



Assets and Services Department

Havelock Oxidation Ponds

Upgrading Proposals

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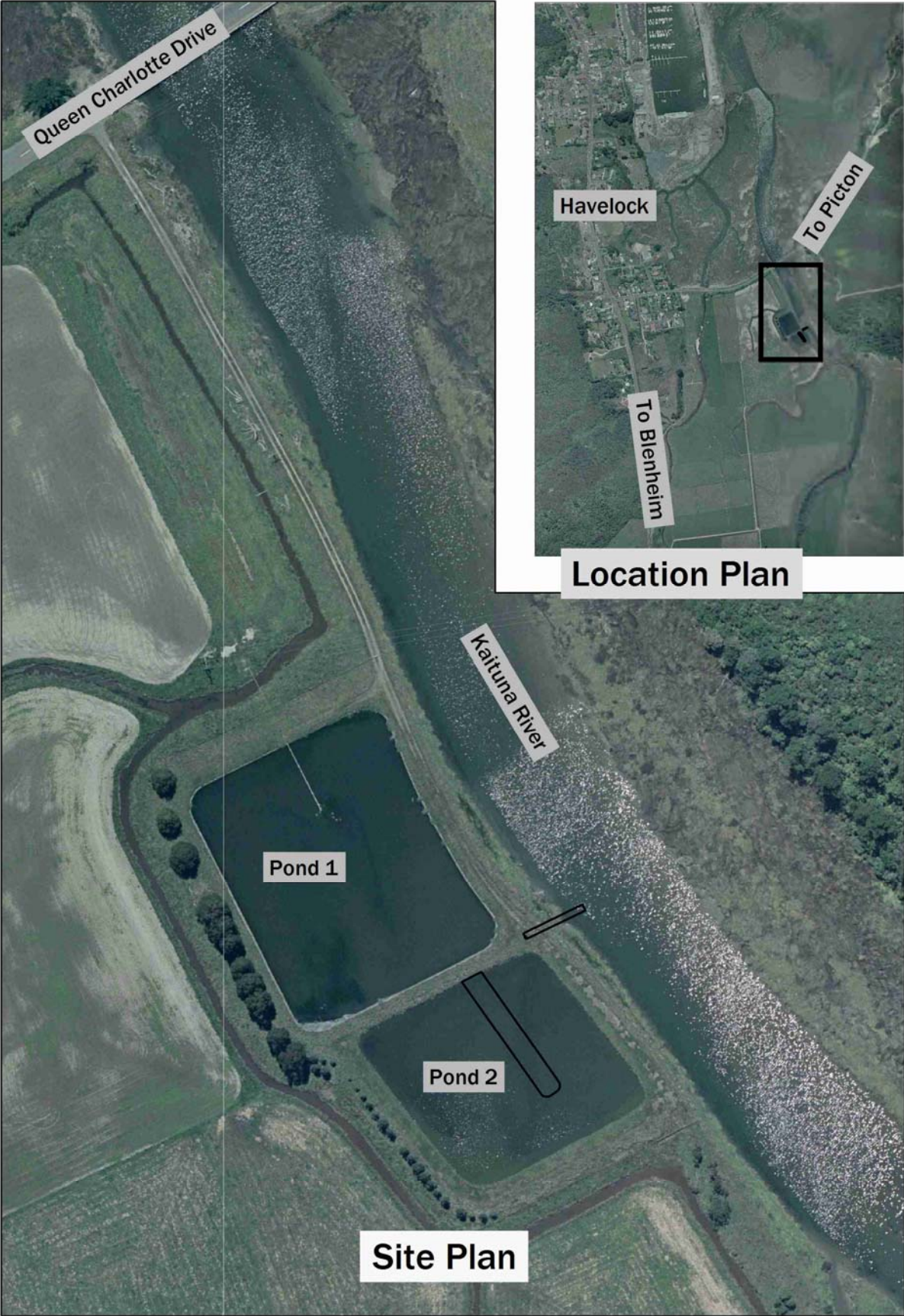
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Location Plan – Figure 1



1. Introduction

1.1 Resource Consenting

The Havelock Sewage Treatment Plant (STP) has now been in operation for 21 years. The pond is currently authorised under resource consent U960127 which was granted on 30 November 1996 for a period of 10 years. The current resource consent was therefore due to expire on 30 November 2006.

