BEFORE A HEARINGS PANEL OF THE GREATER WELLINGTON REGIONAL COUNCIL

UNDER	**the Resource Management Act 1991 ("the Act")**
IN THE MATTER OF	**resource consent applications to Greater Wellington Regional Council pursuant to section 88 of the Act to discharge contaminants to land, air and water**
BY	**South Wairarapa District Council**
FOR	**the proposed staged upgrade and operation of the Martinborough Wastewater Treatment Plant**

BRIEF OF EVIDENCE OF Kevan Grant BRIAN ON BEHALF OF SOUTH WAIRARAPA DISTRICT COUNCIL

WASTEWATER TREATMENT PROCESS ENGINEERING

DATED 17 April 2015

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EVIDENCE OF Kevan Grant BRIAN ON BEHALF OF SOUTH WAIRARAPA DISTRICT COUNCIL

1. My full name is Kevan Grant Brian.

2. I am a Technical Director at Mott MacDonald New Zealand Limited (formerly AWT Water Limited). I hold an honours degree in Environmental Engineering from Massey University (Palmerston North). I am a Chartered Chemical Engineer and have been a full member of the Institute of Chemical Engineers (IChemE) since 2003. I am also a member of the Institute of Professional Engineers New Zealand (IPENZ) and have approximately 17 years' experience in the wastewater industry in New Zealand and in the United Kingdom with particular focus on municipal wastewater treatment plant upgrades and trials.

3. I have read the Code of Conduct for Expert Witnesses in section 5 of the Environment Court's Practice Note (2011). I agree to comply with that Code of Conduct. Except where I state that I am relying upon the specified evidence of another person, my evidence in this statement is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions which I express.

PURPOSE and SCOPE OF EVIDENCE

4. I assisted with preparation of the report entitled '*Application for Resource Consents, Activity Description and Assessment of Environmental Effects*' ("**AEE**"). In particular, my involvement centred on providing technical advice on the performance of the existing Martinborough oxidation ponds, potential alternative upgrade options and the suitability of a high rate treatment ("**HRT**") plant.

5. My evidence will address the following:

(a) A summary description of existing Martinborough wastewater treatment plant including oxidation ponds

(b) Existing pond maintenance and performance

(c) Alternative treatment options considered

(d) Potential for odour generation from the proposed treatment process

(e) Submissions regarding current non-compliances and proposed wastewater discharge rate.

(f) Conclusions

SUMMARY DESCRIPTION OF EXISTING MARTINBOROUGH WASTEWATER TREATMENT PLANT

6. The MWWTP was initially constructed in 1975 and is typical of many smaller wastewater treatment facilities built in the 1970's throughout New Zealand. It consists of an oxidation pond system with gravity flow from the incoming sewer main from the southwest. The plant components are described as follows.

7. The primary oxidation (facultative) pond is an unlined pond with a surface area of 16,300m^2 and a capacity of 23,000m^3. At average flow and normal water level, the pond has a hydraulic retention design time of 47 days. At peak flows, this can reduce to below 13 days, in accordance with its design parameters. The oxidation pond treats sewage using biological activity to reduce contaminants and enables settlement of solids, which forms into a 'sludge' on the bottom of the pond. Naturally occurring UV (from sunshine) also acts to kill a proportion of pathogens. Over a number of years the facultative pond has been retrofitted with:

- Two inclined shaft surface aerators installed in 1998, which act to enhance biological treatment; and to mitigate potential odour effects by regularly moving the pond surface.
- Sub baffles (Rock Groynes) and an outlet structure with curtains for the effluent to pass through prior to reaching the maturation cells.

Research had suggested some benefit from this simple addition, but monitoring indicates little benefit in practice.

8. Four lined maturation cells follow the facultative pond and were installed in 2007 to increase retention times, thereby providing additional levels of treatment prior to discharge.
9. A Lift Pump Station and UV disinfection were installed in November 2011 to further improve pathogen removal from the effluent which, in high concentrations, can have effects on human health. Natural UV on the ponds has some benefits, but additional mechanical treatment was required under a previous GWRC resource consent.
10. The treated effluent discharges by gravity to the Ruamahanga River via a 50m unlined outfall channel at low to medium river flow periods. Under higher flows the true left bank of the river channel intercepts and overflows this channel and the discharge is more direct.
11. The plant is equipped with a DO probe, outflow meter (which replaced the damaged inflow meter in 2011), overflow/bypass monitoring and alarms. Bypassing the maturation cells and the UV Plant can be manually initiated in exceptional circumstances by operations personnel. Wet weather bypass results in direct discharge of partially treated effluent to the river. Bypass has not been initiated at this site to date. The mechanism by which bypass can be achieved is inspected by site operational staff no less than six-monthly.

