Martinborough

Waste Water Treatment Plant

Proposed operation, upgrade and maintenance

Application for Resource Consents, Activity Description and Assessment of Environmental Effects

Application By: South Wairarapa District Council

7 April 2014

Ref: 12502

geange consulting
planning and environmental assessment

AWT
H2know-how
a member of the Mott MacDonald Group

Quality Assurance Statement

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GLOSSARY

AAF	Annual Average Flow
BOD_5	5 day Biological Oxygen Demand
BPO	Best Practicable Option
CDC	Carterton District Council
CIA	Cultural Impact Assessment
CLAWD	Combined Land and Water Discharge
DIN	Dissolved Inorganic Nitrogen
DO	Dissolved Oxygen
DRP	Dissolved Reactive Phosphorous
EC	Electrical Conductivity
FTW	Floating Treatment Wetlands
FWP	Greater Wellington Freshwater Plan
GWRC	Greater Wellington Regional Council
GWWTP	Greytown Wastewater Treatment Plant
HMF	Half Median Flow
HRT	Hydraulic Retention Time
I/I	Inflow and Infiltration
IIRMP	Inflow and Infiltration Reduction Management Plan
LTP	Long Term Plan
MCI	Macroinvertebrate Community Index
NH_4-N	Ammoniacal Nitrogen
NPS	National Policy Statement Freshwater Management 2011
OMP	Odour Management Plan
QMCI	Quantitative Macroinvertebrate Community Index
RMA	Resource Management Act (1991), including subsequent amendments
RPS	Wellington Regional Policy Statement
SWDC	South Wairarapa District Council

TN	Total Nitrogen
TP	Total Phosphorous
TSS	Total Suspended Solids
WCDP	Wairarapa Combined District Plan
WWTP	Wastewater Treatment Plant

Part One: A – Resource Consent Application Form

FORM 9

APPLICATION FOR RESOURCE CONSENTS

UNDER SECTION 88 OF THE RESOURCE MANAGEMENT ACT 1991

To: Greater Wellington Regional Council
34 Chapel St
PO Box 41
Masterton, 5840

Attn: Nicola Arnesen / Paula Pickford
Environmental Regulation

APPLICATION FOR RESOURCE CONSENTS ASSOCIATED WITH THE MARTINBOROUGH WASTEWATER TREATMENT PLANT

1 **SOUTH WAIRARAPA DISTRICT COUNCIL** applies for resource consents for the activities described below.

2 The activity to which the resource consents relate is the ongoing operation, maintenance, and upgrade of the Martinborough Wastewater Treatment Plant (including ancillary activities), as described in the Description and Assessment of Effects that accompanies this application.

3 The names and addresses of the owner of the land to which the activity applies are

South Wairarapa District Council
PO Box 6
MARTINBOROUGH 5741
C/- Paul Crimp, Chief Executive Officer.

4 The location of the proposed activity is
Martinborough Wastewater Treatment Plant
Dublin Street
Martinborough
(Valuation ID: 18310-16700, Legal Description LOT 1 DP 44557 LOT 5 DP 87782 BLK IX HUANGARUA SD).

Pain Farm
Lake Ferry Road
Martinborough
(Valuation ID: 1833000200, Legal Description PT SEC 5 WHAREKAKA DIST BLK IX HUANGARUA SD

5 The type of resource consents sought are:

a) A discharge permit for the discharge of contaminants to the Ruamahanga River through the term of the consent (being treated effluent from the Martinborough Wastewater Treatment Plant);

b) A discharge permit for the discharge of contaminants to land and water for the term of consent (being treated effluent via seepage from the ponds and channel associated with the Martinborough Wastewater Treatment Plant);

c) A discharge permit for the discharge of treated effluent to land and water (being land application of treated effluent from the Martinborough Wastewater Treatment Plant to land adjacent to the WWTP (Stage 1B) and Pain Farm (Stage 2A & 2B)); and,

d) A discharge permit for the discharge of contaminants to air (being odour from the WWTP ponds and treatment process (excluding pond desludging); and discharge to air of effluent associated with land application).

6 Attached, in accordance with Schedule 4 of the RMA, is a Description and Assessment of Effects on the Environment in the detail that corresponds with the scale and significance of the effects that the proposed activity may have on the environment, including information required in terms of the various Regional Plans.

7 The term of consent which is sought for the consents is **35 years**.

Signed on behalf of South Wairarapa District Council

07 April, 2014
Date

Address for Service of the Applicant

C/-Kerry Geange
Geange Consulting
PO Box 213
CARTERTON

Phone: 0275 432 643
Email: kerry@geangeconsulting.co.nz

Part One: B – Application Site: Certificates of Title

Part One: C – Proposed Resource Consent Conditions

Definitions

In the following conditions, the expressions below have the meaning given:

Definitions:	
WWTP	Wastewater Treatment Plant
MWWTP	Martinborough Wastewater Treatment Plant
BOD_5	Five days Biochemical Oxygen Demand
NH_4-N	Total Ammoniacal Nitrogen
NO_x-N	Total oxidised nitrogen
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
DRP	Dissolved Reactive Phosphorous
E.coli	*Escherichia coli*
DO	Dissolved oxygen
g/m^3	Grams per cubic metre
L/s	Litres per second
Manager	Manager Environmental Regulation, Wellington Regional Council

Schedule 1 - General Conditions

1. The activity authorised by this Wastewater Discharge Permit shall be undertaken in general accordance with the application (including the Description and Assessment of Effects) lodged with the Wellington Regional Council on **7 April 2014** and further information received on:

   - ***[to be completed with relevant additional information requested by GWRC through the consent process, if any]***

   Where there may be contradiction or inconsistencies between the application and further information provided by the applicant, the most recent information applies. In addition, where there may be inconsistencies between information provided by the applicant and conditions of the permit, the conditions apply.

   Note: *Any change from the location, design concepts and parameters, implementation and/or operation may require a new resource consent or a change of consent conditions pursuant to Section 127 of the Resource Management Act 1991.*

2. The Consent Holder shall engage in writing with the Manager Environmental Regulation, Wellington Regional Council (hereafter referred to as "the Manager"), if any contingency works or variation from the consents is required prior to undertaking any such activity. This is to ascertain whether the contingency work is within the scope of this consent, or whether a variation to the consent or additional resource consent will be required.

Upgrade Staging

3. The treatment system shall be upgraded in stages (generally in accordance with the application) in accordance with the following:

Table 1: Land Management Stage Commissioning Programme

Stage Name	Stage Description	Stage to commence no later than:
Stage 1A	Plant Optimisation and minor capital works	Commencement of this consent
Stage 1B	Discharge of treated effluent to "MWWTP Adjacent" block during low-flow conditions	December 31, 2015
Stage 2A	Discharge of treated effluent to Pain Farm (Stage 2A) without deferred storage	December 31, 2030
Stage 2B	Discharge of treated effluent to Pain Farm (Stage 2B) with deferred storage	December 31, 2035

Notes: *(1) Schedule 2: Condition 2 specifies the maximum discharge rates to the Ruamahanga River, and Schedule 4; Condition 1 & 2 for permitted rates of application for land treatment. (2) The application volume is an estimate only provided for context. This condition does not specify a maximum or minimum discharge volume. The Application regime will be managed in accordance with rates specified in Note (1) above, and the Effluent Discharge Management Plan (Schedule 1: Condition 6).*

Management and Operations Plans

4. The Consent Holder shall prepare the Plans listed in Table 2 (below). The Plans shall give effect to requirements in Schedule 1, 2, 3, and 4 (attached) and may be prepared as separate plans or as part of a combined plan.

5. The Plans in Table 2 (below), including any amendments, shall be subject to the endorsement of the Manager. The consents shall thereafter be exercised in conformance with the endorsed Plans.

6. All Management Plans listed in Table 2 (below) are to be prepared by a suitably qualified and experienced person with expertise in the matters that the individual Management Plan is to address.

Table 2: Management Plans

Management Plan	***Due (time from commencement of consent)***
MWWTP Operations and Maintenance Manual	6 Months
Tangata Whenua Values Monitoring Plan	12 Months
Inflow and Infiltration Reduction Management Plan	12 Months
Effluent Discharge Management Plan	12 Months
Odour Management Plan	6 Months
Environmental Monitoring Plan	12 Months

7. The content of the management plans shall be agreed with the Manager prior to being drafted and all management plans shall be reviewed and where necessary updated either annually within one month of the anniversary of the commencement date of this of consent or where environmental monitoring supports a change. Any change shall be subject to the written approval of the Manager.

Advice Note*: Management Plans required by Schedule 1: Table 1 may be combined where there are operational efficiencies achieved by doing so. Where management plans are combined, there shall be clear description as to how the intent of Schedule 1: Conditions 4-6 is to be achieved.*

Monitoring and Recording

8. The Consent Holder shall monitor and record wastewater flow and quality according to the frequency, and constituents specified in Schedule 6: Table 1, at

   a) the locations specified in Schedule 6: Table 2 and Figure 1 (until such time as the Environmental Monitoring Plan is endorsed pursuant to Schedule 1: Condition 5); and
   b) the monitoring locations specified in the Environmental Monitoring Plan (following its endorsement pursuant to Schedule 1: Condition 5).

Advice Note*: The intent of this condition is to confirm that the monitoring fequencies, constituents and locations will be those contained with Schedule 6 of this consent until such time as the Environmental Monitoring Plan is prepared and approved by the Manager. Following approval of the Environmental Monitoring Plan, Schedule 6 shall no longer form part of this consent; all environmental monitoring would then be undertaken in accordance with the approved Environmental Monitoring Plan. This condition applies to and takes precedence over <u>all</u> environmental monitoring conditions contained in all schedules of this consent.*

9. To enable the sampling of the treated wastewater, easy and safe access, to a sampling port(s) shall be provided and maintained as close as is practicable to those sampling locations specified in Schedule 1: Condition 8.

10. The Consent Holder shall keep inspection records and operational logs which record regular inspections, identify changes in the operating procedures and record unusual events that occur at the plant. Copies of these records shall be supplied to the Manager as required by Schedule 1: Condition 15, or within 20 working days of a written request by the Manager.

11. In respect of monitoring required by these consents, the following shall apply:

    a) all monitoring techniques employed in respect of the conditions of this consent shall be carried out by suitably experienced and qualified persons;
    b) all analytical testing undertaken in connection with these consents shall be performed by a laboratory that is IANZ accredited for the analytical tests;
    c) all soil and water sample analyses shall be undertaken in accordance with the methods detailed in the "Standard Methods For The Examination Of Water And Waste Water, 2012" 22nd edition by A.P.H.A. and A.W.W.A. and W.E.F., or any other method approved in written advance by the Manager; and
    d) if any monitoring sites are identified as unsuitable, alternative monitoring sites shall be identified and developed after consultation with the Manager.

12. Where an approved management plan or manual (including any review in accordance with Schedule 1:Condition 7) contains a monitoring, measurement, or recording methodology which differs from those specific methodologies contained within any condition of these permits, the management plan or manual methodology shall prevail.

    ***Note**: The intent of this condition is to ensure that appropriate industry methodologies can be applied over the term of consent without the need for an unnecessary variation to conditions (subject to the endorsement of the Manager).*

Wastewater Volume Measurement

13. The Consent Holder shall fit measuring equipment to monitor the wastewater flows at the following points and within the timeframes specified. Measuring equipment shall be maintained to manufacturer's specifications for the duration of these consents.

a) inlet structure;	before **June 30, 2015**;
b) discharge outflow;	Within **one month** of commencement of this consent
c) land treatment volume.	Prior to any discharge of treated effluent to land (for Stage 1B and Stage 2A & 2B respectively)

14. Where the measuring equipment measures flow in a pipe, measurement error is to be no more than +/- 5% as an average across the flow range, and where installed at a weir or open channel, measurement error is to be no more than +/- 10% as an average across the flow range. The measuring equipment must:

    a) be able to measure cumulative discharge;
    b) be able to measure instantaneous flow rate;
    c) be installed in accordance with the manufacturer's specifications ; and
    d) be calibrated annually.

Reporting

15. The Consent Holder shall provide a **Quarterly Data and Exception Report** for each three-month period ending 31 March, 30 June, 30 September and 31 December to the Manager within 30 working days of the end of each three month period. The quarterly report shall be provided in electronic format. The quarterly report shall include, but not be limited to, the following:

    a) The results of all monitoring undertaken in accordance with the conditions of this consent, with all monitoring data provided in a suitable electronic format; and
    b) A brief commentary on any exceptions identified from the data; and
    c) Subject to Schedule 1: Condition 26 a schedule summarising any complaints received during the quarter.

    Where agreed in writing with the Manager, up to two quarterly reports may be combined into a single report for any such specified reporting period(s).

    ***Advice Note**: The Quarterly Data and Exception Report required under this condition on 30 September of any year may be incorporated into the Annual Report, but where it is shall be clearly identified for compliance monitoring purposes.*

16. The Consent Holder shall provide to the Manager an **Annual Report** by **30 September** each year, summarising compliance with the conditions of these consents for the previous compliance year (1 July to 30 June inclusive). The Annual Report shall be provided in electronic format. This report shall include as a minimum:

    a) a summary of all monitoring undertaken in accordance with the conditions of this consent, including analysis of the information in terms of compliance;
    b) where compliance has not been met a discussion on any trends or changes in environmental effects evident from the monitoring data, both within the annual period and compared to previous years;
    c) any reasons for non-compliance or difficulties in achieving compliance with the conditions of this consent;
    d) any measures that have been undertaken, or are proposed to be undertaken in the upcoming 12 months, to improve the environmental performance of the wastewater treatment and disposal system;
    f) any recommendations on alterations/additions to the monitoring programmes and/or any changes to any Management Plan following any review in accordance with Schedule 1: Condition 7;
    g) a schedule of any complaints recorded during the year and any follow up actions undertaken; and
    i) any other issues considered important by the Consent Holder.

    ***Advice Note:** A copy of the Annual Report shall be made available to the Community Liaison Group, Kahungunu ki Wairarapa and Rangitaane o Wairarapa within 10 working days of submission to the Greater Wellington Regional Council.*

Communications and Liaison

17. Within **three months** of the commencement of this consent, the consent holder shall establish a Community Liaison Group (CLG) in order to report to community members on the performance of the MWWTP, the long term strategy for wastewater treatment and discharge, progress with initiatives to reduce flow and load of contaminants to the MWWTP, improvements to MWWTP performance, and reductions to the volume and load of contaminants discharged to the Ruamahanaga River. The

Consent Holder shall invite all submitters to the application to attend the CLG meetings. The CLG shall be invited to meet at intervals as decided upon by the members of the CLG, but at least once per year, and records of the meetings shall be forwarded to the Manager within two weeks of each meeting.

18. Within **1 month** of commencement of this consent a WWTP liaison person shall be appointed by the Consent Holder to be the main and readily accessible point of contact. The Consent Holder shall take appropriate steps to seek to advise all stakeholders and interested persons of the stakeholder liaison person's name and contact details. If the liaison person will not be available for any reason, an alternative person shall be nominated by the consent holder.

Resource Consent Compliance System

19. Within **two months** of commencement of this consent, the Consent Holder shall develop and implement a robust resource consent compliance management system, including the identification of the person responsible for monitoring compliance. The Consent Holder shall provide a written summary (including templates and examples as relevant) of the compliance system to the Manager by the end of the two month period. A copy of the summary shall also be provided to the members of the CLG, Kahungunu ki Wairarapa and Rangitaane o Wairarapa.

Management of Pond Level

20. The Consent Holder shall not allow (under normal operating conditions and to the extent practicable) any discharge to the Ruamahanga River (including any discharge of effluent to land which may enter the Ruamahanga River) to occur as a result of overtopping of the oxidation pond embankments.

Signage

21. For the duration of these consents, the Consent Holder shall:

    a) maintain signage on the true left and true right stream banks in the immediate vicinity of the treated wastewater outfall which shall at all times:
        - provide clear identification of the location and nature of the discharge; and
        - state the width and downstream distance of the mixing zone authorised by this consent; and
        - provide a 24-hour contact phone number; and
        - be visible to the public visiting the area and legible from a distance of 50 metres without unnecessarily detracting from the visual amenity of the area.

    b) maintain appropriate signage on the boundaries of the site which shall be legible to a person during daylight hours, warning that partially treated wastewater is discharged to land and may be present at the site.

22. The Consent Holder shall consult with Wairarapa Public Health and provide a copy of their written approval regarding the wording of the signs prior to submitting them for approval to Wellington Regional Council. Written confirmation of the signage placement accompanied by photographs of the signage shall also be provided to the Manger within one month of the commencement of this consent.

Access

23. The access gate to the site shall remain locked at all times that operational staff of the consent holder (which shall include authorised contractors) are not present on site, to prevent unauthorised access.

24. Stock access to the WWTP oxidation ponds and discharge channel shall be restricted, except that grazing of the embankment by stock shall be permitted under the management of the Consent Holder. All fences or other barriers shall be maintained by the consent holder to be of suitable stock proof standard at all times.

On-site meeting with WWTP Operations Contractor

25. The consent holder shall arrange and conduct a consent information meeting within **two months** of the date of commencement of this consent. The purpose of the meeting shall be to confirm the conditions of the consents and the responsibilities of the contractor. The consent holder shall invite, with a minimum of 10 working days notice, the Wellington Regional Council and a representative from each key contractor operating the activity.

Complaints Register

26. The Consent Holder shall keep a record of any complaints that are received with respect to the operation of the WWWTP and associated irrigation. The record shall contain the following details:

    a) name and address of the complainant;
    b) identification of the nature of the complaint;
    c) date and time of the complaint and of the alleged event;
    d) weather conditions at the time of the complaint; and
    e) any measures taken to address the cause of the complaint.

27. The Consent Holder shall notify the Manager of all complaints relating to the exercise of these consents which result from a non-compliance with the conditions of these consents, within **24 hours** of being received by the Consent Holder, or the next working day. A schedule of all complaints shall be provided with the quarterly report.

28. The Consent Holder shall forward to the Manager a copy of any complaints recorded in the annual report required by Schedule 1: Condition 16.

System Failure

29. The system shall be maintained in an efficient operating condition at all times. In the event of any treatment failure that is likely to result in deterioration in the quality of the discharge which would affect the receiving environment, and be in breach of any condition of this consent, the consent holder shall:

    a) Take immediate steps to remedy and mitigate any adverse effects on the environment caused by the failure;
    b) Notify the Manager within 24 hours after the malfunction has been detected, detailing the manner and cause of that malfunction and the steps taken to mitigate its effects and to prevent recurrence. Notification can be sent to the Wellington Regional Council at notifications@gw.govt.nz. Please include the consent reference and the name and phone number of a contact person;
    c) The Consent Holder shall forward an incident report to the Manager within seven (7) working days of the incident occurring, unless otherwise agreed with the Manager. The report shall describe the manner and cause of the incident, measures taken to mitigate/control the incident (and/or illegal discharge), and measures to prevent recurrence; and
    d) Notify Wairarapa District Health Board as soon as practicable after the malfunction has been detected.

    Advice notes:

    1) Compliance with this condition does not preclude Wellington Regional Council undertaking follow up enforcement investigations and actions against the Consent Holder.

    2) This condition is intended to apply to treatment failure under normal conditions. Discharge under extreme weather events are regulated separately in Schedule 2: Condition 4 and for the sake of certainty it is noted that this condition does not apply to those events.

30. Notification in accordance with Schedule 1: Condition 29(d) shall include but not be limited to:

- The nature of the discharge,
- Location of the discharge,
- Start date and estimated time of the discharges,
- End date and estimated time of the discharge (if known at the time of notification),
- Estimated duration of the discharge (hours),
- Maximum flow (litres/second) or estimate thereof,
- Mean flow (litres/second) or estimate thereof,
- Estimated volume (m^3),
- Cause of overflow/discharge,
- Action taken (including signs, notification of interested parties, clean-up of stream etc), and
- The contact details of the person reporting the notification.

Review of Conditions

31. Wellington Regional Council may review any or all of the conditions of this consent by giving notice of its intention to do so pursuant to Section 128 of the Resource Management Act 1991, at any time within three months of the annual anniversary of the date of commencement of this consent for any of the following purposes:

- to deal with any adverse effects on the environment which may arise from the exercise of this consent, and which it is appropriate to deal with at a later stage;
- to review the adequacy of any monitoring requirement(s) so as to incorporate into the consent any modification to any plan(s) or monitoring requirement(s) which may become necessary to deal with any adverse effects on the environment arising from the exercise of this consent;
- to alter the monitoring requirement(s) in light of the results obtained from any previous monitoring;
- to require remediation measures to be undertaken if adverse effects from the activity are greater than anticipated in the application.

Resource Management Charges

32. A resource management charge, set in accordance with section 36(2) of the Resource Management Act 1991 shall be paid to Wellington Regional Council for the carrying out of its functions in relation to the administration, monitoring and supervision of the resource consents and for the carrying out of its functions under section 35 (duty to gather information, monitor and keep records) of the Act.

Schedule 2: Discharge permit to discharge treated wastewater to Ruamahanga River

CONDITIONS

Discharge Rate, Parameters and Regime

1. Subject to the additional restrictions during each Stage imposed by Schedule 2: Condition 2, this permit authorises the discharge of treated wastewater at:

   a) An annual average daily flow of 650m^3/day; and
   b) A maximum daily rate of 4,300m^3/day**.**

2. In addition to the maximum rates specified in Schedule 2: Condition 1, discharges to the Ruamahanga River shall be operated under the following conditions:

   a) Discharge regime prior to the commissioning of Stage 1B land treatment
   Until the commencement of the Stage 1 Land Treatment, treated wastewater shall be discharged to the River via the existing discharge channel at a rate not exceeding the maximum rates provided for in Schedule 2; Condition 1.

   b) Stage 1B & 2A Discharge to Ruamahanga River
   Following confirmation of commencement of Stage 1B Land Treatment in accordance with Schedule 2: Condition 6, discharges into the Ruamahanga River shall not exceed the following:

Flow in the Ruamahanga @ Waihenga Bridge (L/s)	Max. Wastewater discharge (m^3 / day)	Max. Wastewater discharge rate (L/s)
Below 24,930 (< HMF)	Nil	Nil
24,930 to 49,860 (< median)	1350	11
49,860 to 99,720 (< 2 x median)	2700	21
99,720 to 149,580 (< FRE3)	3000	35
Above 149,580 (> FRE3)	4300	50

   c) Stage 2B Discharge to Ruamahanga River
   Following confirmation of commencement of Stage 2B Land Treatment in accordance with Schedule 2: Condition 6, there shall be no discharge of treated effluent to Ruamahanga River when the flow in the Ruamahanga River at Waihenga Bridge is less than three times the median flow (149,580 l/s).

   Advice Note: *Contingency measures to manage pond storage volumes shall be included in the Effluent Discharge Management Plan to minimise, as far as practicable, any discharge to the Ruamahanga River during Stage 2B (i.e. land treatment shall be the priority where practicable).*

3. Any treated wastewater discharged to the Ruamahanga River shall meet the following standards:

   a) The concentration of BOD_5 shall not exceed 60g/m^3 in 9 out of any 12 consecutive monthly test results;
   b) The concentration of TSS shall not exceed 90g/m^3 in 9 out of any 12 consecutive monthly test results;

c) The concentration of Total Ammonia-nitrogen (NH_4-N) shall not exceed 30g/m^3 in 9 out of any 12 consecutive monthly test results; and
d) The concentration of TN shall not exceed 35mg/l in 9 out of any 12 consecutive monthly test results.
e) The concentration of DRP shall not exceed 7g/m^3 in 9 out of any 12 consecutive monthly test results.

Advice Note: *Compliance will be demonstrated based on the monthly samples as set out in Schedule 6: Table 1.*

4. The following UV treatment standards shall apply:

a) For discharges up to 2,800m^3/day 5 of 10 consecutive *E coli* values shall not exceed 100 cfu per 100 millilitres, and no more than 2 out of 10 consecutive values shall exceed 1,400 per 100 millilitres; or
b) For discharges over 2,800m^3/day, UV treatment shall be applied to a minimum of 2,800m^3/day and the remaining flow shall have no UV treatment.

5. All discharges to the Ruamahanga River shall be made via the existing surface discharge channel at the location identified in Schedule 6: Figure 1.

Advice Note*: Instantaneous flows in the Ruamahanga River at the Waihenga Bridge site are measured by Wellington Regional Council and are available on the website at the following link http://graphs.gw.govt.nz/ruamahanga-river-at-waihenga-bridge/*

Confirmation of Land Treatment

6. The consent holder shall confirm in writing to the Manager the commencement date of any land treatment in Stages 1B, 2A & 2B, including any transitional operational requirements to give effect to land treatment irrigation. This confirmation shall be provided no less than 20 working days prior to any irrigation on the respective land treatment site.

7. A copy of the confirmation required by Schedule 2; Condition 6 shall also be provided to the members of the Community Liaison Group, Kahungunu ki Wairarapa and Rangitaane o Wairarapa no less than five working days thereafter.

Near Zone River Health Survey

8. Within **3 months** of commencement of this consent, a protocol shall be developed to characterise river health in the discharge "near zone" (c.4m from the True Left Bank for a distance of no less than 250m downstream of the discharge) in a range of river and wastewater flow conditions. As a minimum, the survey shall be carried out in both winter and summer conditions, and include sampling during maximum wastewater discharge flows proposed for Stage 1A & 1B at no less than three River flows; and include monitoring of Ammoniacal-N, DO, DRP, and BOD.

9. Within **15 months** of commencement of this consent, a Near Zone River Health Report shall be submitted to the Manager which outlines the investigation, analyses, and findings of the River Health Survey required by Schedule 2: Condition 8. The Report shall include confirmation of the suitability of the reasonable mixing zone.

Environmental monitoring

Water Quality Sampling

10. Subject to Schedule 1: Condition 8, the Consent Holder shall collect representative grab samples from the Ruamahanga River according to the frequency, constituents and locations detailed in Schedule 6: Table 1, Table 2 and Figure 1.

Macroinvertebrate Sampling

11. The Consent Holder shall have an appropriately qualified and experienced ecologist undertake macroinvertebrate sampling annually in the period between January 1 and March 31 at surface water locations identified in Schedule 6: Table 2 and Figure 2, each year until the second anniversary of the commencement of Stage 2B.

    Advice Note: *The timing of the invertebrate sampling is intended to reflect in-stream conditions under the discharge to water regime and under the discharge to land regime. In addition, for certainty, sampling locations are subject to change under Schedule 1: Condition 8.*

12. The sampling and assessment required under Schedule 2: Condition 11 shall be undertaken following a period of at least three weeks without a significant flood event (defined as an instantaneous river flow exceeding three times the estimated median flow in Ruamahanga River at Waihenga and during a period of low flow.

13. The macroinvertebrate sampling shall follow Protocols C3 (Hard-bottomed quantitative), P3 (full count with subsampling option) and QC3 (Quality control for full count with subsampling option) from the Ministry for the Environment's "protocols for sampling macroinvertebrates in wadeable streams" (Stark et al. 2001). This shall involve:

    a) collection of five replicate 0.1m^2 Surber samples at random within a 20m section of riffle habitat at each sampling site;
    b) full count of the macroinvertebrate taxa within each replicate sample to the taxonomic resolution level specified for use of the Macroinvertebrate Community Index (MCI); and
    c) enumeration of the results as taxa richness, MCI, QMCI, %EPT taxa and %EPT individuals.

    Advice Note: *Where a more appropriate method of sampling and assessment is identified and included within an approved Environmental Management Plan, the alternative programme and method shall take precedence over Schedule 2: Conditions 11-13.*

Periphyton and Algae Assessment

14. The Consent Holder shall have an appropriately qualified and experienced freshwater ecologist undertake an assessment of the percentage cover, biomass and community composition of periphyton, filamentous algae and cyanobacterial mats in run habitat, as close as possible to the sites defined in Schedule 6: Table 2 and Figure 2. The periphyton assessment shall be every year to coincide with macroinvertebrate monitoring and reporting (refer Schedule 2: Condition 11).

    The periphyton and algal assessment is to include:

    a) a visual assessment of the percentage cover of both filamentous algae and algal mats (to the nearest 5%) at five points across each of four transects encompassing run habitat and extending across the width of the river at each sampling site. Reported estimates shall include:
        (i) Percentage cover of visible stream bed by bacterial and/or fungal growths (sewage fungus) visible to the naked eye;

(ii) Percentage cover of visible stream bed by filamentous algae more than 2cm long;
(iii) Percentage cover of visible stream bed by diatoms or cyanobacteria mats more than 0.3cm thick;
(iv) Percentage cover of visible stream bed by diatoms less than 0.3cm thick; and
(v) Percentage cover of visible stream bed that is clean.

b) collection of a composite periphyton sample across each sampling site using method QM-1a from the Stream Periphyton Monitoring Manual (Biggs & Kilroy 2000) at the same established monitoring sites and transects as defined in Condition 10 above (a composite of scrapings from eight rocks, two from each transect), using method QM-1b from the Stream Periphyton Monitoring Manual (Biggs & Kilroy 2000). The composite sample shall also be analysed for ash free dry weight and chlorophyll *a*.

15. The Consent Holder shall have an appropriately qualified and experienced freshwater ecologist undertake an assessment of the percentage cover of deposited sediment in run habitat, as close as possible to the sites identified in Schedule 6: Table 2 and Figure 1. The deposited sediment assessment shall be undertaken twice per year, including once annually to coincide with macroinvertebrate monitoring required by Schedule 2: Condition 11.

Reporting

16. The findings and results of investigations undertaken in accordance with Schedule 2: Conditions 10, 11, 14 and 15 shall be incorporated and submitted in annual reports, as required by Schedule 1: Condition 15. The reports must note any differences encountered with reference to the applicable discharge regime and assess compliance against the discharge quality standards listed in Schedule 2: Condition 3.

Schedule 3:	**Discharge permit to discharge contaminants and odours to air from oxidation ponds and other operational activities; and from irrigation of treated effluent.**

CONDITIONS

Odour Management

1. There shall be no discharges of odour to air that are noxious, dangerous, offensive or objectionable resulting from the operation of the MWWTP, at or beyond the boundary of the WWTP site as designated (Ds065) in the Wairarapa Combined District Plan.

2. There shall be no discharges of odour to air that are noxious, dangerous, offensive or objectionable resulting from the irrigation of effluent from either the Stage 1B (MWWTP) or Stage 2A & 2B (Pain Farm) Land Treatment sites, at or beyond the boundary of the respective irrigation area site boundary.

3. There shall be no spray drift that is noxious, dangerous, offensive or objectionable resulting from the irrigation of effluent from either the Stage 1B (MWWTP) or Stage 2A & 2B (Pain Farm) Land Treatment sites, at or beyond the boundary of the respective irrigation area site boundary.

4. All irrigation of treated effluent under Schedule 4 shall be managed in strict accordance with the relevant parts of the Effluent Discharge Management Plan (Schedule 1: Condition 3) relating to the land treatment discharge.

5. The management of odour from the scheme shall be in strict accordance with the Odour Management Plan (Schedule 1: Condition 4).

Schedule 4: Discharge permit to discharge treated wastewater to land via an irrigation system

CONDITIONS

Discharge Rate and Quality

1. The discharge of treated wastewater to land shall not exceed the following rates:

   a) Stage 1B Land Treatment: MWWTP 795 m^3/day
   b) Stage 2A & 2B Land Treatment: Pain Farm 4300 m^3/day

2. The effluent hydraulic loading rate shall not exceed the following:

   a) 35mm depth per week, and no more than 15mm in any 24 hour period during Stage 1B; and
   b) 21mm depth per week, and no more than 9mm in any 24 hour period during Stage 2A or 2B.

3. Any treated wastewater discharged shall meet the following standards:

   a) The concentration of BOD_5 shall not exceed 60g/m^3 in 9 out of any 12 consecutive monthly test results;
   b) The concentration of TSS shall not exceed 90g/m^3 in 9 out of any 12 consecutive monthly test results;
   c) The nitrogen loading rate, as a consequence of:
      (i) The exercise of this permit; and/or
      (ii) The application of nitrogen based fertiliser; and/or
      (iii) The disposal of any other waste
      shall not exceed a maximum of 300kg/ha/yr determined from the average of 12 consecutive monthly test results and the average monthly flow collected in accordance with the Environmental Monitoring Plan (Schedule 1: Condition 4).

4. The detailed design of the land treatment irrigation proposed for Stage 1B shall be included in the Effluent Discharge Management Plan (Schedule 1: Condition 4).

5. Detailed design for Stage 2A & 2B Irrigation shall be included with a revision to the Effluent Discharge Management Plan in accordance with Schedule 1: Condition 7.

6. The design of the land treatment irrigation schemes for Stage 1B, 2A and 2B shall be undertaken to, where practicable, give effect to the following:

   a) Discharge of treated wastewater to the irrigation area shall:
      (i) Be evenly distributed to the entire area being utilised for irrigation;
      (ii) Not cause runoff or surface ponding; and
      (iii) Not lead to the development of anaerobic soil conditions.

   b) Avoid the discharge of wastewater to land within 125m of the property boundary, except that wastewater may be discharged to land within 25m from the property boundary where:
      (i) median E. Coli. concentrations are less than 100cfu/100ml; and
      (ii) Irrigation is at low pressure (less than 1.4 bar); and,
      (iii) The irrigation boom does not exceed 1.52m from ground level and does not incorporate an “end gun”;

(iv) where wind speed does not exceed 12m/s (or 4m/s sustained for a period of 15 minutes or more) in a direction toward an existing dwelling (at the time of commencement of this consent) on an adjoining site within 300m of the irrigation area.

7. The discharge of treated wastewater to the irrigation area shall be in strict accordance with the Effluent Discharge Management Plan (Schedule 1: Condition 3).

Monitoring

8. The Consent Holder shall continuously measure and maintain daily records of wastewater flows entering the treatment plant and the volume of the treated wastewater discharged to the land application area, to record the quantity of material being received and applied.

9. The Consent Holder shall record the location and volume applied to various irrigation areas within the land application system.

10. The Consent Holder shall record crop and pasture management practices across the site including:
    a) Cultivation date;
    b) Sowing date;
    c) Fertiliser applications;
    d) Harvesting; and
    e) Any other management practices.

11. The Consent Holder shall carry out groundwater sampling according to the constituents and frequency specified in the Environmental Monitoring Plan; and samples shall be taken in accordance with the most recent version of Wellington Regional Council's groundwater sampling protocol.

12. During Stage 1B, 2A & 2B, the Consent Holder shall undertake soil monitoring in accordance with the Environmental Monitoring Plan during the period of September and October every second year to assess soil health and performance of the land treatment scheme.

Reporting

13. The findings and results of investigations in Schedule 4: Conditions 12 and 13 shall be incorporated and submitted in the Annual Report (Schedule 1: Condition 15). The reports must note any differences encountered with reference to the applicable discharge regime and provide reasons where appropriate as to why irrigation has not been maximised.

Schedule 5: Discharge permit to discharge treated wastewater to land via seepage from MWWTP oxidation ponds and discharge channel

CONDITIONS

Discharge Rate

1. The rate of discharge to land (and subsequently groundwater) from the base and sides of the oxidation and maturation ponds and base and sides of the discharge channel via seepage is for 24 hours per day, 7 days per week, 52 weeks per year.

Monitoring

2. The Consent Holder shall:

   a) carry out groundwater sampling according to the constituents and frequency in Schedule 6: Table 1, and at locations identified in Schedule 6: Table 2 and Figure 1; and

   b) samples shall be taken in accordance with the most recent version of Wellington Regional Council's groundwater sampling protocol.

Reporting

3. The results of monitoring undertaken in accordance with Schedule 5: Condition 2 shall be incorporated and submitted in the Annual Report, as required by Schedule 1: Condition 15.