A resource consent application for renewal was lodged six months prior to expiry to ensure ongoing rights to discharge. The Regulatory Department of Council required further information to assess the activity which required further field work and modelling by Cawthron. This additional work has been undertaken.

The land that the ponds are sited on is designated for the operation of a Sewage Treatment Plant in Volume 3 of the Marlborough Sounds Resource Management Plan under Designation 42.

1.2 Background

Loading

The STP serves both Havelock residential and commercial. The current population utilising the STP is estimated to be 550. The flow was calculated for a week day in February 2006 at 143 cubic metres per day (m^3/d) compared with a design average dry weather flow to the pond of 175 m^3/d . There is only relatively minor commercial contribution to the system and Council has a policy for controlling new industrial and commercial connections.

By measuring influent sewage strength each year and monitoring pond performance throughout the year, operations staff are able to determine if a significant increase in loading has come about, and if it has, investigate the source.

Biochemical oxygen demand (BOD) is a measure of the organic strength of a wastewater. The BOD can be used to calculate the amount of oxygen needed for biological treatment. The influent biochemical oxygen demand (BOD) was measured on 18 January 2006 and found to be 240 grams per cubic metre (g/m^3) which is typical of domestic wastewater.

The flow was calculated for a typical day based on pump capacity and pump run times. With the flow and the BOD concentration, the mass load for the day was calculated at 34.3 kilograms BOD per day (kg/d). This compares to a pond design loading of 42 kilograms per day (kg/d) based upon the Ministry of Works loading criterion of 84 kilograms per hectare per day ($\text{kg}/\text{ha}/\text{d}$). Testing shows no increase in BOD loading on the pond over the term of the current consent.

It is proposed that a survey of potential tradewaste dischargers in Havelock be undertaken in 2008. Council has a tradewaste bylaw which is used to place controls on tradewaste discharges. Tradewaste also attract a targeted charge based upon flow and strength of the waste.

Stormwater entry to sewers is an ongoing issue for all conventional gravity sewerage schemes. Wet weather flows are monitored from telemetry records of pump run times. Any significant changes are investigated. The sewer in Havelock is designed for sewage only. Stormwater is a separate system. A survey of Havelock is being considered in the next five years to investigate stormwater connections to the sewer. Any stormwater found connected to the sewer will be removed.

Pond Operation

The STP is a single oxidation pond (pond 1) with the treated wastewater discharged into the adjacent Kaituna River via an outfall through the flood stopbank. Since the pond was first established 21 years ago there have been several upgrades to improve the pond performance including the following:

- Desludging of the Pond: In the summer of 1999/2000 sludge that had accumulated in the oxidation pond (pond 1) was removed by dredge and pumped to a new pond (pond 2) constructed on the south side of the oxidation pond. The sludge has been dried and removed for further “ageing” prior to considering options for reuse. The pond that received the sludge from the dredge was sized and built for use in the future as a maturation pond.
- A mechanical aerator has been utilised on the oxidation pond from time to time when required to aid treatment. Council has taken delivery of a second aerator for use as required at Havelock, Spring Creek and Seddon oxidation ponds.
- Telemetry was installed at pump stations to detect pump faults, power failure and high level alarms which are automatically relayed to the on-call operator. These systems reduce the risk of overflows from sewers.
- The original pumps have been progressively replaced.

Discharge Performance over the existing Resource Consent Period

The existing single oxidation pond provides basic treatment which tends to be somewhat variable.

Table 1 shows the median biochemical oxygen demand (BOD) of the pond effluent over the 10 year period of the current resource consent was 35 g/m³ and the range 14 to 110 g/m³. The total suspended solids (TSS) median for the same period was 80 g/m³ and ranged from 26 to 270 g/m³. There is also a

wide range in faecal coliforms and enterococci. The wide range in effluent quality is typical of a single oxidation pond.