EXISTING POND MAINTENANCE AND PERFORMANCE

12. Oxidation ponds are typically relatively effective in removing biochemical oxygen demand (BOD), suspended solids and pathogens but are relatively ineffective at removing nutrients such as nitrogen and phosphorus. Oxidation ponds require regular maintenance in order to be effective in treating wastewater.
13. The MWWTP is managed and operated by CityCare Limited (‘CityCare’) under the terms of an Operations and Maintenance Contract (‘OMC’) signed in October 2012. The contractor is required to ensure that the

MWWTP is operated in strict compliance with relevant resource consents.

14. Although a well-defined operations process exists on site which is managed by CityCare, there is currently no specific Operations and Maintenance Manual ('OMM') in place.

15. The following are constantly monitored and/or inspected daily:
    - Outlet flows
    - UV transmissivity of effluent
    - UV dosage

16. Standard good practice weekly maintenance procedures appear to be adhered to and are considered adequate. Upgraded inlet flow monitoring is proposed to be installed as part of the inlet screen installation, programmed for completion as part of the Stage 1A optimisation programme.

17. Mechanical aeration in the primary oxidation pond is effective at mitigating odour from the pond surface. No requirement for any additional odour control processes has been identified for the MWWTP. SWDC advises there is no record of odour issues either through compliance monitoring, site operations, or reports through SWDC complaints monitoring. SWDC advise that GWRC have not raised any odour related issues with SWDC.

18. However, in line with the precautionary approach being adopted, an Odour Management Plan is proposed to be developed within six months of consent being granted.

19. It is typically apparent if sludge accumulation is limiting the effective operation of a pond system and desludging may be required. Typical 'symptoms' of this might include:
    - belching of solids due to accelerated anaerobic decomposition;
    - re-entrainment of solids due to wave and current action; and
    - reduced hydraulic retention time in the ponds and therefore pond performance due to the loss of the volume taken up by the accumulated sludge

20. None of these symptoms have been evident at MWWTP (see AEE). There is no record of the MWWTP ponds having ever been desludged and based on the most recent survey (Opus, 2013; Appendix 4 of AEE) of existing sludge accumulation, and assessment of its impact on plant efficiency and effluent quality, this has concluded that sludge is not currently impacting pond efficiency or performance.

21. At normal operating levels the pond retains a design buffer margin of 25% of the ponds operating capacity which is considered adequate. SWDC have advised they are not aware of any overtopping having occurred at the site. The operational contingency of the pond is best managed by development and implementation of the OMM.

22. Table 1 below provides a summary of the annual MWWTP discharge volume and treated effluent quality statistics as measured over the past five years. It provides a summary of the current pond and treatment plant performance.

23. Table 1: Wastewater Discharge Composition

Constituent	**N**	**Mean Concentration (g/m^3)[1]**	**Median Concentration (g/m^3)**	**75%ile Concentration (g/m^3)**	**Mass loading (kg/yr)**
Flow*	567	608 (m^3/day)	326 (m^3/day)		221,920 (m^3/y)
BOD_5	125	41	35	54	9,012
SS	125	62	55	81	13,785
TN	121	27	28	33	6,009
NH_4-N	123	18.9	19.9	25.8	4,193
DRP	125	4.8	5.0	6.8	1,069
TP	125	6.1	6.5	8.0	1,359
pH	92	8.0	7.9		NA
*E. coli***	50	NA	100 (cfu/100ml)		NA

* Flow has been measured since 2011.

** E coli data following UV disinfection installation.

COMPLIANCE WITH CONDITIONS OF EXISTING DISCHARGE CONSENT

24. There have been a number of exceedances of the existing resource consent compliance limits in terms of the treated effluent quality discharge in recent years (Appendix 17 of the AEE). These relate specifically to E. coli, total nitrogen and ammoniacal-nitrogen. A description of these is provided below.