Schedule 6 - Monitoring Summary

Table 1: Sampling Parameters, Frequency and Location

Location	Inlet	Outlet	Land discharge area	Ruamahanga River	Groundwater sampling (pond seepage)	Groundwater sampling (land application area)
Constituent	Post inlet screening	Post UV		At locations in Table 2 & Figure 1	At locations in Table 2 & Figure 1	At locations in Table 2 & Figure 1
Flow	Every 15 minutes	Every 15 minutes	Daily		Water level below top of casing 6 monthly during summer and winter	Water level below top of casing 6 monthly during land application in summer and during winter rest period
Inspection	Daily	Daily	Daily		6 Monthly	Before & after land application season
Pond level		Daily				
Soil moisture and Rainfall			Daily			
UV Dosage			Daily			
Biological Oxygen Demand BOD	TBC	Monthly		Monthly	Annually	
Suspended Solids SS	TBC	Monthly		Monthly		
E. coli		Monthly		Monthly	Annually	Before & after land application season
Faecal Coliforms		Monthly		Monthly	Annually	
Ammoniacal Nitrogen NH3-N	TBC	Monthly		Monthly	Annually	

Nitrate Nitrogen NO3-N	TBC	Monthly		Monthly	Annually	Before & after land application season
Total Phosphorus TP	TBC	Monthly		Monthly	Annually	Before & after land application season
Total Nitrogen TN	TBC	Monthly		Monthly	Annually	Before & after land application season
Dissolved Reactive Phosphorus DRP	TBC	Monthly		Monthly	Annually	Before & after land application season
Particulate Organic Matter POM		Monthly		Monthly	Annually	
pH	TBC	Monthly		Monthly	Annually	
Conductivity	TBC	Monthly		Monthly	Annually	
Temperature	TBC	Monthly		Monthly	Annually	
Clarity (black disc)		Monthly		Monthly		
Dissolved Oxygen DO	TBC	Monthly		Monthly	Annually	

***Note**: Schedule 1 : Condition 12 applies to Schedule 6: Table 1 to the extent that where an approved management plan or manual (including any review in accordance with Schedule 1:Condition 7) contains a parameter, frequency, or detection limit which differs from those specific methodologies contained within this table, the management plan or manual methodology shall prevail. This is to ensure that current appropriate industry methodologies can be applied without the need for an unnecessary variation to conditions (subject to the endorsement of the Manager).*

Table 2: Monitoring Sites

APPROXIMATE SAMPLING SITE LOCATION	NZTM N	NZTM E
A. Wastewater Sampling Site		
Discharge to Ruamahunga River	1804567	5434977
UV Treatment Plant	1804562	5434931
Martinborough Receiving Water (Ruamahunga River)		
Upstream of discharge	1804399	5435667
50m downstream	1804399	5435103
250m downstream	1804267	5435237
500m downstream	1804038	5435261
B. Groundwater Sampling Sites		
[To be confirmed in the Environmental Monitoring Plan]		

***Note**: Schedule 1:Condition 12 applies to Schedule 6: Table 2 to the extent that where an approved management plan or manual (including any review in accordance with Schedule 1:Condition 7) contains a monitoring location which differs from those specific methodologies contained within this table, the management plan or manual methodology shall prevail. This is to ensure that current appropriate industry methodologies can be applied without the need for an unnecessary variation to conditions (subject to the endorsement of the Manager).*

Figure 1: Indicative monitoring site locations *(NB Inlet monitoring location to be confirmed upon installation of equipment during Stage 1A).*

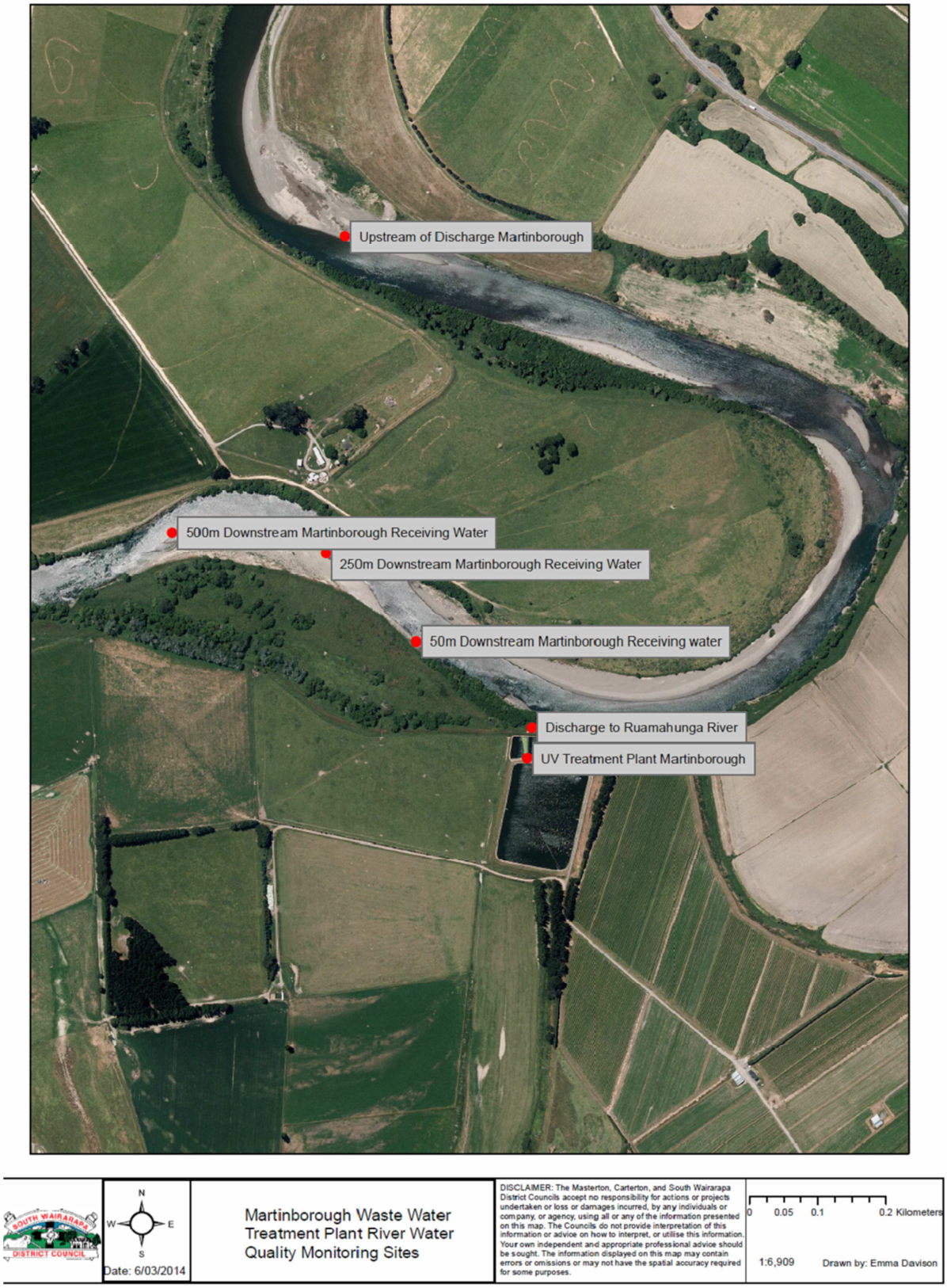
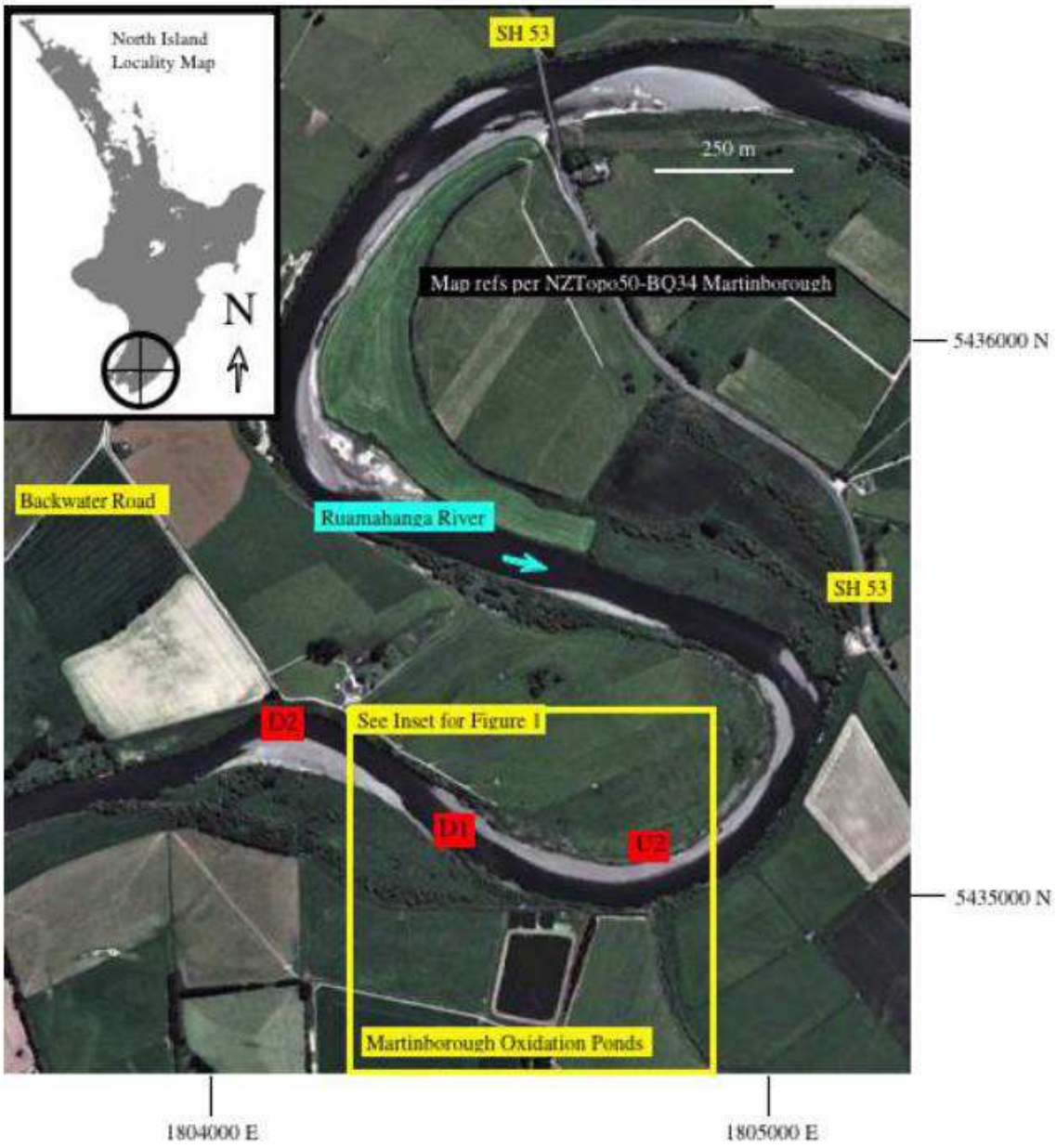


Figure 2: Indicative macroinvertebrate monitoring site locations



Part Two: Description and Assessment of Effects on the Environment

1 INTRODUCTION

South Wairarapa District Council ("**SWDC**") is legally responsible for the operation of wastewater treatment and disposal facilities throughout the District. These include facilities in Featherston, Martinborough, and Greytown, as well as a small community scheme at the Lake Ferry township. All three of the urban facilities now require replacement resource consents.

There are increasing demands and pressures on authorities to decrease the actual and potential effects of wastewater treatment and disposal on the environment, coupled with the increasing financial pressures on small community ratepayers. SWDC has responded to this challenge by developing a comprehensive long-term integrated strategy for wastewater management in the District. The Strategy is focussed on the treatment of wastewater through land, and removal of effluent from local rivers and streams.

This document outlines the proposal to undertake a staged upgrade for the Martinborough Wastewater Treatment Plant ("**MWWTP**") to an irrigation based land treatment regime ("**the Project**").

The first stage of the Project (Stage 1A, from 2013 to 2016) will involve some minor upgrades to the existing pond system on site to ensure it is performing at its optimal level. The first stage of land treatment (Stage 1B, from 2015/16 to 2022) will see approximately 24% of the annual treated wastewater removed from the Ruamahanga River and going to land at the WWTP during "low-flow" conditions when potential adverse effects on water quality are greatest. From 2030, between 75% & 100% of the typical flow in each month will be irrigated to land at Pain Farm in all but the three wettest months (Stage 2A), and from 2035 additional storage will enable full land treatment in all but a 1-in-10 year event (Stage 2B).

The Project takes full recognition of the limitations of the existing wastewater treatment system, actual and potential effects of the Project on the receiving environment, and the expectations and significant financial constraints faced by the South Wairarapa Community. The proposal represents the best practicable option ("**BPO**") in terms of the Resource Management Act 1991 ("**RMA"**), and more importantly is a fully considered and sustainable proposal which will avoid impacts on the long-term economic wellbeing of the South Wairarapa community while providing for their health and safety.

1.1 SWDC District Wide Wastewater Management Strategy

This section outlines the strategic approach to wastewater management adopted by SWDC.

Following extensive review of historic practices and the WWTP assets, community consultation was undertaken to confirm constraints, opportunities, and priorities. The outcome was the SWDC

Wastewater Strategy[1] ("**the Strategy**"). A copy of this document is included as Appendix 1. The Strategy is recognised and implemented through SWDC's management documents, including the Long Term Plan and Annual Plan. The Strategy has been a key factor in developing the Project for which consents are now sought.

The key aspects of the Strategy in terms of this application are outlined below.

1.1.1 The SWDC Long Term Plan and Project Vision

The SWDC Long Term Plan[2] ("**LTP**") states SWDC's goal with respect to the Waste Water Treatment 'Key Project'. This goal has been adopted as the 'Project Vision' for the urban WWTP upgrade programme:

> *To collect, treat, and discharge wastewater from the urban areas of Featherston, Greytown, and Martinborough and the coastal settlement of Lake Ferry so as to provide public health protection with minimal effects on the environment.*

1.1.2 SWDC's Strategic Approach to Wastewater Treatment and Disposal

The key aspects of the Strategy adopted are as follows:

- Due to the significant capital costs involved and financial constraints of the SWDC community, to take a long-term view of solutions (50+ year horizon) in an integrated way across all three urban WWTP's.
- The need to develop the best practicable option[3] ("**BPO**") for each site and on a combined basis offering a high degree of performance certainty fundamentally based on parameters of risk, public health, environmental effects, and community affordability.
- To ensure continued consultation with key stakeholders, including iwi, and community groups (which has been ongoing since 2008), and Greater Wellington Regional Council (GWRC, as the regulator) in developing and implementing the preferred long-term options.
- To obtain the required degree of certainty through a commitment in the short term (i.e. to 2022) to optimise performance of the existing plant where practicable, and implement the preliminary stages of the best practicable option at each site.
- Deliver sustainable projects based on the philosophy of implementing the best practicable option and "Do it once – Do it Right".

These overriding principles underlie the proposed activity as described in this report, and the respective separate proposals for the WWTP's at Featherston and Greytown.

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1 The Wastewater Strategy remains in a 'final draft' form. It will be reviewed following grant of the current consents for all three urban plants to ensure that review is fully informed.

2 SWDC Long Term Plan 20112-22 (Adopted 27 June 2012); P19

3 Best Practicable Option is defined in the Resource Management Act 1991 as
"in relation to a discharge of a contaminant or an emission of noise, means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to—
(a) the nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and
(b) the financial implications, and the effects on the environment, of that option when compared with other options; and
(c) the current state of technical knowledge and the likelihood that the option can be successfully applied"

1.1.3 SWDC approach to developing the WWTP Projects

SWDC have undertaken a comprehensive process in developing the Project at the three sites extending over two years of reviews, technical investigations and option assessment, and consultation and engagement of key stakeholders. These are outlined in detail as relevant throughout the report, but the following were fundamental in determining the Project.

1.1.3.1 Affordability

The South Wairarapa community is one of the smallest and most economically constrained in New Zealand. In addition, it has not one but three full urban WWTP's to operate, maintain, and upgrade as regulations and expectations change. Following the development of the Wastewater Strategy SWDC have identified a budget of over $31.5 million for its implementation across all three sites. The assumption through this process is that works will be fully funded by ratepayers as no government or other subsidy is currently available nor confirmed as proposed, and "public-private partnerships" have proven difficult and unsuccessful for similar schemes throughout NZ. As a result, the spending must be spread over a sufficient timeframe so as to not result in unaffordable increases in rates (either from direct spending or the cost of borrowing).

The affordability assessment concluded that the $31.5M of new capital funding must be spread over at least 28 years (from 2012 to 2040) in order to be sustainable, which is reflected in the capital programme proposed.

1.1.3.2 Assessment of Available Treatment Upgrade Options

A comprehensive assessment of the available options has been undertaken by SWDC (refer Appendix 2 & 13, and section 7.3). Whilst there are upgrade options which technically could achieve significant improvements quickly, the affordability of those has made them unfeasible. For example, new high rate treatment plants were considered for all sites (and various combinations of sites), but were less economic in the long-term and less aligned to the principles of the Strategy. Any short-term capital improvements (e.g. additional treatment during Stage 1) would require extending the programme to achieve full land treatment (due to affordability), and were therefore discounted. In addition, some of the short-term options would become redundant under the land treatment regime, further increasing sunk costs.

At Martinborough, alternative land disposal sites were investigated prior to the decision to use Pain Farm, and the option of full storage was also considered. For Featherston a wide range of land based options was considered, prior to adopting the preferred option to pursue high rate treatment. Similarly in Greytown, a range of options were considered, including piping the discharge directly to the Ruamahanga River (bypassing the Papawai Stream) in the short term. At an additional cost of $1.0M, this would not result in sufficient environment to justify such significant expenditure and would be contrary to the long term Project objectives, and is therefore not considered practicable.

1.1.3.3 Simultaneous vs Sequential Facility Upgrade, Prioritisation of Works & Catchment Approach

Following the affordability criteria and the best technical option at each facility being determined, the most appropriate construction programme over the three sites was considered. There are two possible options:

Simultaneous development – where all three sites are developed at the same time; or

Sequential development – where one facility is fully upgraded, then upon completion, the next facility is upgraded, and then the third facility.

Sequential development would require SWDC to prioritise between the Ruamahanga River (Greytown and Martinborough), the Papawai Stream (Greytown), and Donald's Creek (Featherston). There are a number of criteria which could be adopted to determine a priority, including for example sensitivity of the receiving environment to wastewater discharge, relative effects on the receiving environment, cultural significance, recreational use, and relative cost.

However, as outlined above, given the affordability criteria determined above, the timeframe between each site would be approximately 10 years, meaning the final facility would effectively be adopting a "do nothing" option for 20 years. It is considered that this would be inconsistent with the purpose of the RMA, and would not represent the Best Practicable Option.

It has therefore been determined that the most appropriate programme is a catchment based one with a programme of managed incremental improvements at each site in a manner which optimises the improvement over the catchment in terms of the available budget.

The simultaneous upgrade programme adopted recognises that:

i. All three receiving environments ultimately discharge to Lake Onoke (Greytown and Martinborough via the Ruamahanga River; and Featherston via Lake Wairarapa);

ii. All three sites have equally important (although different) cultural, community, and environmental significance which are inappropriate to prioritise;

iii. Water quality in all three receiving environments upstream of the discharge is significantly compromised by upstream point source and diffuse discharges outside of SWDC control, and which are subject to a complex much wider, long-term, and regionally integrated strategy;

iv. Although the relative contribution of nutrients to the surface water is relatively low in terms of cumulative discharges in the wider catchments (especially to the Ruamahanga River from Greytown[4] and Martinborough WWTP's), the removal of nutrients in the short term during low-flow conditions will significantly decrease the contribution of nutrients from the wastewater discharges to the Ruamahanga River in terms of water quality for contact recreation and aquatic habitat, both key considerations across all three sites within the Wellington Regional Freshwater Plan objectives and policies;

v. Both Greytown and Martinborough have existing land at the WWTP which is readily available and suitable for land treatment during low flow conditions;

vi. The Featherston network requires significant sewerage network rehabilitation before <u>any</u> feasible treatment upgrade can be implemented, with a minimum six-year timeframe.

[4] It is recognised that the Papawai Stream is the immediate receiving environment for the Greytown discharge. A comprehensive discussion on this is provided within the Greytown application.

On balance, the relative improvements that can be achieved on an individual and catchment wide basis through a simultaneous upgrade programme are considered to provide the framework for the best practicable option.

1.1.4 Term of Consent

The implementation of the Strategy relies upon a level of certainty which can best be provided by a long term consent. As such, the applications seek the maximum term of **35 years**. A full explanation and rationale of the proposed maximum term is included in section 4.6 of this report.

1.1.5 Proposed Staging

The Strategy implementation is separated into two stages. These stages have been determined primarily on the basis of SWDC funding approval processes.

- **Stage 1** is the **"Short Term"** programme from the grant of consent **until June 30, 2022**, aligned to the current SWDC Long Term Plan (2012 – 2022).
- **Stage 2** is the **"Medium Term"** programme from **1 July, 2022 to 30 June, 2048**.

A third stage is identified, outside the term of this current application to "50 years plus", which continues the SWDC long-term Strategy.

The proposed capital works within Stage's 1 & 2 have been developed through a process of:

1. Determining relative adverse effects on the receiving environment across each of the three urban WWTP's,
2. Existing asset optimisation and performance; and,
3. A review of feasible alternatives for sustainable long-term wastewater treatment at all three sites.

A prioritised programme of optimisation works and treatment upgrades was then developed across all three sites (refer Figure 1) to deliver the best practicable option for each site, and collectively.

Figure 1 below provides a summary of the capital programme. This illustrates the Martinborough upgrade in the context of the integrated programme across all three sites described above.

A schematic of the proposed upgrades and stages are included at Figure 2, including the capital investment stages 1A and 1B, and 2A and 2B. A summary of the associated reduction of key effects on water quality at low-flows is included as a result of the proposal is included as Figure 3.

Figures 4-6 then illustrate the decrease in nutrient loadings for the three identified primary nutrients of concern (ammonia, dissolved reactive phosphorus, and total nitrogen). The plots show both the reduction at low-flow in the Ruamahanga River, and also plot the annual nutrient loading across all flows. A full description of these improvements in included in the assessment of effects (see Section 6).

A detailed description of each stage of the proposal is then provided in section 3.

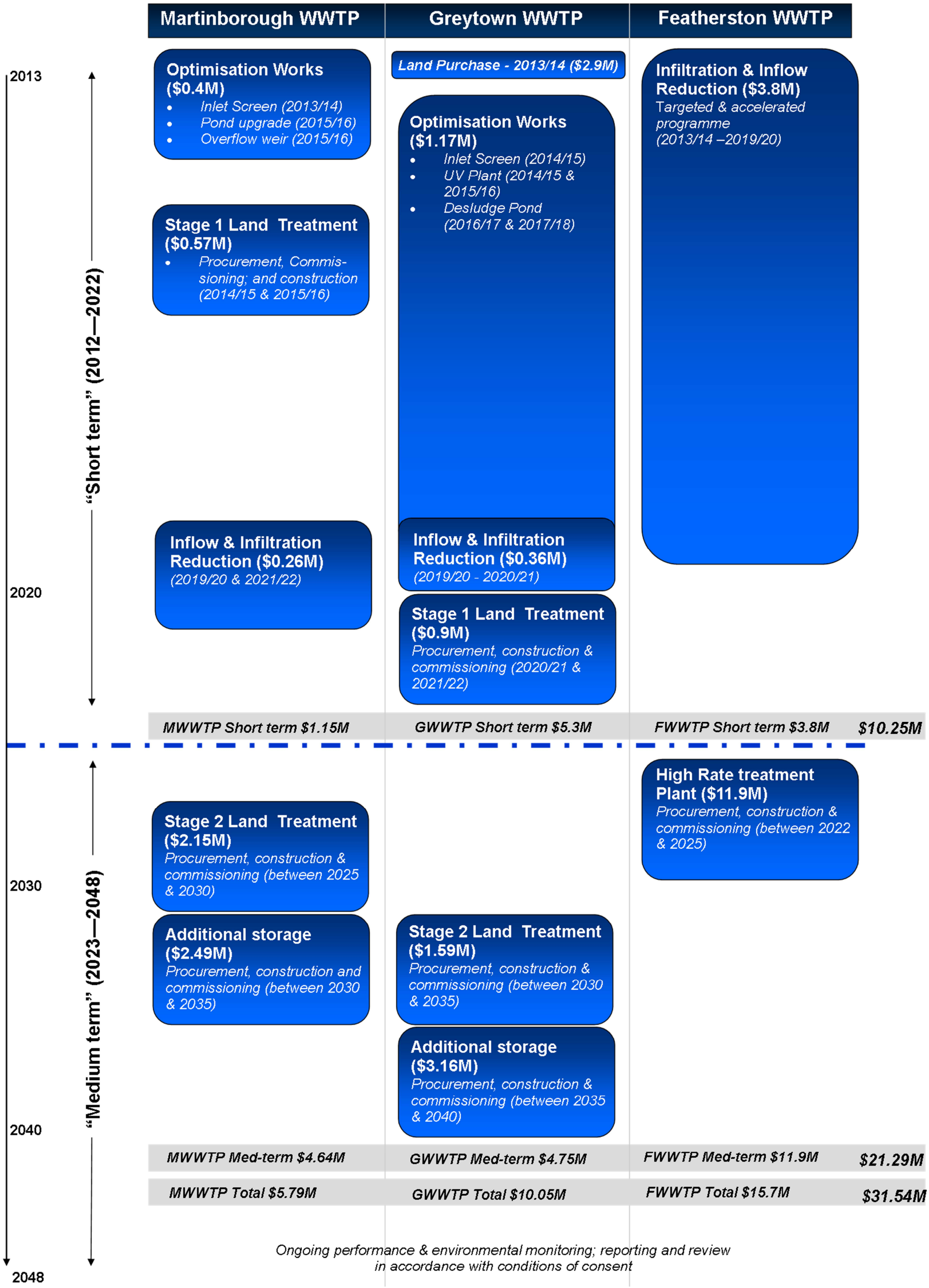

Figure 1 – SWDC WWTP Upgrade Capital Programme

Figure 2A - Martinborough WWTP: Existing situation

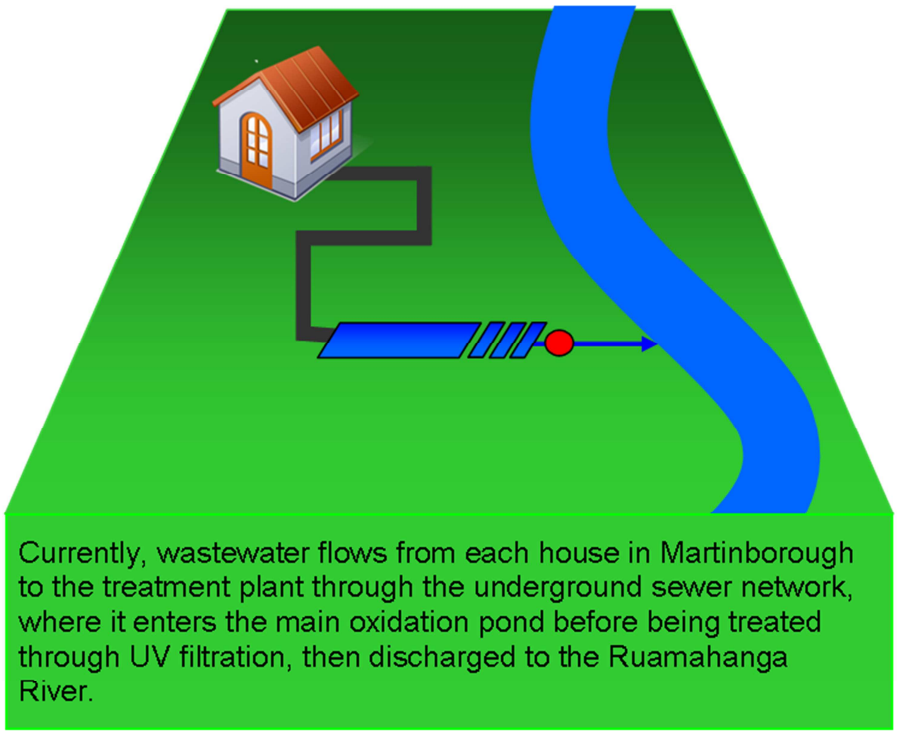

Figure 2B - Martinborough WWTP: Stage 1A & 1B (2013 to 2022)

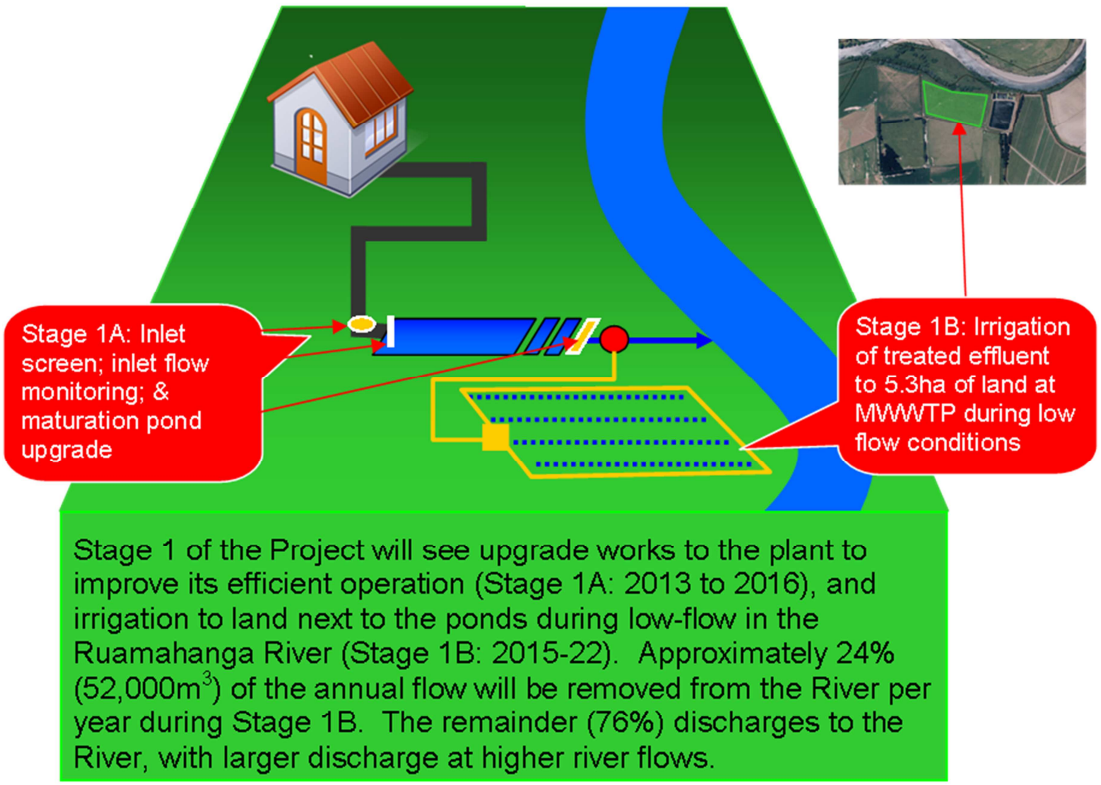

Figure 2c - Martinborough WWTP: Stage 2A (2025 to 2030)

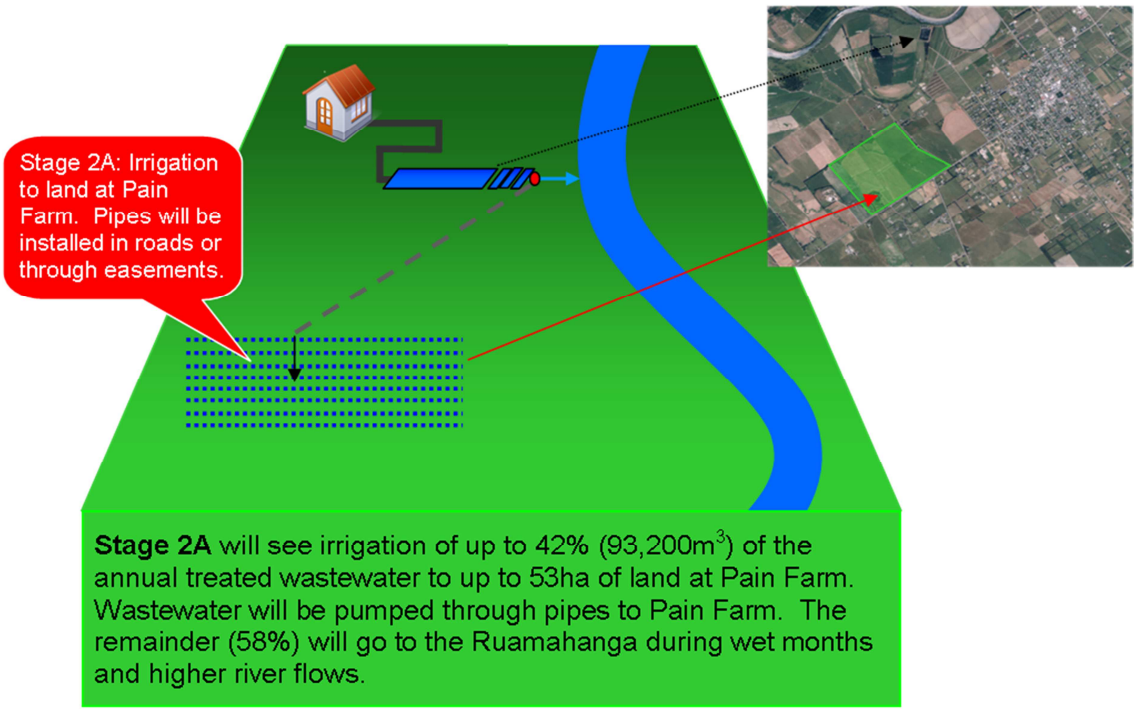

Figure 2d - Martinborough WWTP: Stage 2B (2030 to 2035)

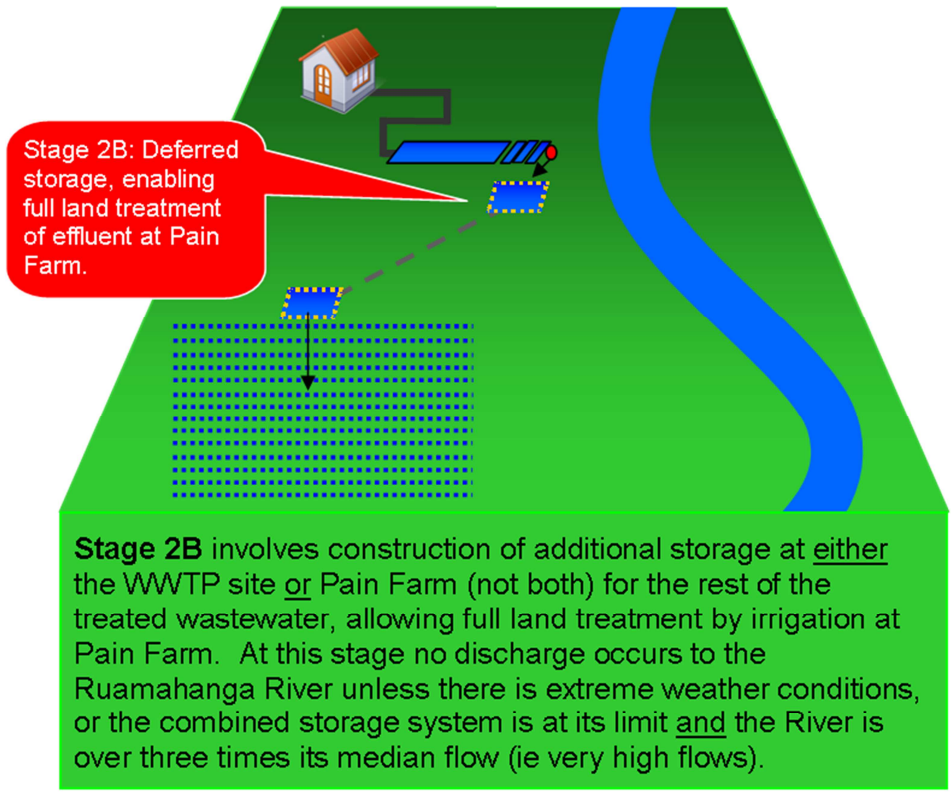

***Figure 2** – Schematic of existing wastewater treatment process and proposed staged upgrade*

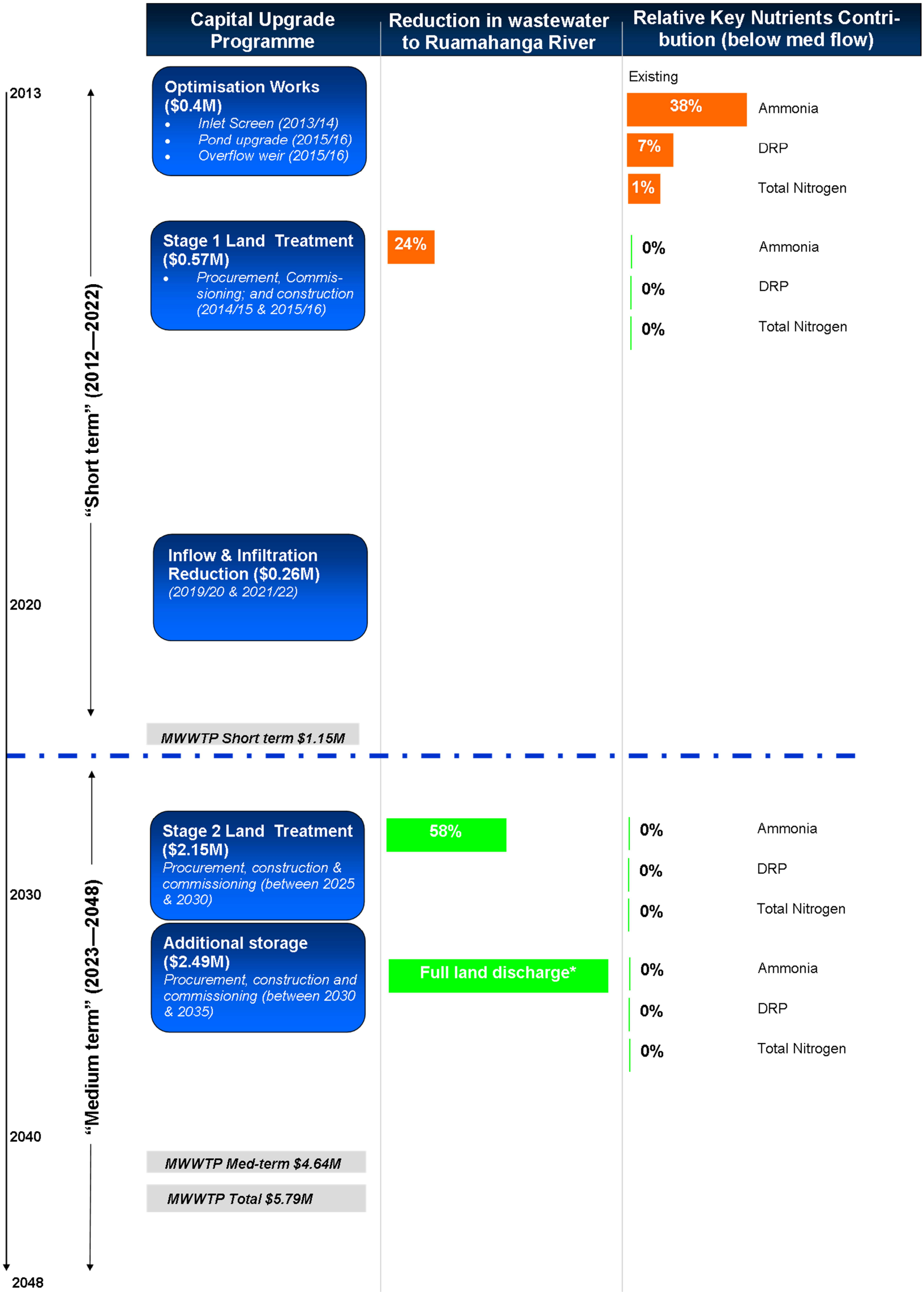

Figure 3 – *MWWTP Programme and key effects profile*

The figures below summarise the reduction in the respective loadings of the three identified key nutrients. Further description and analysis of these and other nutrients is included in the assessment of effects in Section 6.

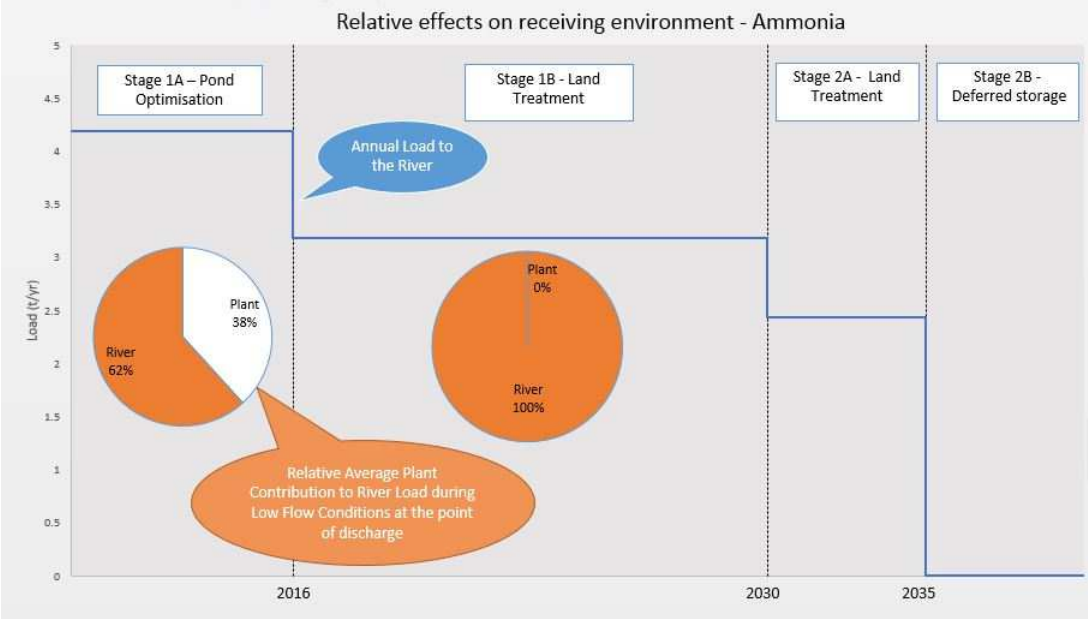

Figure 4 - *Relative effects on the receiving environment of staged proposal - Ammonia*

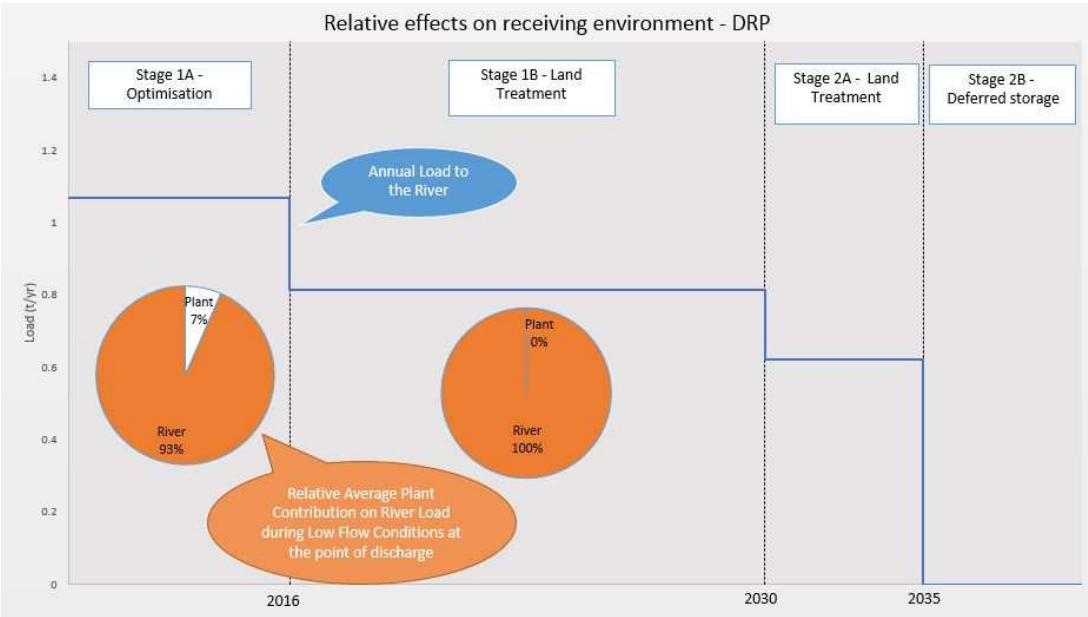

Figure 5 - *Relative effects on the receiving environment of staged proposal – Dissolved Reactive Phosphorus*

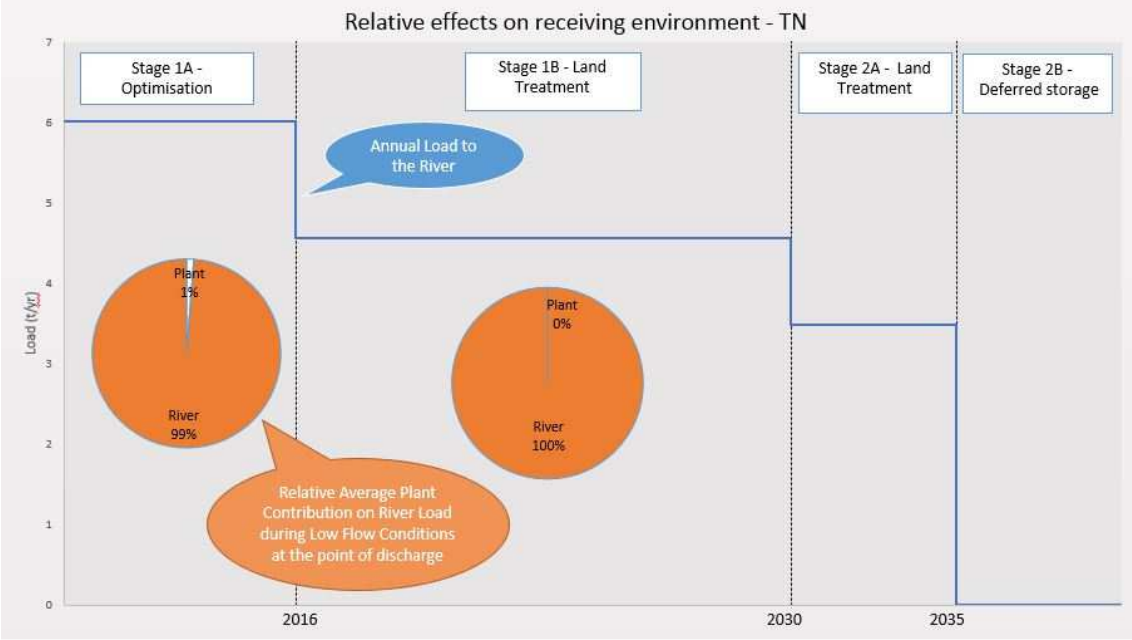

Figure 6 - Relative effects on the receiving environment of staged proposal – Total Nitrogen

1.2 Purpose of this Document

The purpose of this document is to provide a description and assessment of effects on the environment for the proposed discharges to water and land in respect of the operation of the MWWTP for the next 35 years.