Parameter		Units	No. of Samples	Median	Range
Biochemical oxygen demand	BOD	g/m ³	14	35	14 - 110
Soluble biochemical oxygen demand	SBOD	g/m ³	16	17	5 – 43
Total Suspended Solids	TSS	g/m ³	16	80	26 – 270
Faecal coliforms		/100 ml	17	9.4 x 10 ⁴	4.2 x 10 ³ – 1.6 x 10 ⁷
Enterococci		/100 ml	17	5.4 x 10 ³	4.0 x 10 ¹ – 1.1 x 10 ⁵

Table 1: Havelock Oxidation Pond Effluent Quality Summary 1995 – 2005

Wastewater entering the oxidation pond continues to have BOD and TSS consistent with domestic strength. There has been no trend towards higher loading.

Discharge to Air

Discharges to air are authorised under the existing resource consent. The consent condition requires that no offensive or objectionable odours are permitted beyond the site boundary. Over the last 10 years there have been no complaints from the public and there has been no monitoring undertaken by the Council Regulatory Department to indicate that compliance has not been achieved.

Occupation of River Bed by Discharge Structure

The outfall pipeline occupies a position in the true left bank and bed of the Kaituna River and the pond bund which also forms the river stopbank.

Continuing Right of Discharge

Section 124 of the Resource Management Act 1991 requires the consent holder to make application for renewal of resource consents six months prior to expiry if it is intended to continue to discharge beyond the expiry date. To satisfy the above requirement the resource consent application was lodged prior to 30 May 2006. More information was requested which required further field work and modelling by Cawthron. The application is now being modified to include the latest information and will be resubmitted.

2. Location

The Havelock Sewage Treatment Plant is located on the true left bank of the Kaituna River, just upstream of the road bridge on Mahakipawa/Queen Charlotte Drive, Havelock.

3. Proposal

3.1 Pond Upgrade

Planned Upgrading

- Complete construction and put into service a maturation pond within the existing southern pond (pond 2).
- Install a new transfer pipe between ponds 1 and 2.
- Construct and install a new outfall pipe of up to 300mm diameter from pond 2 to the Kaituna River, and construct an in-bank diffuser for this outfall

It is proposed to utilise the existing pond (pond 2) built to hold sludge and located immediately to the south of the existing operational oxidation pond (pond 1), as a maturation pond. This will ensure a more consistent and better quality of effluent prior to discharge by increasing the retention time and reducing the potential for short circuiting. Biochemical oxygen demand (BOD) and total suspended solids (TSS) will be at lower concentrations than with the current single pond but more importantly will be more consistent and will be predominantly due to algae rather than directly from organic material in the raw sewage. Bacterial indicators will be more consistent and lower. Faecal coliforms can be expected to have a median value less than 10,000/100 ml compared with the current median of 94,000/100 ml. The appropriateness of this level of proposed treatment is considered in later sections.

It is proposed to install a new transfer pipe between ponds 1 and 2 to bring pond 2 into service. A new outfall structure and in-bank diffuser is proposed.

Possible Additional Upgrading

The following additional upgrading may be required during the next 15 years. The decision to do the upgrading will depend upon the cost versus benefit of each, any increase in loading that may occur and availability of funding.

- Permanent power supply
- Installation of an inlet screen for pond 1
- Construction of a sludge holding/drying pond
- Desludging of pond 1.

Consideration is also being given to modifying the inlet and outlet to the existing oxidation pond. If found to be beneficial to performance and economical then it will be implemented.

Following consultation, consideration is being given to planting native species on the river stopbank adjacent to the ponds. The plantings would have to be consistent with the operation of the ponds and not reduce the flood capacity of the river.