25. As noted above, a lift pump station and UV disinfection system was installed at the MWWTP in November 2011 to improve the pathogen removal efficiency from the effluent. Since installation of the system, monitoring that there has been indicated a substantial drop in the E. coli levels in the treated wastewater discharge. However since installation, three and five sampling events have been non-compliant for E. coli in the 2012/2013 and 2013/2014 monitoring periods respectively. These are presented and explained in details in Appendix 5 and 17 of the AEE. There are a number of possible technical reasons that a reduction in treatment efficiency of a UV system may occur. These include:

   - the need for frequent manual cleaning of the UV tubes than initially anticipated
   - infiltration of non UV light treated effluent into the weir discharge chamber
   - a small defect in the UV light reactor vector lens
   - a change in the UV light reactor default settings

   These issues are typically not uncommon in the early stages of introduction of a new system and they have now been remedied. It is anticipated that with the improvements now in place, the E. coli levels will continue to trend towards achieving compliance. There have been no exceedances of the E. coli compliance limit in the last seven months.

26. The monitoring results for total nitrogen and ammoniacal-nitrogen (in summer only) have exceeded their corresponding geomean compliance limits since 2011. This is not surprising as pond systems are not

specifically designed for the removal of nutrients. A comprehensive range of alternative options to the existing WWTP system were assessed in order to mitigate the effect of elevated nutrient levels on the receiving environment. These are discussed below.

ALTERNATIVE TREATMENT OPTIONS CONSIDERED

27. The RMA requires an applicant to provide a description of alternative methods, including a description of alternative available receiving environments, where the activity involves the discharge of any contaminant[1]. Mr Allingham provided an assessment of SWDC's asset management approach and response in regards to the preferred method of treatment and disposal to surface water in the initial stages before migrating to a land disposal system in the latter stages.

28. As part of the process for developing long-term options, AWT evaluated four long-term alternative options[2]:

a) Integrated land disposal scheme with and without the inclusion of Carterton District Council's (CDC) WWTP effluent. This option combined wastewater discharges from Martinborough, Featherston and Greytown at a centralised location.

b) Separate land disposal schemes at each individual WWTP site.

c) Integrated high rate treatment plant and discharge to water. This option combined the wastewater discharges from Martinborough, Featherston and Greytown at a centralised location and then discharges to the Ruamahanga River.

d) Separate high rate treatment plants at each WWTP with continued discharge to water.

29. A preliminary assessment was undertaken to determine the feasibility of an alternative facility which combined wastewater from Martinborough with Greytown and Featherston, and a second combined scheme

[1] RMA 1991: Clause 1(f)(ii), 4th Schedule – *Where the activity includes the discharge of any contaminant, a description of … Any possible alternative methods of discharge*, including discharge into any other receiving environment, and section 105.

[2] 'South Wairarapa Integrated Wastewater Scheme – Technical Review' (AWT, August, 2013), as lodged with the AEE (2014, Appendix 13).

including Carterton District. Due primarily to the cost of pumping and piping to a central facility, these combined scheme options were considered cost prohibitive (AWT, 2013 refer to Appendix 13 of AEE).

30. An evaluation of the alternative options[3] was considered for MWWTP. The alternatives were evaluated through multi-criteria analyses that supports the adopted best practicable option overall for the three urban WWTP's. The alternatives considered include optimisation works, some land treatment procurement, reducing inflow and infiltration in the short-term to enable a more affordable, effective, and sustainable treatment, storage and land treatment and disposal solution to be developed and implemented in the long-term.

31. Twenty-three (23) options were evaluated which consisted of Option 1 'status quo / do nothing'; Options 2 to 10 which included 'pond enhancement measures' ranging from floating wetlands to flow curtains; Options 11 to 15 consisting of 'pond add-on solutions / additional pond effluent treatment' such as constructed wetlands and membrane filtration; Options 16 and 17 consisting of the replacement of the pond system by way of HRT systems, Options 18 and 19 investigated the land treatment based disposal and discharge to water options, and Option 20 assessed inflow and infiltration rehabilitation; as discussed further below.

32. Options 1 to 15 were not considered feasible mostly due to the uncertainty of these options to remove nutrients to low levels. Options 17 to 20 were considered feasible therefore they were investigated in further detail.

33. I will firstly comment on some of the main options considered before elaborating on options 16 to 20.

[3] 'Greytown Wastewater Treatment Plant – Alternatives Considered Multi-Criteria Analysis - All Options - Key Parameters' (AWT, 2013) as lodged with the AEE (2014, Appendix 2).