As outlined above, the proposal for the MWWTP must also be considered in the wider context of the Featherston and Greytown plants, which also require significant investment, and both of which are currently going through a similar replacement resource consent process at the current time. This long-term and district-wide integrated asset management strategy is a key aspect to all three applications.

This document has been prepared in accordance with Section 88(6) and the Fourth Schedule of the Resource Management Act 1991 (the RMA). The document includes:

- A description of the proposed activities,
- An analysis of the statutory framework within which the application must be considered by the consenting authority,
- An assessment of the actual and potential effects on the environment, including proposed mitigation, and
- An assessment of the planning and policy framework as relevant to the application.

1.3 Martinborough WWTP – Existing Resource Consents

The MWWTP is operated under existing resource consents.

Resource Consent WAR970079[2624] was renewed in 2002 and enabled the current and ongoing operation of the MWWTP. A variation to the discharge to water consent was granted in September 2011 (WAR0079[30753]) to lower effluent quality standards temporarily.

In particular, this consent enabled the operation of the MWWTP, including the treatment and disposal of wastewater associated with the facility, by providing for the:

- Discharge of contaminants to water (WAR970079[2624] and [30753]), and
- Discharge of contaminants to air (WAR970079[20870])

A copy of this existing consent (including variation) is included as Appendix 3 to this report.

The discharge to water consent (WAR97079[30753]) expired on 10 July 2012[5]. A new consent is therefore required to enable continued operation of the plant.

The discharge to air consent (WAR970079[20870]) expires on 10 July 2022.

1.4 Background to consent application and status of previous application

SWDC lodged an application for the new resource consent with GWRC on April 13, 2012. On April 30, 2012, following a preliminary assessment, GWRC requested additional information on the proposed activity in accordance with the RMA. Further information was provided in December 2013, but at that stage confirmation of the detailed land disposal regime for Stage 2 was not available.

An extension to timeframes was confirmed by GWRC which enabled further information to be obtained.

This document replaces all previous applications, and supersedes previous proposals and information supplied to GWRC. This application should therefore be read in preference to and in isolation from any previous documentation, unless specific reference is made.

1.5 Exercise of existing resource consents while this application is being processed.

Section 124(2) of the RMA provides for an activity to continue to operate until the application for replacement consent for the same activity is determined where:

(a) a resource consent is due to expire; and
(b) the holder of the consent applies for a new consent for the same activity; and
(c) the application is made to the appropriate consent authority; and
(d) the application is made in the period that—
(i) begins 6 months before the expiry of the existing consent; and
(ii) ends 3 months before the expiry of the existing consent; and
(e) the authority, in its discretion, allows the holder to continue to operate.

[5] The MWWTP will continue to operate under this consent until the current application is determined, under the terms of the RMA and the approval of the GWRC (refer section 1.5).

The current resource consent for discharge to water expired on 10 July 2012. The applicant has requested GWRC apply the principle of s124(2)(e) and section 37 of the RMA to enable ongoing operation under the existing consent. GWRC has accepted this request, and the MWWTP can therefore operate lawfully under the existing consent until this current application is determined.

1.6 Consents Sought

SWDC seeks the following resource consents from GWRC:

- Discharge of a contaminant to water pursuant to section 15(1)(a) of the RMA and Rule 5 of the Regional Freshwater Plan for the Wellington Region.
- Discharge of contaminants to land (and to land which may enter water) pursuant to section 15(1)(b) of the RMA and Rule 8 of the Regional Plan for Discharges to Land for the Wellington Region (for separate discharges associated with seepage from the existing pond and discharge channel, and application of treated effluent to land).
- Discharge of contaminants to air pursuant to section 15(2) of the RMA and Rule 23 of the Regional Air Quality Management Plan for the Wellington Region (for discharges associated with both the pond system and the irrigation of treated effluent).

Each application should be determined as a '**Discretionary Activity**' in terms of the Act[6].

[6] A full assessment of the proposed activity against relevant plans is included at section 5.2 of this report.

2 EXISTING SCHEME DESCRIPTION

This section of the report summarises the current operation of the MWWTP in terms of its inputs, its treatment and operational processes, and its discharge.

2.1 Site Location and Access

The MWWTP is located at the end of Dublin Street, Martinborough, accessed via an adjoining private property[7]. The site itself is comprised of 3.47ha and is located approximately 1km to the north-west of the Martinborough urban boundary and 1.8km straight-line distance from the town centre.

The Martinborough Wastewater Reticulation Network is a gravity system containing almost 24km of in-ground pipe ranging in size from 100mm to 300mm diameter.

The combined value of the MWWTP asset and sewer network is in the order of $12 million[8]. SWDC are the legal owner of the MWWTP site and sewer network.

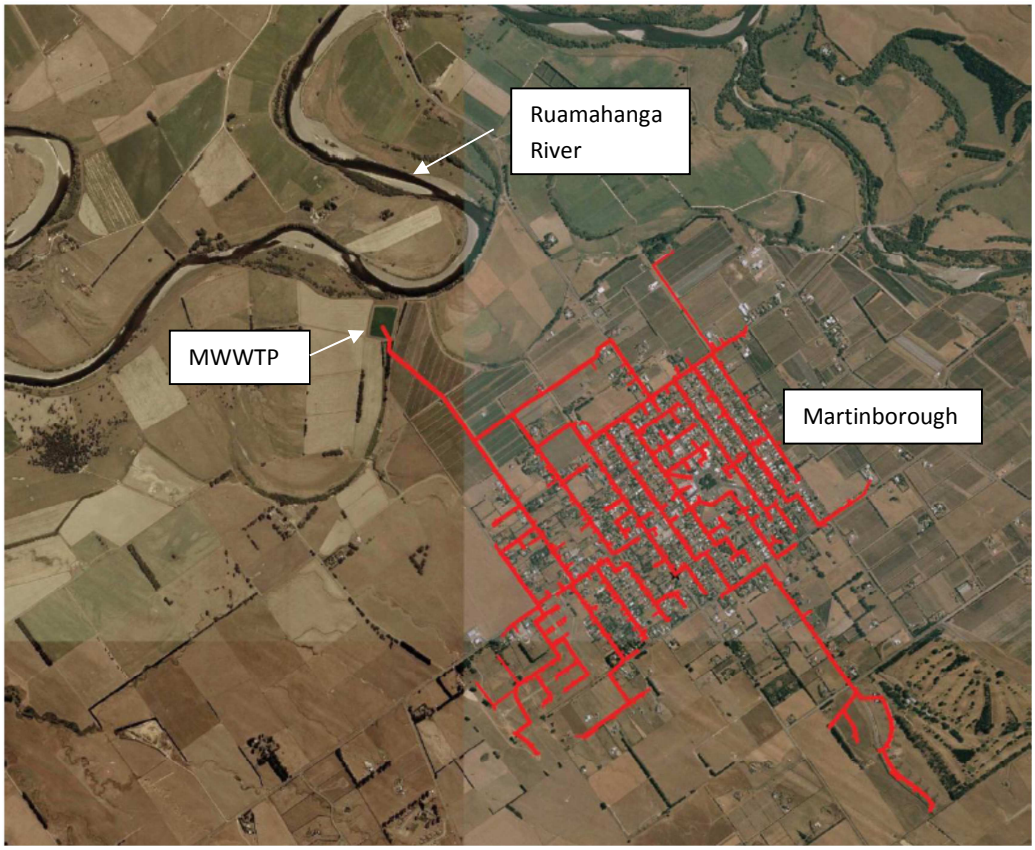

Figure 7 – Extent of the Martinborough wastewater system

Access to the site is restricted to authorised personnel only, being Council operational staff and approved contractors. No general public access is permitted to the site. The site (including point of discharge) is stock fenced to demarcate the site and avoid inadvertent entry to the site or facility by people or grazing stock on adjoining property. Clear signage identifying the activity and the potential health risk is in place and maintained by SWDC.

7 Certificates of Title are included in Part 1 to this document.

8 As at the last valuation, June 30, 2012.

2.2 Current Inputs

2.2.1 Input Sources

The MWWTP services a population of around 1,500 people[9] within the urban area of Martinborough. A small number of light industrial and commercial activities also contribute. This is estimated to be no more than 5% of flows.

All discharges to the sewerage system are subject to the provisions of the Masterton District Council and South Wairarapa District Council Consolidated Bylaw 2012: Part 12 – Trade waste[10], adopted by SWDC on July 31, 2013.

2.2.2 Input Volumes

The theoretical daily flow from a population of 1,500 is 375m^3/day. Inflow data collected from December 2007 to November 2011[11] shows that the ponds have an average annual daily inflow of 574m^3/d, with a measured peak of 2,960m^3/d.

When compared with the theoretical daily flow volumes, the actual MWWTP input volumes are clearly high for the size of the population being served by the plant. A chief cause of the high influent flow rates to the WWTP is from rainfall inflow and groundwater infiltrating the system (referred to as 'inflow and infiltration', or 'I/I'). The system suffers from I/I during wet periods. The causes of I/I are principally from:

- The deteriorating condition of underground pipework; and
- The cross connection of rainwater downpipes with foul sewer connection.

Both of these are due to old, possibly poorly constructed, and certainly deteriorating wastewater collection systems. SWDC recognise the negative impact of I/I on the efficient running of the MWWTP system, and a long term strategy with which to address this issue is set out in Section 1 of this report. SWDC propose to prepare as part of the proposed consent, an I/I Reduction Management Plan[12] that will confirm the process and procedures by which I/I will be investigated and managed in future in accordance with the proposed capital works programme.

2.2.3 Input Characteristics

Routine monitoring of the influent entering the ponds is not a condition of the current consent. The input sources summarised above suggest that the influent is largely domestic in nature, with some commercial and minor industrial input.

2.2.4 Impacts of Population Growth on Input

A population increase in Martinborough of 8.4% has occurred since the 2001 Census (Statistics NZ). The Census counted 654 occupied dwellings in the Martinborough Urban Area in 2013. The average

[9] Recorded resident population of 1,470 at the 2013 census survey; NZ Statistics.
[10] A copy of the Trade Waste Bylaw can be obtained from http://www.swdc.govt.nz/policies-plans-and-bylaws
[11] After 7/12/2011 the flow meter has been relocated to the WWTP outlet.
[12] Refer proposed Condition provided in Part 1 Schedule 1: Condition 6, and Appendix 6

household size was found to be 2.3 people, which is lower than the Wellington region average of 2.6 people.

Over the term of the consent however, zero-growth has been assumed on the basis of the 2012 Statistics New Zealand subnational population projections to 2031. There is inherent provision for some growth however, through a combination of the conservative approach taken to land treatment regimes, and an assumption that flow reduction will be achieved through the infiltration and inflow rehabilitation programme.

2.3 Treatment Process

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:

- 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 curtain** 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.
- 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.
- **A Lift Pump Station** and **UV disinfection** was installed in November 2011 to further improve pathogen removal from the effluent which, in high concentrations, can cause effects on human health. Natural UV on the ponds has some benefits, but additional mechanical treatment was required under a previous GWRC resource consent[13].
- 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.
- 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

[13] GWRC Consent WAR970079 [30753]; condition 7 (see Appendix 3).

and the UV Plant can be manually initiated in exceptional circumstances[14] 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.

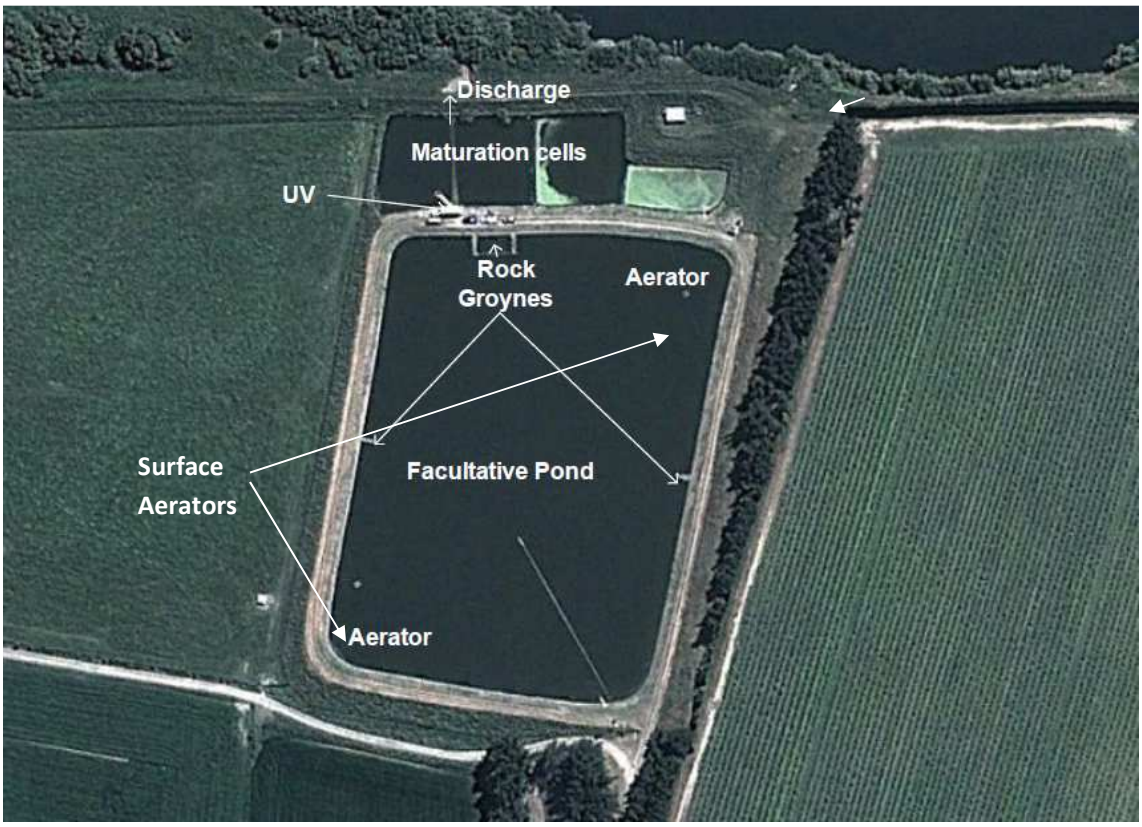

Figure 8 – MWWTP site plan.

2.4 Site Operations and Maintenance

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. This will include resource consents associated with this current application.

Although a well defined operations process exists on site managed by CityCare, there is currently no specific Operations and Maintenance Manual ('OMM') in place. OMM's are currently being prepared through CityCare under the OMC for all of SWDC's WWTP's and Water Treatment Plants. An OMM for MWWTP will be completed within three months of commencement of the consent[15].

2.4.1 Pond Maintenance and Monitoring

The following are constantly monitored and/or inspected daily:

[14] In this respect 'exceptional circumstances' would primarily be power outage or an extreme weather event. SWDC advises the bypass has not yet been required to be used.

[15] Refer proposed Conditions provided in Part 1 Schedule 1: Condition 4.

- Outlet flows
- UV transmissivity of effluent
- UV dosage

The following maintenance procedures are undertaken weekly:

- Checking the perimeter of the site; including checking perimeter fencing and access gates, and maintaining clear warning signs.
- Checking the ponds, including cleaning of inlet/outlet structures as required, checking valve settings, checking general pond operation (for dead spots, algal blooms etc), removal of floating debris;
- Checking structural integrity of pond;
- Maintain pond surrounds including weed and vermin control;
- Discharge inspection – clearing weeds as required to ensure free flow and rapid mixing with receiving waters;
- Checking dissolved oxygen in the pond, and flow measurements in the inlet chamber.

Inlet flows were monitored prior to equipment failure in 2011. 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.

2.4.2 Odour control

As outlined above, the 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 issue 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.

However, in line with the precautionary approach being adopted, an Odour Management Plan is proposed to be developed[16] within six months of consent being granted.

2.4.3 Sludge Management

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

None of these symptoms have been evident at MWWTP[17]. There is no record of the MWWTP ponds having ever been desludged.

[16] Refer proposed Conditions provided in Part 1 Schedule 1: Condition 4.
[17] *Pers. Comm*. Stu Clark, NZET.

To assist with asset planning and this project, SWDC commissioned a survey of existing sludge accumulation and an assessment of its impact on plant efficiency and effluent quality[18]. This has concluded that sludge is not currently impacting pond efficiency or performance. A copy of the assessment in included as Appendix 4 to this document.

2.4.4 Operational Contingency

At normal operating levels the pond retains a design buffer margin of 25% of the ponds operating capacity. Should overtopping look likely or occur in extreme conditions, SWDC would initiate an appropriate emergency response plan, including working with GWRC and civil defence. Notification of GWRC would occur immediately. This process, along with wider notification protocols (including neighbouring landowners) will be documented in the Operations and Management Manual[19]. The emergency provisions of the RMA[20] would then be applied in terms of retrospective resource consent.

SWDC have advised they are not aware of any overtopping having occurred at the site.

2.5 Treatment Plant Performance

This section considers the performance of the MWWTP from the perspective of the level of compliance with the existing consents[21]. Where actual or potential non-compliance with conditions of consent is identified, the effects of and relevant non-compliance are considered in detail in the assessment at Section 7 of this report, in the context of the Project.

2.5.1 GWRC Compliance Reporting

The GWRC compliance report for 2012/2013[22] determined compliance as follows:

(2624)	Discharge to Water	Significant non-compliance
(20870)	Discharge to Air	Full Compliance

The rating of 'significant non-compliance' was given due to noncompliance with conditions 1, 2, 7 & 15. These related to specific compliance with conditions of effluent quantity and quality (specifically discharge volume, *E.coli,* TN and Ammonia), and technical non-compliances resulting from not having confirmed upgrade proposals. No further enforcement action has been carried out due to the strategic review process being undertaken which has resulted in this current application.

A full copy of the existing conditions of consent is included as Appendix 3. A copy of the 2012/13 GW compliance report is included as Appendix 5.

[18] Opus Ltd, Sludge Survey Report - Martinborough WWTP, April 2013 (see Appendix 4 to this document)

[19] Refer proposed Conditions provided in Part 1 Schedule 1:Condition 4; and see Appendix 6 for draft version of Operations and Management Manual.

[20] Refer s.330 & 330A of the Resource Management Act 1991.

[21] It is acknowledged that assessment against consent conditions does not provide a complete consideration of plant performance. Monitoring of influent and analysis of effluent is proposed in order to obtain a record of actual plant performance, to determine benefits of upgrades, and to identify tradewaste potential discharges.

[22] GWRC, Compliance monitoring report 2012/2013 for WAR970079 [30753, 20870], 11 October 2013 (see Appendix 5)

2.5.2 Public complaints

SWDC is required to hold and maintain a 'complaints register' for the operation of the site in terms of air discharge only[23]. This has been extended by SWDC to include all operations at the site under this project.

SWDC advise the only complaint recorded has been in respect of the location of the public health warning sign at a boundary shared with a local vineyard, as required by the consent. Due to compliance requirements and the need to ensure appropriate public information, the sign was retained in its existing location.

SWDC advises a query was also made during a significant flood event a number of years ago regarding potential contamination of farm land from a possible overtopping of the ponds during heavy rainfall. This matter was reported to GWRC and monitoring subsequently undertaken. No overtopping was confirmed, and no contamination or risk was identified.

2.5.3 Summary of current performance & compliance with current consents

This section summarises the performance of the MWWTP against the current resource consent requirements. A full analysis is provided in Appendix 17 (Plant Preformance and Appendix 9 (Ecological Assessment).

Monitoring data collected since the 2011 variation was given effect indicates that full compliance is being achieved for the following contaminants:

- BOD
- Suspended Solids
- Oil & Grease
- Total Phosphorus, and
- pH

The following parameters have exceeded the consent discharge limits in this period:

- Discharge Volume (mean and maximum limits)
- E. Coli (absolute limits)
- Total Nitrogen, and
- Ammoniacal Nitrogen (with the exception of winter geomean, for which compliance is achieved)

Table 1 below provides a summary of the annual MWWTP discharge volume and effluent quality statistics as measured over the past five years, and provides an estimate of the annual plant mass loads to the environment.

[23] Consent WAR970079[20870]; Condition 2 (refer Appendix 3).

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	490 (cfu/100ml)	100 (cfu/100ml)		NA

* - Outflow has been measured since 2011.
** - *E.coli* data following UV disinfection installation

Further analysis of effects of these monitoring results as relevant to the Project is included in section 6 below.

3 DESCRIPTION OF PROPOSAL

A comprehensive range of alternatives was considered in developing the Project, including consideration of how the MWWTP works would integrate with the other two plant upgrades. A summary of the alternatives considered at a high level is provided in section 2 above, and a detailed assessment of alternatives for MWWTP provided in section 7.3 below, and Appendix 2.

This section outlines the activity proposed.

Resource consents are sought for the ongoing operation, maintenance and upgrade of the MWWTP in two stages. Primary treatment will continue to be provided from the existing oxidation pond and tertiary treatment by UV disinfection over the term of the consent. However, a significant improvement will be implemented through the introduction of land treatment in two stages.

In summary,

i. **Stage 1A** involves a series of minor upgrades to the existing WWTP to improve and optimise its performance;

ii. **Stage 1B** involves the discharge of 24% of treated wastewater (on an annual basis) to 5.3ha of vacant land at the MWWTP site during low-flows in the Ruamahanga River;

iii. **Stage 2A** involves irrigation of 42% of annual wastewater to Pain Farm (a Council owned property);

iv. **Stage 2B** involves the construction of additional storage at the MWWTP or Pain Farm to contain all treated wastewater, other than in extreme weather events.

The Project staging has been proposed on the basis of the following:

i. Any plant optimisation works must be beneficial to the long-term proposal to minimise unnecessary and "sunk" costs;

ii. Inflow & infiltration is evident at Martinborough, but not sufficient to defer capital upgrades to achieve land treatment;

iii. The Stage 1B Land Treatment should be as early as possible and should target low flows in the Ruamahanga to maximise benefits to water quality for both aquatic habitat and recreational purposes;

iv. Stage 1B Land Treatment should be non-deficit irrigation on the basis of maximising the beneficial effects on water quality, and recognising that seepage to the River will not have any adverse effects which are more than minor during that summer land treatment period; and,

v. Stage 2A Land Treatment should occur prior to construction of the additional storage capacity in order to avoid delaying the benefits of getting 42% of the treated effluent out of the Ruamahanga River and to enable full monitoring of Pain Farm prior to full land treatment, which can inform required volume of deferred storage and the final irrigation regime.

3.1 Project Sites

The existing treatment facilities at the MWWTP described in Section 3 above will continue to be used by SWDC.

The 8ha block of land owned by SWDC adjacent to the existing facility (referred to herein as the 'Adjacent Block') will be used for land treatment (via surface spray irrigation) during Stage 1B (refer Figure 9 and 10 below).

The Council owned 'Pain Farm', located on Lake Ferry Road and approximately 2.1km south west of the MWWTP, will be used for land treatment during Stage 2A & 2B (refer Figures 9 and 11 below). Pain Farm has a total land area of approximately 84ha.

The additional 'deferred' storage provided during Stage 2B will be located either at Pain Farm, or on the Adjacent Block. Pumping and irrigation infrastructure will be contained within Council owned land, and reticulation pipework for Stage 2A & 2B will be laid underground either within easements or in existing road reserve from the MWWTP to Pain Farm. This will be confirmed during Stage 2A detailed design.

Figure 9 – Overview of Stage 1B and 2A & 2B Land Treatment locations.

3.2 Proposed Effluent Treatment Process (including Staging)

The Project is comprised of a Combined Land and Water Discharge ('CLWD') treatment and discharge regime during Stage 1A (from 2015/2016), which is upgraded to a full Land Treatment Scheme in Stage 2B.

The underlying principle of the proposed Stage 1B CLWD regime is that treated wastewater will be applied to land (or stored in the system) at times when river flow is at very low levels and the risk of significant adverse effects is greater, and discharged into the Ruamahanga River at times of higher flow where the potential adverse effects are mitigated. The discharge regime has been developed using a risk-based approach based on potential adverse effects on the water quality of the Ruamahanga River.

The proposal (including staging) is described in more detail below.

3.2.1 Stage One – Optimisation Works and Low Flow Land Treatment

3.2.1.1 Optimisation works

The MWWTP pond system will remain largely as existing, as the primary receptor of effluent from the sewer network. However, a series of projects to ensure the existing pond system is operating at an optimal level is proposed as part of Stage 1A. Some of these works have already been commenced while the consent process has been progressing.

The Stage 1A Optimisation Works Programme at MWWTP will be comprised of the following:

1. **Inlet screening** to remove gross solids, rubbish, stringy and fibrous material and debris prior to the oxidation pond. Removal of this material up-front of the treatment process will assist in: (i) reducing the maintenance requirement on the surface aerators (especially failures due to the seizing up of the impellers due to floating matter); (ii) improving sludge management (by reducing its accumulation in the pond and therefore reducing the overall sludge volume); (iii) preventing future pond desludging difficulties (desludging equipment blockage and non-acceptance of sludge as a potential soil conditioner due to litter content); and in the case of proposed land treatment, protection of irrigation pumps (reducing the risk of blockage). Screened solids will be collected and disposed of at an appropriately approved and consented landfill facility.

   Inlet flow monitoring and measurement will also be installed as part of the screen upgrade project.

2. **Maturation Pond Upgrade** involving covering one or two maturation ponds to limit light and thus reduce algae and TSS prior to UV disinfection. Covered floating wetlands or Black Disc's are examples of floating covers used at other plants. SWDC have purchased floating wetland rafts which are currently installed as a trial system at Featherston. Therefore it is proposed to relocate these to a maturation cell at MWWTP to provide some improvement in algae removal. The level of improvement is difficult to quantify, however, there is minimal cost involved in relocating the wetland rafts to Martinborough and thus is considered a sustainable and efficient use of existing infrastructure.

3. **Pond Overflow weir** to allow better control and "buffering" of peak flows from the main oxidation pond to the maturation ponds, thus further increasing Hydraulic Retention Time ("HRT") and further reducing the potential for solids carry over.

These works will take place over two financial years (2013/14 and 2014/15).

3.2.1.2 Infiltration and Inflow ("I/I")

Infiltration and inflow ("I/I") of stormwater/groundwater into the sewer has been identified as an issue in Martinborough, but is not of sufficient significance to defer treatment upgrades[24]. Further investigations will be undertaken by SWDC to further identify the extent of the problem, and used to establish a targeted rehabilitation programme to be undertaken in 2019-2022. This rehabilitation work will be done prior to developing the Stage 2 (Pain Farm) Land Treatment scheme. The I/I investigation work will identify how much I/I flow can be removed which is required to inform the overall sizing, detailed design, and cost of Stage 2.

SWDC propose to develop an Inflow and Infiltration Reduction Management Plan ("IIRMP") within 24 months of commencement of the consent[25]. The intention of the IIRMP will be to document the I/I investigations to be undertaken to identify and quantify key catchment network issues and flows that will be used to define a priority I/I rehabilitation works programme, procedures for reporting annually what works have been undertaken and reductions in flow measured, and roles and responsibilities. A draft outline of the IIRMP has been included in Appendix 6.

3.2.1.3 Sludge Management

A follow up sludge survey will be undertaken toward the end of Stage 1B. If required, a desludging programme, methodology and sludge disposal process would then be determined. Any additional resource consents required to enable desludging will be obtained upon confirmation of the desludging methodology and at least six months prior to any work taking place.

3.2.1.4 Stage 1 Land Treatment (Stage 1B)

The proposed land treatment upgrade is staged.

Stage 1B land treatment will involve the irrigation of up to 795m^3 of treated effluent per day to the Adjacent Block. Investigations indicate the Adjacent Block contains an area of approximately 5.3 hectares (or the 8ha available) suitable for irrigation and providing for suitable "buffer areas", which is capable of assimilating a minimum of 30 mm/day of wastewater.

A maximum application rate of 15mm/d in any 24 hours is proposed with a 3 day rotation, equating to a maximum weekly application rate of 35mm. The discharge to land will occur when the Ruamahanga River is below half-median flow (i.e. river flows < 24.93 m^3/s as measured at Waihenga Bridge).

Works on the irrigation infrastructure for Stage 1B will commence in the 2014/15 financial year with design and construction of irrigation infrastructure, including pipes, pumps, and irrigation equipment. It is expected that this will enable Stage 1B land treatment to commence in the 2015/16 summer period.

[24] Infiltration and Inflow at Featherston is so significant that rehabilitation of the sewer network is critical prior to any substantive treatment upgrades. The Featherston WWTP is also subject to an ongoing consent process.

[25] Refer proposed Conditions provided in Part 1 Schedule 1: Condition 3.

Figure 10 – Stage 1B land treatment MWWTP – 5.3ha adjacent to existing pond.

Irrigation is expected to be undertaken using surface sprinkler irrigation infrastructure. A Detailed Design and an Effluent Discharge Management Plan will be prepared and submitted to GWRC within 12 months of consent.

Stage 1B land treatment will be a non-deficit irrigation regime developed following investigations by LEI (2014) (attached to this report as Appendix 7). It has been determined that nutrients are not the limiting factor for the discharge, but hydraulic applications rates (i.e. the ability of the soil to take wastewater). Key design criteria are summarised as follows:

- The rate at which the soil/plant system can sustainably receive wastewater.
- Avoidance of prolonged drainage from the site, through the application of a sustainable average annual application rate of 2.7mm/d and maximum application rate of 15mm/d with suitable rotation periods.
- That supplementary nutrients such as Fertiliser to meet plant requirements and the proposed maximum annual loading rate of Nitrogen to land will not exceed 300 kg N/ha/yr and Phosphorus of 40kg/ha/yr.
- Consideration of the existing storage available in the existing oxidation ponds.
- River Half Median Flow (HMF) have been conservatively used to represent low flow conditions.
- Any discharge to the river will result in an increase of River DRP concentration (at Waihenga Bridge[26]) following mixing of not more than 0.002 mg/L.

The discharge regime proposed for Stage 1B land treatment is outlined below.

[26] The closest flow gauge to MWWTP

- Discharge to land during Ruamahanga HMF (low flow) conditions (flows less than 24.93 m^3/s measured at Waihenga Bridge) and when soil conditions allow, which are typically experienced during summer months.
- This corresponds to a total annual average flow (AAF) of effluent irrigation to land of 52,000m^3/yr that can be discharged to land in a sustainable manner.
- This volume corresponds to 24% of the total AAF from the MWWTP discharged to land over a typical year, with the remaining flow discharged to the river[27].

Table 2: Relative Proportion of Flows Discharged to MWWTP Adjacent Land and Surface Water with no Additional Storage (Stage 1B)

Month	Discharge to land (%)	Discharge to river (%) at flow =	
		<HMF	> HMF
January	79	0	21
February	59	0	41
March	43	0	57
April	15	0	85
May	0	0	100
June	0	0	100
July	0	0	100
August	0	0	100
September	13	0	87
October	13	0	87
November	46	0	54
December	49	0	51
Mean Annual	**24**	**76**	

Once Stage 1B land treatment commences, the irrigated land will be used to grow high nutrient uptake crops, in a "cut-and-carry" operation where harvested crops will be sold, likely as stock feed. The irrigation blocks will be managed either directly by Council or under contract arrangement. The irrigation land used solely for the proposed land treatment (i.e. not for multiple purposes).

3.2.2 Stage Two A & B: Land Treatment and Deferred Treatment

Stage 2 land treatment will involve pumping effluent and land treatment (via irrigation) to 53ha of irrigable land at Pain Farm. Based on soil investigations it has been determined that Pain Farm is capable of assimilating all of the wastewater generated from MWWTP at a rate of 9.6 mm/day (LEI, 2014).

[27] Volume reductions are estimates only, based on assessment of available data, and may alter slightly in practice.

Figure 11 – Location of Stage 2A & 2B Land Treatment area – "Pain Farm", Ferry Road, Martinborough

Irrigation will be implemented over two stages of increasing volume (Stage 2A & 2B). Discharge to the Ruamahanga River will only occur during Stage 2A when there are capacity limitations at the ponds and where the River is in high flow conditions (more than 3 times median flow).

Stage 2A will provide infrastructure for the irrigation of up to 42% of the average annual treated wastewater volume (93,200m^3). It is proposed that the land treatment procurement and consturction will commence prior to installing the additional storage. Therefore, for a period of approximately 5 years, the removal of discharge to the river will equate to approximately 42% of annual treted wastewater (Stage 2A) increasing to full land treatment once additional storage is provided for any 9 years out of 10 (Stage 2B) based on average discharges and climatic conditions. The relative proportion of flows discharged to land and the Ruamahanga River during Stage 2A are presented in the following table[28].

Table 3: Relative Proportion of Flows Discharged to Pain Farm Land and Surface Water with no Additional Storage (Stage 2A)

Month	Discharge to land (%)	Discharge to river (%) at flow =			
		<25%ile	25%ile-median	Median–FRE3	>FRE3
January	100	0	0	0	0
February	100	0	0	0	0
March	93	0	0	0	7
April	97	0	1	2	0
May	85	0	0	11	4
June	0	0	35	37	28
July	0	0	3	37	60
August	1	0	4	58	38

[28] Based on the empirical water budget prepared by LEI, Martinborough WWTP Land Discharge Scenarios, Final, 2014 (Appendix 7)

September	98	0	0	2	0
October	99	0	0	0	1
November	100	0	0	0	0
December	99	0	0	1	0
Mean Annual	**42**	**58**			

$2.15M has been committed between 2025 and 2030 for the following infrastructure proposed for Stage 2A:

- Reticulation from the existing plant to Pain Farm, which is likely to include:
    - Approximately 2.1km of rising main from the proposed storage pond[29],
    - A pumping station and filtration system also located on the Stage 1 Land Treatment site,
    - Distribution system and pumping system at Pain Farm.
- Spray irrigation equipment at Pain Farm, such as centre pivots, including automatic control and monitoring systems.

Stage 2B involves the construction of approximately 37,400m^3 of additional storage pond capacity and full land treatment. To reduce pumping requirements and maximise gravity flow from the existing plant it is possible this storage would be located on the Adjacent Block. This would require the relocation of Stage 1 irrigation equipment to Pain Farm. The location of the additional storage will be confirmed during detailed design. The alternative would be storage at Pain Farm.

$2.49M has been committed from 2030 for the installation of additional storage to enable commissioning of Stage 2B land treatment before the end of 2035. This timeframe is captured as a proposed condition of consent[30] to provide all stakeholders with the necessary level of certainty.

The balance of the proposed consent term (from 2035 to 2048) would then focus on performance monitoring and system management and improvements.

Efficiencies can potentially be achieved by designing the Stage 1B land treatment scheme to be easily extended for the Stage 2A & 2B scheme, for example, sharing the same pump station and rising main from the MWWTP outlet. Therefore, SWDC propose that the investigations and preliminary design for Stage 2A & 2B be included in the development of the Effluent Discharge Management Plan to be submitted to GWRC by December 2015.

The Stage 2A & 2B land treatment irrigation area (Pain Farm) will be used to grow high nutrient uptake crops, in a "cut-and-carry" operation, where harvested crops will be sold. Pain Farm will be managed (possibly under contract), solely for the proposed land treatment.

3.2.3 Summary of Discharge Regime

Key design parameters and outcomes for the proposed discharge regime of MWWTP wastewater at the site are given in the following table for each of proposed Stages 1A, 1B, 2A and 2B.

[29] The pipe corridor will be the subject of future easements, which will be progressed following confirmation of the infrastructure corridor during detailed design.

[30] Refer proposed Conditions provided in Part 1 Schedule 1: Condition 3

Table 4: Key Design Parameters and outcomes for the proposed discharge regime at MWWTP

Parameter	Average Year			
	Stage 1A – No Land Application	**Stage 1B – MWWTP Adjacent**	**Stage 2A – Pain Farm no storage**	**Stage 2B – Pain farm with storage**
Land Application				
Design Criteria:				
Irrigable area (ha)	0	5.3	53	53
Limiting parameter		Nutrient to Groundwater	Hydraulic	Hydraulic
Soil moisture trigger to allow application		5mm above FC after application	1mm below FC after application	1mm below FC after application
Average daily application rate over the year (mm/d)		2.7	0.4	1.0
Maximum application per event (mm/d)		15	9	9
Maximum application per event – June, July, August (mm/d)		0	9	9
Outputs:				
Yearly application depth (mm/y)		995	155	370
Yearly application volume (m3/y)		52,731	93,208	222,374
Natural Drainage (mm/y)		497	459	459
Drainage in excess of natural (mm/y)		840	76	272
Days of land application and/or storage (#/y)		87	153	365
N applied (kg N/ha/y)		177	28	66
P applied (kg P/ha/y)		41	6	15
Plant uptake N/P (kg N/ha/yr)		300/40		
Soil retention N/P (kg N/ha/y)		0/108		
Na applied (kg Na/ha/y)		995	155	370
Additional Storage				
Storage volume 90th%ile (m^3)		N/A	3,700	37,400
River Discharge				
Design Criteria:				
River Cut-off	All Flows	HMF	HMF	FRE3
Nutrient Loading Limit		DRP Detection Limit – 0.002mg/L		
Outputs:				
Volume to river, HMF – 20FEP (m^3/y)		131,194	120,797	0
Volume to river, >20FEP (m^3/y)		37,977	8,374	Only when required to manage pond storage
Total Volume to river (m^3/y)	221,920	169,171	129,171	0
Days of river discharge (#/y)	365	247	212	0
N load (kg/y)	3,950	3,011	2,299	0
P load (kg/y)	910	694	530	0

To ensure that between river flows of >HMF and <FRE3 the mass loading to the river does not cause an increase in the river DRP concentration (after full mixing) above detection limits of 0.002 mg/L, the following stepped discharge rate is proposed.

Table 5: Maximum discharge rate at key river flow rates (following commissioning of Stage 1B).

Flow in the Ruamahanga @ Waihenga Bridge (L/s)	Max. Wastewater discharge (m^3 / day)	Max. Wastewater discharge rate (L/s)
Below 24,930 (< HMF)	Nil	Nil
24,930 to 49,860 (< median)	1350	11
49,860 to 99,720 (< 2 x median)	2700	21
99,720 to 149,580 (< FRE3)	3000	35
Above 149,580 (> FRE3)	4300	50

Note: The above flow rates have been based on an assumed average annual DRP effluent value.

3.3 Proposed discharge to Air

The continuation of the discharge to air from the MWWTP ponds is proposed. The operation on site will continue to be managed in accordance with the existing resource consent, which currently expires in 2022. A new consent is sought to align the term of that existing consent with the current consents.