During the course of the consent it may be desirable to carry out further improvements to the ponds for operational reasons, primarily to reduce maintenance and operating costs. The improvements may include a new sludge holding and drying pond; a permanent power supply for an aerator rather than the portable generator set currently used; pond desludging and the installation of a mechanical fine screen on the influent. None of the improvements will have any adverse effects other than the associated cost. The fine screen would be relatively small and stand about 3 metres above the pond bund. The screen and aerator would make little noise and would not be an issue at the nearest house which is 350 metres away. The improvements contemplated would be carried out within the existing footprint of the STP and so would be permitted in terms of the current designation, or if more land is required the designation would be extended and/or resource consents obtained.

3.2 Consents Required

Discharge to Water

A consent to discharge effluent to the Kaituna River will be required. It is proposed to continue discharging treated wastewater into the Kaituna River at a maximum discharge rate of 2400 m³/day based upon inflow to the pond. This flow equals the capacity of the two pumps at the terminal pump station and allows for a significant component of wet weather infiltration and inflow.

Currently dry weather flow is 143 m³/d and this is expected to increase by about 1 m³ per day per additional house. The application is based upon a significantly higher flow than the typical flow of sewage to provide for entry of stormwater and ground water to the sewers. It is much better to pump this excess flow to the treatment plant and provide treatment, than have the excess discharge from the sewers in the township.

It is proposed to retain the existing mixing zone of 50 metres upstream and 50 metres downstream of the in-bank diffuser discharge.

Discharge to Air

A consent to discharge odour from the STP will be required.

In an oxidation pond, gases are released as part of the natural breakdown of sewage in which odours and compounds, including hydrogen sulphide and volatile acids are produced in anaerobic conditions in the sludge layer of the pond. A correctly functioning pond will be aerobic in the upper liquid layer, which controls odour release by oxidising the gases produced from the breakdown of sludge.

Good management including controlling the depth of the sludge, monitoring pond performance and the intermittent use of an aerator will minimise the release of odours.

Due to the exposed nature of the site and the distance to the nearest house, the risk of odour nuisance is reduced. Over the last 10 years Council has no records of any complaints received with regard to odour generated by the ponds.

Outfall Structure

A consent for the existing outfall structure to occupy the river bed is required. The existing outfall structure is a 150 mm pipe with a flood gate that discharges the treated wastewater through the stopbank and into the Kaituna River. The outfall is recessed into the stopbank and is anchored by a concrete headwall. The outlet of the outfall is located directly on the bank and bed of the river.

It is proposed to upgrade the outfall from the STP by installing a new pipe from pond 2 to the river and outfall structure on the river bank. The effluent will then emerge into the river through the rock that surrounds the diffuser outfall rather than through the end of a single pipe. There will be a pipe outlet for high level overflow to minimise any risk of pond overflow under high flows or blockage of the diffuser. The Ecological Survey of Havelock Oxidation Pond Discharge (Cawthron Institute, 2005) recommended that the method of discharge to the river be improved. The diffuse discharge will promote mixing in the river and reduce the risk of direct human contact with the effluent.

A consent for the new outfall structure to occupy the riverbed is required. Once the new outfall pipe and in-bank diffuser have been constructed and installed, the existing outfall pipe from pond 1 (for discharge) will be decommissioned.

3.3 Term of Consent

The last two resource consents that were issued for the discharges to water and to air have each been for a period of ten years. Over these two consent periods, the ponds have had only a minor localised environmental effect, which is highlighted in the assessments carried out by Cawthron Institute. In addition, there have been no public complaints received by Council with regard to the performance of the ponds.

Given the performance of the ponds over the last 10 years, the minor localised effect of the discharge and the proposed upgrade detailed in Section 3.1, it is considered reasonable that a new resource consent application should request a term of 15 years.

3.4 Alternatives

There are a number of different upgrades to the ponds that have been considered – see assessment of alternatives in Section 6.

4. Statutory Requirements

4.1 Resource Management Act 1991 (RMA)

The application will be considered under the following sections of the Resource Management Act 1991:

- Section 15 – Discharges of Contaminants into the Environment
- Section 13 – River Surface Bed Activity

4.2 Marlborough Sounds Resource Management Plan – Volume 3

The Marlborough Sounds Resource Management Plan (MSRMP) is the relevant planning document and became operative in February 2003.