Option 8 (floating wetlands)

34. Floating wetlands are a relatively new wastewater treatment system which has recently been commissioned at towns such as Waipawa and Waipukurau.

35. FTWs are a passive / low energy process, and are a good retrofit option for pond treatment systems. They are fairly unaffected by fluctuations in water levels within the pond and are relatively easy to maintain. The cover and shelter provided by the floating treatment media promotes conditions conducive to settling by reducing turbulence and light, thus assisting with algae management. The FTW have low capital and operation expenditures compared to other high rate treatment plant options, and they can be configured to address a range of performance objectives. The addition of coagulation dosing following the FTWs and before the UV can also target Phosphorus removal.

36. FTW however have a limited track record in New Zealand and overseas with wastewater treatment, particularly with regard to nutrient removal and their long term sustainability and reliability. FTW are difficult to control if problems arise at the plant or in the event of external influences, and thus specific effluent quality targets are difficult to guarantee.

37. A trial floating treatment wetland (FTW) was constructed at the MWWTP in 2010 and was monitored for approximately three years. This pilot system did not perform well, with some reduction in TSS, E.coli and BOD_5 observed but little change in terms of nitrogen or phosphorus removal. A comparison of the performance from other FTW systems installed in New Zealand targeting nutrient removal has been undertaken by AWT (2013)[4]. Results for the removal of BOD, TSS and ammonia were promising, although the level of improvement does appear to diminish in the warmer summer months. The data available however is very limited and thus the long-term performance reliability of FTW cannot be accurately determined at this time.

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[4] AWT Water Ltd, Martinborough WWTP - Consent Application Technical Review, Letter prepared for SWDC, 22 March 2013.

38. FTW has been discounted because of the treatment performance uncertainties with respect to nitrogen and phosphorus removal provided by this process, key constraints for the MWWTP.

Sand filtration (Option 13)

39. Sand filtration beds, remove colloidal and particulate material in accordance with the properties of the filter (e.g. grain size, bed depth and applied surface loading rate). The filter acts through entrapment and adhesion to arrest the solid material and trap them on the surface of or within the body of the media or medium. In some applications it is necessary to pre-treat the effluent flowing into a sand bed to ensure that the particulate solids can be captured.

40. Pre-treatment can comprise of pH adjustment, coagulation and/or flocculation. Sand filters used for treatment of secondary treated municipal wastewater can be located as a final polishing stage where the sand traps residual suspended material and bacteria and can provide a physical matrix for denitrification (conversion of nitrates into nitrogen gas) in conjunction with upstream carbon dosing.

41. Sand filters become clogged with flocculent and or entrapped solids after a period in use and they are then backwashed or pressure washed to remove this material. This backwash water is typically run into settling tanks to allow the backwashed solids to settle and the supernatant returned to the ponds with the solids being dewatered and disposed as solid waste. Alternatively, the backwash could be returned to the head of the works for settlement in the ponds.

42. Trials conducted in Carterton in 2003, using Dynasand filters and a range of coagulants showed a limited improvement in effluent quality with only very high coagulant doses showing a marked improvement. Further trials were to commence in 2012, however the results have not been reviewed. For MWWTP a large sand bed filtration system would be required to cope with the large flows and additional pumping for the backwashing cycles would be required. The sand bed filtration process is likely to work very

satisfactorily for particulate contaminants. Phosphorus could also be precipitated using upstream metals salts coagulants (Aluminium, Iron) dosing although the level of removal is uncertain without further bench scale trials being undertaken.

43. This option has been discounted because of the large uncertainties regarding its nutrients removal performance, the likely filter size and comparative cost, along with the difficulties associated with filtering of algae with this type of process.

Constructed Wetlands (Option 15)

44. Construction of a specially designed treatment wetland on the outlet of the MWWTP ponds was considered.

45. With specific design, some reduction in BOD_5 and TSS can be expected. In addition, wetlands have been shown to remove phosphorus through uptake by growing plants and/or through adsorption to sediments in sub-surface wetlands. Phosphorus removal, however seldom exceeds 1-3 mg/L and at certain times of the year wetlands can release phosphorus that has been accumulated over the growing season. Extensive nitrogen removal typically requires long hydraulic residence times in wetlands (greater than 14 days), thus resulting in large land area requirements and significant upfront construction costs. Regular harvesting is also required to remove the nitrogen and phosphorus from the system that has accumulated in the wetland via plant uptake.

