,000	30,000	**90,000**
	25	0.05	17	540,000	60,000	27,000	**87,000**
	25	0.05	18	480,000	60,000	24,000	**84,000**
	25	0.05	19	420,000	60,000	21,000	**81,000**
	25	0.05	20	360,000	60,000	18,000	**78,000**
	25	0.05	21	300,000	60,000	15,000	**75,000**
	25	0.05	22	240,000	60,000	12,000	**72,000**
	25	0.05	23	180,000	60,000	9,000	**69,000**
	25	0.05	24	120,000	60,000	6,000	**66,000**
	25	0.05	25	60,000	60,000	3,000	**63,000**
					1,500,000	975,000	2,475,000

Annual cost for AFFCO of servicing a loan of $1.5M for additional storage pond construction

Constant (capital + interest) payment each year

total cost ($)	Life span (years)	interest rate	year	amount owing at start of year ($)	principal repayment ($)	interest payment ($)	1/interest rate	principal repayment =initial loan amount/(1/rate-(1/(rate(1+rate) raised to power of duration of loan)))	**total annual principal and interest payment ($) (constant)**
1,500,000	25	0.05	1	1,500,000	31,429	75,000	1.05		**106,429**
	25	0.05	2	1,468,571	33,000	73,429	1.05		**106,429**
	25	0.05	3	1,435,571	34,650	71,779	1.05		**106,429**
	25	0.05	4	1,400,921	36,383	70,046	1.05		**106,429**
	25	0.05	5	1,364,538	38,202	68,227	1.05		**106,429**
	25	0.05	6	1,326,337	40,112	66,317	1.05		**106,429**
	25	0.05	7	1,286,225	42,117	64,311	1.05		**106,429**
	25	0.05	8	1,244,107	44,223	62,205	1.05		**106,429**
	25	0.05	9	1,199,884	46,434	59,994	1.05		**106,429**
	25	0.05	10	1,153,450	48,756	57,672	1.05		**106,429**
	25	0.05	11	1,104,693	51,194	55,235	1.05		**106,429**
	25	0.05	12	1,053,499	53,754	52,675	1.05		**106,429**
	25	0.05	13	999,746	56,441	49,987	1.05		**106,429**
	25	0.05	14	943,304	59,263	47,165	1.05		**106,429**
	25	0.05	15	884,041	62,227	44,202	1.05		**106,429**
	25	0.05	16	821,814	65,338	41,091	1.05		**106,429**
	25	0.05	17	756,476	68,605	37,824	1.05		**106,429**
	25	0.05	18	687,871	72,035	34,394	1.05		**106,429**
	25	0.05	19	615,836	75,637	30,792	1.05		**106,429**
	25	0.05	20	540,199	79,419	27,010	1.05		**106,429**
	25	0.05	21	460,781	83,390	23,039	1.05		**106,429**
	25	0.05	22	377,391	87,559	18,870	1.05		**106,429**
	25	0.05	23	289,832	91,937	14,492	1.05		**106,429**
	25	0.05	24	197,895	96,534	9,895	1.05		**106,429**
	25	0.05	25	101,361	101,361	5,068	1.05		**106,429**
					1,500,000	1,160,717			2,660,717

APPENDIX 3

The number of days in April and May when the river flow was in different rate categories

Dry = number of days <1/2median + <median flow rate is >=20

year	month	< ½ MF	½ MF <x< MF	MF <x< 2MF	2MF <x< Q20	Q20 <x< 3MF	> 3MF	# days check	dry?
1996	april	0	2	17	1	4	6	30	
1996	may	0	7	9	4	3	8	31	
1997	april	6	2	12	1	3	6	30	
1997	may	4	25	2	0	0	0	31	dry
1998	april	17	5	6	1	0	1	30	dry
1998	may	3	14	9	1	1	3	31	
1999	april	8	14	5	0	0	3	30	dry
1999	may	0	14	12	2	1	2	31	
2000	april	7	15	4	1	1	2	30	dry
2000	may	11	15	5	0	0	0	31	dry
2001	april	24	4	1	0	0	1	30	dry
2001	may	2	12	7	2	0	8	31	
2002	april	18	10	2	0	0	0	30	dry
2002	may	14	7	4	0	1	5	31	dry
2003	april	27	2	1	0	0	0	30	dry
2003	may	17	7	7	0	0	0	31	dry
2004	april	10	15	5	0	0	0	30	dry
2004	may	1	19	9	0	2	0	31	dry
2005	april	2	22	5	0	0	1	30	dry
2005	may	0	10	12	2	2	5	31	
2006	april	0	15	11	0	0	4	30	
2006	may	0	2	19	4	4	2	31	
2007	april	14	11	5	0	0	0	30	dry
2007	may	23	8	0	0	0	0	31	dry
2008	april	19	8	3	0	0	0	30	dry
2008	may	5	12	11	1	1	1	31	
2009	april	30	0	0	0	0	0	30	dry
2009	may	2	8	12	3	2	4	31	
2010	april	26	4	0	0	0	0	30	dry
2010	may	17	7	2	2	0	3	31	dry
2011	april	4	12	9	0	2	3	30	
2011	may	0	12	16	0	3	0	31	
2012	april	10	11	5	0	1	3	30	dry
2012	may	6	20	5	0	0	0	31	dry