The site of the Havelock Oxidation Ponds is designated “Oxidation Ponds” (Designation 42). The designation authorises the use of the site for “oxidation ponds”. The designation does not permit any discharges to air or water or structures within or adjacent to the river bed.

The underlying zoning is Rural 3 which is also overlain as being in a natural hazard area which is denoted as flood hazard.

The small parcel of land between the ponds and the Kaituna River is zoned Local Recreation Zone.

The Kaituna River is identified as being in a Riparian Management Zone.

The Coastal Marine Zone extends up the Kaituna River, however the discharge point into the Kaituna River is outside the Coastal Marine Zone.

4.3 Rules – Volume 2

Discharge to Air

There are no rules in the MSRMP permitting discharges to air from the oxidation ponds. The air discharge is therefore a **discretionary activity**.

Discharge to Water

There are no rules in the MSRMP permitting the discharge of treated waste water into the Kaituna River from oxidation ponds. The discharge to water therefore will be considered as a **discretionary activity**.

The MSRMP requires the Kaituna River to be managed for fishery purposes and lists eight standards of water quality that the river is to achieve.

Although the MSRMP does not require the Kaituna River to be managed for contact recreation, Cawthron was asked to consider the discharge from the pond in relation to the contact recreation standards of the plan in addition to the standards set for management for fishery purposes.

The potential impact of the discharge on shellfish gathering in accordance with Appendix H of the MSRMP has been considered separately by Cawthron.

Discharge Structure – River Surface Bed Activity

Rule 26.1.4 (General Rules) states that proposed structures adjacent to and within watercourses must be set back at least 8 metres, unless specified elsewhere in the MSRMP, or in Table 1 in Appendix 1 and the Ecology Maps in Volume Three.

New utilities (the proposed outfall structure) are identified under Rule 26.5.1.1 as permitted, provided they meet conditions under Rule 26.5.1.2, any relevant general rules and rules for the Local Recreation Zone and Riparian Management Zone.

One of the conditions under Rule 26.5.1.2 describes restrictions for structures in the Riparian Management Zone, as contained in Table 1 (Appendix 1) and the Ecology Maps. Table 1 identifies the Kaituna River as part of the Riparian Management Zone. It states that that excavation and fill and building construction adjacent to this watercourse, must meet a riparian setback distance of 20 metres. Because the new utility (outfall structure) does not meet the setback requirement, it is considered a **limited discretionary activity** under Rule 26.5.1.4.

However, because part of the structure is located in the Local Recreation Zone (Chapter 40) the rules for this zone must also be considered. Under Rule 40.1, utilities are permitted provided they

meet several conditions under section 38.1. One of these conditions does not allow any excavation or filling in Riparian Management Zones. Both excavation and filling are activities associated with the utility (new outfall structure). Hence under Rule 40.3 the outfall structure is considered as a **discretionary activity**. The excavation, filling, building and construction activities associated with the new structure are also considered **discretionary activities** under this rule and under Table 1 (Appendix 1) of the MSRMP.

5. Assessment of Environmental Effects

The STP has been operating for a period of 21 years. Two successive resource consents have included a range of monitoring conditions and also required improvements to be carried out to the pond.

Ecological Surveys

Cawthron Institute has completed three ecological surveys during the 10 year term of the current consent. In its most recent report (May 2005), Cawthron concludes that the discharge causes a localised enrichment effect on sediments in the river and it is unlikely the effects of the discharge will ever extend beyond this minor sediment impact. The report also notes that both the pond and the discharge from it appear to be providing habitat and food for some fish and other wildlife. The current resource consent provides for a mixing zone of 50 metres upstream and downstream of the outfall. Cawthron concludes that an analysis of the current effects suggest an actual mixing zone of 25 metres upstream and downstream of the outfall.

Cawthron recommend an improvement to the outfall which has been taken into account.

In the May 2005 report, Cawthron concludes:

“further monitoring (ecological surveys) is not necessary unless a known and persistent deterioration in effluent quality occurs and/or the discharge volume is increased.”

Council proposes more regular monitoring which would give early warning of a persistent deterioration in effluent quality.