46. A wetland would require significant land and physical works, while providing similar treatment performance as a FTW. Although this is a land contact process and thus to some extent addresses cultural values, it is not expected that the effluent quality would consistently and reliably meet effluent quality requirements for a discharge to surface waterways, (particularly for nitrogen removal) and ongoing maintenance and harvesting of the wetlands can be difficult and expensive. Additionally, there is a recognised risk (from my experience) that if the wetland were to follow the existing UV disinfection plant the pathogen

levels could potentially increase through habitation of wildlife influences (i.e. wetlands have a tendency to attract waterfowl). For these reasons, this option has not been considered further.

High rate treatment plants (Options 16 & 17)

47. Though multi-criteria analysis[5] and subsequent consideration, it has determined that a high rate treatment plant is likely to be a feasible option for the MWWTP.
48. Where the main driver for upgrading wastewater treatment plants is nutrient removal, high rate treatment activated sludge systems have been the most common option favoured by other Councils in New Zealand. High rate treatment processes (for example Membrane Bioreactor ("MBR") or Sequential Batch Reactor ("SBR") are robust well proven technologies and would greatly improve the overall effluent quality.
49. High rate treatment plants utilise processes that use bacteria (biomass) to break down soluble and small particulate organics. These soluble components are then settled and removed as sludge, with a portion of the sludge being recycled back into the process tank to maintain the microbiological population. This process is called activated sludge and there are several variations on this process.
50. The effluent quality from a high rate treatment plant is generally reliable and they therefore present a suitable alternative to land treatment. However they have high capital and operational costs when compared to the alternative solutions investigated for the MWWTP.
51. As Mark Allingham will explain in this evidence, SWDC is committed to diverting treated effluent flows from water onto land. Land irrigation will provide significant environmental benefits to the Ruamahanga River in the long-term from the complete removal of contaminants to surface water during low flow conditions and treatment of nutrients via a sustainable cut and carry operation. This was the best practicable

[5] As shown in Appendix 2 of the AEE (2014).

option in terms of affordability and the relative benefits to the receiving environment.

POTENTIAL FOR ODOUR GENERATION FROM THE PROPOSED TREATMENT PROCESS

52. As outlined above, the mechanical aeration in the primary oxidation pond is effective at mitigating odour from the pond surface however there is potential for odour generation from the proposed treatment process due to:
    - Loads
    - Timing
    - Biological activity
    - Operation and management
    - Weather
    - Anaerobic conditions in the ponds or soil
53. The primary potential effect on air quality is in respect of odour emanating from the plant, or from the discharge. Poorly managed or stressed WWTP's do have the potential to create odour by being allowed to become anaerobic. As given in the AEE (Section 4.2), there is no record of any complaints or indication of adverse effect on air quality from the operation of the MWWTP or the immediate site since the aerators were installed in 1998.
54. The operation on site will to continue to be managed in accordance with the existing resource consent. In her evidence, Katie Beecroft will discuss odour issues relating to the proposed land treatment system.
55. An Odour Management Plan will be developed which will include procedures for managing odour from both the ponds and irrigation infrastructure, within six months of the commencement of the consent.

SUBMISSIONS

Martinborough Business Association – Submitter #9

56. Martinborough Business Association (MBA) has noted the significant non-compliances with existing consent '2624' relating to the discharge of wastewater from the MWWTP to water (Ruamahanga River). The rating of 'significant non-compliance' was given due to environmental non-compliances with conditions 1, 2 and 7, and the significant non-compliance of condition 15 relating to the annual compliance report. Mark Allingham in his evidence will provide further response to this concern.

57. Condition 1 of the current consent WAR970079 [30753] requires SWDC to undertake upgrades and operate in accordance with the resource consent application. Not all of the proposed second stage upgrades of the original resource consent applications were undertaken. The consent s127 variation in 2010 in part recognised this fact by temporarily relaxing the discharge consent limits. GWRC have considered this to be an environmental non-compliance in the past. The average effluent flow from the plant was 608 m^3/d with a maximum of 11,478 m^3/day (refer to AEE, Appendix 12). These flow rates exceeded the consented volumes of 465 m^3 (daily average) and 1,460 m^3 (daily average).