The proposed method of land application for both Stage 1B (on the Adjacent Block) and Stage 2A & 2B (Pain Farm) is likely to be low spray irrigation. There will be a potential discharge to air both of contaminants, and of odour. Tertiary treatment of the wastewater and careful design of the irrigation infrastructure will mitigate potential effects associated with spray drift of aerosols[31], and odour, and undertaken in strict accordance with the Effluent Discharge Management Plan.

In addition, an Odour Management Plan (OMP) will be developed which will include procedures for managing odour from both the ponds and irrigation infrastructure. A draft outline of an OMP has been included in Appendix 6 as an example of the framework which may be adopted.

3.4 Operations and Maintenance

A detailed Operations and Maintenance Manual will be developed for MWWTP within six months of the commencement of consent. This document will be written in a co-ordinated manner with the Effluent Discharge Management Plan. A draft OMM is included as Appendix 6 by way of example of the proposed framework.

3.5 Performance and Environmental Monitoring

3.5.1 Influent Wastewater Monitoring

The discharge entering the MWWTP will be limited (as far as is practicable) to treated municipal waste. Best endeavours will continue to be used to ensure that no high-strength industrial effluent is discharged into the MWWTP through the implementation of the Masterton District Council and South Wairarapa District Council Consolidated Bylaw 2012: Part 12 – Trade waste.

[31] Plan Change 3 to the Wairarapa Combined District Plan specifically considered these matters. Further discussion on this is included at section 5; included as Appendix 15..

Influent monitoring is proposed to enable incoming volume and quality to be determined. This will enable pond performance to be accurately monitored and reported.

Other initiatives to reduce the volume of wastewater being generated will continue as part of the proposed I/I investigations and rehabilitation work, with an objective to see a relative reduction over time in ADF prior to implementing the Stage 2A land treatment. Initiatives will include not only physical works, but community education and advice programmes. This process will be encapsulated within the IIRMP.

Initiatives and results will be reported annually as a condition of consent, as part of a proposed Annual Report.

3.5.2 Treated Discharge Volumes to Land or the Ruamahanga River

Based on the current performance of the plant and the staged implementation of the proposed land treatment scheme the following treated discharge volumes to water and land have been proposed:

Table 6: Proposed Discharge Volumes to Water and Land

	Discharge to the Ruamahanga		Discharge to Land	
	Mean	Maximum	Mean	Maximum
Stage 1A	650 (m^3/d)	4,300 (m^3/d)		
Stage 1B	Discharges to River shall not exceed the volumes and flow rates presented in Table 5.		143 (m^3/d)	795 (m^3/d) 1,855 (m^3/wk)
Stage 2A			212 (m^3/d)	4,300 (m^3/d)
Stage 2B		4,300 (m^3/d) & 32(l/s) when river flows >FRE3.	530 (m^3/d)	11,130 (m^3/d)

3.5.3 Treated Discharge Effluent Quality Characteristics

SWDC propose consent effluent quality limits that reflect the current plant performance. These are highlighted in bold in Table 7 below. The reason for this is that no significant upgrades to the MWWTP pond system process are proposed because final effluent polishing will be achieved through future land treatment. Some minor optimisation works however are proposed to maintain and enhance pond effluent quality in the short-term, however it is difficult, due to the passive nature of pond systems to accurately quantify the level of improvement likely to be achieved through these optimisation works. An assessment has been undertaken to determine the level of effects on the environment, from the existing plant which represents this interim period of two to three years before land treatment commences, and the conclusions of this assessment are presented in Section 7 of this report.

Table 7: Treated Effluent Quality

E.coli cfu/ 100 mL	BOD_5 mg/L	SS mg/L	Total N mg/L	Ammonia Nitrogen mg/L	Dissolved Reactive Phosphorus (DRP) mg/L

Discharges <2,800m3/d 5 of 10 consecutive monthly test results shall not exceed	**Discharges <2,800m3/d no more than 2 out of 10 consecutive monthly test results shall not exceed**	**9 out of any 12 consecutive monthly test results shall not exceed**				
100	1,400	60	90	**35**	**30**	7

3.5.4 Environmental Monitoring Plan

An Environmental Monitoring Plan is to be prepared providing details on the type of monitoring to be undertaken in accordance with the consent conditions, the methods to be used and monitoring site locations. A draft structure for the Environmental Monitoring Plan is included in Appendix 6.

Monitoring data will be provided to GWRC on a quarterly basis, including a brief commentary on any exceptions identified from the data.

A detailed Annual Report will be prepared summarising all monitoring undertaken including a critical analysis of the information in terms of compliance and adverse environmental effects. The annual report is to include a discussion of any trends or changes in environmental effects evident from the monitoring data, any reasons for non-compliance, any actions that have been undertaken to address non-compliance or improve environmental performance, any proposed changes to the monitoring program, and any other issues considered important by SWDC.

In summary, the proposed monitoring is to include:

- Wastewater Quantity and Quality Monitoring
- River Water Quality and River Health Monitoring
- Soil Health Monitoring
- Crop and pasture management practices
- Groundwater Quality Monitoring
- Monitoring of complaints.
- Cultural Health Monitoring.
- I/I Rehabilitation Monitoring.

3.6 Proposed Management Plans

The activity will be undertaken in accordance with a suite of detailed management plans, as referred to throughout this report. These will be finalised following the grant of consent to ensure all relevant details of the granted consent are fully provided for, in accordance with the following programme:

Table 8 – Proposed Management Plans

Management Plan	***Due (time from commencement of consent)***
MWWTP Operations and Maintenance Manual	6 Months
Tangata Whenua Values Monitoring Plan	12 Months
Inflow and Infiltration Reduction Management	12 Months

Plan	
Effluent Discharge Management Plan	12 Months
Odour Management Plan	6 Months
Environmental Monitoring Plan	12 Months

The Management Plans may be separate documents or combined within one or more documents, depending upon the conditions of consent, and operational requirements and efficiencies.

By way of summary, the purpose of the various proposed plans is as outlined below. Each of the plans will be developed by appropriately qualified or experienced people, with input from relevant key stakeholders where relevant, and will be submitted to GWRC prior to being finalised. A draft structure for the operational plans is included in Appendix 6.

Operations and Maintenance Manual (OMM) – The OMM outlines the detailed operations of the treatment plant and process, and will generally include details of the resource consent, detailed operating procedures for all plant (including manufacturers specifications), condition inspection programmes, maintenance and repair details for all assets and grounds, consumables (e.g. chemicals), and the general methodologies and resources required for efficient and complying operation. An example framework is included as Appendix 6.

Tangata Whenua Values Monitoring Plan (TWVMP) – The TWVMP will be developed in a joint process with Kahungunu ki Wairarapa and Rangitaane o Wairarapa and shall include the following considerations:

a) What cultural health indicators tangata whenua would like monitored within the Ruamahanga River environment associated with the MWWTP discharge;

b) The methodology of how the identified cultural health indicators will be sampled/evaluated;

c) The monitoring responsibility and frequency for the identified cultural health indicators; and,

d) A map showing the location of the identified cultural health indicators sampling point(s).

The cultural health indicators and methodology will be developed in accordance with the Ministry for the Environment's '*Cultural Health Index for Streams and Waterways, 2006*' as appropriate or any other relevant guideline jointly agreed between the Consent Holder, Kahungunu ki Wairarapa and Rangitaane o Wairarapa.

The TWVMP will be one process and tool to help facilitate (i.e. not replace) the partnership approach SWDC seeks to build with tangata whenua.

Effluent Discharge Management Plan (EDMP) – The EDMP will document the detail of the land and river discharge regime, and in particular provide the operation and maintenance processes associated with the land treatment irrigation infrastructure; monitoring and reporting requirements, and specify contingency measures (e.g. during equipment failure). An example framework is included at Appendix 6.

Inflow & Infiltration Reduction Management Plan (IIRPM) – The IIRMP will contain the methodologies for determining the extent of Inflow and Infiltration into the sewer network, and outline the investigation process for determining the most efficient, cost effective, and non-disruptive manner for rehabilitation. An example framework is included at Appendix 6.

Odour Management Plan (OMP) – The OMP identified the potential risks associated with odour and aerosols in the air associated with the operation of the WWTP and land treatment system, including procedures to avoid those effects, protocols for responding to complaints and other incidents. As any odour will be an operational matter, the OMP will be closely integrated with the OMM. An example framework is included at Appendix 6.

Environmental Monitoring Plan (EMP) – The purpose and structure of the EMP is described in Section 3.5.4 above. An example framework is provided in Appendix 6.

3.7 Ongoing Stakeholder Engagement

SWDC is committed to ongoing engagement with key stakeholders and the community.

A Community Liaison Group (CLG) will be developed, with invitations to join to all neighbouring landowners and submitters. The CLG will be kept advised of progress through the stages through regular communication, including receiving copies of the Annual Report and management plans, as desired. SWDC views the CLG as an important contributor in implementing and achieving its long term Wastewater Strategy.

In addition, SWDC will nominate and make known a single point of contact that is accessible for any queries or concerns regarding the WWTP.

3.8 Consent Compliance

SWDC acknowledges that as with most WWTPs, detailed compliance with previous consent conditions could have been monitored and reported better. To rectify this, SWDC will establish a comprehensive compliance monitoring system, and will nominate a single person responsible for consent compliance monitoring.

3.9 Proposed Term of Consent

The proposed term of consent is **35 years** from the grant of consent.

There is no formula or strict criteria to calculate the term of a resource consent. There is however some assistance from the Environment Court over a number of separate and specific cases. The relevant factors are well summarised in *PVL Proteins Ltd v Auckland Regional Council*[32], which include:

[32] PVL Proteins Limited v Auckland Regional Council (Environment Court A61/2001)

- A decision on what is the appropriate term of the resource consent is to be made for the purpose of the Act, having regard to:
    - the actual and potential effects on the environment and relevant provisions of applicable instruments under the Act,
    - the nature of the discharge,
    - the sensitivity of the receiving environment to adverse effects,
    - the applicant's reasons, and
    - any possible alternative methods of discharge, including to another receiving environment

- Relevant factors in making a decision on the term of the resource consent include that conditions may be imposed requiring:
    - adoption of the best practicable option,
    - requiring supply of information relating to the exercise of the consent,
    - requiring observance of minimum standards of quality in the receiving environment, and
    - reserving power to review the conditions.

The same decision advises that a longer consent term is appropriate where a short term will create uncertainty for an applicant, and where there is a need for an applicant to protect its investment with as much security as is consistent with sustainable management (as defined in Part II of the RMA), and/or where there are known and minor effects on the environment on a constant basis,

Conversely, a shorter term is suggested more appropriate where there is:

- expected significant future change in the vicinity
- uncertainty about the effectiveness of conditions to protect the environment (including the applicant's past record of being unresponsive to effects on the environment and making relatively low capital expenditure on alleviation of environmental effects compared with expenditure on repairs and maintenance or for profit).
- fluctuating or variable effects on the environment,
- dependence upon human intervention or management for maintaining satisfactory performance, or relies on standards that have altered in the past and may be expected to change again in future.

The proposed upgrade to land treatment for MWWTP is clearly consistent with the purpose of the RMA, the principles of sustainable management within the RMA, and the relevant provision of national and regional planning documents. The assessment has concluded that the proposed land treatment is also the best practicable option currently available.

The upgrade to achieve this is a significant capital investment for SWDC. The resulting asset will be a sustainable long term solution for the local community valued at over $20M[33]. SWDC need a level of certainty over the consent term to facilitate this investment. A short-term consent would create significant (and unnecessary) uncertainty for SWDC.

[33] This includes the valuation of Pain Farm.

The upgrade to full land treatment contains no significant uncertainty for GWRC in terms of effects. The assessment concludes, even with a conservative "buffer", that Pain Farm contains sufficient land of suitable characteristics to take all of the wastewater generated without any significant risk of adverse effect which is any more than minor. Conversely, a significant positive effect will be achieved in terms of sustainable management of the Ruamahanga River.

Conditions are proposed to ensure that the best practicable option is adopted, that any adverse effects through the term of consent are monitored and reported, and that all necessary information is supplied to both GWRC and key stakeholders.

In accordance with the guidance above, a shorter term consent could be appropriate if SWDC was seeking consent to allow continued full discharge to the River for the full term of consent where there were major risks or uncertainties with the proposed upgrades. This is not the case under the current Project. An example of where this could be appropriate is where there was new or unproven treatment methodology.

SWDC have committed to remove 24% of the wastewater from the river during low flows by the 2015/16 summer period. This is required by conditions of consent. Similarly, Stage 2A & 2B land treatment is required to be commissioned by the end of 2030 (irrigation) and 2035 (additional storage) respectively. This staging will ensure affordability is maintained, and the risk of unaffordability is mitigated. Additionally, if these stages are not achieved, SWDC will be in breach of their consent. Annual Reporting on progress toward each of these stages is proposed, with design of the Stage 1B Land irrigation required to be confirmed well before irrigation.

In addition, an annual update on wastewater treatment industry technology will also be provided to enable an assessment that the proposal remains the best practicable option through the term of consent. A review condition is also proposed, enabling GW to review the key conditions of consent on an annual basis for the term of the consent. Collectively, these will ensure that conditions do not become outdated, irrelevant, or inadequate.

Actual and potential adverse effects have been identified, and have been quantified (as far as practicable) across the term of the consent. Any fluctuations will be identified through monitoring and managed in accordance with relevant detailed management plans.

SWDC recognise the need to ensure compliance with consent conditions, and has proposed the implementation of a specific consent compliance management framework with a nominated person responsible for ensuring compliance. Any risk of non-compliance will be swiftly identified and proactively managed.

The comprehensive management plans will also be subject to an annual review and update, which will be provided to GWRC and key stakeholders.

The proposal is a series of well defined and discreet stages which will collectively provide a significant and sustainable benefit in a manner consistent with the RMA where the proposed review provisions are capable of addressing all matters of concern, and which is capable of responding quickly to any identified risk.

A shorter term of consent will not achieve any additional benefits or provide any additional safeguard.

On this basis, the term of consent requested for all consents required for the MWWTP upgrade is 35 years.

4 ENVIRONMENTAL CONTEXT

This section provides a description of the existing site, proposed land treatment sites and receiving environments.

4.1 Project Site Characteristics

The project site comprises of the existing MWWTP oxidation ponds and associated infrastructure and the proposed land treatment sites which include the MWWTP Adjacent Block of agricultural land located west of the existing ponds (Stage 1B) and the 84ha block of agricultural land referred to as Pain Farm (Stage 2A & 2B) - refer section 4.1 & 4.2.

4.1.1 Site location and ownership

The existing MWWTP site and proposed land treatment sites are shown in Figures 7-10. The sites locations and legal descriptions have been detailed in the Application (Part 1 of this Document).

4.1.2 Existing and Neighbouring Land Use

The MWWTP site is described in detail in Section 2.1. The MWWTP site including the proposed Stage 1B Adjacent Block, is bounded by the Ruamahanga River to the north, arable pastoral land to the west and south, and established vineyards to the east. The Adjacent Block is currently grazed.

Pain Farm is bounded by agricultural landuse, primarily cropping and sheep and beef units, with vineyard development to the south across Ferry Road. Pain Farm is currently leased out and used for dairy runoff grazing. A closed landfill and transfer station site occupies 5.3ha of the site and is delineated by shelter belts on all four sides. This landfill is no longer utilised, and it monitored by SWDC under the provision of the relevant resource consent.

The land-use patterns in the wider vicinity are dominated by primary production activities consisting mainly of sheep, beef and dairy farming, with dairying becoming prevalent on the Wairarapa plains. This landuse pattern is a significant influencing factor on changing water quality in the Ruamahanga River.

The nearby small urban area of Martinborough is the primary residential landuse in the vicinity, with density decreasing rapidly beyond the urban boundary and into the rural zone. The nearest dwelling to the MWWTP site is located 600m to the south of the site, with the urban fringe of Martinborough beginning 800m to the southeast. A dwelling located in the centre of Pain Farm is owned by SWDC, and currently operates as a bed and breakfast. The residence is surrounded by established trees and gardens which will provide some buffering from any potential spray drift from the proposed land treatment scheme. The nearest neighbouring residential activity to Pain Farm is located within a lifestyle subdivision directly to the south across Lake Ferry Road, which also have established wind-breaks around the property boundaries. The closest dwellings are located around 50m from the Pain Farm boundary. An olive grove is also located across Lake Ferry Road from the Site. A trucking contractors depot and truck wash have recently been established on land immediately east of Pain Farm, which includes washdown irrigation effluent to adjoining land to the east and north of that site (i.e. not on Pain Farm). Figure 12 and Table 9 provide locations and distances to potentially sensitive receptors from the MWWTP and Irrigation Application sites.

Figure 12 – Distance to Sensitive Receptors from MWWTP and Irrigation Zones

Table 9 – Distance to Sensitive Receptors from MWWTP and Irrigation Zones

	Distance From WWTP		**Distance from Irrigation site 2**
House A	328.6m	House 1	330.8m
House B	541.5m	House 2	350.6m
House C	605.8m	House 3	263.8m
House D	672.4m	House 4	69.6m
House E	852.0m	House 5	162.2m
House F	977.7m	House 6	284.0m
House G	996.7m	House 7	379.8m
House H	1036.6m	House 8	546.6m
House I	876.3m	House 9	563.8m
House J	742.1m	House 10	381.2m
House K	799.6m	House 11	278.9m
House L	782.5m	House 12	171.2m
House M	845.0m	House 13	69.3m
House N	384.1m	House 14	165.3m
		House 15	339.7m
		House 16	189.5m
		House 17	265.6m
		House 18	165.7m
		House 19	346.4m
		House 20	436.5m

There are no other known potentially sensitive land uses identified in the immediate vicinity of the site.

4.1.3 Geology, Topography and Geomorphology

The Ruamahanga River is responsible for the near-surface geology in the vicinity of the site, as the River has, over time, deposited unconsolidated sediments ranging from very coarse-grained gravel strata to very fine-grained silt and clay strata.

Both the MWWTP and Pain Farm sites are located on historic river terraces on the southern bank of the Ruamahanga River. These river terraces are relatively flat through this area, expanding out across the plains within the Wairarapa valley that is demarcated by the rolling hills that in turn give way to the hill and range formations to the east and west respectively.

Pain Farm has an elevation of around 22-25m above mean sea level and is elevated above the present Ruamahanga River flood plain, thus there is not risk of flooding at the site. The site is gently rolling with a fall towards the north-west. Figure 13 shows the surface water features associated with Pain Farm. There are several unnamed watercourses which eventually drain to the Ruamahanga River approximately 4 km from the site. Along the north-western boundary a permanently flowing stream runs to the west towards the Ruamahanga River. A number of ephemeral watercourses run across the Site towards the stream. Little is known about flow or water quality in these water courses. They predominantly drain agricultural land to the east of the Pain

Farm site and it is expected that water quality will reflect this upstream land use i.e. elevated nutrients and reduced dissolved oxygen. During site investigations in summer only the stream on the north western boundary had water in it. All waterways are currently accessible by stock, have limited shading and shallow water depth. The waterways are not considered to be sensitive water ways. Due to the ephemeral nature of the waterways running across the site they are considered to have a low habitat value.

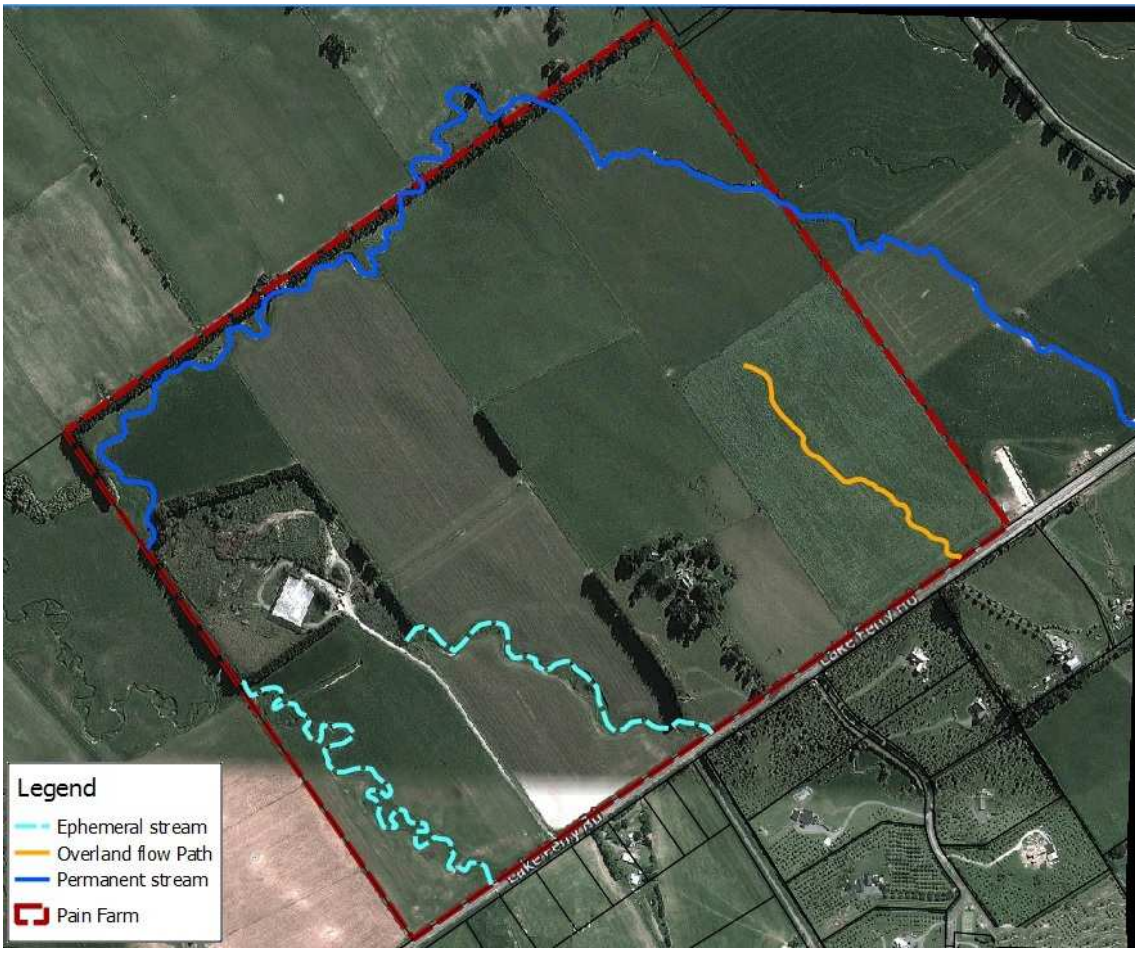

Figure 13: Pain Farm Surface Watercourses

4.1.4 Soils

4.1.4.1 MWWTP Stage 1 Land Treatment Site:

Soil cores observed[34] at the MWWTP and adjacent block correspond to well-draining Greytown deep silt loam (S-Map: Waimakariri_1.2, NZSC: Typic Fluvial Recent Soil). The soil description for the MWWTP adjacent block can be summarised as follows:

- Yellowish brown (10YR 4/2) silt loam topsoil. Weakly pedal, fine nut and crumb. Underlain by increasing sand content; medium sand, minor silt, 5% gravel (6mm-20mm) subangular greywacke.

[34] Refer LEI 2013, - see Appendix 16

4.1.4.2 Pain Farm Site:

Soil cores observed[35] at Pain Farm correspond to the imperfectly draining Wharekaka mottled fine sandy loam (Mottled Argillic Pallic Soil, NZSC). Soil descriptions for the Site can be summarised as follows:

- Soil of the flats near the stream: Dark greyish brown (10YR 4/2) silt loam topsoil. Underlain by silt loam and clayey silt. Between 40 and 60 cm a pan was present. Below 80 cm the soil was strongly gleyed and from 85 cm the soil was gravelly.
- Soils of the gently rolling terrain: Were very similar to the above described soil. Lenses of sandy and gravelly material were present at depth with strong mottling throughout the profile and a pan varying from 35-50 cm below the soil surface.

Within 50m of the stream saturated conditions were encountered at 0.85 m in the soil. Elsewhere on the Pain Farm saturated conditions were not encountered within 1.3 m of the soil surface. There was however, extensive evidence of frequent or long duration wetness due to the presence of mottles and manganese nodules below 0.2 m.

As a result of the above site investigations, LEI (2014)[36] have classified the soils at the MWWTP adjacent as Zone A (well-draining) and at Pain Farm as Zone C identified as having a restriction of both subsoil permeability and seasonal high groundwater.

4.1.5 Groundwater

4.1.5.1 MWWTP and Stage 1B Land Treatment Site

These sites are located above the Lower Ruamahanga groundwater zone (unconfined and semiconfined). SWDC has not regularly monitored groundwater for contamination. According to GWRC records there are ten current groundwater abstraction consents in the area. SWDC have not been advised of any concerns regarding groundwater quality. Similarly, GWRC do not have any significant monitoring data on groundwater quality in this area. A 2008 report[37] did not specifically include the Martinborough area.

The water table has been defined, at around 12m based on monitoring undertaken from GWRC monitoring bores on the Adjacent Block).

[35] LEI (2012)
[36] LEI, *Martinborough WWTP Land Discharge Scenarios and Assessment of Environmental Effects*, March 2014.
[37] GWRC*, Targeted groundwater quality investigations in the Wairarapa*, August 2008.

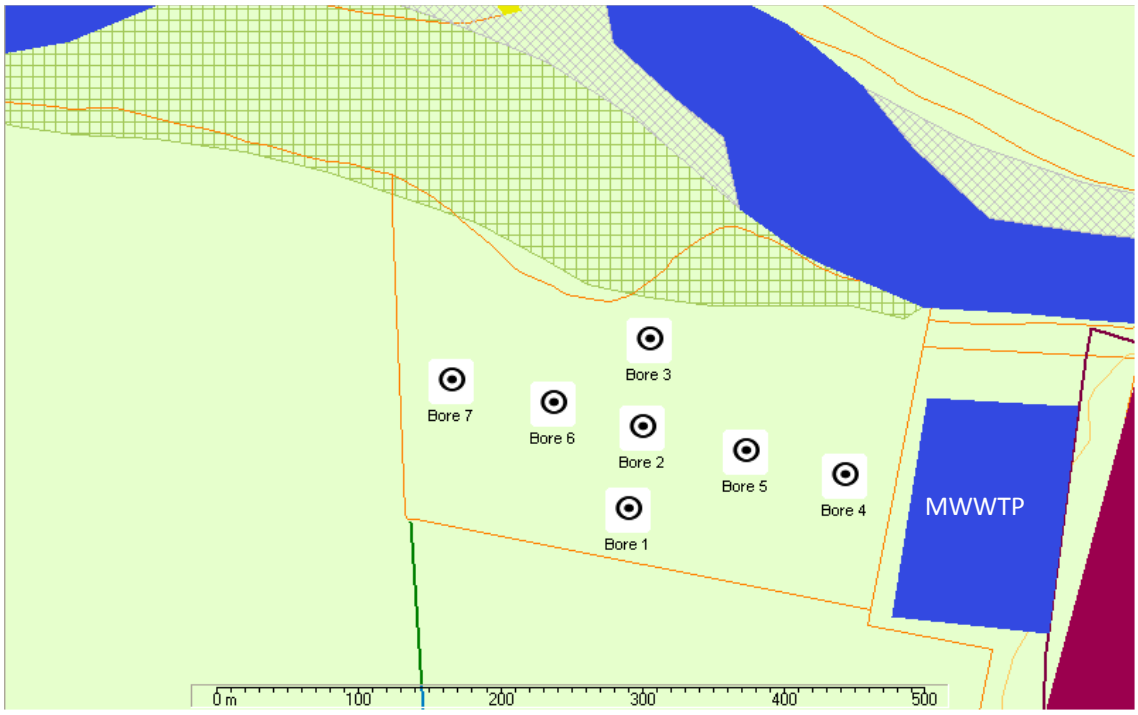

Figure 14 - GWRC groundwater monitoring bore locations – to west of MWWTP pond

4.1.5.2 Pain Farm

This site is located above the Martinborough Terrace groundwater zone (confined and semi-confined). No specific monitoring information of groundwater at Pain Farm has been assessed. Groundwater level within this aquifer range between 4.25m – 6.75m based on available data from monitoring of bores in the area. LEI have identified a hard argillic pan on-site, which above the pan there was observed a lot of mottling indicating a perched water table is likely.

Consideration of groundwater levels at Pain Farm was given by LEI in site suitability investigations. Average groundwater level ranges between 4.25m – 6.75m based on available data from monitoring of bores in the area, with seasonal high water level of between 1-2m.

Although no specific investigation or data has been identified, it is assumed that groundwater flows toward the Ruamahanga River. No water bores have been identified between Pain Farm and the River.

4.1.6 Climate and Climate Change

Martinborough is the North Island's driest location, being in a rain shadow created by the Tararua and Rimutaka Ranges. Extreme weather patterns are rare, although the area is prone to spring frosts and wind.

The prevailing wind direction[38] is from the northeast direction (22% of the time) and typically up to 14.9 km/hr, with westerly (16%) and southwesterly (16%) equally prevalent.

A summary of the typical climate conditions for Martinborough is summarised as follows[39]:

[38] At the East Taratahi monitoring station. Approximately 30km north of the site.

- Mean annual rainfall is 781mm, with a mean winter rainfall of 474mm and mean summer rainfall of 307mm.
- Mean annual sunshine of 2019 hours.
- Mean annual air temperature of 12.3°C (winter mean of 9.3°C and a summer mean of 15.3°C).
- Mean annual relative humidity of 78.7%.
- Calculated evaporation of 950 mm/year (248 mm over winter and 702 mm over summer).
- 52 mean annual ground frost days.

The effects of climate change in New Zealand are slow, but well documented. In terms of the Wairarapa climate change is expected to experience the following by 2090:

- Increased average temperatures of around 2.1 degrees C, with warmer summers and less frosts;
- Increased rainfall of about 3% over the year across the region, but less rain in winter and spring, and more in summer and autumn, with an increased frequency of very heavy rainfall events in South Wairarapa during southerly storms (up to 7% more by 2050);
- Extreme winds will increase by 2% to 5% in winter, and decrease by the same amount over summer; and,
- Greater evaporation.

Although there will likely be some changes experienced during the term of consent, the proposal will not exacerbate climate change nor will the effects of climate change increase the intensity of the effects experienced by it. The discharge regime is determined by river flow and soil moisture. Changes in these over the life of the consent will be monitored throughout the term of the consent, and considered in detail in the consent renewal in 35 years time.

4.1.7 Natural Hazards

4.1.7.1 Flooding Hazard

The MWWTP is located in close proximity to the Ruamahanga River and is located with the 50 year flood zone identified by GW. The pond embankments are raised to mitigate potential risk of incursion by flooding, which has historically been effective at mitigating flood effects. Pain Farm is not located within the identified 50 year flood zone. The assessment of flood return interval undertaken by LEI (2012) indicates 'Nil Risk' at Pain Farm and a moderate risk at MWWTP, with a flood return interval between a 1:20yr and 1:60yr return period event.

[39] From the NIWA database

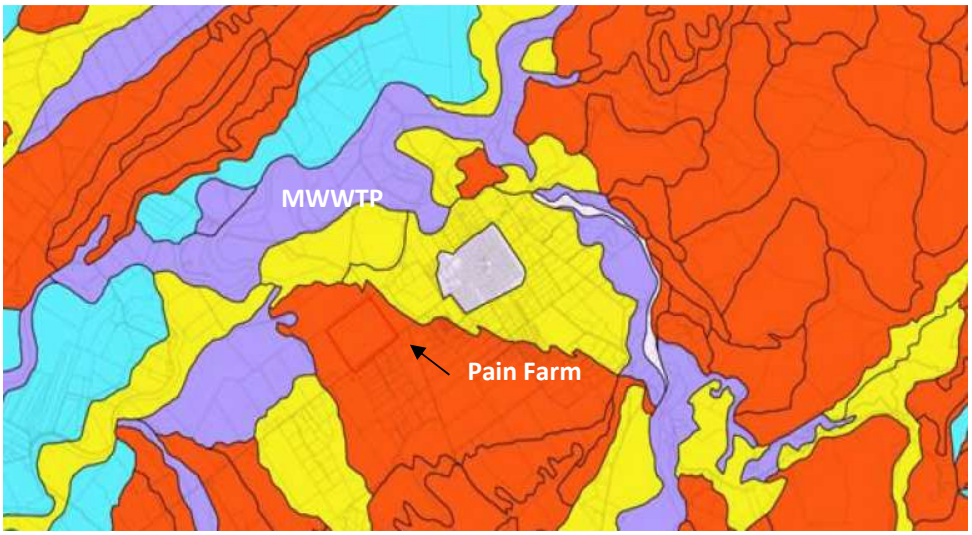

Figure 15: Flood Hazard return period mapping (from LEI, 2012). Refer Appendix for detailed explanation.

4.1.7.2 Faulting

The sites are located within the a basin which is crossed by a series of north-east to east north-east striking, active faults, including the Carterton and Greytown Faults, which are splays off the Wairarapa Fault. The Wairarapa Fault is considered to be the most active in this region. It is located roughly 15km from the application site, and expected to generate a major event at a recurrence interval of <2000years.

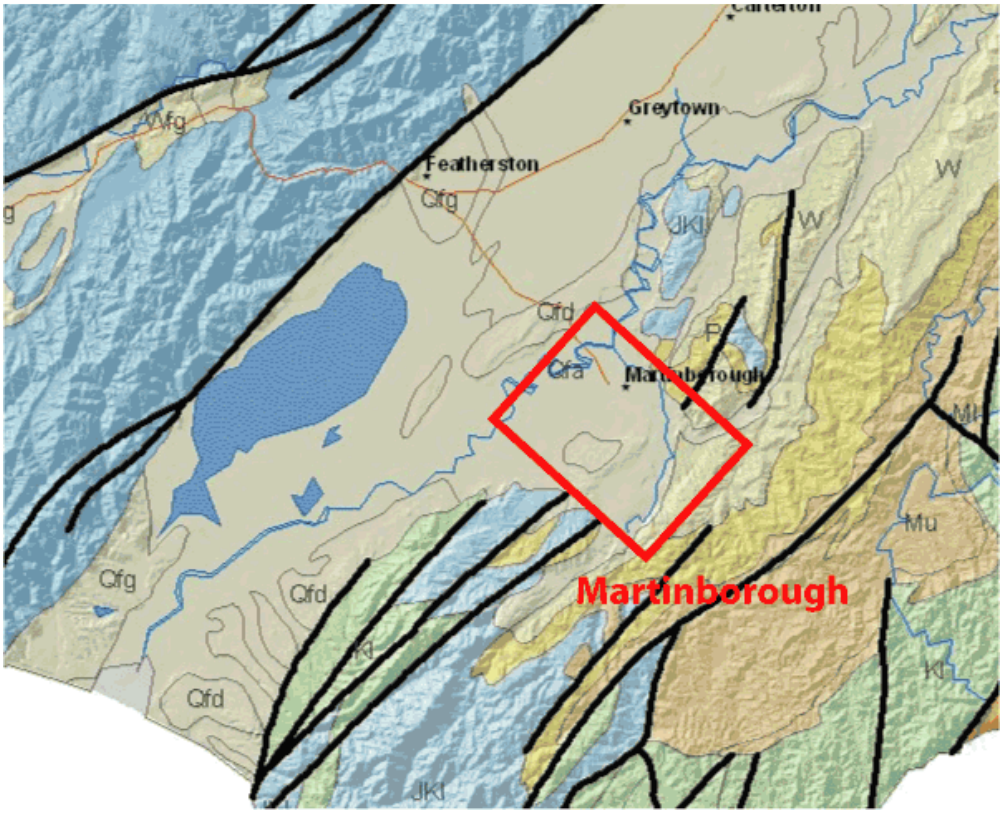

Figure 16: Active fault lines in the vicinity

4.2 Air Quality

GWRC is responsible for monitoring ambient air quality in the region. There is no indication in the 2012 air quality monitoring report published by GWRC that there is any general air quality issue in the Martinborough area, however this monitoring focuses specifically on particulate matter, Carbon monoxide and Nitrogen dioxide and does not address odour[40].

There is no record of any complaints or indication of adverse effect on air quality from the operation of the MWWTP off of the immediate site since the aerators were installed in 1998 (refer section 2.1.2). Furthermore, SWDC are not aware of any localised air quality issue (i.e. odour) in the vicinity of the site associated with the MWWTP or at Pain Farm.

4.3 Ruamahanga River

4.3.1 Ruamahanga River Catchment Description

The Ruamahanga River originates in the north eastern Tararua Range near Mt Dundas and flows through the Wairarapa valley culminating at Lake Onoke, and ultimately via the lake discharges to the sea.

The Ruamahanga River is 162 kilometres long with a catchment area of approximately 3430 square kilometres. It has major tributaries rising from the Tararua Range (including the Waipoua, Waingawa and Waiohine rivers) and also from the eastern Wairarapa hills (Kopuaranga, Whangaehu, Tauweru and Huangarua rivers).

The MWWTP is located in the reach generally referred to as the Lower Ruamahanga River. This reach is approximately 72 kilometres in length and includes the section of river between the confluence with the Waiohine River down to Lake Onoke. With the exception of the Waiohine River, other significant tributaries to the Lower Ruamahanga River are the Huangarua River and the outflow from Lake Wairarapa.

4.3.2 River Hydrology

GWRC has monitored flow in the Lower Ruamahanga River at Waihenga Bridge, approximately 2.2 kilometres upstream of the MWWTP discharge, since 1976. GWRC (2007), (2011) [41] and (2013)[42] provided the following base statistics for hydrology in the Lower Ruamahanga River.

- Median flow (1976-2011) of 49.86 m^3/s.
- During the period 1976 – 2011 flow was below: (i) the minimum flow (8.5 m^3/s) stipulated in the FWP less than 2% of the time, (ii) the ½ median 24 % of the time, and (iii) above 3 x median 13% of the time (see Figure 17 showing the River flow distribution).
- Highest monthly average flows occur between June and October.
- Lowest monthly average flows occur during the months January to March.

[40] Mitchell, T. (2013), *Greater Wellington Regional Council, Annual air quality monitoring report for the Wellington region, 2012*. Greater Wellington Regional Council.
[41] GWRC, Hydro Statistics Report, Draft, 2011.
[42] Estimated low flow statistics provided by GWRC, M. Gordon, 8 May 2013.

- Estimated low flow statistics are provided in Table 10.
- The minimum flow, which occurred around the 16 March 2013 (4.117m^3/s), was the lowest recorded since 1976, when reliable low-flow records began.
- The mean annual flood for the Ruamahanga River at Waihenga is 1,064m^3/s, with the maximum recorded flood of 1,903m^3/s occurring on 15-16th February 2004 (GWRC 2007). The flood frequency table for the Ruamahanga River at Waihenga is provided below.

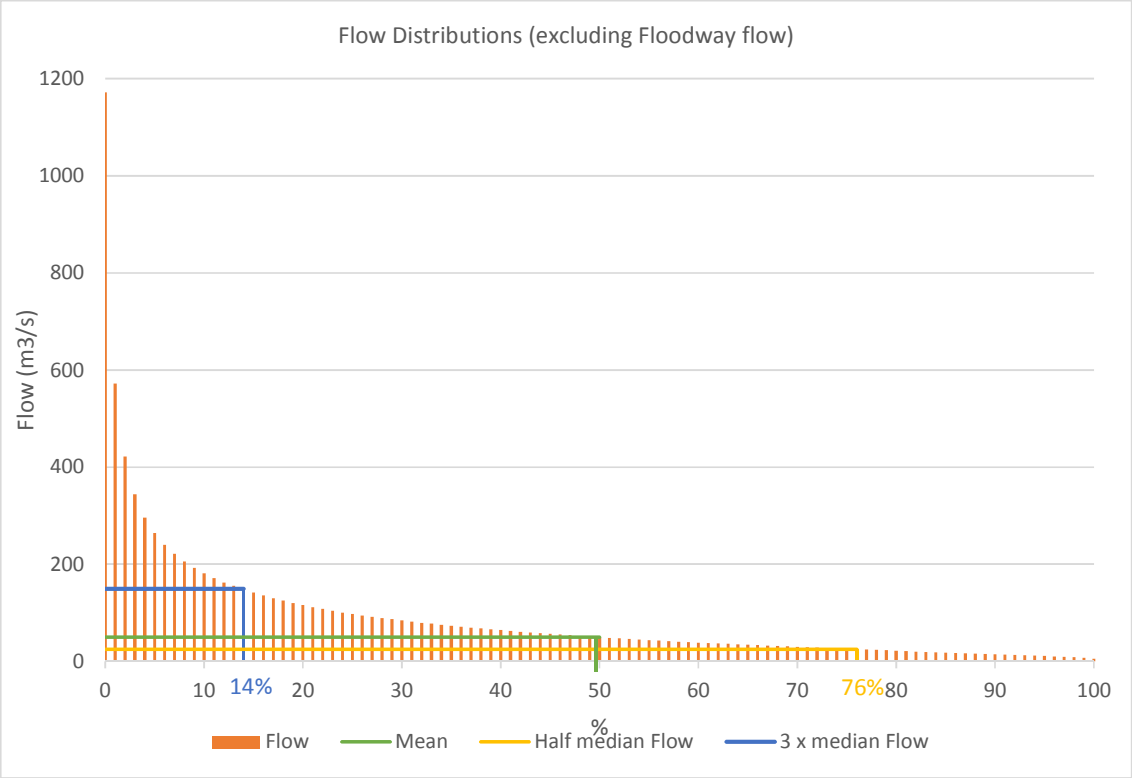

Figure 17 Ruamahanga River Flow Distribution at Waihenga Bridge (excluding floodway flow).