58. Condition 2 of the current consent WAR970079 [30753] requires the loading of the oxidation pond to not exceed 100kg BOD/ha/day. The Opus (2013) report[6] estimated that the maximum design loading rate to the Martinborough Oxidation pond is approximately 89kg BOD5/ha/day. This is based on the oxidation pond having an area of 1.63 ha, average raw influent flow of 490m^3/d, factoring in temperature and average raw influent BOD5 concentration at average flows of 220g BOD5/m^3 (Metcalf &Eddy 3rd Ed, reference 5). An influent sample was taken for BOD5 on 16/07/2014 of 250 mg/L. However, no influent flow

[6] Opus, Sludge Survey Report - Martinborough and Featherston WWTP's, April 2013 (Appendix 4 of consent application).

measurement was undertaken due to the influent flow meter being out of commission. If this same method used by Opus is applied, the loading rate on the oxidation pond may be exceeding 100 kg BOD/ha/day however this cannot be confirmed. A BOD loading rate restriction condition for the pond is not proposed for the replacement consent. Instead, conditions relating to a BOD standard for the discharge of treated wastewater to the Ruamahanga River are proposed.

59. Condition 7 of the current consent WAR970079 [30753] requires the quality of the existing discharge from the pond into the Ruamahanga River shall comply with the tabulated parameters. The treated effluent discharge has exceeded the tabulated quality standards for Total Nitrogen, Ammonia and *E.Coli*, thus resulting in environmental non-compliance. As shown in the table above, the geomean compliance standards for TN and summer Ammonia-nitrogen, and 90th percentile standard for summer Ammonia-Nitrogen have been exceeded. *E.coli* has also exceeded the absolute standard of 200cfu/100ml. All other parameters are in compliance with the standards.

60. The exceedence of summer Ammonia-N and TN geomean standards are not surprising considering the type of treatment process and its limitations in nitrogen removal. Ponds are susceptible to temporal variations and environmental conditions and are not specifically designed for nutrient removal. Hence SWDC have applied for a replacement consent that consists of a staged upgrade to full land treatment which aims to remove nutrients from the Ruamahanga River over the long-term. The exceedances of the *E. coli* standards (according to the most recent annual compliance report 2013/2014) are due to a range of factors such as the cleanliness of the UV lamp lens, weather conditions and data anomalies. Proposed condition 4 of Schedule 2 details the UV treatment and *E.coli* standards which the MWWTP discharge is to adhere to. It allows for the occasional breach for data anomalies and/or maintenance issues however *E.coli* levels in the receiving environment are likely to decrease when Stage 1B is

implemented which will be further described in Katie Beecrofts evidence.

61. As stated in the AEE (page 19) it is acknowledged that assessment against the conditions of consent is not an indicator of plant performance. Monitoring of influent and effluent is proposed to determine the actual plant performance, quantify the benefits of upgrading the plant and to identify potential tradewaste discharges.

Neville Fisher – Submitter #10

62. Mr Neville Fisher opposes the lifting of the average daily discharge rate from 465m^3 to 650m^3 and also opposes the proposed increase of the maximum daily discharge rate from 1,460 m^3 to 4,300 m^3.

63. As outlined above in paragraph 53 and as given in the AEE (Appendix 12), the flow from the MWWTP has a daily mean discharge of 608 m^3 with a maximum daily discharge of 11,478 m^3/day. The existing daily maximum flow is significantly greater that the volume discharge restriction condition proposed. In addition, the proposed conditions allow for the actual existing and proposed Stage 1A discharge to occur during which the loading rates and concentrations of contaminants are unlikely to significantly increase based on population growth predictions (AEE, pages 15 and 16). I agree that increased discharge rates when the Ruamahanga River is at high flow conditions will occur but this will result in overall benefits to the immediate receiving environment as addressed by Mr Coffey.

64. As shown in Table 4 of the AEE, the overall discharge and load of contaminants discharged to the Ruamahanga River and final receiving environments (Lake Onoke and Lake Wairapapa) in the long term will significantly reduce.

Sustainable Wairarapa Inc – Submitter #12

65. Sustainable Wairarapa Inc (SW Inc) question how the proposal can be developed if the accurate flow information is currently unknown. In the absence of accurate influent flow data, flows have been estimated based on standard calculations using population and industry information.

66. For the treatment upgrade works (i.e. I&I) we have based the improvement works on inflow data prior to 2011. As the population growth of Martinborough is not likely to have changed considerably within this short period of time, this is considered a valid estimate of flow for any proposed plant improvement works.

67. To verify the influent flow, a new inflow meter as part of the inlet screen commissioning will be installed (Sec 6.3.3 of AEE). The data from this inlet flow meter, along with up-to-date population projections, and industry information and analysis will be undertaken as part of the detailed design phase of the works.

68. SW Inc note in their submission that the proposed conditions with standards are based on 9 out of 12 monthly samples and question whether three months of summer low flows can be subject to non-compliance and overall compliance still be achieved. The proposed 9 out of 12 monthly consecutive monthly test conditions are widely used throughout the industry has as it allows a buffer in terms of any sampling and analytical errors (considered outliers) or extreme climatic events. If for example, more than three consecutive monthly summer low flow sampling events are outside of the proposed limits, compliance will not be achieved.

EFFLUENT STANDARDS

69. A statistical summary of the effluent quality discharged from the MWWTP is provided in Appendix 12 of the AEE. The summary was based on all monitoring data collected since 2009 excluding E coli and flow

which, due to installation of the UV disinfection system in November 2011, was based on data collected between December 2011, and June and November 2013 respectively. The proposed effluent standards as provided in Schedule 2, Condition 3 of the AEE, are based on the 75th percentile concentration of the data. However the effluent concentration standards have been rounded up slightly. This was due to: 1) simplicity and 2) to allow a small buffer for any unusual test results due to environmental variations, technical malfunctions and/or analytical or testing errors.

70. I have reviewed the s42A pre-hearing report and the recommendations provided by Dr Ausseil. The treated effluent limits (Schedule 2, Condition 3) suggested by Dr Ausseil equate to the median, or 50th percentile, concentration of the historic monitoring data. This concentration limit for the discharge quality would be met in 6 out of every 12 sampling events (50% of the time) but could not be met in the suggested 8 out of every 12 sampling events. The treated effluent discharge would, however, meet the 75th percentile concentration limit which equates to 9 out of every 12 sampling events.

71. In Schedule 2, Condition 4 of the AEE, the proposed standards for UV treatment are set for discharges of up to 2,800 m^3/day. In Dr Ausseil's recommendation report (s42A), he suggested that this flow limit be revised to 3,000 m^3/day for both contact recreational purposes and to be consistent with the flow limit provided in Schedule 2, Condition 2(b). The UV unit is not hydraulically limited and the UV lamps power (dose rate constant) can be varied for flow. Its specification was based on a maximum flow rate of 35 L/s which equates to approximately 3000 m^3/day. Therefore, in my opinion Condition 4 can be revised to a maximum wastewater discharge of 3,000 m^3/day.

CONCLUSION

72. The current MWWTP was initially constructed in 1975 and comprises an oxidation pond system with gravity flow from the incoming sewer main. Since its inception the plant has undergone various operational upgrades with the current performance of the pond considered adequate.

73. The existing pond maintenance procedures appear to be adhered to and are considered adequate.

74. The treated effluent discharge has shown some exceedances of the existing discharge consent compliance limits particularly for E. coli, TN and ammonicacal-nitrogen. A UV disinfection system was installed at the MWWTP in November 2011. Since then, periodic exceedances have occurred primarily due to the introduction of the new system however these have now been remedied and the discharge should meet the compliance limits.

75. Pond systems are not specifically designed for the removal of nutrients such as nitrogen and ammoniacal-nitrogen and as such, an evaluation of twenty three alternative options was considered to upgrade the existing WWTP. A land treatment system was considered the best practicable option for treatment of the wastewater both in terms of community affordability and the relative benefits to the receiving environment.

76. Limits on the quality of the treated effluent to the receiving environment from the plant have been proposed as a condition of a discharge consent. The limits are based on the historic effluent monitoring data for the existing WWTP.

77. There are currently no concerns relating to odour from the existing MWWTP and this is not likely to change from the proposed upgrades to the plant. An Odour Management Plan will be developed which will include procedures for the management odour from both the ponds and irrigation structure.

78. The proposed land treatment system for the MWWTP is likely to provide long-term environmental benefits to the Ruamahanga River by both a

reduction in discharge quantity of treated wastewater and associated contaminants to the river as long as best practice management is implemented and adhered to.

Date: 17 April 2015

Signed: pp [signature]

EXHIBIT KGB1: Schematic of Current MWWTP treatment process