Table 10: Estimated revised low-flow statistics for Ruamahanga River at Waihenga Bridge (as of May 2013).

Return Period	1 Day	7 Day	14 Day	28 Day
MALF	8712	10274	12800	17824
2.33	7842	9053	10931	14898
5	6361	7163	8283	10979
10	5537	6134	6893	8969
20	4938	5397	5923	7590
50	4340	4673	4993	6289
100	3983	4245	4456	5549

Table 11: Flood Frequency Table for the Ruamahanga River at Waihenga (GWRC, 2007)

Return Period	Annual Exceedance Probability (%)	Flow (m^3/s)
2.33 years	Mean Annual Flood	1064
5 years	20%	1319
10 years	10%	1527

20 years	5%	1726
50 years	2%	1984
100 years	1%	2177

Table 12 below is a list of current surface water take consents that directly affect the Ruamahanga River.

Table 12: Surface Water Take Consents - Ruamahanga River

Surface Take Details	GW File No.	Consent Holder	Expiry Date
To take surface water from the Ruamahanga River to maintain the water level in a wetland	WAR020151	EPM Handyside	31-05-37
To take surface water from the Ruamahanga River to operate a border dyke irrigation scheme for irrigation of pasture and crops	WAR050115	JM Martin	30-09-16
To take and use surface water from the Ruamahanga River cut-off at Kumenga as a backup supply to irrigate pasture	WAR090023	Eric Snoek	30-09-14
To take surface water from the Ruamahanga River for frost protection of vineyard	WAR110055	Palliser Estate Wines	30-09-16
To take surface water from the Ruamahanga River for irrigation of pasture	WAR060022	EPM Handyside	30-09-16
	WAR020023	Mike McCreary	30-09-16
	WAR090089	GJ & AM Daysh	30-09-16
	WAR050175	Macland Farms Limited	30-09-16
	WAR060014	Rotopai Farms Ltd	30-09-16
	WAR100133	Rotopai Farms Ltds	30-09-16
	WAR100309	Tauanui Farm Ltd	30-09-16
	WAR110001	G & M Vollebrecht	30-09-16
	WAR110002	G & M Vollebrecht	30-09-16
	WAR110012	Quantum Farms Ltd	30-09-16
	WAR110068	SJ Cates and VR Malneek	30-09-16
	WAR110073	RG Handyside and Gawith Trustees 2008 Ltd	30-09-16
	WAR110079	EPM Handyside	30-09-16
	WAR110094	DW Wood	30-09-16
	WAR1100114	Richard Osborne	30-09-16
	WAR110119	Ahuwhenua Met Ltd	30-09-16
	WAR110085	Drylands Trust	30-09-16
	WAR120124	Herrick Land Co. Ltd	30-09-16

Under the current FWP, takes of up to 20,000 litres per day, at a maximum rate of 2.5 litres per second, are allowed as a permitted activity. It is not known how much water is being taken from the Lower Ruamahanga River under the permitted activity rule.

4.3.3 River Water Quality and River Health

The major point source contaminant discharges affecting the Ruamahanga River are stormwater from the main Wairarapa townships, and treated sewage from Rathkeale College, Masterton (via Makoura Stream), Carterton (via Mangatarere River), Greytown (via Papawai Stream), Featherston (via Donalds Creek and Lake Wairarapa) and Martinborough. Other discharges to the Ruamahanga

system are from stock water races and activities such as aggregate processing (consent reference WAR040039, operated by Wairarapa Sand and Metal).

Non-point source discharges are also received from overland runoff from the extensive agricultural land in the catchment.

GWRC monitor four sites (McLays, Te Ore Ore, Gladstone, and Pukio) on the Ruamahanga River for water quality under their Rivers State of the Environment (RSoE) monitoring programme.

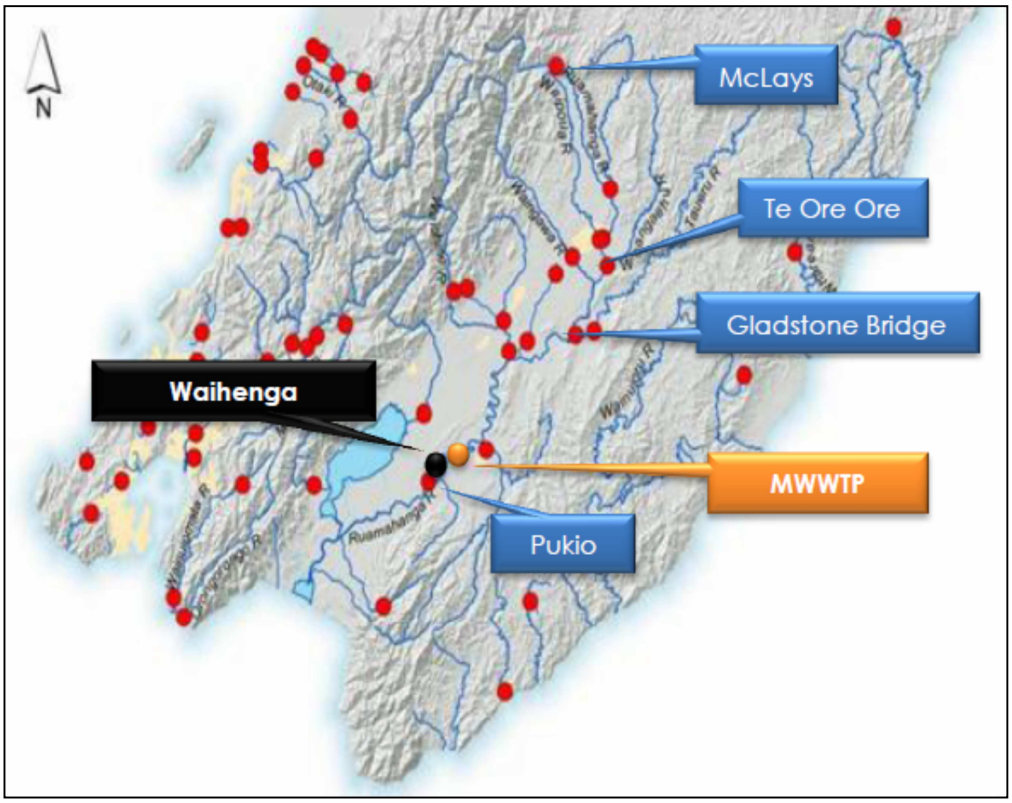

Figure 18 GWRC RSoE (BLUE BOXES), Recreational and Flow (black box) monitoring sites on the Ruamahanga River in relation to the MWWTP

The Gladstone Bridge site is upstream to the MWWTP and Pukio is about 15 kilometres downstream from the MWWTP. Each of these sites has been monitored on a monthly basis for a variety of parameters since September 2003. Biological (macroinvertebrates and periphyton) monitoring has also occurred on an annual basis during the late summer - early winter period.

A comprehensive assessment of the Ruamahanga River surface water quality and river health is provided in the EAM (2012) [43] Assessment of Ecological Effects, attached in Appendix 9. To avoid repetition, a detailed description of surface water quality parameters and guideline limits is presented in Section 1.3 of the EAM report and provides a clear background from which to assess effects. Water quality data collected from the RSoE between September 2003 to August 2011 is

[43] EAM, Assessment of Ecological Effects on the Ruamahanga River from the Martinborough WWTP, April 2012. It is acknowledged that assessment of water quality is limited to data between 2003 & 2011. Data since has not been additionally assessed but GW SoE Reporting suggest no significant change which would alter the assessment of effects of the Project.

discussed in Section 3.5.1 – 3.5.9 of the EAM report[44]. Macro-invertebrate survey information is discussed in Section 3.6.1 of the EAM report and River assimilative capacity and mass loads are estimated and discussed in Sections 3.5.10 – 3.5.11. Based on a review of the EAM report, Forbes Ecology, in their 2012[45,46] and 2013[47] reports has also provided some relevant information regarding the Ruamahanga River surface water quality and river health (the latter is provided in Appendix 11).

The main findings from the EAM and Forbes Ecology reports on characteristics of the Ruamahanga River are summarised as follows[48]:

- Water quality generally decreases downstream, as the cumulative effects of the numerous upstream point and non-point discharges are realised.
- Median DIN concentrations at Gladstone exceed ANZECC guidelines[49] (lowland streams - 0.465 mg/L – 50% compliance) and GWRC proposed quality limits[50] (0.180mg/L) to protect the main in-stream values in the lower Ruamahanga. Below median river flow conditions DIN appears to reduce to fall below the ANZECC guidelines. DIN concentrations reduce sharply at Pukio and median concentrations meet ANZECC trigger values under all flows (62% compliance).
- Median DRP concentrations at Te Ore Ore, Gladstone and Pukio exceed ANZECC guidelines (lowland streams - 0.010mg/l) and the GWRC proposed quality limit (0.014mg/L). A marked increase at the Gladstone Bridge site at low river flows is also noted and is a typical pattern associated with point source discharges such as from the Masterton WWTP located upstream of this monitoring site. DRP concentrations decrease at low flows between the Gladstone Bridge and Pukio monitoring sites.
- Nutrient concentration ratios indicate that the system is generally phosphorus limited however periods of co-limitation are likely during low river flows.
- The median NH_4-N concentration at Gladstone when compared to all sites was significantly higher under all flow scenarios, and showed exceedences in the ANZECC default trigger values for physical and chemical stressors in New Zealand slightly disturbed ecosystems (0.021 mg/L) 41% of the time. Although an assessment of compliance against the toxicant trigger value for 95th% level of protection of freshwater species and GWRC proposed quality limit of 0.9mg/l was not undertaken (including river pH and temperature), median NH_4-N concentrations at Gladstone and Pukio comply under all flow conditions. NH_4-N concentrations also show an increase with increasing river flow at Gladstone and Pukio.
- Recreational bathing beach microbiological data for each monitoring year since 2005/06 has indicated that sites monitored on the Ruamahanga River typically breach the "action" guideline of 550 cfu/100 mL (MfE/MoH 2003[51]) at least once per season. Almost without

[44] It is acknowledged these sections have largely been re-populated from a report prepared by Olivier Ausseil in 2011.
[45] Forbes Ecology. Overview of state of knowledge: Martinborough WWTP discharge in-stream effects. 26 October 2012.
[46] Forbes Ecology. Compilation of Supporting Information Regarding Martinborough WWTP Assessment of In-Stream Effects. 20 November 2012.
[47] Forbes Ecology. Martinborough, Greytown, and Featheston treated Wastewater Discharges: Low-flow Assessment of Ecological Effects. Prepared for SWDC. July 2013.
[48] A focus has been made within this AEE on the river water quality and river health between Gladstone and Pukio as this is the area of particular interest with regard to the MWWTP.
[49] Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (ANZECC). National Water Quality Management Strategy: An Introduction to the Australian and New Zealand Guidelines for Fresh and Marine water Quality. Volume 1. October 2000.
[50] Ausseil, O. Email: Water Quality Limits – Ruamahanga. 1 March 2012.
[51] Ministry for the Environment and Ministry of Health (MfE/MoH). Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas. Published June 2002, Updated June 2003.

exception where an action level has been recorded it has been positively correlated with significant rainfall events. This illustrates that E.coli counts in the River are typically related to urban stormwater, re-suspension of sediments, and diffuse-source runoff.

- Visual clarity decreases significantly with distance downstream in the Ruamahanga River with the highest clarity being at times of low flow and at higher flows fails to meet the Ministry for the Environment (1994)52 guideline levels (1.6m) at Gladstone and Pukio (GWRC proposed water quality limits of 3m at < median river flow and <30% change).
- Dissolved oxygen levels are relatively stable throughout the Ruamahanga main stem and meet guideline levels (>80% saturation) however it has been noted that this data may be misleading due to the time of day that DO has been monitored historically.
- Although not statistically significant there appears to be a small increase in periphyton growth at Pukio when compared to the Gladstone Bridge site (median biomass 30mg/m2) with more regular breaches of the New Zealand periphyton guideline (50 mg chlorophyll-α /m2) biomass for the protection of aquatic biodiversity (Biggs, 2000) and some of the filamentous algae cover guideline for aesthetics and recreation (30% cover). As with upstream sites there has not been a recorded breach of the higher biomass guideline 120 mg chlorophyll-α/m2 for the protection of aesthetic, recreational, and trout fishing values at the Pukio site. The noted increase in periphyton growth at Pukio is thought to be a combination of a longer accrual period in this lower section of the river and that dissolved nutrient concentrations (DRP and DIN) are consistent with nutrient use by the algal biomass[53]. Although there is relatively high nutrient enrichment in the Ruamahanga River, periphyton growth is largely kept in check by the high frequency of flood events that occur in this system. Calculations indicate that periphyton biomass is likely to reach levels exceeding guideline limits during periods of stable flows in excess of 10 to 15 days.

An analysis of the assimilative capacity of the Ruamahanga River was undertaken by EAM (2012) and Forbes (2012) comparing parameters in the Ruamahanga River against ANZECC and GWRC proposed limits. The results have been collated and are presented in Table 13. The key findings were:

- At the top of the catchment, McLays illustrates there is a relatively large assimilative capacity for all determinants and that only clarity becomes an issue at flows above 3 times medium.
- Downstream at Gladstone, there is however no assimilative capacity for DRP below median flows when compared against ANZECC and GWRC proposed limits. There is also no assimilative capacity for DIN when compared against GWRC limits at below median flows. Clarity is an issue under all flow conditions.
- At the lowest of the four monitoring sites and downstream of the MWWTP discharge point, DRP and DIN concentrations are lower than the Gladstone site and appear to meet guideline values at below HMF, however no assimilative capacity for either parameter exists below median flow. Clarity is an issue under all flow conditions. NH_4-N appears to be reduced from Gladstone concentrations allowing increased assimilative capacity, whilst *E.coli* numbers are relatively unchanged and there remains reasonable assimilative capacity.

[52] Ministry for Environment. RMA Water Quality Guidelines No. 2: Guidelines for the management of water colour and clarity. Wellington. ISBN 0-477-05891-4. 1994.

[53] A recent report (Ausseil 2011) suggests that periphyton cover in the Ruamahanga is possibly under-estimated by the current assessment method, and that sampling protocols for estimating the periphyton cover in the Ruamahanga River be reviewed to ensure accurate assessments in future.

Table 13: Summary of analysis of assimilative capacity within the Ruamahanga River

Parameters	**Guideline Value**		**Flows < ½ median flow**	**Flows <median flow**	**Flows < FRE3 flow**	**Flows > FRE3**
	ANZECC	GWRC proposed limit				
Assimilative capacity in the Ruamahanga River at McLays						
DRP (mg/L)	0.010	0.014 (@<FRE3)	0.002 (+0.008) (+0.012)	0.002 (+0.008) (+0.012)		
DIN (mg/L)	0.460	0.180 (@<FRE3)	0.030 (+0.435) (+0.150)	0.030 (+0.435) (+0.150)		
NH_4-N (mg/L)	0.021	0.9 (@pH8 & 20°C @ all flows)	0.005 (+0.016) (+0.895)	0.005 (+0.016) (+0.895)	0.017 (+0.004)	0.016 (+0.005)
Clarity (m^{-1})	1.6m	3m (@<median)	5.07 (+3.47) (+2.07)	4.26 (+2.66) (+1.26)	2.05 (+0.45)	0.82 **(-0.78)**
E.coli (cfu/100mL)	550	550 (@<FRE3)	4 (+546) (+546)	1.5 (+448.5) (+548.5)	9 (+441)	5 (+445)
Assimilative capacity in the Ruamahanga River at Te Ore Ore						
DRP (mg/L)	0.010	0.014 (@<FRE3)	0.008 (+0.002) (+0.006)	0.003 (+0.007) (+0.011)		
DIN (mg/L)	0.460	0.180 (@<FRE3)	0.385 (+0.080) **(-0.205)**	0.385 (+0.080) **(-0.205)**		
NH_4-N (mg/L)	0.021	0.9 (@pH8 & 20°C @ all flows)	0.005 (+0.016) (+0.895)	0.005 (+0.016) (+0.895)	0.005 (+0.016)	0.008 (+0.013)
Clarity (m^{-1})	1.6m	3m (@<median)	2.63 (+1.07) **(-0.37)**	1.79 (+0.11) **(-1.21)**	0.64 **(-0.96)**	0.16 **(-1.44)**
E.coli (cfu/100mL)	550	550 (@<FRE3)	60 (+490) (+440)	120 (+430) (+430)	120 (+430)	180 (+370)
Assimilative capacity in the Ruamahanga River at Gladstone						
DRP (mg/L)	0.010	0.014 (@<FRE3)	0.031 **(-0.021)** **(-0.017)**	0.035 **(-0.025)** **(-0.021)**		

DIN (mg/L)	0.460	0.180 (@<FRE3)	0.429 (+0.036) **(-0.249)**	0.320 (+0.145) **(-0.140)**		
NH_4-N (mg/L)	0.021	0.9 (@pH8 & 20°C @ all flows)	0.012 (+0.009) (+0.888)	0.020 (+0.001) (+0.880)	0.025 **(-0.004)**	0.029 **(-0.008)**
Clarity (m^{-1})	1.6m	3m (@<median)	2.78 (+1.18) **(-0.22)**	1.92 (+0.32) **(-1.08)**	0.75 **(-0.85)**	0.16 **(-1.44)**
E.coli (cfu/100mL)	550	550 (@<FRE3)	20 (+530) (+546)	25 (+525) (+525)	48.5 (+501.5)	1400 **(-850)**
Assimilative capacity in the Ruamahanga River at Pukio						
DRP (mg/L)	0.010	0.014 (@<FRE3)	0.007 (+0.003) (+0.007)	0.015 **(-0.005) (-0.001)**		
DIN (mg/L)	0.460	0.180 (@<FRE3)	0.139 (+0.326) (+0.041)	0.330 (+0.135) **(-0.15)**		
NH_4-N (mg/L)	0.021	0.9 (@pH8 & 20°C @ all flows)	0.005 (+0.016) (+0.895)	0.005 (+0.016) (+0.895)	0.017 (+0.004)	0.016 (+0.005)
Clarity (m^{-1})	1.6m	3m (@<median)	2.1 (+0.5) **(-0.9)**	1.0 **(-0.6) (-2.0)**	0.23 **(-1.37)**	0.08 **(-1.52)**
E.coli (cfu/100mL)	550	550 (@<FRE3)	45 (+505) (+505)	61 (+489) (+489)	170 (+380)	1700 **(-1150)**

An indicative comparison of median annual nutrient loads (tonnes/annum) for the period September 2003 – August 2011 based on GWRC RSoE monitoring sites is presented in Table 14. These are also compared to median annual nutrient loads of the Masterton, Carterton, Greytown and Martinborough WWTP discharges into the Ruamahanga River. The combined WWTP discharges upstream of Pukio are estimated to contribute approximately 13.6%, 39.4%, 4.0% and 4.2% of TP, DRP, TN and DIN respectively. Of these discharges Masterton WWTP contributes the most significant portion of these parameters (75 – 83%) prior to current upgrade works. In addition, at the lower catchment sites, it has been shown that the majority of the nutrient loads are carried during high to very high flow conditions.

Table 14 Indicative Comparison of River median annual nutrient loads and WWTP median annual nutrient loads (Numbers in brackets denote the increase (t/a) between sites moving downstream)

Site	TP	DRP	TN	NH_4-N	DIN
McLays	3.35	0.95	29.6	2.30	12.9
Te Ore Ore	11.8 (+8.45)	4.00 (+3.05)	221.5 (+191.9)	3.52 (+1.22)	155.6 (+142.7)
Gladstone Bridge	40.2 (+31.75)	16.8 (+12.8)	599.4 (+377.9)	23.3 (+19.8)	416.2 (+261.2)
Pukio	168.0 (+150.7)	48.7 (+31.9)	1959 (+1360)	38.0 (+14.7)	1229 (+813)
Masterton WWTP	17.3	14.40	63.3	37.7	43.0
Carterton WWTP	2.00	1.74	5.09	4.20	No data
Greytown WWTP	2.00	1.73	5.79	3.45	3.50
Martinborough WWTP	**1.64**	**1.29**	**4.28**	**2.05**	**2.13**

It is acknowledged that a number of the municipal treatment plants are undergoing improvements (in particular Masterton) and reduced loadings into the river can be expected to result in improvements in the Ruamahanga River water quality in the future. In line with the precautionary approach adopted, any improvements have not been considered as part of this assessment.

To provide an indication of overall river health, the following is summarised in terms of macroinvertebrate diversity indices at monitoring sites in the Ruamahanga River and fish species observed. A more detailed assessment is provided in the EAM (2012) report Appendix 9:

- Macroinvertebrate communities of the Ruamahanga River are in generally good ecological health, although some catchment effects appear evident based on the higher condition of the McLays site.
- Specifically, monitoring at the McLays site indicates a high level of ecological health (“excellent” MCI grade), significantly higher than all other downstream sites for MCI, QMCI and %EPT taxa richness, and higher than Pukio for taxa richness. The benthic community at McLays appears to be stable over time.

- Te Ore Ore also appears to be in "good" (MCI grade) ecological health, with consistently higher results than the site at Gladstone. MCI, QMCI and taxa richness appears a stable over time, however %EPT richness appears to be increasing.
- Monitoring at the Gladstone and Pukio sites also indicate "good" (MCI grade) ecological health and with the exception of the differences noted above, no other significant differences were detected. These sites also appear to be stable over time.
- There are around 50 native freshwater fish species in New Zealand, with the three major families being the galaxiids, the bullies, and the eels. As at 10 January 2012, there were thirty-six species of fish identified[54] in the Ruamahanga Catchment, twenty-three of which are native species, and seven of which are exotic (introduced species) and one, the grayling is extinct. The species most frequently recorded are the longfin eel, brown trout, shortfin eel and brown mudfish. Of the native fish identified in the catchment only 4 are non-migratory (dwarf galaxias, crans bully, upland bully, and brown mudfish). The high ratio of diadromous species[55] listed in the Ruamahanga catchment suggests that the Lower Ruamahanga River is an important 'fish corridor' allowing many species to travel between upstream freshwater habitats and the sea. The assessment undertaken also finds that the Ruamahanga River has been identified 'regionally significant' for native fish migration, and the Lower Ruamahanga River in particular is also important for providing access to spawning reaches in tributaries including the Mangatatere and Huangarua Rivers, in particular for trout.

4.3.4 Lake Onoke

Lake Onoke is a 630 hectare highly modified shallow coastal lake/estuary and the ultimate receiving environment for the MWWTP and other discharges that enter the Ruamahanga River. Lake Onoke drains to the sea at Palliser Bay through an opening at the south eastern end of the lake. The Lake outlet regularly blocks and requires artificial opening.

Little has historically been known about the water quality in Lake Onoke and the effect of landuse within the catchment. An ecological vulnerability assessment undertaken in September 2007 (Robertson & Stevens 2007) rated Lake Onoke's existing condition as poor for sedimentation, nutrients, saltmarsh and aquatic macrophytes.

A full description of the Lake and its existing qualities and constraints has since been reported for GWRC by Perrie & Milne (2012)[56]. Some key findings of this report include:

- Together with Lake Wairarapa, Lake Onoke is part of the largest wetland complex in the southern North Island, which is considered to be of both national and international importance due to its significant ecological, recreational and natural character values.
- Lake Onoke has traditional and spiritual values and is considered a taonga. Historically, Lake Onoke was an important source of mahinga kai, especially in regards to tuna (eels).

[54] From NZ Freshwater Fish database; reported at Table 25 - Assessment of Ecological effects on the Ruamahanga River from MWWTP: EAM; April 2012.

[55] Fish which migrate between freshwater and saltwater during their lifecycle.

[56] Perrie, A and Milne, JR. 2012. Lake water quality and ecology in the Wellington region: State and trends. Greater Wellington Regional Council, Publication No. GW/EMI-T-12/139, Wellington.

- Due to the high diversity of wetland habitats present in and around the lake it provides significant habitat for a wide variety of plant, fish and bird species, including both regionally rare and threatened species. However, as with the eels, there is concern around the status of many of these populations.
- Lake Onoke is listed in Appendix 2 of Greater Wellington's Regional Coastal Plan as an area of significant conservation value. Values include being a breeding ground for threatened bird species and marine fish and rare and vulnerable native plant species.
- Water quality in Lake Onoke is heavily affected by the large component of agricultural land use in the catchment.
- Nutrients are also received from urban land use and discharges of treated municipal wastewater (via the Ruamahanga River).
- The relative contributions of nutrients to the Lake from respective external sources are not well understood.
- The role of internal nutrient cycling, a potentially significant factor, has not been quantified.
- Investigations into nutrient inputs is a high priority for GW for Lake Onoke given that further land use intensification is expected in the Wairarapa Valley.
- Flow conditions in the Ruamahanga River influence water quality in the Lake. Water quality deteriorates with an increase in river flow, due to the monitoring near the mouth of the Ruamahanga River and increased flushing of nutrients that occurs within the large upstream agricultural catchment during rainfall events. (This is consistent with the deterioration of water quality (i.e. higher concentrations of both phosphorus and nitrogen) in the Ruamahanga River at higher flows of this report).
- The influence of the Ruamahanga River outflow on water quality in other parts of the lake (i.e. Western Lake) is not known but is likely to decrease to some extent with distance from the river mouth (at least when the lake mouth is open).
- Similarly little is known about the potential for internal cycling of nutrients within the lakebed sediments, although moderately elevated concentrations of phosphorus have been detected in surface lakebed sediment samples collected from sites in the centre and western portions of the lake.
- Water quality in some coastal lakes has been shown to be strongly influenced by whether the lake mouth is open or closed.

The report confirms that the actual contribution of individual landuse types (including wastewater treatment plants) is not able to be determined at this point. There are a wide range of variables influencing water quality within the lake, the correlation between which is not well understood at all. Importantly, given the location of the monitoring location, the report concludes that monitoring results are not necessarily representative of the lake as a whole. It recommends a considerably more comprehensive programme of monitoring and address associated catchment wide landuse issues on water quality, and discourage point source discharges to surface water. Much of this responsibility lies with GW in terms of regulation and monitoring.

Whilst it is outside of the scope of this application to confirm the relative loadings and effects of all nutrients in the catchment, SWDC will be assisting GW in their programme of catchment wide improvement through this application and the environmental monitoring proposed. The estimate of nutrient loads from the WWTP based on historical monitoring data is outlined in section 2.5. The proposed monitoring regime for this consent will provide additional background level data, which SWDC will be supplying to GW on a regular basis.

4.4 The Cultural Perspective

As assessment with respect to cultural values and perspectives has been commissioned by SWDC[57]. This, first and foremost identifies that the typical assessment afforded cultural values in terms of section 6, 7, and 8 of the RMA often do not enable consideration of the wider picture.

The assessment identifies that indigenous studies amongst Maori theorisers has examined what was needed for full Maori research. Six Kaupapa Maori principles have been identified which will better enable Maori to benefit from any research that they are involved in. The benefits of this approach are expected to extend past the conceptual to the transformative. The six principles are:

1. **Tino Rangatiratanga** transformative principle that seeks transformative action;
2. **Whanau** principle that seeks benefit for all parts of the community
3. **Raruraru o te Kainga** socio economic principle that acknowledges the difficulties whanau face
4. **Taonga Tuku Iho** principle that acknowledges what we have been passed down to us
5. **The Ako Maori** principle that acknowledges the preferred way Maori want to transmit knowledge
6. **Moemoea** The kaupapa principle of a collective vision from the people going forward

The assessment has identified the need to resolve the breaches of the Treaty of Waitangi by the Crown in order to enable the full involvement of Wairarapa Maori as an affected party.

SWDC supports the Treaty of Waitangi Claim settlement process, and also looks forward to the settlement of claims within the District.

The assessment has considered the proposed activity in terms of these principles, and has also considered the relevant policy frameworks. It has not raised any significant concerns from a cultural perspective on the application itself. The assessment does however raise the following key issues:

1. That improvement in water quality is a long term process which needs to be done correctly,
2. The need for integrated catchment management
3. The importance of enabling participation of Maori in their own right
4. The key need to improve water quality in Lake Wairarapa
5. The importance of maintaining and enhancing water quality in waterways

[57] Cultural Values Assessment (Refer Appendix 14)

6. Recognising the issues associated with infiltration into the system reducing the efficiency
7. The intrinsic values Maori afford water, and the contrary nature of introducing human effluent into water

4.5 Local Amenity and Recreation Values

The Ruamahanga is identified as being a water body with values requiring protection, having recreational and amenity values[58], in particular for fishing, swimming, kayaking, canoeing, tubing, rafting, power boating, jet skiing, picnicking, walking, and duck shooting. GWRC (2012) have identified that the suitability for recreational grades achieved downstream of the MWWTP (at "Bentleys Beach"), are "very poor" when considered in all flows, improving to "poor" during low flow conditions[59].

As with water quality and cumulative effects, it is very difficult to determine the specific effect on recreational values from the MWWTP. SWDC have however recognised the potential effect in the staging of the land treatment outlined.

As outlined earlier, Lake Onoke also has recreational and amenity values associated with it. These are however affected by the nitrification and siltation of the lake by landuse within the large Ruamahanga River and Lake Wairarapa catchment, as outlined earlier.

[58] Wellington Regional Policy Statement; Appendix 1, Table 15.

[59] Greenfield S, Ryan A and Milne JR. 2012. *Recreational water quality in the Wellington region: State and trends*. Greater Wellington Regional Council, Publication No. GW/EMI-T-12/142, Wellington.

5 STATUTORY CONTEXT AND CONSENT STATUS

5.1 Resource Management Act 1991 - Part III (Duties and Restrictions)

The following limitations apply under the RMA (paraphrased):

> Section 15 – in relation to discharges, no person may release:
> - a contaminant into water; or
> - a contaminant onto or into land which may result in the contaminant entering water; or
> - a contaminant from an industrial or trade premise into air; or
> - a contaminant from an industrial or trade premise onto land,
>
> unless expressly allowed by a national environmental standard or other regulation, a rule in a regional plan, or a resource consent (note that an industrial or trade premise include premises used for disposal of waste materials).

Thus for the proposed activity, a range of regional consents may be needed for either proposed stage, depending on the contents of the relevant regional plans.

5.2 Regional Plans for the Wellington Region

5.2.1 Discharge of treated wastewater effluent to water

Treated wastewater effluent is proposed to be discharged to the Ruamahanga River throughout the term of consent, with the frequency and volume changing as described in section 3.2. In addition, the proposed wastewater discharged during Stage 1B to the MWWTP Adjacent Block could technically be a discharge to surface water in specific groundwater and river conditions. Consent is therefore sought to provide SWDC with certainty.

Rule 5 of the Regional Freshwater Plan for the Wellington Region (as updated at January 2012) (the Freshwater Plan), specifies the following:

> *The discharge of any contaminant or water into fresh water:*
> - *that is not provided for in Rules 1, 2, 3, and 4; and*
> - *which cannot meet the requirements of Rules 1, 2, 3, and 4; and*
> - *which is not a non-complying activity in Rule 6;*
>
> *is a **Discretionary Activity**.*

The proposed discharge is not provided for within Rules 1 to 4 (which relate to minor discharges, stormwater and contamination only by heat).

Rule 6 provides for *Discharges to wetlands, lakes and rivers, with surface water to be managed in its natural state* as a Non-complying activity. These water bodies are specified in Appendix 2 (Part A) of the Freshwater Plan. The Ruamahanga River is not specified in that schedule. Rule 6 is therefore not applicable.

The proposed discharge of treated effluent to the Ruamahanga River (including indirectly from the discharge to land at the MWWTP Adjacent Block) therefore requires consent pursuant to Rule 5 of the Regional Freshwater Plan, to be assessed as a **Discretionary Activity**.

5.2.2 Discharge of Treated Effluent to Land

The proposal includes discharges of treated effluent to land as follows:

1. The discharge of effluent into land through the open channel which discharges the treated effluent from the MWWTP to the Ruamahanga River;

2. The potential discharge to land of effluent through the bottom and sides of the MWWTP ponds;

3. The discharge of treated effluent to land to the MWWTP Adjacent Block (Stage 1B) as described in section 3.

4. The discharge of treated effluent to land at Pain Farm as described in section 3 from 2035.

The 'Regional Plan for Discharges to Land' (the Discharges to Land Plan) contains rules relating specifically to the discharge of treated wastewater to Land. Rule 8 of that Plan provides a 'catch all' rule for all discharges containing human sewage not otherwise provided for. Rule 8 states that

> *Any discharge containing human sewage onto or into land is a Discretionary Activity unless the discharge is allowed by Rule 3, 5, 6, or 7.*

Rule 8 covers any discharge to land that contains human sewage which is not a pit latrine (Rule 5), controlled discharge of aerobically treated sewage (Rule 6), or smaller scale on-site treatment and disposal (Rule 7).

Due to the scale of the MWWTP it is unlikely that Rules 3, 5, 6, or 7 are intended to apply, and also it cannot be guaranteed that the proposed activity would comply with the respective permitted activity standards at all times.

To provide certainty, resource consent is therefore sought by SWDC under Rule 8 of the Discharges to Land Plan for these potential discharges. These applications should also be determined as a Discretionary Activity.

5.2.3 Discharge to Air

The Regional Air Quality Management Plan contains a specific rule on the discharge of contaminants to air from sewage disposal as a permitted activity. This however excludes municipal sewage treatment. The explanation to the Rule specifies that:

> *The discharge of contaminants to air arising from the treatment of municipal sewage or liquid or liquid-borne trade wastes is explicitly excluded from Rule 21 and requires a resource consent under Rule 23.*

Rule 23 is a general rule stipulating activities not otherwise permitted will require resource consent as a Discretionary Activity. This will necessarily apply to the proposed Land Treatment, both Stages

1B and 2A & 2B, effectively providing a replacement consent and "extension" of the existing odour discharge consent to align with the term of these consents.

> ***Rule 23 General rule (discretionary activities)***
> *The discharge of contaminants into air from:*
> *(1) any process or activity explicitly excluded from Rules 1-22*
>
> *is a **Discretionary Activity**.*

5.2.4 Wairarapa Combined District Plan

5.2.4.1 MWWTP

The MWWTP operates under an existing designation[60] in the Wairarapa Combined District Plan ("**WCDP**") in favour of SWDC for 'Sewage Disposal' purposes. The proposed continuation of operations at the MWWTP falls within the existing designated purpose.

It is also noted that:

- there are no changes to the proposed activity which would require an amendment to the existing designation at this stage[61];
- there are no landuse activities[62] proposed which fall outside of the designated purpose at the MWWTP, and therefore no additional landuse consents required under the district plan provisions;
- a designation of the Stage 2A & 2B irrigation area (Pain Farm) and associated infrastructure is not proposed at this stage;
- any landuse consents required under the WCDP for the establishment of the irrigation infrastructure (including pump stations and in ground pipes) will be obtained from SWDC prior to implementation of Stage 2A), when detailed design has been completed.

It is therefore considered that no resource consents are required under the WCDP.

It is also noted for completeness, that the MWWTP is within a Rural 'Special' Zone. This zone was established specifically to provide long term certainty to key infrastructure, and in particular protect against potential reverse sensitivity effects. This is considered in further detail later in the assessment. The site is also contained within a Flood Alert Management Area, acknowledging the potential risk of flooding associated with the location adjacent to the Ruamahanga River.

5.2.4.2 Proposed Land Treatment

The proposed Stage 1A land treatment will fall within the scope of the existing designation. An Outline Plan of Works[63] will be filed upon completion of detailed design of the irrigation / land treatment scheme.

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60 Refer WCDP, Appendix 6 - Designation (Ds065); also illustrated on Planning Map 67.

61 An amendment to the designation will be required should the SWDC decide to include the land disposal area within the designated area. SWDC are under no obligation to do this, but a decision will be made at a later date on this matter.

62 Landuse activity in this respect is as defined in section 9 of the RMA.

Pain Farm is not included within the existing designation. Stage 2A & 2B Land Treatment therefore needs to be considered in terms of the provisions of the Wairarapa Combined District Plan.

Plan Change 3 to the District Plan[64] introduced new rules relating to the discharge of treated wastewater to Land. Of relevance to this application is Rule 4.5.2(m)(ii)(a). This provides a setback distance standard of 25m from the property boundary for the spray irrigation of treated wastewater with *E.Coli* concentrations with a median less than 100cfu/100ml to be a permitted activity (i.e. would not require a resource consent under the WCDP), where an irrigation system is:

a) Low pressure (less than 1.4 bar); and
b) Has a low boom height (less than 1.52m from the ground);
c) Does not have end spray guns; and
d) Where irrigation will not occur during wind speeds exceeding 4m/s (14.4km/hr).

SWDC is comfortable that land treatment can occur at Pain Farm and meet each of these standards. As such, no landuse consent is sought (or necessary) under the District Plan.

5.3 Summary of Resource Consents required for the proposed activity

From the assessment of the relevant regional plans, it is considered that the proposed continuation of the operation of MWWTP as proposed requires consent for the following:

- **Discharge of a contaminant to water** for the discharge of treated effluent to the Ruamahanga River pursuant to section 15(1)(a) of the RMA and Rule 5 of the Regional Freshwater Plan for the Wellington Region (all stages);

- **Discharge of contaminant to land and which may enter water** for the discharge of wastewater via seepage to land through the base and sides of the unlined treatment pond (and maturation ponds) and the discharge channel pursuant to section 15(1)(b) of the RMA and Rule 8 of the Regional Plan for Discharges to Land (all stages);

- **Discharge of a contaminant to land and water** for the discharge of treated effluent to the MWWTP Adjacent block (including Stage 1B) and Pain Farm (Stage 2A & 2B) which may enter groundwater and the Ruamahanga River, in terms of section 15(1)(b) of the RMA and Rule 8 of the Regional Plan for Discharges to Land;

- **Discharge to contaminants to air** pursuant to section 15(2A) of the RMA and Rule 23 of the Regional Air Quality Management Plan (all stages);

The consents should be determined as '**Discretionary Activity**' in terms of the Act. A proposed consent framework is included in Part 1, with suggested conditions of consent).

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[63] An Outline Plan of Works is required under section 176A of the RMA, unless a waiver is obtained. A waiver may be sought by the Applicant if appropriate. This will be confirmed as part of Detailed Design and Environmental Management Plan.

[64] The decision on Plan Change 3 was released on May 12, 2012. A copy of this decision and relevant sections of the WCDP is included as Appendix 15.

5.4 Resource Management Act 1991 – Part VI (Resource Consents)

Part 6 of the RMA sets out the process for an applicant to apply for resource consent, and the process for a consent authority, in this case GWRC, to determine that application.

This application has been prepared in accordance with the relevant provisions of the Act (in particular s.88).

5.4.1 Section 104 – Consideration of Applications

Section 104 clarifies that the rules and standards contained within the plans identify the trigger points at which the consent authority has determined it wishes to give further consideration to a proposed activity by way of the resource consent process. They provide a baseline of a range of effects considered appropriate. They do not provide a definitive line over which activities should not be consented. It is also clarified here that for a discretionary activity, GWRC has the ability to accept the application and grant consent (including attaching relevant conditions under the guidance of s108), or decline the consent.

A discretionary activity requiring consent must be assessed against the relevant policy provisions which sets out the long term objectives and outcomes sought, and then the specific actual or potential effects of the proposed activity on the receiving environment considered on that basis. Both of these factors must be considered in the overall context of 'sustainable management'[65] and the balance required to be achieved between the environment and the well-being of the community. Only then can a decision as to the appropriateness of the proposed activity be made.

5.4.2 Section 105

Section 105 of the RMA outlines a number of other specific matters the consent authority must have regard to in respect of a discharge consent. These matters are:

(a) *the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and*

(b) *the applicant's reasons for the proposed choice; and*

(c) *any possible alternative methods of discharge, including discharge into any other receiving environment.*

The nature of the discharge and the receiving environment are described in detail in Sections 3 and 4 respectively. The reasons for the proposal are outlined in the discussion on the SWDC Wastewater Strategy in Section 2. A comprehensive assessment of alternatives has been undertaken, as described in Section 1.1 and 7.3 of this report.

5.4.3 Section 107

Section 107(1) of the RMA is restrictive in nature, providing that where any of the following effects are likely to result from a discharge to water, after reasonable mixing, consent shall not be granted:

- the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials,
- any conspicuous change in the colour or visual clarity,

[65] The Purpose and Principles of the RMA, including a definition of 'Sustainable management' for the purposes of the Act, are included in Part II of the Act (ss.5-8).

- any emission of objectionable odour,
- the rendering of fresh water unsuitable for consumption by farm animals, or
- any significant adverse effects on aquatic life.

Section 107(2) specifies the situations in which a consent authority can grant consent if the criteria in s.107(1) are not met, provided it is consistent with the purpose of the Act (section 5 of the RMA) to do so. This provides that:

> *(2) A consent authority may grant a discharge permit ... to do something that would otherwise contravene section 15 ... that may allow any of the effects described in subsection (1) if it is satisfied—*
> *(a) that exceptional circumstances justify the granting of the permit; or*
> *(b) that the discharge is of a temporary nature; or*
> *(c) that the discharge is associated with necessary maintenance work—*
> *and that it is consistent with the purpose of this Act to do so.*

In the event consent is granted, s107(3) provides the ability for GWRC to include conditions requiring works to be staged to ensure that the requirements of s107(1) outlined above can be met.

Section 107(1) is reproduced in full in Appendix 10.

For completeness, an assessment against the exceptions provided in s107(2) is provided below.

5.4.3.1 Section 107(2)(a) – exceptional circumstances

There is no strict legal test for what constitutes "exceptional circumstances" in terms of s.107. Whilst it needs to be considered on a case specific basis, this assessment is commonly applied for wastewater discharge applications throughout New Zealand. Commonly referred to caselaw includes *Paokahu Trust v Gisborne District Council A162/03*, which related to the Gisborne District community wastewater coastal outfall. In that case the Court found that the consequences of refusing a consent (i.e. that the Council could not lawfully use its wastewater system), were 'out of the ordinary' and granted consent on that basis.

This precedent and approach has been adopted locally recently, with the grant of the discharge consents for Carterton District Council. The decision of the Commissioners[66] in that application includes the following:

> *In our view we do not consider exceptional circumstances apply with regard to the effects of the discharge itself, as this WWTP is no different to others around the country which successfully operate without breaching the requirements of s107(1). We struggle with the reasoning that this WWTP is any different to make it exceptional. However, we agree with Mrs Foster where she states:*
>
> *"It is my conclusion that there are exceptional circumstances that justify a grant of consent to allow CDC's discharges to water to continue for a limited period. Those circumstances are that CDC and the Carterton urban community rely on the wastewater treatment and disposal system to function sustainably and to maintain public health standards…"*

[66] Decision on Application by Carterton District Council Wellington Regional Council: WAR090120 [27251, 27252, 27253, 30652, 30653]; 24 August 2012; Paragraph 13.1.3

> *We see the argument presented by Mrs Foster as managing the effects of a community having no legitimate discharge, and not the discharge itself. Despite what may seem like semantics, it is plainly clear that declining grant of consent would result in a situation where a community would be left without a legal discharge, and this would be an exceptional circumstance*.

The same considerations apply in terms of this current consent, and the potential circumstances of not granting consent would be equally exceptional. While the evidence in that situation considered short term consent, the principles remain the same; that the community would be left without a legal discharge which would be an untenable situation and contrary to the purpose of the Act.

In addition, SWDC has outlined a detailed programme of staged improvements and assessed effects profiles that will also ensure that during the term of consent the criteria of s107(1) are met.

5.4.3.2 Section 107(2)(b) – the discharge is of a temporary nature

The effects of the discharge on the receiving environment have been occurring over a prolonged period of time, and to that extent are unlikely to be able to be considered as temporary. However, in terms of the current application, there is specific provision within the proposal to decrease the extent of adverse effect in a staged manner through Stage 1A & 1B, and then significantly in Stage 2A. The effect of the proposal is therefore not permanent.

There is some guidance in caselaw, providing that "temporary" is case specific, and that the intent of the RMA and relevant policy framework are relevant considerations[67]. In terms of this application, the proposal is intended to enable the implementation of a long-term strategy (50 years plus) to remove wastewater discharges from surface water. In addition, the most significant effects, those on aquatic life during low-flow periods in the Ruamahanga, will be significantly reduced with the Stage 1B Land Treatment. This is currently programmed to commence in the summer of 2015/16 – a period of approximately just 18 months. Following this, there may still be an adverse effect, but its significance is considerably reduced.

From this perspective it is considered that there is the potential that within 18 months effects may have been reduced to no longer have a significant adverse effect on aquatic life.

5.4.3.3 Section 107(2)(c) – associated with necessary maintenance work

The proposed discharge is not associated with necessary maintenance work.

5.4.3.4 Consistency with the Purpose of the Act

The overriding requirement to grant consent under the exceptions provided in s107(2) still remains that the proposal is consistent with the purpose of the Act. The SWDC strategy (as outlined in section 1.1) and this proposal are consistent with the purpose and the principles of sustainable management.

[67] *Fletcher Property Ltd v America's Cup Village Ltd A050/99*

5.5 Policy Framework

This section outlines the relevant policy documents and provisions. It covers relevant national, regional, and local policy. This is useful in order to put the proposal into the wider context of what the national and regional policy frameworks are seeking to achieve in the short and long term.

5.5.1 National Policy Statement Freshwater Management 2011

The National Policy Statement for Freshwater Management 2011 (Freshwater NPS) came into effect on 1 July 2011. From that date, decision-makers under the RMA must have regard to the NPS in consenting decisions.

The Freshwater NPS contained two transitional policies (A4 and B7) requiring Regional Councils to amend their Plans to be consistent with the policies for freshwater quality (A4) and quantity (B7) directly into regional plans. Plan Change 4 (December 2011) to the Regional Freshwater Plan for the Wellington Region inserted policies into the Plan to give effect to policies A4 and B7 of the Freshwater NPS.

The assessment of consistency in that respect can therefore be limited to the relevant provisions of the Regional Freshwater Plan.

Integrated management

Part C of the NPS directs the integrated management of freshwater on a catchment basis.

Objective C1 *To improve integrated management of fresh water and the use and development of land in whole catchments, including the interactions between fresh water, land, associated ecosystems and the coastal environment.*

Policy C1 *By every regional council managing fresh water and land use and development in catchments in an integrated and sustainable way, so as to avoid, remedy or mitigate adverse effects, including cumulative effects.*

Policy C2 *By every regional council making or changing regional policy statements to the extent needed to provide for the integrated management of the effects of the use and development of land on fresh water, including encouraging the co-ordination and sequencing of regional and/or urban growth, land use and development and the provision of infrastructure.*

The proposed activity is founded on the strategic approach outlined at Section 1.1. These include

- Taking a long term view of solutions (20-50+ year horizon).
- Developing the best practicable option across all three sites in an integrated and sustainable manner
- Developing long-term technical options with a high degree of performance certainty fundamentally based on balanced parameters of risk, public health, environmental effect, and financial affordability.
- Providing continued engagement with key stakeholders, including iwi and community groups, (which has been ongoing since 2008) in considering and developing the preferred long-term options.

The proposal is therefore not inconsistent with the principles of integrated catchment based resource management and Part C of the NPS.

Tāngata whenua roles and interests

The NPS contains specific recognition of the importance of providing for the involvement of tangata whenua in decision on freshwater resources and related ecosystems.

Objective D1 *To provide for the involvement of iwi and hapū, and to ensure that tāngata whenua values and interests are identified and reflected in the management of fresh water including associated ecosystems, and decision-making regarding freshwater planning, including on how all other objectives of this national policy statement are given effect to.*

Policy D1 *Local authorities shall take reasonable steps to:*

a. involve iwi and hapū in the management of fresh water and freshwater ecosystems in the region

b. work with iwi and hapū to identify tāngata whenua values and interests in fresh water and freshwater ecosystems in the region and

c. reflect tāngata whenua values and interests in the management of, and decision-making regarding, fresh water and freshwater ecosystems in the region.

The applicant has engaged with iwi representatives from Rangitaane o Wairarapa and Kahungunu ki Wairarapa during the process of developing this resource consent application and the longer term aspiration to remove discharge from the river. There is overwhelming support from tangata whenua at the proposal to remove the discharge from surface water and go to land.

The Cultural Impact Assessment commissioned by SWDC generally agrees with the intent of these policies, and seeks to find ways in which Maori can be actively engaged in the decision making process.

SWDC has proposed a condition to develop a Tangata Whenua Values Management Plan. This will ensure the operational practices adopted recognise the key role and values of tangata whenua as kaitaiki, and include provision for identification of cultural health indices and monitoring. This will include an ongoing commitment to work through the Wastewater Steering Group, but more importantly provide an opportunity to provide input into forming key decisions.

The proposed activity is therefore considered to generally reflect and provide for the intent of Section D of the Freshwater NPS.

5.5.2 Wellington Regional Policy Statement (2013)

The Regional Policy Statement ("**RPS**") is a high level policy document which all regional and district plans within the region are required to give effect to. The intent of the RPS is to integrate the management of natural and physical resources across the region to achieve the stated community outcomes.

Within the RPS, the wastewater network is identified as an important physical resource, and defined as "Regionally Significant Infrastructure"[68]. The RPS then outlines a number of provisions which recognise the benefits of regionally significant infrastructure (including public health and safety)(refer RPS Objective 10), and require Councils to provide for its protection from adverse effect (including reverse sensitivity) (refer RPS Policy 39), even if it affects public access to surface water (refer, for example, RPS Policy 59).

The RPS promoted the transfer of treated wastewater from water to Land (refer RPS Policy 16, for example).

In terms of the Ruamahanga River, the proposed RPS identifies the growing competing demands for use of the river and for the various uses and development of its floodplains. The Ruamahanga is identified as being a water body with values requiring protection, having recreational and amenity values[69], in particular for fishing, swimming, kayaking, canoeing, tubing, rafting, power boating, jet skiing, picnicking, walking, and duck shooting. It is also identified that the Ruamahanga is an identified habitat for indigenous fish species, and for six or more migratory indigenous fish species. This has also been identified in section 3.1.10 above.

Importantly also, the RPS identifies the importance of cultural values, and the importance of the water resource to Maori, and seeks to provide for its enhancement. This aligns with the SWDC strategy of limiting wastewater discharge to the River.

5.5.3 Regional Freshwater Plan

The Regional Freshwater Plan for the Wellington Region (December 1999; updated January 2012) ("**the Freshwater Plan**") has a number of general objectives and policies, and then more specific objectives and policies that relate to the aspects for which specific rules have been developed.

The Ruamahanga River is included in Appendix 5 – "*Water Bodies with Regionally Important Amenity and Recreation Values – Water Quality to be Managed for Contact Recreation Purposes*".

The mid and lower reaches of the Ruamahanga River are scheduled in Appendix 7 - "*Water Bodies with Water Quality Identified as Needing Enhancement*". The specified purpose for which enhancement is sought is "Contact Recreation Purposes", consistent with the inclusion in Appendix 5, referred above.

The general objectives and policies are directed at protecting the mauri of water and respecting the **relationship of tāngata whenua with waterbodies** (Objectives 4.1.1 to 4.1.3), protecting natural character; protecting ecosystem habitat values and the life-supporting capacity of water and aquatic ecosystems (Objectives 4.1.4 to 4.1.6); maintaining or enhancing amenity and recreational values associated with water (Objectives 4.1.7 and 4.1.8); managing flood hazard risks (Objectives 4.1.9 and 4.1.10), and providing for the use and development of freshwater resources, subject to managing adverse effects and enabling community involvement (Objectives 4.1.11 to 4.1.17).

These general objectives are expanded through numerous policies. Principle amongst them in relation to the MWWTP project are (summarised):

[68] Wellington Regional Policy Statement; 2013; Appendix 3 - Definitions
[69] Wellington Regional Policy Statement; Appendix 1, Table 15.

- to avoid, remedy or mitigate adverse effects on aquatic habitats and freshwater ecosystems by having regard to maintaining biological and physical processes; feeding, breeding and sheltering habitat; diversity of aquatic life; fish life-cycles; and preventing irreversible adverse effects (Policy 4.2.11)
- to promote maintenance and enhancement of aquatic habitats and ecosystems when considering landuse outside of the river bed (Policy 4.2.12);
- to avoid, remedy, or mitigate any adverse effects on water bodies identified as regionally important for amenity and recreational values by managing effects and timing activities to minimise effects on amenity and recreational use (Policy 4.2.15);
- To restrict public access to river beds only where exceptional circumstances exist, including to provide for public health and safety (Policy 4.2.16);
- To promote avoidance or mitigation of potential effects associated with flooding (Policy 4.2.18);
- To have regard to the benefits of the proposal on use of the water body (Policy 4.2.23);
- To have regard to the effects on other established activities (Policy 4.2.24);
- To encourage users of freshwater to adopt an ethic of guardianship for future generations (Policy 4.2.25);
- To adopt a precautionary approach to the management of freshwater where information is incomplete (Policy 4.2.26);
- encouraging the restoration or rehabilitation of freshwater resources, including wetlands, where appropriate (Policy 4.2.27)
- To recognise the needs of existing lawful users of freshwater by allowing users to upgrade progressively their environmental performance where improvements are needed and to prioritise existing users over new users (Policy 4.2.29):
- providing for activities which have effects that are no more than minor – as a guide, these encompass non-exclusive activities; activities that have localised and/or temporary effects on plants, animals and habitats; activities with no off-site adverse effects and no significant or prolonged decreases in water quality; no adverse effects on natural character, traditional tāngata whenua sites or uses; and no adverse effects on river bank stability (Policy 4.2.33)
- to apply appropriate conditions (Policy 4.2.35 and 4.2.36).

Specific objectives and policies that relate to **water quality** that are relevant to the application, summarised, include:

- to manage water quality for contact recreation purposes in identified water bodies (including the Ruamahanga River) (subject to Policy 5.2.10) (Policy 5.2.4);
- to have regard to specified water quality standards in Appendix 8 (subject to Policy 5.2.10) (Policy 5.2.8);

- To manage the quality of identified waterbodies for the identified purpose (including the middle and lower reaches of the Ruamahanga for contact recreation purposes (Policy 5.2.9)
- to allow contaminant discharges which do not satisfy the above policies only in specified circumstances, including that the discharges are temporary and/or associated with necessary maintenance, or that exceptional circumstances justify granting the permits, and that it is consistent with the RMA's purpose to grant consent (Policy 5.2.10)
- when considering resource consent applications, to have regard to the extent to which the discharge will avoid contamination that will have an adverse effect on the life-supporting capacity of freshwater and freshwater ecosystems, and how likely (meaning feasible and dependable) it will be that any discharges will avoid more than minor adverse effects on ecosystems (Policy 5.2.10A)
- to ensure that mixing zones allowed by conditions take into account the existing characteristics of the water and waterbody and the purpose for which it is being managed (Policy 5.2.11);
- to allow discharges containing sewage directly to freshwater where it is agreed as appropriate (Policy 5.2.12);
- to encourage discharges to land where there are less adverse effects than discharging to water and there are no significant constraints to doing so (Policy 5.2.13); and,
- to promote a reduction in non-point source discharges (Policy 5.2.15).

The **water quantity and the taking, use, damming or diversion of freshwater** objectives and policies relative to the application, are summarised below. Note that, as no actual water take from a water body is proposed, a limited number of provisions are relevant. These relate to the diversions associated with the project.

- people are able to divert surface water, while ensuring that flows in rivers maintain the natural and amenity values of the waterbodies (Objective 6.1.1)
- when considering applications, to take into account the extent of adverse effects on the life-supporting capacity of freshwater and associated ecosystems (Policy 6.2.4A)
- to provide for minor or temporary diversions when they are associated with authorised works or resource consents (Policy 6.2.14)
- to allow the diversion of water provided that adverse effects are avoided, remedied or mitigated, and provide that significant adverse effects on natural and amenity values, water quality and flows, biological and physical processes, fish passage, sediment transport, flood hazard, bank stability, if not adequately offset, are avoided (Policy 6.2.15)
- to encourage water conservation (Policy 6.2.19).

The relevant objectives and policies for the **use of beds of rivers and lakes and development on the floodplain** include (paraphrased):

- appropriate uses of beds of rivers are allowed provided there is no increase in flood risk and adverse effects are avoided, remedied or mitigated (Objectives 7.1.1 and 7.1.2)

- to not allow the use of river beds for uses that have significant adverse effects on a range of uses and qualities including tāngata whenua values, natural and amenity values, water quality, flood hazard, bank stability, and water quantity (Policy 7.2.2)
- to ensure that the reclamation or drainage of a river bed is only carried out when there are no practicable alternatives, there are significant benefits to the community and it is consistent with Policy 4.2.10 (see earlier reference – natural character protection) (Policy 7.2.15).

5.5.4 Regional Plan for Discharges to Land (1999)

This Plan has a range of objectives and policies addressing primarily land contamination, hazardous substances, and waste discharges.

The Discharge to Land Plan recognises the importance to tangata whenua and the wider community of removing sewage from water for discharge to land, and the benefits of land based discharges, but also recognises that poorly designed systems, overloading soils or discharging industrial waste can have an adverse effect on the soil resource (Issue 2.1.3 & 2.3.1). Overall, the Plan recognises a preference to discharge sewage to land.

The Plan recognises that there are a large number of small scale domestic discharges to land in the region, the significant effects of which need to be managed (Objective 4.1.4) and more generally that the adverse effects of discharges of liquid contaminants are avoided, remedied or mitigated (Objective 4.1.5).

Policies seek to:

- Give particular consideration to any relevant iwi management plans or statements of tangata whenua views (Policy 4.2.12).
- Give particular regard to the following matters when assessing applications for permits to discharge contaminants to land from reticulated sewerage systems (Policy 4.2.13):

  (1) the nature of the contaminants entering the sewerage system and being discharged from the system;

  (2) whether trade wastes are present in the system, and any actions required to:

  (a) monitor the trade wastes entering the system; and

  (b) minimise the adverse effects of trade wastes on the treatment of the effluent;

  (3) the extent to which stormwater is able to enter the system, and any actions required to avoid, remedy or mitigate the effects of system overload by stormwater;

  (4) the management of the system, and any actions required to avoid, remedy or mitigate the effects of any accidental discharges from the system;

  (5) the location of the discharge site and the hydrogeological conditions at and around the site;

  (6) the extent to which the effluent is treated prior to the discharge entering any water, and any actual or potential effects of the discharge on surface water, coastal water, and groundwater (particularly in the vulnerable areas identified in Map 1);

  (7) the effects of any odour or contaminant discharged into air;

(8) any actual or potential effect of the discharge on human health or amenity, and on the health and functioning of plants, animals or ecosystems;

(9) any other uses or values of the discharge site and surrounding area, including any values placed on the site by tangata whenua; and

(10) the Public Health Guidelines for the Safe Use of Sewage Effluent and Sewage Sludge on Land, or alternative researched and documented benchmarks for assessment.

- To require discharges to land from reticulated sewerage systems to be managed in accordance with a site-specific discharge management plan (Policy 4.2.14).
- To require discharge permits for on-site sewage treatment and disposal systems only where there are likely to be significant adverse effects as a result of the size of the system, or particular constraints imposed by the site (Policy 4.2.15(2)).

The Project includes a comprehensive process for the development of detailed design and management plans to ensure each of these matters will be given regard.

5.5.5 Regional Air Quality Management Plan (2000)

This Plan seeks to manage the potential effects of discharges on air quality. With respect to the Project, the general policy relating to managing the effects of discharges on air quality is relevant. Specific policies of relevance are:

- To ensure mitigation takes into consideration the sensitivity of the receiving environment (Policy 4.2.6)
- To require the following where appropriate (policy 4.2.10):
  - Best Practicable Option (BPO) to be adopted;
  - operations manual and contingency plans
  - effects based monitoring
- To avoid, remedy or mitigate any adverse effects, (including on human health or amenity values) which arise as a result of the frequency, intensity, duration, offensiveness, time and location of the discharge to air of odorous contaminants (Policy 4.2.14).

5.6 Resource Management Act 1991

5.6.1 Purpose and Principles

The decision on the application must be consistent with the overriding purpose and principles if the RMA. The stated purpose of the Act is to '*promote the sustainable management of natural and physical resources'*[70]. The term 'sustainable management' is specifically defined[71].

> *In this Act,* sustainable management *means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—*

[70] Section 5(1), Resource Management Act, 1991
[71] Section 5(2), Resource Management Act, 1991

(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.

Sections 6, 7, and 8 of the RMA then outline the principles by which this overriding purpose should be applied. In summary:

- Section 6 sets out matters that are defined to be of 'National Importance', including:
  - *the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development* (s.6(a))
  - *the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers* (s.6(d))
  - *the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga* (s.6(e))
  - *the protection of protected customary rights* (s.6(g))

- Section 7 identifies specific other matters which must be given particular regard in determining the application, including
  - *Kaitiakitanga, and the ethic of stewardship* (s.7(a) & 7(aa))
  - *the efficient use and development of natural and physical resources* (s7(b))
  - *the maintenance and enhancement of amenity values* (s.7(c)), *and the intrinsic values of ecosystems* (s7(c) & s.7(d))
  - *maintenance and enhancement of the quality of the environment* (s.7(f))
  - *any finite characteristics of natural and physical resources* (s.7(g))
  - *the protection of the habitat of trout and salmon* (s.7(h))
  - *the effects of climate change* (s.7(i))

- Section 8 requires that the Principles of the Treaty of Waitangi be taken into account.

6 ASSESSMENT OF EFFECTS AND PROPOSED MITIGATION

6.1 Introduction

This section outlines the potential effects of the proposed activity on the receiving environment.

6.2 Positive Effects

The consideration of "effects" associated with the Project includes any positive effect[72].

There are obvious benefits to the Martinborough and South Wairarapa community of having an operating and efficient wastewater treatment network. SWDC and the urban Martinborough community rely on the wastewater treatment and disposal system to function sustainably and to maintain public health standards. An inability to continue to operate the wastewater network would have significant consequences on the wellbeing of the community, and on their health and safety. This is recognised in the Regional Policy Statement with the inclusion of the plant as "regionally significant infrastructure".

The proposal has also been integrated with the necessary upgrade projects at Greytown and Featherston. This has ensured that all three communities will receive the necessary investment and all three receiving environments a reduction in the adverse effects associated with wastewater treatment over the consent term. The adopted strategy and capital programme across all three plants has also necessarily taken into consideration the financial constraints of the South Wairarapa communities. Exceeding the financial capacity of the community would have significant adverse effect on both current and future generations, and the proposed strategy will avoid that. The proposal has the benefit of being affordable, whilst achieving significant improvements.

The proposed activity will remove treated effluent from the Ruamahanga River in clearly defined stages. Although there are acknowledged existing water quality issues upstream of the MWWTP which are outside the Applicant's control, the proposal will have a clear benefit to the water quality and recreation values across the term of the consent, and beyond. Importantly, the proposed staging will also ensure that a significant improvement is made in the short-term, with the removal of nutrients during low-flow conditions, when susceptibility to adverse effects is greater.

Overall the project achieves a sustainable balance in enabling the wellbeing of the community, and providing considerable benefits to the environment.

6.3 Potential Effects on Surface Water Quality and River Health

Discharges of contaminants to water from treated wastewater do have the potential to adversely affect the life-supporting capacity and quality of that water body. Depending upon the nature of the discharge and the receiving environment, these effects can range from insignificant to acute in a very short timeframe if contamination is significant, or gradual and cumulative over a long period of sustained exposure.

The assessment below considers the potential effects of the existing discharge on the Ruamahanga River, which is proposed to continue for up to 2 years, and the potential effects of the staged

[72] RMA: Section 3 – Meaning of Effect.

removal of the discharge over the short to medium term (recognising the variety of landuse in the catchment, including urban and primary productive uses). Minor pond optimisation works are proposed to the existing wastewater treatment plant, however, while some improvement in effluent quality may occur these works are not designed to significantly improve the discharge quality as mitigation will be achieved primarily over time through the proposed land treatment.

This assessment of potential effects of the proposed activity on water quality and river health has been undertaken in accordance with the RMA, relevant technical standards, and the Water Quality Guidelines contained at Appendix 8 of the Regional Freshwater Plan. Information has been drawn from previous effects assessments of the current discharge and includes findings from the following environmental investigations:

1) Annual macroinvertebrate surveys undertaken by Coffey since 2006 on behalf of SWDC. EAM (2012) provides a comprehensive summary of the survey results (see Appendix 9).
2) An assessment of ecological effects undertaken by Forbes Ecology (2013) during the 2012 – 2013 summer low flow period. As part of this work, Forbes Ecology undertook a mixing study, periphyton surveys, and water quality sampling within the Ruamahanga River (see Appendix 11). It is considered the low flow assessment provides a very conservative worst case approach as the conditions at the time correlated with a 1 in 70 year drought event.
3) A river water quality sampling programme undertaken by SWDC collecting monthly samples from upstream and downstream of the MWWTP since July 2010 to December 2013. The data sets analysed are limited[73] and provide a snapshot only of River water quality at sites upstream and downstream of the MWWTP. The plume characterisation work undertaken by Forbes (2013) also highlights further limitations with the downstream river data, particularly in regard to the sampling locations used which are likely to have fallen outside the most concentrated discharge plume. Therefore the river water quality monitoring data provides limited information on discharge effects but has been included as part of the assessment of effects in the absence of any other site specific data.
4) LEI (2014)[74] have used an empirical water and nutrient budget to determine the proposed discharge regime (see Appendix 7). An important component of this budget is the adopted approach that phosphorus (P) is the limiting nutrient in the River, as is common in catchments with similar characteristics to the Ruamahanga River Catchment, and that P loading will result in no detectable change beyond the mixing zone for determination of acceptable discharge between HMF and FRE3. For the current analytical methodology used this corresponds to a change in river water concentration of no more than 0.002 mg/L (P detection limit). In the absence of an acceptable load to the river being established, this approach is considered to be conservative.

[73] Total dataset = maximum 40 samples. EAM (2012) has assessed the data between March 2011 – December 2011 (n=16) which included data collected under different flow conditions. Forbes Ecology (2013) has provided an assessment of the summer low-flow 2012-2013 data (n=5). AWT has collated all the data collected and this is provided in Appendix 10.

[74] LEI, Martinborough WWTP Land Discharge Scenarios and Assessment of Environmental Effects, March 2014.

5) Mass Balance Calculations prepared by Forbes and AWT Water (2014) supersede those prepared by EAM (2012) [75] (see Appendix 12). The Mass Balance approach has been adopted to make predictions of the concentration of a given contaminant after full mixing within the river. For a given contaminant the Mass Balance calculations use the upstream river water quality concentration (taken from the SWDC in-stream monitoring data between March 2011 and April 2013[76]), in conjunction with treated effluent quality (between January 2009 and November 2013) and discharge flow rates (based on the water and nutrient budget work by LEI) to predict what concentration should be expected after full mixing downstream of the discharge under various river flow conditions (river flow data taken from Waihenga Bridge). The Mass Balance Calculations have been used to assess the current and future scenarios. It is considered that the mass balance calculations present a very conservative worst case approach for the following reasons:

   - River flows under wet weather wastewater flow scenarios have been assumed to be the same as dry weather wastewater flows. It would be highly unlikely that a wet weather wastewater flow would occur during minimum river flow conditions; however this conservative approach provides a useful understanding of worst case outcomes of the discharge quality for the receiving environment.
   - Similarly it has been assumed the river background and effluent concentration data would be the same under dry weather and wet weather flows, again this is unlikely to be the case.
   - Contaminant concentration results from river up-stream monitoring carried out by SWDC appear to be higher for most contaminants when compared against those recorded at the Gladstone RSoE monitoring site.

   In addition, monthly average in-river concentrations after full mixing of the discharge and corresponding plant contribution concentrations to the downstream river concentrations have been calculated using daily time-step river flow and discharge flow rate information (generated from the water and nutrient budget) for each of the proposed upgrade scenarios including the existing scenario.

6) The outputs from this water and nutrient budget have been used to estimate the seasonal discharge load of key contaminants to the River from the existing MWWTP discharge and following the staged removal of discharges from the proposed land treatment upgrades (AWT, 2014, see Appendix 12).

6.3.1 Potential Effects Associated with the Discharge of Treated Wastewater to the Ruamahanga River

6.3.1.1 Effects on Water Quality associated with the Direct Discharge to Water

The mixing study undertaken by Forbes (2013), assists in characterising the spatial extent of the discharge plume and concluded the following:

[75] There was uncertainty raised by GWRC of what river background information had been used by EAM in their mass balance calculations, therefore Forbes and AWT have re-evaluated the mass balance information using the full upstream river water quality dataset collected by SWDC.

[76] The upstream concentrations have been split between summer and winter concentration data and seasonal medians used. The data has not been analysed in terms of river flow due to the limited dataset available.

- The discharge plume was found to result in a concentrated, relatively poorly mixed plume area which extended <4m laterally across the river from the TL bank and appeared to extend beyond 370m downstream of the outfall.
- Beyond that zone more uniform mixing was observed.
- The less concentrated plume extended as far as 6/10 to 7/10 of the river's width within 30m downstream of the outfall and was sufficient to stimulate periphyton growth.
- Periphyton provided the best indicator of plume extent, and showed that by 90 – 130m downstream of the outfall the entire river's width was, at least at times, affected by the plume.
- Outside of the concentrated plume, the extent of periphyton cover across the riverbed began reducing from 130m downstream.

It is therefore concluded that an area of the mixing zone along the TL riverbank is poorly mixed during low flow conditions. The specific effect of this further downstream of 250m has not been assessed. SWDC therefore proposed to undertake further investigations to characterise river health in the discharge "near zone" (c.4m from the True Left Bank for a distance of no less than 250m downstream of the discharge) under a range of river and wastewater flow conditions[77]. This work will be used to better characterise the mixing zone, and confirm future water quality and ecological monitoring sampling locations.

The following sections assess the effects of the different contaminants within the discharge on the receiving environment based on the information available.

6.3.1.1.1 Dissolved Reactive Phosphorus

High bioavailable nutrient concentrations such as DRP in the water column in conjunction with other favourable facts such as periods of sustained low flow and high sunlight penetration, can increased peak biomass and lead to undesirable periphyton proliferation. Excessive periphyton growth can impact the aesthetic/recreational values, fishery values and negatively impact aquatic biodiversity of water bodies. The proliferation of periphyton growth can also lead to problems in aquatic systems such as altered flows, large diurnal fluctuations in dissolved oxygen concentrations, eutrophication and in some instances the formation of algal blooms which can be toxic to humans and animals.

Existing and Stage 1A Discharge Effects

The predicted assimilative capacity of the Ruamahanga River for DRP measured at Gladstone Bridge and Pukio is poor during less than median flows as discussed in Section 4.3. These predictions are supported in part by the SWDC upstream river water monitoring results, which show, median DRP concentrations in the river exceed both the ANZECC default trigger value (0.010mg/L) and the GWRC proposed limit (0.014mg/L), indicating the river over the period of monitoring is at capacity for DRP over 50% of the time (see Appendix 12).

No statistically significant difference in median DRP concentrations between upstream and any downstream monitoring results were observed, however, it is acknowledged that the full effects of the discharge may not have been captured during this monitoring programme (EAM, 2012; Forbes

[77] refer proposed condition Part 1, Schedule 2: Condition 8

Ecology, 2013). The high proportion of periphyton cover measured during the low flow assessment also indicates a response to the discharge DRP concentrations (Forbes, 2013).

Mass balance calculations show that following full mixing, DRP will remain elevated when compared with guideline values under all flow conditions (largely related to the already elevated upstream concentrations). Discharge contributions to river DRP concentration following full mixing are high, and are particularly significant during river flow conditions less than HMF and depend greatly on the discharge flow rate and effluent concentration. These plant contributions decrease with increasing river flow and appear seasonal, with reduced effects on downstream DRP concentrations under winter discharge scenarios (see Appendix 12).

Based on the above analysis it is concluded that the existing discharge is likely to be having an adverse effect on river DRP concentrations downstream of the outfall and that these adverse effects are restricted quite discretely to the TL riverbank of which the full extent of effects are not well known. Across the width of the river, mixing and dilution within the river appears to moderate DRP increases downstream of the outfall, although discharge effects at river low flows are perhaps better described by the periphyton cover assessment discussed in Section 6.3.1.2.1 (Forbes, 2013). The discharge concentration contributions are greatest during river flow conditions at and below HMF as showing in Figure 19 below. The effects of the existing discharge will continue as proposed until the 2015/16 summer period at which time Stage 1B land treatment is to commence. Therefore, during this period it is anticipated that the adverse environmental effects on the environment will be more than minor during summer low flow periods.

Targeted treatment to remove phosphorus from the discharge, such as coagulant dosing, was considered as part of the options evaluation. However due to the short period of time this form of treatment would provide most value, the significant capital expenditure required and the probability for such treatment to become redundant and counteract the purpose of the land treatment cut and carry operation, SWDC have discounted this option. SWDC have instead focused its resources on removing the discharge from the river.

Stage 1B – Stage 2A Discharge Effects

The proposed removal of the discharge during low flow conditions (flows less than HMF), as part of the Stage 1B upgrades will result in a significant reduction in plant contribution to DRP concentrations in the river and should result in enhanced downstream water quality during these periods, when undesirable periphyton growths are most likely as shown in Figures 19 and 20.

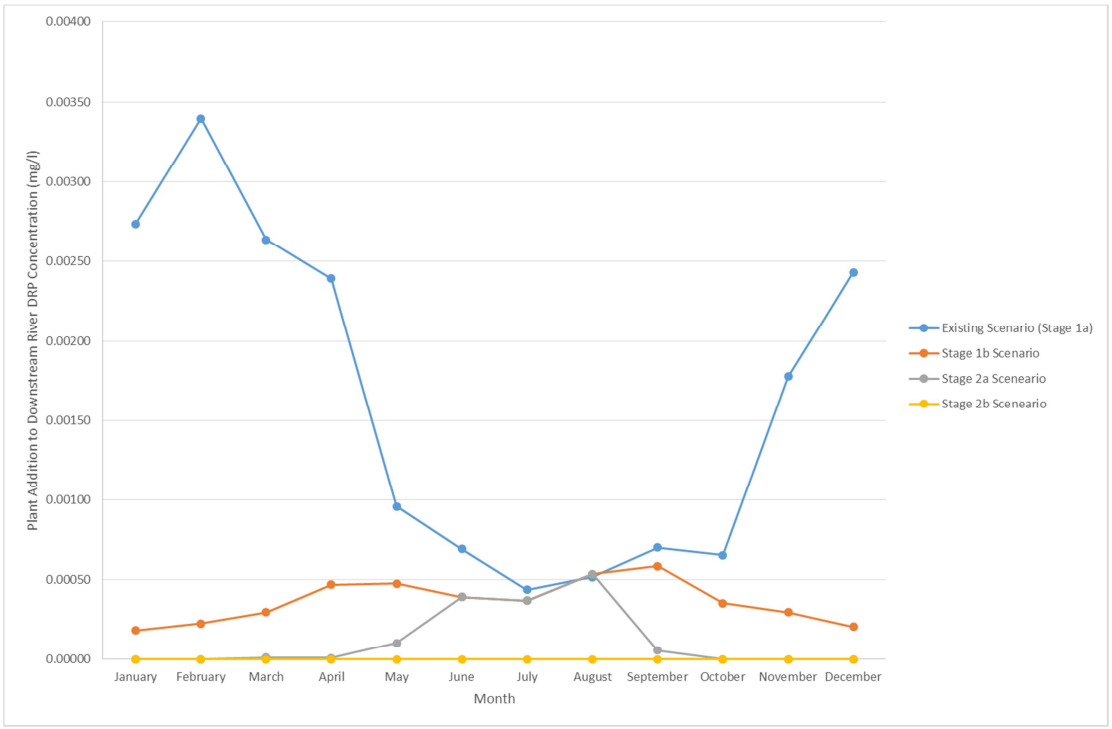

Figure 19: Plant DRP Concentration Contribution to Downstream River Quality for each proposed staged upgrade

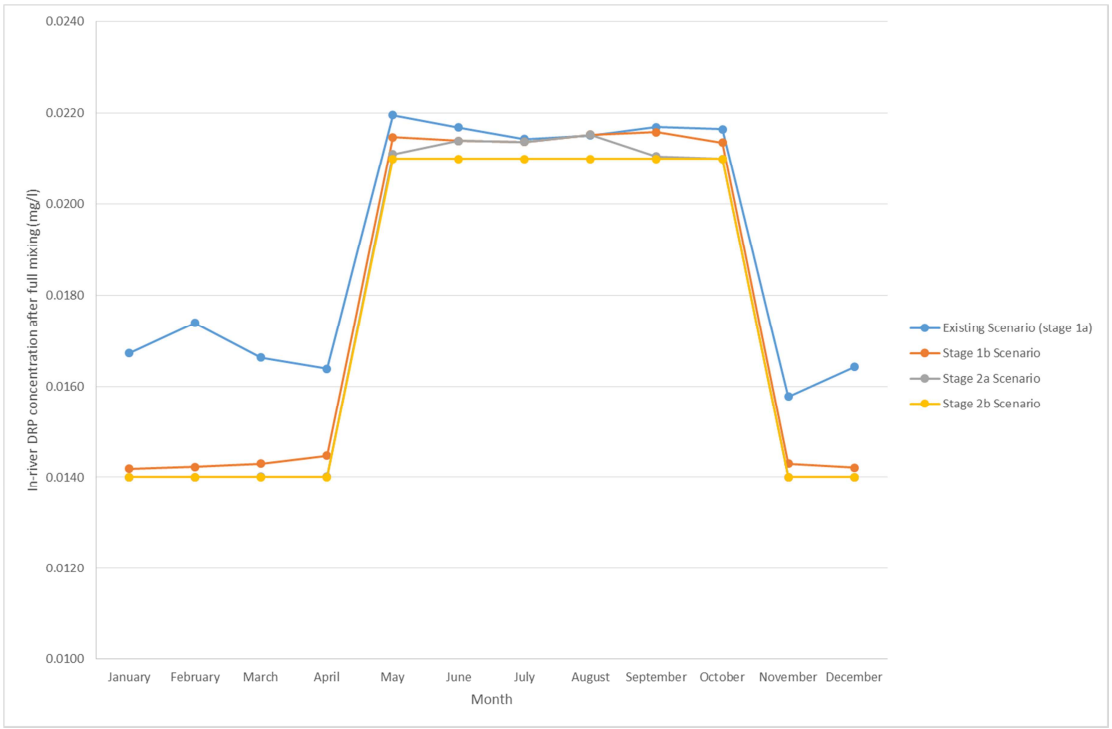

Figure 20: Downstream fully mixed river DRP concentrations for each proposed staged upgrade

The continued discharge during river flows above HMF, are unlikely to have significant cumulative effects downstream as the discharge regime has been developed based on a conservative approach that ensures phosphorus concentrations following full mixing will not increase above detection limits

(0.002mg/l) thus minimising the discharge concentration contribution to the river. Near-field effects from the discharge during flows greater than HMF have not been fully defined, although are likely to be limited to the TL bank of the river with improved mixing as river flows increase. The proposed Near Zone River Health Survey[78] will assist in confirming this.

The proposal to remove the MWWTP discharge during low flow conditions and the proposed restrictions to discharge rates under other river flow conditions is expected to result in an overall enhancement to river quality in terms of DRP concentrations and the environmental effects are expected to be no more than minor.

Stage 2B Discharge Effects

Stage 2B will see a complete removal of the discharge from the River for most years, with an allowance to discharge treated effluent only under high flow conditions when mixing will be high. The effects on the environment following stage 2B are expected to be no more than minor.

6.3.1.1.2 Dissolved Inorganic Nitrogen

Existing and Stage 1A Discharge Effects

Similarly to DRP, DIN is a bioavailable nutrient and can result in undesirable periphyton growths, thus impacting on contact recreational values and aquatic systems.

The predicted assimilative capacity of the Ruamahanga River for DIN measured at Gladstone Bridge and Pukio is poor during less than median flows as discussed.

River data over the 2012-13 low flow season showed all mean and median DIN values were less than the ANZECC default trigger value (0.465mg/l), however some individual upstream and downstream DIN concentrations did exceed the proposed GWRC DIN quality limit (0.180mg/l). No significant difference in median DIN values between upstream and any of the downstream monitoring sites was observed. However, to reiterate, the river monitoring data undertaken is unlikely to have captured the concentrated plume and thus the full effects of the near-field discharge on downstream DIN concentrations.

As with DRP, DIN river background concentrations frequently exceed guideline values, therefore, the discharge DIN concentrations after mixing, will remain elevated above guideline values during these periods. An increase in DIN concentrations is indicated following full mixing by the mass balance calculations (see Appendix 12), however the contribution by the plant to downstream river DIN concentrations are comparatively small when compared to DRP, and reduce to negligible levels with increasing flow.

Based on the above analysis it can be concluded that the existing discharge is likely to be having an adverse effect on DIN concentrations downstream of the outfall and that these adverse effects are restricted quite discretely to the TL riverbank and may extend to distances greater than 500m downstream. Following full mixing, the MWWTP DIN contribution to the River however appears

[78] refer proposed condition Part 1, Schedule 2: Condition 8

minor to negligible, thus the cumulative effects of the existing discharge downstream after full mixing are likely to be no more than minor.

Stage 1B – Stage 2A Discharge Effects

The removal of the discharge during low flow conditions as part of the Stage 1B upgrades will have a significant improvement in downstream water quality during summer low flow periods. However near-field effects of the discharge during flows greater than HMF have not been defined, and may continue to have some level of effect that are likely to be limited to the TL bank of the river and are reduced with improved mixing as river flows increase. This will also be confirmed in the proposed Near Zone River Health Survey.

Stage 2B Discharge Effects

Stage 2B will see a complete removal of the discharge from the River for most years, with an allowance to discharge treated effluent only under high flow conditions when mixing will be high. The effects on the environment following stage 2B are expected to be no more than minor.

6.3.1.1.3 Total Nitrogen

Existing and Stage 1A Discharge Effects

Based on the SWDC river water quality monitoring the median TN concentrations are shown to have returned to less than the ANZECC default trigger value (0.614mg/l) by 50m downstream (Table 15).

Table 15: Total Nitrogen Concentrations Monitored Upstream and Downstream of MWWTP (2010-2013)

ANZECC default trigger value	50m upstream		50m downstream		250m downstream		500m downstream	
	median	95%ile	median	95%ile	median	95%ile	median	95%ile
mg/L								
0.614	0.490	1.140	0.600	1.680	0.555	1.239	0.590	1.207

The 95th percentile results at all sites (including upstream) exceed the ANZECC default trigger value.

Statistical analysis of the river TN concentration data collected over the 2012-13 low flow season showed no significant difference in median values between upstream and any of the downstream monitoring sites. All mean and median TN values were less than the ANZECC default trigger value (0.614mg/l). As with DRP and DIN, the monitoring to date is unlikely to have captured the concentrated plume and thus the full effects of the discharge on downstream TN concentrations.

Mass balance calculations for TN indicate the current summer median after full mixing under all river flow conditions will comply with the ANZECC default trigger value (refer to Appendix 12). Moderate percentage contributions under maximum discharge rates are observed, however these apply only to discharges during low flow conditions. Background median winter TN concentrations using historical upstream river data exceed guideline values, therefore after mixing, discharge TN concentrations during winter will also exceed guideline values. However as with summer conditions the percentage contribution of TN from the MWWTP discharge to the River is negligible.

Based on the above analysis it is concluded that the existing discharge is likely to be having a near-field adverse effect on nitrogen concentrations downstream of the outfall and that these adverse effects are restricted quite discretely to the TL riverbank and may extend to distances greater than 500m downstream. Across the river, the plume appears to mix well, and the effects soon become insignificant. The contribution to river concentrations following full mixing appear moderate during low flow conditions when the plant is being operated at maximum discharges rates (likely to be a rare occasion), however at all other times the TN concentration contribution from the plant is likely to be no more than minor.

Stage 1B – Stage 2A Discharge Effects

The removal of the discharge during low flow conditions as part of the Stage 1B upgrades will result in a significant reduction in plant TN concentration contribution to the river as shown in Figure 21 and result in some improvement in downstream water quality during summer low flow periods although the level of improvement is not as significant as that noted for DRP.

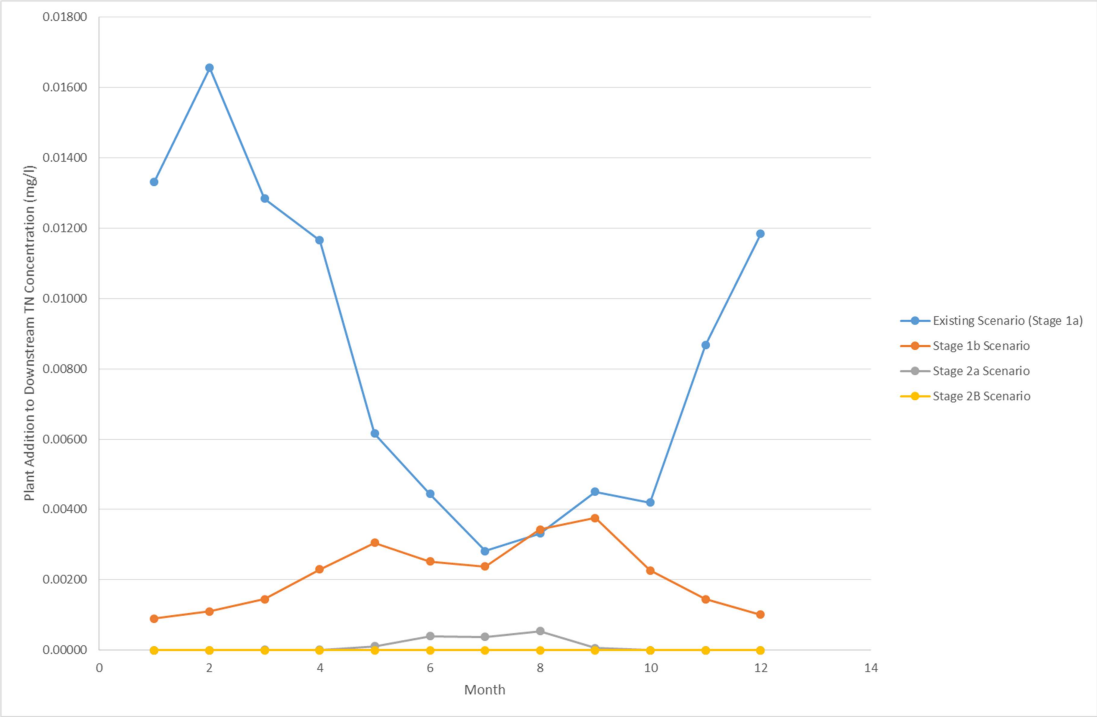

Figure 21: Plant TN Concentration Contribution to Downstream River Quality for each proposed staged upgrade

Near-field effects of the discharge within the concentrated plume during river flows greater than HMF have not been defined, and may continue to have some effects that are likely to be limited to the TL bank of the river and are reduced with improved mixing as river flows increase. The proposed Near Zone River Health Survey will provide additional information in this respect. Downstream cumulative effects of the discharge contribution to river TN concentration following full mixing however will be no more than minor for Stage 1B and negligible for Stage 2A.

Stage 2B Discharge Effects

Stage 2B will see a complete removal of the discharge from the River for most years, with an allowance to discharge treated effluent only under high flow conditions when mixing will be high. The effects on the environment following stage 2B are expected to be deminimis.

6.3.1.1.4 Nitrate-Nitrogen

The summer low-flow monitoring during 2012-13 showed that Nitrate-N concentrations had no significant difference in median values between upstream and any of the downstream monitoring sites, and that all results were well below the GWRC proposed limit of 1.7mg/l for chronic toxicity and ANZECC toxicant limit of 0.7mg/L for 95% protection level (Forbes, 2013). No further analysis of nitrates has been undertaken as this parameter is not currently monitored at the MWWTP and it is assumed to be in low concentrations due to the type of treatment processes used at MWWTP. No proposal to denitrify the effluent as part of the upgrade works is included, therefore the effects on the river water quality environment will not change in the short-term and remain simply improve as the effluent is removed from the river as part of implementing the land treatment components of the scheme.

6.3.1.1.5 Ammonia

Ammonia can be toxic to many aquatic organisms and the level of toxicity is governed by pH, temperature and salinity.

Existing and Stage 1A Discharge Effects

Under high river flows (FRE3 and greater) the assimilative capacity of the River to receive Ammonia is limited when compared with the ANZECC default trigger level (0.021mg/L), however no non-compliance with chronic exposure trigger limits are noted from the RSoE monitoring sites in the Lower Ruamahanga.

Based on the SWDC river water quality monitoring data, the existing discharge appears to affect downstream ammoniacal-nitrogen concentrations in the Ruamahanga River resulting in an exceedence in the ANZECC default trigger level (0.021mg/L) for physical and chemical stressors on aquatic organisms (refer to Table 16). However exceedence of chronic exposure trigger concentrations have not been recorded (i.e downstream sampling data shows compliance with the ANZECC trigger value and GWRC proposed quality limit of 0.9mg/l for protection of 95% of species in freshwater) (refer to Figure 22).

Table 16: Ammonia Concentrations Monitored Upstream and Downstream of MWWTP (2011-2012)

ANZECC default trigger value	ANZECC chronic exposure trigger value / GWRC proposed limit	50m upstream		50m downstream		250m downstream		500m downstream	
		Median	95%ile	median	95%ile	median	95%ile	median	95%ile
mg/l									
0.021	0.900	0.020	0.030	0.070	0.280	0.050	0.122	0.060	0.120

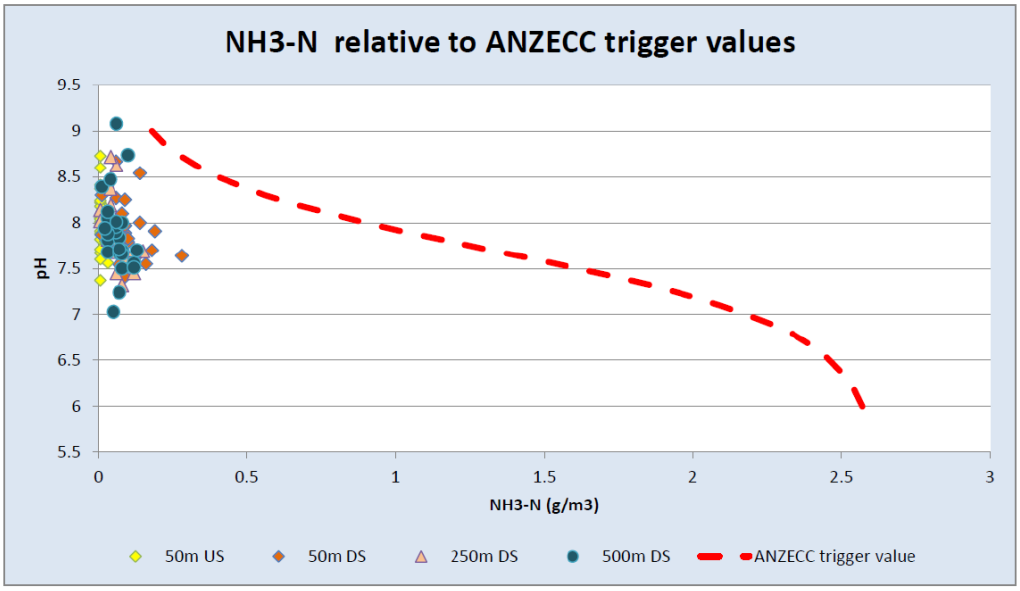

Figure 22 – Ammoniacal Nitrogen Concentrations measured 50US, 50DS, 250 DS, 500 DS of the MWWTP discharge compared with River pH data (Forbes, 2012).

At the closest monitoring point to the treated wastewater outfall (50m DS), the median ammonia concentration (0.09mg/l) is 10 times less than the chronic exposure trigger value and the maximum ammonia concentration is 3.21 times less than the chronic exposure trigger value. The data therefore suggests that mixing of treated wastewater reduces ammonia concentrations to less than chronic levels well within 50m downstream of the discharge point (Forbes, 2012[79]). Sampling over the low-flow summer period (2012-2013) supported this finding, with all except one result for ammonia less than laboratory detection limits. Despite the constraints identified with the sampling programme, this does provide evidence that if effects are greater within the concentrated discharge plume, then these effects would appear to be limited to a narrow area along the TL bank of the river reducing the extent of potential effects on aquatic organisms downstream.

Mass balance calculations (Appendix 12), indicate that the current discharge after full mixing would comply with the ANZECC 95% trigger protection limit and GWRC proposed quality limit for ammonia under all flow scenarios. However the ANZECC default trigger is likely to be exceeded during winter (attributed to the elevated river background concentrations measured), and in summer under most effluent quality and discharge rate scenarios when river flows are less than HMF. The plant contribution to downstream river ammonia concentrations is significant under most flow scenarios.

The effects of the existing discharge with regard to river ammonia concentrations is shown to be having an adverse effect downstream of the outfall and it is likely that these effects are greatest within the narrow concentrated plume along the TL riverbank. Across the width of the river, data suggests that mixing of the treated wastewater reduces ammonia concentrations to less than chronic exposure levels well within 50m downstream of the discharge point, thus providing for fish passage. When considering the far-field effects following full-mixing, it is noted the existing discharge is having a significant contribution on the river ammonia concentrations under all

79 Forbes Ecology, Compilation of Supporting Information Regarding Martinborough WWTP Assessment of Instream Effects, prepared for Geange Consulting, 20 November 2012.

discharge scenarios, although the effects of these contributions are not expected to be having chronic or even toxic effects.

Stage 1B – Stage 2A Discharge Effects

The proposed Stage 1B upgrades will result in the removal of all discharges to the River below HMF within the short-term thus negating any potential chronic effects on aquatic ecology during these periods. However near-field effects of the discharge during flows greater than HMF have not been fully defined, and may continue to have some localised effects that are likely to be limited to the TL bank of the river and are reduced with improved mixing as river flows increase and the proportion of discharge contribution reduces.

Following full mixing, it is predicted that the proposed discharge regime will meet all guideline trigger limits during summer months. As shown in Figures 20 and 21 above for DRP and TN, the plant contribution of NH4 and associated effects will markedly reduce over the summer months as a result of Stage 1B implementation and again further with the implementation of Stage 2A. Thus the proposal will result in an overall net improvement in river water quality with regard to ammonia particularly during the summer months, and with time as Stage 2A is implemented in the shoulder months. The effects of the proposed Stage 1B and Stage 2A upgrades will be no more than minor.

Stage 2B Discharge Effects

Stage 2B will see a complete removal of the discharge from the River for most years, with an allowance to discharge treated effluent only under high flow conditions when mixing will be high and migration of aquatic organisms is less likely. The effects on the environment following Stage 2B are expected to be no more than minor.

6.3.1.1.6 Pathogens

The potential adverse effects of pathogens in surface water are a risk to human, animal and ecosystem health, and a reduction in recreational amenity. *E.coli* is monitored by SWDC at the MWWTP and within the River as an indicator for disease causing pathogens.

Existing and Stage 1A Discharge Effects

E.Coli contamination has reduced substantially since the installation of the UV disinfection plant and the recalibration of dosage rates. The UV disinfection plant and pumps are capable of treating up to 3,000m^3/day to the required 3-log reduction target.

The in-stream *E.coli* monitoring data analysed by EAM (2012) and low-flow in-stream data analysed by Forbes Ecology (2013) to assess effects on water quality from the current MWWTP discharge showed pathogen numbers were typically below the 'alert' guideline range for contact recreation (<260cfu/100ml) at all monitoring sites downstream of the MWWTP discharge. Comparison of the upstream reference site to the three downstream monitoring sites revealed no significant differences in *E.coli* concentration. Monitoring data suggests that *E.coli* levels reduce to within the range reported at the upstream reference site within 50m of the discharge[80]. It is reiterated that the

[80] It is noted that the earlier in-stream data was collected prior to the UV disinfection being commissioned.

in-stream sampling points may not have been in the full concentrated plume[81], even so, on review of the recent UV disinfection plant performance[82], the level of treatment being achieved will ensure contact recreation guidelines are met following reasonable mixing.

Mass Balance calculations show the existing discharge will have a negligible increase in pathogen count following full mixing under river summer low flow conditions when contact recreation is likely to be at its greatest. Based on this information, it is considered that the current discharge and proposed median target effluent quality limit of 100cfu/100ml will have less than minor effect on water quality in terms of pathogens and no adverse effects are anticipated by the continued discharge to the River.

Stage 1B – Stage 2B Discharge Effects

Following the commissioning of the staged land treatment, the removal of the existing discharge from the river will further enhance river water quality in terms of public health risk and will ensure the effects on river water quality are negligible. It is noted that the treatment capacity of the UV plant is limited to 3,000m^3/d. Therefore during situations where daily discharge volumes may exceed the UV treatment capacity reduced pathogen removal is anticipated. The effects of this however are considered to be no more than minor as such discharges will be operated to coincide with high river flows when contact recreation is unlikely.

6.3.1.1.7 Biological Oxygen Demand

The potential adverse effect of BOD on surface waters is a reduction in the dissolved oxygen content of the water available to aquatic life and which can result in stress and/or mortality of river flora and fauna. Reducing conditions may occur in the sediment, leading to release of nutrients into the water.

Existing and Stage 1A Discharge Effects

River BOD_5 concentration monitoring carried out over the low flow period 2012-2013 showed no significant difference between the median of upstream and any downstream monitoring sites (Forbes Ecology, 2013). Furthermore, mean and median BOD_5 concentrations were less than the GWRC proposed limit ($ScBOD_5$ - 2 g/m^3 at < FRE3) although based on the variability observed it would appear BOD downstream could exceed these proposed limits periodically.

Mass balance calculations reflect this finding, with no exceedence in the guideline value shown following full mixing of the discharge under all river flow conditions when assessing median and 90th percentile effluent concentrations. Discharge contributions of BOD_5 to the river are also shown to be small. The effluent BOD_5 quality is shown to improve over winter months, which is likely due to greater dilution in the system from I/I, thus effects in winter are expected to be negligible on the river both in the near and far-field.

Based on the very low concentrations measured in the river and small contributions predicted from the discharge, the existing discharge is considered to be having a no more than minor effect on river water biological oxygen demand following reasonable mixing.

[81] One *E.coli* result in March 2012 at the 50mDS sampling site entered the amber range.

[82] median = 36cfu/100ml for 2013 and median = 100cfu/100ml for 2012-2013

Stage 1B – Stage 2B Discharge Effects

Following the commissioning of the staged land treatment, the removal of the existing discharge from the river will further enhance river water BOD concentrations downstream of the MWWTP and will ensure the effects on river water quality are negligible when discharged during river flow conditions greater than HMF.

6.3.1.1.8 Suspended Solids

Existing and Stage 1A Discharge Effects

Fine sediment deposition at 50-90m downstream of the outfall was observed to increase progressively over the low flow monitoring period while the proportional cover by sediment consistently reduced downstream to levels comparable to upstream conditions (Forbes Ecology, 2013). Although the 50-90m downstream site was comparatively more depositional than other downstream monitoring sites, and despite the sediment deposition noted, mean suspended sediment concentrations at all downstream monitoring sites were not significantly different to the mean upstream concentration during the observed summer low flow conditions. The source of sediments at the nearest downstream site was attributed to the treated wastewater discharge, although the effects were not considered statistically significant.

No conspicuous oil or grease films, scums or foams, or gross floatable solids were observed during the summer low flow analysis (Forbes Ecology *pers comm*, 2014).

Mass balance calculations indicate that the summer discharge (when highest suspended solid concentrations are experienced) represents a minor contribution (<8%) to the river in terms of solids concentration following full mixing (see Appendix 12).

Based on the above assessment, the effects of the discharge on suspended concentrations in the Ruamahanga River are considered to be no more than minor, and restricted to within 50 – 90m of the discharge outfall.

Stage 1B – Stage 2B Discharge Effects

Depositional conditions are likely to occur during low flow conditions, therefore any potential depositional effects that may be attributable to the discharge within 90m of the outfall will be mitigated as a result of the proposed removal of discharge during river flows less than HMF. At river flows greater that HMF it is expected that depositional effects will be significantly reduced. Furthermore as river flows increase, the load being carried by the river will increase, meaning the contribution of solids by the plant will be deminimus.

6.3.1.1.9 Visual Clarity and Colour

Visual Clarity and Water Colour have a direct impact on contact recreational values.

Existing and Stage 1A Discharge Effects

Predictions on changes in visual clarity in the Ruamahanga River were made by EAM (2012) using the methodology set out in the RMA Water Quality Guidelines No. 2: *Guidelines for the Management of*

Water Colour and Clarity (MfE 1994). These calculations predicted that there is unlikely to be significant changes in visual clarity (<0.5%) downstream of the discharge from the MWWTP at all flows and the existing discharge would meet the in-stream target of <30% change for the protection of contact recreation and amenity values of the River.

The predicted values are supported by in-stream turbidity and black disk analysis undertaken during low flow conditions when River clarity is understood to be at its best (i.e worst case scenario) (Forbes, 2013). Mean turbidity and black disk results showed no significant difference between mean upstream and any sites monitored downstream of the outfall and clarity at all sites was greater than 3m (GWRC proposed limit). Therefore the effects of the existing discharge on visual clarity are considered to be no more than minor.

Within, what has later been defined as the concentrated plume along the TL riverbank, Forbes Ecology noted some discolouration and cloudiness of the discharge mixing with the River water along the TL bank (Forbes Ecology *pers comm.*, 2014). This discolouration was noted to be within 50m of the outfall. Therefore changes in colour are considered to be no more than minor following reasonable mixing.

Stage 1B – Stage 2B Discharge Effects

Removal of the discharge as land treatment is commissioned will only enhance any potential effects from the discharge on river clarity and colour. Thus the effects on river water quality of the proposed upgrades are considered to be no more than minor.

6.3.1.1.10 pH, Dissolved Oxygen and Temperature

Existing and Stage 1A Discharge Effects

Analysis of the very limited pH and Temperature data over the 2012-13 low flow summer period indicated the discharge had:

- an effect of reducing pH, causing a statistically significant reduction in pH from upstream to up to 150-190m downstream. The change in pH however did not exceed 0.5 pH (GWRC proposed limit under all flows). Even with the reduction in pH, mean and median pH at all sites including the upstream reference site, were elevated above the ANZECC upper limit default trigger value (7.8pH - for physical and chemical stressors for slightly disturbed ecosystems).
- no changes in temperature were observed between upstream and any downstream monitoring site greater than 3 degrees (GWRC proposed quality limit). Thus it is indicated that the effects of the discharge on temperature are no more than minor.
- No more than minor effects are anticipated from the discharge on river water pH or temperature.

Point measurements of DO were taken during the low flow monitoring period, although these were likely taken outside the concentrated plume and were not representative of diurnal effects. On review of the effluent DO, results indicate well oxygenated effluent (average 8.5mgO/L), therefore the potential effects of the discharge are unlikely to be significant with exception to low flow periods when river oxygen levels are likely to be low. It is difficult to conclude what level of effect the

discharge may be having on DO currently, however it is likely to be no more than minor across the width of the river and any adverse effects are likely to be limited to the concentrated plume along the TL bank.

Stage 1B – Stage 2B Discharge Effects

Removal of the discharge as land treatment is commissioned will greatly enhance any potential effects from the discharge on river pH and DO, particularly during low flow conditions when the effects are likely to be at their greatest. River temperature is not considered to be an issue. Thus the effects on river water quality of the proposed upgrades are considered to be no more than minor.

6.3.1.2 Effects on River Health Associated with the Direct Discharge to Water

6.3.1.2.1 Effects on Periphyton

Periphyton growth is a function of overall nutrient supply in the water and the frequency of flood events. The lower Ruamahanga is subject to frequent high flows, meaning shorter 'accrual' periods for algal growth. This explains the low level of breaches of the relevant guidelines for periphyton growth despite the high soluble nutrient loadings.

Existing and Stage 1A Discharge Effects

In a review of the Coffey and Associates reports (2006 – 2013) on periphyton communities, it was found that there was some inter-year variability in late summer periphyton cover (Forbes, 2012; Coffey, 2013[83]). Periphyton cover was consistently high at all three sites sampled, especially at the point 200m downstream of the outfall (site D1) where cyanobacteria and/or green filamentous algae was shown to proliferate. The periphyton cover visual assessment therefore indicates some potential for significant adverse effects to periphyton communities from the discharge.

The significance of effects to periphyton communities during summer low flow conditions was assessed as part of the 2012-2013 summer low flow monitoring program (Forbes, 2013). It is important to note the periphyton surveys were undertaken during one of the most extreme low-flow seasons on record for the Ruamahanga River. The treated wastewater discharge was found to have a locally significant effect on increasing periphyton cover and biomass, which peaked within an area <190 m downstream of the outfall. Reliable signs of diminishing periphyton cover were apparent by 250–290 m downstream of the outfall. In no survey over the 5 month low flow period, did the average of any transect exceed 60% cover by thick mats (GWRC proposed limit). Furthermore, long filamentous algae was less than 30% cover at all sites with exception to April when filamentous algae cover was around 60% both upstream and downstream of the outfall.

The mean accrual period in the lower Ruamahanga River is calculated to be 13 days (based on summer flow data)[84]. Therefore it is suggested that although there is relatively high nutrient enrichment in the Ruamahanga River, periphyton growth is largely kept in check by the high

[83] Coffey and Associates Limited, South Wairarapa District Council Discharge from the Martinborough Oxidation Pond to the Ruamahanga River Instream Biological Survey for part compliance with Condition 20 of consent WAR 970079 (2624), March 2013.

[84] Hickey, C.W.; Norton, N.; Broekhuizen, N., Proposed dissolved reactive phosphorus guidelines for the Ruamahanga River, Client Report HAM2004-082, NIWA report to Beca Carter Hollings & Ferner Ltd, June 2004.

frequency of flood events that occur in this system. The continuation of the existing discharge over the first 2 years of the consent is unlikely to have any immediate improvement on periphyton cover during low flow conditions, however, if assuming that the calculated accrual period of 13 days is correct for the lower Ruamahanga River, then the effects are expected to be infrequent, of a temporary nature and localised to within 250m of the outfall.

Stage 1B – Stage 2B Discharge Effects

Removal of effluent discharges to the River during periods of less than half median river flows will significantly improve near field effects in terms of periphyton cover and biomass and contact recreational values in the River during these low flow periods when environmental conditions are most optimum for periphyton proliferation. The discharge is unlikely to result in any future exceedence in guideline limits and therefore the effects on periphyton cover and biomass as part of the proposed upgrades will be no more than minor.

6.3.1.2.2 Effects on Macroinvertebrate Community Composition

Due to their sedentary nature and relatively long life cycle, aquatic macroinvertebrate communities live with the stresses and changes that occur in the aquatic environment over an extended period of time (in some cases up to a year or more). Their community structure is shaped by those stresses and changes, and therefore they respond to effects over time. Macroinvertebrate communities therefore provide a good indication of impacts in an aquatic environment, and changes can represent influences resulting from both natural and human activities[85]. For New Zealand freshwater systems the Macroinvertebrate Community Index (MCI) is a particularly reliable biotic index for assessing impacts in freshwater environments from nutrient enrichment.

Existing and Stage 1A Discharge Effects

Consideration of the effects of the actual discharge on macroinvertebrate communities has been assessed using annual summer macroinvertebrate survey information undertaken by Coffey and Associates from 2006 – 2013 (EAM, 2012; Coffey, 2013). The monitoring sites compared include an upstream reference, 200m and 500m downstream. By way of summary, these results indicate the following situation in respect of the existing discharge:

1) Overall, physical habitat quality (in terms of macroinvertebrates which colonise stony streams) was relatively low and was compromised by a lack of a well-developed riparian zone in the vicinity of the Martinborough oxidation pond discharge.
2) There was no significant difference in average taxa richness between sampling sites upstream and 500m downstream of the mixing zone for the oxidation pond discharge in the Ruamahanga River during all surveys.
3) However the 2013 summer (70 year drought conditions), was the only time in the past five years that average MCI was significantly reduced at the 500m downstream site relative to the upstream site. This had not been the case during the previous four years and it appears likely that during the early summer drought of 2013, lower river flows contributed to a more

[85] MfE 2007.

significant impact of the Martinborough oxidation pond discharge in the receiving waters of the lower Ruamahanga River.

4) All previous years, no significant difference in MCI or QMCI scores between the upstream site and the 500m downstream site (within years) has been observed. This indicates broadly that the aquatic macroinvertebrate community is likely significantly adversely affected at the point 200m downstream of the discharge point, but not significantly affected 500m downstream from the discharge point.
5) All previous surveys have indicated MCI and QMCI scores at the upstream site and the 500m downstream site to fall within the 'fair' range. While at the 200m downstream site scores generally fall with the 'poor' range. The 2013 summer was the only time that average QMCI upstream and 500m downstream of oxidation pond discharge had been below 4 indicating poor instream quality both upstream and downstream of the mixing zone for the Martinborough oxidation pond discharge to the Ruamahanga River.
6) Some stress is evident in macroinvertebrate communities at both the upstream and 500m downstream sites (at these sites the community was largely driven by a mix of key species, some that are negatively affected by increased pollution (e.g. *Deleatidium*, *Aoteapsyche colonica*, and beetles) and others that have some tolerance to pollution (e.g. *Physella* and *Potamopyrgus* snails and chironomid midges), this was amplified during the summer 2013 low flow period. Considering the surrounding catchment (i.e. farmland) it is likely these sites experience nutrient enrichment from diffuse sources that impacts the structure of the macroinvertebrate community.
7) While the community at the 200m downstream site is likely impaired due to the treated wastewater discharge the key drivers of community structure were the pollution tolerant snail and dipteran *Chironomus* species.

The existing discharge is therefore having a negative localised effect on macroinvertebrate community structure, and under most years this is limited to within 500m downstream, however during the extreme 2013 low flow period, indications were the area of impact may have extended greater than 500m downstream. These effects are unlikely to be improved significantly during the short-term due to general response times of these organisms.

Stage 1B – Stage 2B Discharge Effects

A measurable improvement in instream community structure over the medium term following implementation of the staged land treatment scheme, is expected as a result of the reduced discharge frequency and pollutant input. As a result of other inputs to the lower Ruamahanga River at this location (i.e. farmland) it is however unlikely that the overall condition of the river will improve significantly (i.e. upstream monitoring site has been categorised as 'fair').

6.3.1.2.3 Effects on Fish

Existing and Stage 1A Discharge Effects

To date there has been no work quantifying the effects of the MWWTP effluent discharge (or any WWTP discharge) to fish communities in the Ruamahanga River. During the low flow monitoring period, a fish kill was noted within two points along the most concentrated edge of the discharge plume, which may potentially have been attributable to the discharge during this exceptional low-

flow period (Forbes, 2013). Testing on the likely cause of death of the fish was however not undertaken.

Based on the mixing study, it is considered that the discharge is unlikely to present in toxic levels across the full width of the river thus retaining fish passage up stream (Forbes, 2013). This is supported by the fact that most fish species have been identified upstream of the MWWTP discharge point and that ammoniacal nitrogen in particular is likely to be below guideline limits after reasonable mixing has occurred.

Stage 1B – Stage 2A Discharge Effects

The removal of the discharge during river flows less than HMF as proposed by the stage 1B upgrades is anticipated to mitigate the potential effects indicted by the low flow monitoring period, when the discharge is experiencing reduced dilution and mixing. Thus the effects on fish habitat and passage following the implementation of the proposed land treatment scheme is considered to be no more than minor.

Stage 2B Discharge Effects

The subsequent removal of all direct discharges to the river in the medium-term, with exception to particularly wet years and high river flows, is considered to have negligible effects on fish habitat and passage.

6.3.2 Potential Effects of the Discharge to Land on Surface Water-bodies

The Ruamahanga River is the only surface water body in the vicinity of the MWWTP Adjacent Block. There are several small ephemeral waterways which travel Southeast to Northwest across the Pain Farm site to a permanent waterway which is a tributary of the Ruamahanga River.

As discussed in Section 4.1.3 the surface water courses within or near to the Pain Farm site are considered to have a low sensitivity due to the likely low habitat value. The management of Pain Farm with minimal grazing is expected to have a net improvement in the water way condition by eliminating stock access to the water ways. In addition, a 20 m buffer will be maintained between the irrigation zones and flowing waterways which will avoid either direct discharge to surface water, or overland flow entering surface water.

The effects of the discharge of wastewater to land will be no more than and potentially less than effects under the existing, permitted, land use.

Section 8.7 of the LEI (2014) report included in Appendix 7 provides a detailed assessment of effects of the proposed land discharge on these surface water-bodies. The following provides a summary of these effects and applies only to proposed land treatment Stages 1B – 2B.

6.3.2.1 Effects on Water Quality associated with Land Application

6.3.2.1.1 Nutrients

The applied nitrogen from the land application areas is expected to be removed by the soil and pasture. The wastewater will be applied in a manner which results in no overland flow and so any nitrogen from the land application area will enter the surface water environment via groundwater.

Expected nitrogen loss from the sites in drainage due to wastewater application and additional fertiliser is unlikely to be detected over and above the current land use-induced background.

Potential adverse effects of phosphorus on surface waters are similar to those described for nitrogen. Due to plant uptake and soil occlusion, it is anticipated that phosphorus entering surface waters from the land application system will be negligible and the effects will be less than minor.

6.3.2.1.2 Pathogens

Most applied pathogens are attenuated within 10 mm of the soil surface, so they are not expected to enter groundwater, much less surface water, therefore the expected effect of pathogens from the discharge to land on surface water will most likely de minimus.

6.3.2.1.3 Other Contaminants

Soil at the land treatment sites is expected to assimilate the applied BOD, and it is unlikely that the discharge will lead to any deterioration in water quality in surface water. The effects of BOD from land treatment of wastewater on surface water are expected to be not more than minor.

6.3.2.1.4 Water

Over-application of wastewater has the potential to cause through-flow of contaminants to groundwater, or surface ponding and run-off, either of which could lead to the transport of contaminants into surface water. The wastewater application to land is proposed to be at a sustainable rate that will minimise through-flow and surface flow. Thus the effect of applied water on surface water will be less than minor.

6.3.2.2 Effects on Aquatic Ecology associated with Land Application

The aquatic flora and fauna in the Ruamahanga River and its tributaries are unlikely to be affected by the proposed discharge to land. The discharge of the wastewater will be at a sustainable rate for the soil type, ensuring soil absorption, treatment and utilisation of applied contaminants from the wastewater is maximised within the land treatment scheme. Therefore the effect of the land applied water on aquatic ecology will be less than minor.

6.3.2.3 Effects on Water Quality associated with Flooding of the Land Application Site

There is a risk of flooding at the Adjacent Block. As irrigation to this block will be limited to the summer river low flow period as part of Stage 1A, flooding will not occur at the same time as irrigation. Furthermore, operation staff will draw on climate forecasting information to ensure land application occurs well in advance of any substantial rainfall event. Therefore the potential effects on water quality associated with flooding of the land application site will be less than minor.

Pain farm is located outside the Ruamahanga River flood plain and therefore the potential effects on water quality associated with flooding will be de minimis.

6.3.3 Potential Effects of Pond Seepage of Untreated Wastewater on the Ruamahanga River.

No investigations have been carried out to quantify the volume of seepage from the existing ponds to groundwater and ultimately the Ruamahanga River. The ponds are unlined, thus there is a level

of risk that pond seepage is occurring, although presently pond sludge in the base of the ponds will be assisting in minimising any such seepage.

It is therefore difficult to quantify what effects the potential pond seepage may be having on the Ruamahanga River in the absence of any data. This investigation will commence following the installation of a new inflow meter as part of the inlet screen commissioning and will include groundwater monitoring from appropriately located sampling bores to assist in characterising the plume and effects on groundwater and Ruamahanga River. Results will be analysed and reported to GWRC including any recommended actions.

6.3.4 Potential Cumulative Effects on the Ruamahanga River and Lake Onoke Water Quality and Ecological Health

The definition of effect also includes consideration of the potential cumulative effects of the proposed activity on its receiving environment. As the ultimate receiving body for the discharge is the lower Ruamahanga River and Lake Onoke, both water-bodies are subjected to high contaminant loadings, particularly nutrients. It is acknowledged that the MWWTP discharge is a contributing factor to the cumulative water quality effects on Lake Onoke. However, to date there have not been any studies quantifying the effect(s) of the discharge from the MWWTP, or in fact any WWTP, to Lake Onoke.

The MWWTP discharge (and associated contaminant loads) has been calculated to be relatively small in comparison to other point source and diffuse sources, to the Ruamahanga River. Calculations by EAM (2012) based on RSoE data from Pukio and Gladstone monitoring sites, determined the discharge from the MWWTP contributes the following contaminant loads:

- 1.1% of the total median annual river TP load (t/a) at Pukio and 1.1% of the annual inputs occurring between Gladstone Bridge and Pukio.
- 2.6% of the total median annual DRP load (t/a) at Pukio and 4.0% of the inputs occurring between Gladstone and Pukio.
- 0.2% of the total median annual TN and DIN load (t/a) at Pukio and 0.3% of the inputs occurring between Gladstone and Pukio.
- 5.4% of the ammoniacal nitrogen load (t/a) inputs occurring between Gladstone Bridge and Pukio.

A high level analysis has been undertaken to estimate the potential load reduction to the river as a result of the proposed Stage 1B and Stage 2A & 2B upgrades. The following table illustrates these calculations, and is based on the background river concentrations upstream of the MWWTP.

A significant reduction in DRP load is shown in Stage 2A with all the load removed from the river during summer months and only 1.26% (0.03t) being discharged to the River under high river flows when the effects of the discharge are expected to be negligible.

Table 17 – Estimated DRP loads to the river for the following project stages.

Parameter / Season		Existing Scenario			Stage 1B			Stage 2B		
		Back-ground	Existing MWWTP	Existing Contribution	MWWTP	Contribution	load reduced	MWWTP	Contribution	load reduced
		t/month	t/month	%	t/month	%	%	t/month	%	%
DRP	Summer	1.82	0.06	**3.30**	0.02	**1.10**	**66.67**	0.00	**0.00**	**100**
	Winter	2.71	0.12	**4.43**	0.12	**4.43**	**0.00**	0.02	**0.74**	**83.33**
TN	Summer	50.68	0.32	**0.63**	0.12	**0.24**	**62.50**	0.00	**0.00**	**100**
	Winter	103.05	0.76	**0.74**	0.76	**0.74**	**0.00**	0.11	**0.11**	**85.53**
NH_4-N	Summer	0.65	0.20	**30.77**	0.08	**12.31**	**60.00**	0.00	**0.00**	**100**
	Winter	2.64	0.57	**21.59**	0.57	**21.59**	**0.00**	0.08	**3.03**	**85.96**

The mass load calculations indicate that a moderate improvement in DRP, TN and NH4-N load to the River during summer only (reduction of ~66 - 60% load) is anticipated from the proposed Stage 1B land application proposal. Stage 2B will see the majority of all contaminant loads removed from the river during summer, with exception to periods when storage may be exceeded during particularly wet weather. For this analysis, it has been assumed that any such discharges will occur in the winter period when land application will be limited due to unsuitable soil conditions.

Based on these high level load calculations presented, the proposed upgrades will greatly assist in reducing contaminant load to the lower Ruamahanga and Lake Onoke, however given the current relatively small contribution from the MWWTP discharge, the overall load reductions are likely to be small and may not be detectable.

6.3.5 Summary of Effects on Surface Water Quality and River Health

In summary, the lower Ruamahanga suffers from high nutrient enrichment with upstream nutrient concentrations (in particular DRP and DIN and to some extent ammonia) limiting the assimilative capacity of the lower Ruamahanga River to accommodate further nutrient inputs such as the MWWTP particularly during low flow conditions.

A concentrated (poorly mixed) zone along the true left bank (3-4m wide and 370m or more long) has been identified. The effects previously assessed therefore may have potentially been underestimated for this zone of poor mixing. In the absence of accurate data from the concentrated plume area, it has been assumed that the near field effects for a majority of the MWWTP discharge contaminants are likely to be more than minor along the true left bank due to poor mixing.

Across the width of the river, mixing appears to reduce the potential effects on water quality and therefore barrier to fish passage is unlikely.

The discharge appears to be having a localised significant effect in increasing periphyton cover and biomass during low-flow summer conditions, with effects peaking within an area of <190m downstream and reliable signs of diminishing periphyton cover apparent by 250-290m downstream. Negative effect on pollution sensitive macroinvertebrate taxa have also been documented within 200m of the discharge. Downstream data (500m downstream) indicates that river mixing reduces the level of effects on macro-invertebrates to no more than minor with exception to extreme low flow conditions as observed during the 2013 low flow period where effects did appear to extend beyond 500m downstream.

Whilst the MWWTP discharge to the Ruamahanga does indeed contribute to the contaminant loading and to cumulative effects to Lake Onoke, these loads are considered to be minor when compared with other contaminant inputs. A greater concern for this catchment appears to be the inputs occurring from diffuse sources due to on-going agricultural intensification.

The above localised effects are to be addressed primarily through the staged upgrades and incremental removal of direct river discharges over the term of the consent. The removal of discharges during periods when the river flow is less than HMF as proposed during stage 1 upgrades, will in the short-term improve localised river water quality and health when the effects of the discharge are most pronounced in terms of nutrient discharges and effects on periphyton growth and macroinvertebrate composition. Some localised effect on water quality is likely to remain under other river flow conditions, although the effects will be reduced as a result of increased dilution and mixing available. The greatest improvements in localised water quality and river health year round will be achieved by the implementation of the full land application where significant reductions in contaminant loads are anticipated.

6.3.6 Proposed Mitigation

Mitigation of effects on water quality is proposed to be achieved by:

- The adopted best practicable option, involving the removal of wastewater from the Ruamahanga River in stages which optimise reduction in adverse effects, particularly during low flow conditions.
- A comprehensive monitoring programme to enable confirmation and ongoing assessment of actual effects, including effluent quality, river water quality and ecological monitoring.
- Targeted near field sampling within the concentrated plume to monitor the effects of the existing discharge under a range of flow conditions.
- A comprehensive suite of management plans which will detail procedures for operation, communication, and responses to unexpected monitoring results or unintended discharged.
- A conservative design and sustainable application rate have been proposed for the land application scheme in conjunction with suitable buffer setbacks to surface water. These best practicable measures are intended to minimise impacts on the surface water environment from the land discharge areas.
- Implementation of the Inflow and Infiltration Reduction Management Plan, in an attempt to reduce the volume of effluent
- Influent and plant performance monitoring
- The annual review and reporting of wastewater treatment options
- The establishment of the Community Liaison Group and compliance management system

6.4 Effects on Land Productivity and the Soil Resource

The potential impact of the discharge on the soil and plant system may be on soil structure, erosion potential, contamination, and nutrient uptake and removal. Section 8.5 of the LEI (2014) report included in Appendix 7 provides a detailed assessment of effects of the proposed land discharge on the soil resource and associated crops. The following provides a summary of these effects and applies to the proposed land treatment Stages 1B, 2A, and 2B at both land treatment sites.

6.4.1 Potential Effects of the Discharge to Land on Soil and Crops

6.4.1.1 Organic Solids

Potential adverse effects of organic solids as measured by BOD on the soil and associated crops of the land application sites include the generation of anaerobic conditions in the soil as oxygen is consumed. Anaerobic conditions in the soil can result in surface slimes and lead to plant die off, the production of undesirable odours, degradation of soil structure and reduced soil infiltration capacity.

For Stage 1B, based on the proposed application rates, the BOD loads to the site will be up to 404kgBOD/ha/year, and for Stage 2A & 2B, up to 150kgBOD/ha/year. The BOD applied well below the assimilative capacity of a health soil environment of 600kgBOD/ha/day and therefore the effects of BOD on soil and plants within both the land application areas are expected to be less than minor.

6.4.1.2 Nutrients

Potential adverse effects of high nutrient loading on soil and plants can result in leaching and/or runoff of nutrients to groundwater or surface waters and plant damage due to high ammonia concentrations.

The proposed nitrogen loading to the sites from wastewater are expected to range between 177kgN/ha/yr (Stage 1B) and 66kgN/ha/yr (Stage 2B). Pasture has been shown to be capable of removing 186 - 437 kg N/ha/yr from the effluent. Based on the proposed application regime, it is considered that most of the nitrogen applied will be removed by soil microbe use, plant uptake, short-term soil storage and gaseous losses (volatilisation and denitrification). Despite the low nitrogen loading rate, limited leaching may still occur due to the function of natural systems. However, the proposed conservative rates of application will enable a level of confidence that leaching will not be more than occurs under the surrounding landuse. As a result the effects of nitrogen loading at both land treatment sites are expected to be less than minor on the soil and plants.

The proposed phosphorus loading to the sites from wastewater application are expected to range between 41kgP/ha/yr (Stage 1A) and 15 kg P/ha/yr (Stage 2B). Phosphorus uptake by plants has been shown to be in the order of 130 - 160 kg P/ha/yr for NZ ryegrass pasture in an intensively managed cut and carry pasture system. LEI believe that plant P removal at the proposed sites will be approximately 40 to 70 kg/ha/yr, thus more than what will be applied through effluent irrigation. It is expected that all P applied in wastewater will be able to be utilised by the plants on the site. Any P not removed by the plant and animal system is expected to be adsorbed to the soil or incorporated into the soil organic matter. Therefore the effects of phosphorous loading at both land treatment sites are expected to be less than minor on the soil and plants.

As noted by LEI (2014), it is likely that additional nitrogen and phosphorus will be needed to meet crop needs (up to 300kgN/ha/yr and 40kgP/ha/yr), with potential supplies from additional wastewater application or synthetic fertiliser. The supplementary nutrients will be applied in accordance with best practice (NZFMRA, 2007) to minimise losses. The effects of these additional nutrients will be positive for the soil and plant system by allowing maximum growth.

6.4.1.3 Pathogens

UV disinfection of wastewater flows from the MWWTP currently provides a well disinfected effluent with median *E.coli* counts of 100 MPN/100ml. For the remaining pathogens, the main mechanisms that operate within the soil matrix to ensure pathogen removal are filtration, adsorption and natural attrition. It is understood that 92 - 99.9 % of applied microbes are removed in the top 10 mm of the soil and soils such as those seen at the land application sites are very efficient removers of microbial contaminants. The effect of pathogens on soil and plants at both land treatment sites will therefore be less than minor.

6.4.1.4 Water

There is the potential for over-application of water to lead to saturation of the soil, resulting in pugging, erosion, and loss of soil structure.

In terms of the Adjacent Block, the sandy texture of the predominant soil is not likely to be susceptible to pugging. The soil is capable of receiving greater than 30mm/hr without causing saturation, ponding or run-off, therefore the lower application proposed of 15mm/application when applied over no less than 1 hour is expected to ensure that the risk of saturation and erosion are minimised.

Soils at Pain Farm have limitations for water movement. As such, the irrigated wastewater is to be applied to coincide with plant demand for water on the site (deficit regime). This results in minimal drainage in excess of natural drainage. Using a deficit regime results in irrigation seldom being applied during winter months when the soil is most susceptible to damage due to wet conditions. The rate of application of wastewater will not exceed 3 mm/hr which is the measured rate at which water can infiltrate and permeate through the soil of Pain Farm. At this rate ponding and run-off will be avoided.

The effects of water on the soils and plants of both sites are expected to be no more than minor.

6.4.2 Proposed Mitigation

The assessment above concludes that there will be no adverse effects which are any more than minor from the proposed land application of treated wastewater to soils and plants. However there are mitigation measures which support the precautionary approach.

The mitigation of potential adverse effects resulting from land treatment via irrigation will be mitigated primarily through the careful design of the irrigation scheme. Despite having the physical capacity to receive more wastewater, the Stage 1A irrigation has been limited to a level which will ensure nutrient loading will be no more than what would be expected from dairy farming at the same site.

Land treatment at Pain Farm during Stages 2A & 2B will have a deficit irrigation scheme with specific irrigation regimes documented in the Effluent Discharge Management Plan to ensure that soil and plants are not damaged.

The cut-and-carry cropping regime will also be effective in optimising key nutrients uptake by selected crops, mitigating the potential risks of nutrients entering ground and surface water.

6.5 Effects on Groundwater

The actual and potential effects on groundwater of the proposed discharge of treated wastewater to land and seepage from the existing ponds are twofold:

- Effects on groundwater quality; and
- Mounding impact.

Groundwater from the MWWTP and Adjacent Block (Stage 1B) is expected to discharge to the Ruamahanga River close to the site. There are not considered to be any down gradient groundwater users from this site. A bore search over a 3 km radius around Pain Farm from GWRC shows no down gradient groundwater takes.

6.5.1 Potential Effects of the Discharge to Land on Groundwater

Section 8.6 of the LEI (2014) report included in Appendix 7 provides a detailed assessment of effects of the proposed land discharge on the groundwater resource. The following provides a summary of these effects and applies to the proposed land treatment Stages 1B – 2B at both land treatment sites.

6.5.1.1 Effects on Groundwater Quality associated with Land Application

6.5.1.1.1 Organic Contaminants

Potential adverse effects of BOD on groundwater occur when groundwater discharges to the wider surface water environment. High BOD causes a reduction in dissolved oxygen, leading to anaerobic conditions, mortality of river flora and fauna, and growth of undesirable flora and fauna.

The BOD added to the soil is expected to be ameliorated by the soil due to the proposed sustainable rate of application. BOD entering groundwater from both land treatment sites will be negligible and the effect of BOD on groundwater is expected to be less than minor.

6.5.1.1.2 Nutrients

The potential adverse effects of nutrients on groundwater would only become apparent when groundwater enters surface water, or in regard to nitrogen when it is abstracted from a bore for use.

The discharge of wastewater to the Adjacent Block (Stage 1B) is expected to be at a rate which may result in some leaching of nitrogen. When considering the proposed wastewater nitrogen loading and fertiliser requirements, assuming no grazing of animals occurs on the site an average drainage nitrogen concentration of 3 mg/L is considered to be the maximum expected from the site. At this proposed drainage nitrogen concentration the yearly nitrogen loss from the site would be 212 kg N,

and across the total area of the site (8 ha) the losses are equivalent to 27kg N/ha/y. This leaching rate is comparable to surrounding land uses and therefore the effects due to nitrogen on groundwater beneath the site are considered to be no more than occurs from permitted land uses[86]. In addition, there are no known down gradient groundwater takes. As a result adverse effects due to nitrogen from the land application onto the Adjacent Block (Stage 1B) are expected to be no more than minor for groundwater.

The low nitrogen application rate to be applied to Pain Farm (Stage 2A & 2B) during conditions which do not favour drainage, ensures that a substantial proportion of applied N will be taken up by plants, sequestered by soil, or volatilised/denitrified. Where additional nitrogen is applied to meet plant requirements there is an elevated risk of nitrogen being transported to groundwater. The amount lost to groundwater can be minimised by adopting best practice for nutrient application (NZFMRA, 2007). The supply of nutrients and water at a rate to meet plant needs will enable a level of confidence that leaching will not be more than occurs under the surrounding land use that receives fertiliser application. In addition there are not considered to be any downgradient receptors for the groundwater due to the presence of a pain in the soil across the site inhibiting percolation of groundwater to deeper aquifers, and interception of the shallow unconfined groundwater by a surface water course at the property boundary. As a result adverse effects due to nitrogen from the land application to Pain Farm are expected to be no more than minor for groundwater.

Due to sustainable application rates proposed, plant uptake and the occlusion of minor amounts of Phosphorus by the soil, it is anticipated that Phosphorus entering groundwater as a result of the wastewater application system will be negligible and the effect of Phosphorus on groundwater will be less than minor at both land application sites.

6.5.1.1.3 Pathogens

Potential adverse effects from pathogen contamination of groundwater arise from the risk to human and animal health. As discussed in section 6.4.1.3, most applied pathogens perish within 10 mm of the soil surface. Therefore, the likelihood of pathogens entering the groundwater from the site is low as a result of the wastewater application rates proposed, and the already well disinfected wastewater. It is therefore expected that the effect of pathogens on groundwater from the discharge from both land treatment sites will not be more than minor.

6.5.1.2 Effects on Groundwater Mounding associated with Land Application

There is the potential for over-application of water to lead to localised elevation of the groundwater table known as mounding. Mounding influences the flow direction and rate of shallow groundwater movement. Some drainage to groundwater in excess of the natural drainage from the Adjacent Block, and from Pain Farm is predicted. Drainage in an average year will increase from a predicted 497 mm to 1,337 mm (increase of 840 mm) for the Adjacent Block (Stage 1A) and for Pain Farm (Stage 2A and 2B) an increase from a predicted 459 mm to 731 mm (increase of 272 mm).

For the Adjacent Block (Stage 1A) on average the depth of water that will reach groundwater is equivalent to 2.3mm/day. The underlying aquifer (the Ruamahanga River aquifer) has a direct

[86] As a consequence this leaching is considered to be a permitted baseline and has not been included in the calculations of the total river loads presented in Figure 6 as they would be permitted to occur if the site were used for other dairying or grazing purposes.

hydraulic connection to the Ruamahanga River. With a transmissivity in the range of 3,000 m^2/d – 6,000 m^2/d the addition of this depth of water is expected to be undetectable and to not cause cumulative effects. Effects of water on groundwater from the discharge onto the Adjacent Block are expected to be negligible.

For Pain Farm (Stage 2A & 2B) the proposed application rate is expected to ensure that through-flow is minimised. The water which drains from Pain Farm is likely to be intercepted by a pan in the soil and to be moved laterally into surface water rather than draining downward to the Martinborough Terrace aquifer. Adverse effects of the application of water on the groundwater from the discharge onto Pain Farm will be not greater than minor.

6.5.2 Potential Effects of Pond Seepage of Untreated Wastewater on Groundwater

As discussed, the specific effect of pond seepage on Groundwater quality and mounding is not well understood. It is therefore, proposed as part of the consent, that SWDC will monitor groundwater quality and levels from suitably located monitoring bores to determine what effects if any may be occurring as a result of ongoing pond seepage from the unlined ponds.

6.5.3 Proposed Mitigation

The assessment above concludes that there will be no adverse effects which are any more than minor from the proposed land application of treated wastewater to groundwater. However there are mitigation measures which support the precautionary approach. Mitigation measures include the:

- careful design of the irrigation scheme;
- conservative and sustainable application rates proposed;
- development of specific irrigation regimes documented in the Effluent Discharge Management Plan to ensure effects to groundwater are minimised; and
- proposed groundwater monitoring to assess any potential long-term effects of the proposed discharge to land and pond seepage.

6.6 Effects on Air Quality

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 outlined earlier in the report, there is no record of any complaint regarding odour.

In addition, the MWWTP site is located some distance from the nearest residential dwelling. The site is also located within a Rural 'Special' Zone within the Wairarapa Combined District Plan, specifically (in part) for the purposes of mitigating the potential reverse sensitivity effects associated with odour from the operation of the plant. This underlying zone restricts the ability for additional residential activities to be established within the zone, and effectively mitigates sensitive activities from establishing.

It is also noted that the wider receiving environment has not been reported as having any ambient air quality issues.

The irrigation of wastewater has the potential to release odour and aerosols into the air that can travel and affect people beyond the irrigation area. However, as the wastewater will be aerobic there is not expected to be a release of odour. It is proposed that the irrigation lines will be flushed following periods greater than 21 days of no irrigation. Pathogen transport by aerosols will be mitigated by the use of UV treatment at the WWTP.

Other preventive measures will be that the land application areas will have a 25 m surrounding buffer zone. As is typical for modern wastewater irrigation schemes, automatic shut-down of the irrigators will occur when wind gusts 12 m/s or higher are detected. When wind conditions with sustained wind speeds of 4 m/s for more than 15 minutes occur it is proposed that a buffer to the property boundary of 125 m will be enacted. Management of the system under these wind speed limits can be automated. This will not compromise the ability of the scheme to discharge when soil conditions are suitable since only 2 hours per day are required to discharge the daily maximum application rate sustainably. The wind speed shut-down enables discharge to be targeted to low wind conditions.

In addition to the proposed operational management plans which will document these processes, as specific Air Quality Management Plan will be developed for the site, which is not a requirement under the existing air discharge consent.

The effects are considered likely to be no more than minor at the property boundary. This is supported by other land based wastewater application systems around the country which can and have operated with limited odour and aerosol problems.

6.7 Effects on Cultural Values

The Mauri of Ruamahanga River is of relevance and significance to Iwi. The discharge of human effluent, even treated effluent, is considered by Maori to affect Mauri. The discharge of wastewater to land is not considered to have an adverse effect on the Mauri of the surface water environment. Through the staged reduction of discharge to the Ruamahanga River, its Mauri is acknowledged, and as the system moves to a full time land discharge the Mauri of the Ruamahanga River will be protected. The adoption of a discharge rate tailored to the soil types of each site reduces the likelihood of contaminants reaching groundwater or surface water, so amenity and community values are unlikely to be affected to more than a very minor extent.

The assessment of cultural values provided has considered the proposed activity in terms of identified principles, and has also considered the relevant RMA policy frameworks. It has not raised any significant concerns from a cultural perspective on the application itself. The assessment does however raise the following key issues:

1. That improvement in water quality is a long term process which needs to be done correctly,
2. The need for integrated catchment management
3. The importance of enabling participation of Maori in their own right

4. The key need to improve water quality in Lake Wairarapa
5. The importance of maintaining and enhancing water quality in waterways
6. Recognising the issues associated with infiltration into the system reducing the efficiency
7. The intrinsic values Maori afford water, and the contrary nature of introducing human effluent into water

SWDC acknowledges all of these key points, and has attempted to address them in its proposal.

SWDC propose to establish a Tangata Whenua Values Management Plan within 12 months of grant of consent, and to work with iwi under to identify and then monitor potential effects on Cultural Health associated with the discharge.

It is therefore considered that the proposed activity as applied for will not have any adverse effects on cultural values which are more than minor, and will facilitate positive relationships and improvements over time.

To mitigate any actual or potential effect on Cultural Values SWDC propose the following:

- Continue to recognise the cultural value associated with the Ruamahanga River and its catchment and the role of tangata whenua
- Implement upgrades to the treatment of wastewater in accordance with the proposed staged programme
- Develop a Tanagata Whenua Values Management Plan, including a protocol to identify and monitor effects on Cultural Health associated with the discharge
- Continue to work positive relationships with tangata whenua and facilitate outcomes with other joint key stakeholders

6.8 Effects on Public Health and Safety

The operation of the MWWTP has the sole function of ensuring SWDC can fulfil its role to manage public health and safety risk associated with the management of human sewage. The discharge of sewage to water and/or land, if not sufficiently treated, can have significant public health implications.

The assessment of the potential effects of the proposed discharge on water quality undertaken has not identified any concerns with respect to the current levels of discharge in respect of effects to human health. The zone of reasonable mixing used has not been identified as an area for food gathering, and there was no indication in the aquatic ecology surveys undertaken that there were any species normally collected for food.

The greater potential risk to public health and safety is in the event the consent is not granted (subject to appropriate conditions), and a short term alternative treatment and disposal mechanism needs to be found and implemented.

There is also a potential public health risk in the event of plant failure, should a significant discharge with a low (or nil) level of treatment occur directly to the Ruamahanga River. SWDC have advised they have no record of any such event, and that its occurrence at any of the other similar plants

throughout New Zealand would be extremely rare if not unlikely unless there was a significant natural event. In emergency conditions, should the plant fail and untreated sewage enter the stream, SWDC would initiate its standard emergency operating procedures accordingly.

A primary potential for health and safety risk is in respect of *E. Coli* concentrations. The assessment of effects has concluded that the concentration of E.Coli will not be a risk to human health, primarily due to the ongoing use of the UV plant. The proposed operation regimes will ensure there is no risk to human health under normal (controlled) operating conditions.

The discharge of treated effluent to land could also have a potential adverse effect on health, where the scheme is poorly designed, or where effluent quality is poor. High treatment standards will ensure this risk is mitigated, and when combined with an appropriately designed irrigation scheme the risk of exposure is considered less than minor.

The potential adverse effects associated with the irrigation of effluent have been considered above, both in terms of the discharge to land, water (including groundwater) and air. The effluent will receive a high level of treatment for pathogens prior to discharge, and irrigation will fully comply with the permitted activity standards for buffer zones, thereby mitigating any potneital adverse effect.

Finally, a perceived potential health risk is the presence of endocrine disrupting chemicals (EDC's) in the environment. EDC's are chemicals which disrupt endocrine systems, which are common among many animals (including humans), fish, and birds. Such disruptions are thought to contribute to some cancers, birth defects, and other developmental disorders. Specifically, they are known to cause learning disabilities, severe attention deficit disorder, cognitive and brain development problems, deformations of the body (including limbs); sexual development problems, including feminising of males or masculine effects on females. Any system in the body controlled by hormones can potentially be affected by hormone disruptors.

Steroidal sex hormones have been identified as a potential source of EDC's from treated wastewater. These chemicals include natural hormones from humans and animals (e.g. estrogens and testosterone) and synthetic hormones, such as those used in birth control pills.

The ANZECC water quality guidelines state that the current knowledge on EDC's is insufficient to make any recommendations on guidelines and that the outcomes of considerable ongoing international research will need to be fed into any such guideline development. The potential risk is a function of concentration of EDC's, location of discharge, and risk of exposure. The low concentrations of metals and organic compounds, the small population serviced, along with the low likelihood of prolonged exposure suggest the risk of such effects is negligible.

On balance, there is no data to indicate that any risk of infection or communicable disease associated with the discharge of the treated water during normal operation is any more than minor.

To mitigate any actual or potential effect on public health and safety SWDC propose the following:

- Continue to provide an efficient and effective wastewater treatment plant for the Martinborough community.

- Continue to operate the plant effectively, providing a high level of treatment of E. Coli concentrations.
- Continuing to provide appropriate signage and information on the activity and associated health risk.
- Training of Staff and Contractors regarding consent health and safety risks, monitoring and management.
- Implementation of a comprehensive complaints and feedback monitoring process.
- In order to mitigate the potential adverse effects associated with endocrine disruption, SWDC senior management will maintain current knowledge on the subject, and any research into risks and required treatment.

6.9 Effects on Visual, Aesthetic, and Amenity Values

The MWWTP has been lawfully established and operating in its current location for over 40 years, and is a key aspect of its receiving environment. SWDC has not received any complaints during the period of operation or in developing the Project as to any actual or potential adverse effect of the ongoing operation on any visual, aesthetic, or amenity values associated with the facility. The location of the site is an effective mitigate, being largely distant from the majority of offsite views, and having only limited built infrastructure.

There is the potential for discolouration of the stream from the discharge from time to time, which can affect some people's appreciation of the Stream, particularly for contact recreation. The assessment of effects on water quality above has concluded the effects on visual clarity outside of the reasonable mixing zone will be no more than minor.

The irrigation schemes proposed for Stage's 1 and 2 will be similar in scale and appearance to many other irrigation schemes in the District, and in every rural area. Some minor differences may be evident (e.g. boom height, no end gun, different spray patterns when operating), but for all intents and purposes, it will appear as any other rural irrigation scheme.

It is not considered that there would be any adverse effect on the amenity of the receiving environment at or near the application sites which is any more than minor.

To mitigate any actual or potential effect on visual, aesthetic, and amenity values SWDC propose the following:

- Continue to operate the plant in its current location, thereby avoiding potential effects of new significant infrastructure in a greenfield development.
- Continue signage at the site to ensure identification of onsite activities, including a contact number where there are any queries.
- Continue to maintain the site and operations in a safe and tidy manner, including boundary fencing.
- Implement upgrades to the treatment of wastewater in accordance with the proposed staged programme.

- Design new facilities, including the proposed irrigation infrastructure, to be consistent with their rural environment.

6.10 Effects on Recreational Values

The GWRC report '*Selection of rivers and lakes with significant amenity and recreational values*' (March 2009) identifies the Ruamahanga River as having significant recreational values. The survey which supported the report identified that it is the upper and middle reaches of the River which are of greatest importance, but that the Lower Ruamahanga is valued primarily for duckshooting and fishing.

Respondents to the survey identified the aspects typically associated with amenity and recreational value, but also specified those attributes which would make the river unsuitable for recreation. These included poor water quality; high water flow; low water flow; poor scenery; poor public access; poor vehicle access (at road end or entry point); poor vehicle security (at road end or entry point); too much rubbish and litter; over developed; absence of native plants and bush; lack of cleaning facilities for equipment; lack of toilet facilities; erosion; poor flood control; very poor water quality.

More recently, GW have completed an assessment of recreational water quality[87], which identifies that the suitability for recreational grades achieved downstream of the MWWTP (at "Bentleys Beach"), are "very poor" when considered in all flows, improving to "poor" during low flow conditions.

By necessity, contact recreation should be (and is) restricted at the point of discharge. The only attribute of relevance is therefore 'poor water quality'. The discharge of treated effluent has the potential to adversely affect water quality, as described above. The actual and potential effects of the proposed activity on water quality (and the resultant potential effect on human health) have been assessed in detail above. It is concluded that the discharge will not, after reasonable mixing, have an adverse effect on human health which is more than minor.

In addition, the Project involves the staged removal of wastewater from the River. From Stage 1B Land Treatment (commencing in 2015/16) there will be no wastewater in the River during the specified low flow periods, which will generally align with higher use summer recreational activities.

At the implementation of Stage 2B land treatment, there will be no wastewater in the river other than at times of very high flow (in excess of three times median flow) and only then when storage capacity in the plant is compromised.

It is therefore considered that adverse effects on recreational values from granting the consent will improve in the short term, and be less than minor from the commencement of Stage 2A & 2B land treatment.

To mitigate any actual or potential effect on recreational values SWDC propose the following:

87 Greenfield S, Ryan A and Milne JR. 2012. *Recreational water quality in the Wellington region: State and trends*. Greater Wellington Regional Council, Publication No. GW/EMI-T-12/142, Wellington.

- Continue to operate the plant in its current location, thereby avoiding potential effects of a replacement or combined facility in an alternative location.
- Provide signage at the site to ensure identification of onsite activities and risks, including a contact number where there are any queries.
- Implement the proposed staged removal of treated wastewater from the stream, including during low flow conditions from 2015/16.

7 ADDITIONAL INFORMATION

7.1 Introduction

This section provides additional information relevant to making a decision on this application, in particular

- The 'Best Practicable Option' in terms of the RMA and the current application;
- The assessment of alternatives undertaken by the Applicant in reaching its proposal; and
- Identification of key stakeholders and consultation undertaken.

7.2 Best Practicable Option

Section 2 of the RMA defines Best Practicable Option ('BPO') as

> *in relation to a discharge of a contaminant ... means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to—*
> *(a) the nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and*
> *(b) the financial implications, and the effects on the environment, of that option when compared with other options; and*
> *(c) the current state of technical knowledge and the likelihood that the option can be successfully applied.*

A comprehensive assessment of the options available has been undertaken. This is described at a high level in Section 2.1 and outlined in detail in Section 8.3 below. In terms of the criteria for determining the BPO, the following is of relevance:

- The proposal will result in a significant reduction in the actual and potential effects on the Ruamahanga River resulting from this critical piece of social infrastructure;

- The Ruamahanga River is already significantly compromised as a result of the effects of intensifying landuse activities within the catchment outside the Applicants control. The contribution of contaminants to the River from MWWTP is relatively small. Even permanent removal of the discharge immediately would not result in the Ruamahanga achieving water quality standards. It is simply not within the abilities of the Applicant to improve the Ruamahanga River to achieve relevant water quality guidelines, only to control the extent of the effects from its own activities (i.e. to lead by example);

- The financial implications on the South Wairarapa Community of high rate treatment options in the short term are considerable, particularly when considered in the context of the size of the cost of alternatives, the size of the community, the relatively low environmental benefit (in terms of nutrient loadings in the receiving environment after reasonable mixing) and the fact that SWDC are responsible for three similar urban wastewater systems requiring significant investment;

- The assessment of options has considered the current state of technical knowledge, and the proposed option of land treatment has been shown to be able to be successfully applied.

It is considered, on the basis of the assessment of alternatives and those matters outlined above, that the proposed activity represents the BPO for the treatment and discharge of wastewater at the MWWTP at this stage.

Section 108(e) provides the ability for the consent authority to attach conditions of consent requiring the BPO be adopted, in the context of the proposed discharge and the receiving environment. This concept has been adopted in the development of the proposed Conditions of consent, including a proposal to provide an annual report into wastewater reduction initiatives undertaken and proposed, and wider wastewater industry advancements which may be applicable to the MWWTP.

7.3 Alternatives considered

The RMA requires an applicant to consider alternatives where the activity involves the discharge of any contaminant[88].

The level of investment in the existing MWWTP and system means the total relocation of the plant to an alternative site is not a feasible option. 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 including Carterton District. Due primarily to the cost of pumping and piping to a central facility, these combined scheme options are cost prohibitive (AWT, 2013[89] refer Appendix 13).

SWDC sought alternative land treatment locations, including a preliminary assessment of land in the area (LEI, 2012), and calling for a registration of interest from any private landowners who considered they could utilise the treated wastewater in 2013. There were no registrations for the MWWTP effluent. Purchasing additional land was also considered, with a cost in the millions for the area of land required, which would ultimately defer land treatment. Given Council already owned Pain Farm, which also proved to be suitable for treatment (subject to management) and was available without constraint, additional land purchase was ruled out. Martinborough Golf Course is also owned by SWDC, and was investigated for irrigation. The site is capable of taking the treated wastewater, but due to higher risks of human contact, perception, and the cost of infrastructure for undergrounding irrigation system, Pain Farm was identified as the preferred option.

SWDC have considered and assessed 23 alternative options for upgrade at the existing MWWTP site, including "do nothing", a range of pond improvement options to improve pond performance, and a range of mechanical treatment options. These alternatives are described and assessed in detail in Appendix 2. A multi-criteria analysis was then undertaken to assist with the ranking of each option and development of the best practicable option. A copy of the multi-criteria analysis is also included in Appendix 2.

The analysis found that the pond improvement options considered would achieve some level of improvement in the overall effluent treatment, and in combination could potentially achieve a

[88] 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.

[89] AWT Water Ltd, South Wairarapa Integrated Wastewater Scheme – Technical Review, prepared for SWDC, August 2013.

higher level of contaminant removal. However the degree of improvement is difficult to quantify with any certainty and is unlikely to provide the significant long-term improvements in effluent quality necessary to sufficiently meet water quality standards the Ruamahanga River. Furthermore, some aspects of operability and reliability of some of those options are questionable, and would require further trials to confirm suitability for MWWTP. Some of these minor improvements have however been adopted to improve overall pond performance, as part of the Stage 1A optimisation programme.

A majority of the pond upgrade options have therefore been discounted due to their low overall cost-benefit ratio with respect to achieving a quantifiable improvement in treatment quality. Greater benefits can be achieved through the staged removal of wastewater from the river during low-flow conditions and then to land treatment.

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. Though high rate treatment options have high capital and operational costs when compared to the pond based solutions described, they would produce the most reliable effluent quality and present a suitable alternative to land treatment. However, the SWDC Strategy is to move to land treatment. In addition, in this context the limiting factor in not nutrients, but land capacity. SWDC owns available land which is suitable. Land treatment has therefore scored higher in the assessment[90].

In addition, a range of scenarios of land treatment for hte preferred site was also assessed (LEI (2011)) prior to confirming the preferred proposal. The Project outlined above represents the combination of optimisation works and capital improvements which are considered to be the best practicable option.

7.4 Affected Persons and Consultation

SWDC have consulted with key stakeholders and community throughout the Project development process.

Wide consultation was undertaken on the Wastewater Strategy from early 2011 including mail outs to all ratepayers, local public meetings, meetings with Council's Maori Standing Committee, and offers of one on one meetings with other people as affected.

Following confirmation of the Wastewater Strategy, attention turned to the WWTP Upgrade Projects required for the consents. Regular updates on the project, feedback on progress, and requests for input were made to the Maori Standing Committee, the SWDC Wastewater Combined Steering Committee. The Steering Committee Members include representatives from:

- Tangata Whenua
- The Maori Standing Committee

[90] AWT Water Ltd, South Wairarapa Integrated Wastewater Scheme – Technical Review, prepared for SWDC, August 2013.

- Wellington Regional Council
- Fish and Game
- Department of Conservation
- Wairarapa Public Health
- Sustainable Wairarapa
- Adjacent landowners
- Federated Farmers
- SWDC Councillors
- Featherston, Greytown, and Martinborough Community Boards

Offers of individual or group meetings to discuss the proposal were made, with a disappointing level of response. Irrespective, progress updates and programmes were sent on a regular basis, particularly over 2013 when the alternatives were being assessed.

Workshops were held for Councillors, the Moari Standing Committee and Wastewater Steering Committee, and with Wellington Regional Council. Individual meetings were held with Tangata Whenua and others where requested, with information provided and concerns taken into account.

Council Project leaders regularly asked key stakeholders for the preferred method of communication and consultation to ensure every opportunity was made available. Where a preference was provided, this method was adopted for those stakeholders.

Notices were put in local papers, including calls for input, and progress reporting was updated monthly on the Council's project website.

In addition, the capital programmes have been included in the Long Term Plan and annual planning and reporting incorporating the WWTP projects has been consulted on in accordance with Council's Consultation Policy.

Affected persons have not been specifically identified. SWDC has engaged with all known stakeholders. SWDC have requested public notification of the application to ensure that any other potentially affected party can participate in the process. SWDC are also prepared to work through the pre-hearing meeting process should GW consider that to be beneficial.

7.5 Affordability of the Upgrades to the South Wairarapa Community

Affordability to the SWDC community has been a significant factor for the SWDC Councillors and Executive Management Team in determining the district-wide Wastewater Strategy, and a significant factor in determining the best practicable option for each site, including the MWWTP.

The Project is estimated to cost in excess of $30.5 million across the three sites over the term of this consent, which is significant for one of the smallest districts in New Zealand[91]. The option of both an increased capital investment programme (out to 50 years), and a condensed investment programme to move to land treatment sooner has been considered.

[91] As at 2006 Census; SWDC was the 65th smallest by population of 73 local authority areas in NZ. The rankings from the 2013 Census are not yet published by the Department of Statistics, but it is unlikely that this ranking has changed significantly.

Although there would potentially be some environmental benefits to a shorter programme, given the relatively low contribution of nutrients to the Ruamahanga and Lake Onoke catchment, the actual environmental benefits would be comparatively low, whilst there would be a significant impact on affordability translating directly to a significant rates increase and likely reduction in level of service in other essential community services. Extending the programme would have some financial benefit to the Council and community, but would unnecessarily defer the cultural and environmental benefits that will be achieved.

It is acknowledged that affordability is a matter to be determined by the Applicant and not a decision to be made by the consent authority under the RMA. It is however a relevant factor in assessing the feasible alternatives and in determining the best practicable option, and a matter of relevance in assessing the application in terms of the s.107 restrictions, as outlined above.

8 SUMMARY AND CONCLUSION

This application, description and assessment of effects on the environment relates to the proposed continued operation and upgrade of the Martinborough Wastewater Treatment Plant.

The application is for consents required under the RMA from Greater Wellington Regional Council. The proposal requires no additional consents.

The MWWTP has been operating in excess of four decades and along with the existing sewerage network contributes to the existing and future infrastructure of the South Wairarapa District and the Region. The proposed upgrade will ensure that SWDC can continue to provide for the sewage collection, treatment, and disposal needs into the future. The Regional Policy Statement specifically recognises wastewater treatment facilities as essential services and Regionally Significant Infrastructure, recognising the benefits of infrastructure to communities and the need to reasonably balancing the management of any effects.

The proposed staging of the upgrades, in combination with the integrated programme including the Featherston and Greytown WWTP's, will ensure the SWDC long-term wastewater strategy is progressed in a manner which is environmentally and financially sustainable. SWDC have identified a programme of expenditure of over $30M to give effect to the first 35 years of the Strategy, the term requested for this consent. A comprehensive review of affordability across all Council services has been undertaken, and the capital programme proposed reflects bottom-line affordability. Increasing costs or decreasing timeframes will have significant implications on affordability and on current and future South Wairarapa communities.

The term of 35 years will provide certainty to all parties. In addition, the comprehensive suite of conditions, including a Community Liaison Group, consent compliance system, and the development process outlined for the management plans will ensure a collaborative approach to consent implementation and review. There is no advantage to be gained from a shorter term of consent.

The Ruamahanga River is identified as a having important recreational and amenity values and as a water body needing enhancement within the Regional Freshwater Plan. GWRC monitoring indicates that the water quality within the Ruamahanga is already compromised, principally as a result of the intensive agricultural use within the catchment.

The discharge from the WWTP contributes to the nutrient loadings in the Ruamahanga River, and ultimately Lake Onoke. On a catchment basis however, the relative contributions to nutrients in the Ruamahanga River are low. As a result, the benefit in removing the MWWTP discharge from the River will not be significant, and the Ruamahanga River both upstream and downstream of the discharge will still exceed water quality standards as a result of the intensive landuse in the catchment.

There are some adverse effects on water quality immediately downstream of the discharge, with the most significant being ammonia. After reasonable mixing, these effects comply with water quality standards.

The proposed staging of the activity will however have a significant benefit on water quality in the near discharge zone during low-flow conditions in the Ruamahanga River. Stage 1B irrigation will

remove 24% of the annual discharge from the direct discharge. The direct and cumulative effect of the wastewater discharge will therefore be removed during these low flow periods, having a significant benefit to both aquatic ecology (by removing ammonia), and recreational values. The relative effect of nitrogen on surface water quality from non-deficit irrigation during Stage 1B has been assessed and found to be less than if the land was used for a typical farming operation.

As Stages 2A & 2B are implemented, more effluent will be taken from the River to sustainable and actively managed land treatment at Pain Farm. Through these stages, discharge to the Ruamahanga River will decrease as River flow's decrease, with no discharge below half-median flow. Conversely where River flows are greater, discharge may also be greater, reflecting the lesser potential for adverse effects during higher flow conditions. This will enable active management of pond capacity on a risk basis, avoiding discharge during low-flow conditions and the associated potential adverse effects on water quality and aquatic ecology.

An application has also been made to effectively extend the discharge to air consent to align with the primary discharge consents. An Odour Management Plan will be developed to actively manage minimisation and mitigation of effects. This is not required under the existing consent, but SWDC have identified the value of developing one.

A comprehensive assessment of alternative options has been undertaken, including alternative treatment technologies, treatment and discharge locations and facilities (including shared facilities), and alternative regimes within the preferred alternative. The best practicable option has been determined on the basis of the principles contained in the RMA, and in an integrated programme across all three urban sites.

Consultation has been undertaken with key stakeholders as previously documented, and will continue throughout the process. Engagement will also be continued across the term of consent as each stage comes, with the establishment of the proposed Community Liaison Group, the Management Plans, and the comprehensive reporting programme.

The Purpose and Principles of the Resource Management Act provide for a balance to be achieved in providing essential community services using existing physical infrastructure while managing the potential adverse effects of the activity. The Act also allows a level of pragmatism, enabling the affordability to communities for be a key part of the decision making process, and providing for a consent term enabling the consent holder to confidently commit significant money to the programme.

The proposed activity is a responsible programme which appropriately balances the significant costs of maintaining essential infrastructure for the long term public health and safety of Martinborough's community with the potential effects of wastewater treatment on the environment.

Appendix 1 SWDC Wastewater Strategy

Appendix 2 Options Assessment and Evaluation (AWT 2013)

Appendix 3 Existing Resource Consents

Appendix 4 Pond Sludge Survey Analysis (Opus, 2013)

Appendix 5 2012/13 GW Compliance Reports

Appendix 6 Draft Management Plan Frameworks

- **Operations and Maintenance Manual**
- **Inflow and Infiltration Reduction Management Plan**
- **Effluent Discharge Management Plan**
- **Odour Management Plan**
- **Environmental Monitoring Plan**

Appendix 7 Land Treatment Scenario Assessment, Concept Design, and AEE (LEI, 2014)

Appendix 8 Land Application Option Assessment and AEE (LEI, 2012)

Appendix 9 Water Quality and Ecological Assessment (EAM, 2012)

Appendix 10 Section 107 Resource Management Act 1991

Appendix 11 Water Quality and Ecological Assessment (Forbes 2013)

Appendix 12 Mass Balance Calculations (Forbes & AWT 2013 & 2014)

Appendix 13 Integrated Wastewater Scheme Technical Review (AWT, 2013)

Appendix 14 Cultural Impact Assessment

Appendix 15 Wairarapa Combined District Plan: Plan Change No.3 (Treated Wastewater Irrigation)

Appendix 16 Pain Farm Soil Investigation (LEI 2013)

Appendix 17 MWWTP Performance Assessment (AWT 2013)