Fishery Purposes

Cawthron report dated 27 November 2006 assesses the discharge in terms of the standards in the MSRMP. The standards apply after reasonable mixing, taken to be 50 metres downstream of the discharge.

The Cawthron report notes that some of the minimum criteria are not directly relevant to the Havelock discharge and in those instances the report gives an assessment based upon the most recent and relevant guidelines (ANZECC and NZ Municipal Wastewater Monitoring Guidelines).

The eight standards set for Fishery Purposes are summarised in the following:

1. *Conspicuous oil or grease films or foams or floatable or suspended material.*

None of the above has been observed in the Kaituna River.

2. *Colour or Visual Clarity*

Turbidity and black disk data have not been taken. Using suspended solids as a surrogate shows the discharge is unlikely to cause a conspicuous change in the clarity of the river after mixing.

Algae in the effluent does cause a change in visual clarity near the point of discharge.

3. *Objectionable Odour*

Although the pond has caused odour at times, a 'strong smell' has only been recorded five times in eight years of weekly monitoring.

4. *Suitability for Consumption by Farm Animals*

The river is fenced off from stock and is therefore inaccessible for stock to drink. The water is also brackish making consumption by animals all the less likely.

If stock could access the river the following would need consideration:

(a) Cyanobacteria (blue-green algae) toxins

An algae that could potentially give rise to toxins has been found in four out of 75 samples. In each case the specific algae, microcystis, has reported with a relative abundance of 1 on a scale of 1 rare to 5 dominant.

The risk to stock if stock did drink from the river is therefore considered low.

(b) Nitrate/Nitrite

Concentrations are much lower than the limits for risk to health of stock.

(c) Microbiological – Pathogens

The pond does affect the microbiological quality of the river and this is a primary reason for proposing an upgrading with an additional pond. With a dilution ratio of 100:1 in the 50 m mixing zone it is anticipated the ANZECC guideline limit of 100 faecal coliforms (FC) per 100 ml could be met by the pond discharge if it was not for significant contaminant input from further upstream.

The more relevant issue will be contact recreational quality, even though the river is not managed for this under the MSRMP.

5. *Aquatic Life*

(a) Light penetration.

This is not a relevant measure of the Havelock pond discharge given the tidal fluctuations in water depth and how shallow the river is at low tide.

(b) Ammonia Toxicity

Ammoniacal Nitrogen was found to be quickly dispersed in the river and below threshold levels by 50 metres downstream.

(c) Particulate Organic Matter

Localised sediment enrichment occurs in river sediments for 10 metres downstream of the discharge. No enrichment is detected 25 m downstream.

(d) Aquatic Invertebrate Communities

Cawthron ecological surveys have concluded that the pond discharge does not have a significant adverse effect on aquatic invertebrate communities in the Kaituna River.

6. *Temperature*

Temperature of the pond does exceed 20C in summer but this is dissipated within the 50 m mixing zone.

7. *Dissolved Oxygen*

A one-off survey by Cawthron found that the effluent DO is dissipated in the river in less than 10 m from the discharge.

A further DO survey as recommended by Cawthron is being planned for the first summer following the proposed upgrading.

8. *Suitability of Fish for Human Consumption*

The Cawthron report does note a concern for smelt that have been observed feeding in the effluent discharge. The microbiological quality of the effluent will be improved as a result of the upgrade.

Other larger fish and eels are mobile and unlikely to feed in the discharge plume for long enough to be adversely affected.

Public Health

Treatment ponds can be very effective at reducing concentrations of pathogens that may be present in sewage. In a single pond the effectiveness can be expected to be highly variable and this is seen in the monitoring results for indicator bacteria (faecal coliforms and enterococci) at the STP.

Contact Recreation Purposes

Although the MSRMP does not require the Kaituna River to be managed for contact recreation, people have been observed bathing at the Queen Charlotte Drive Bridge 300 m downstream of the discharge. There are three standards given in the plan for contact recreation.

1. Visual Clarity

This was discussed above for fishery purposes.

2. Contaminants

The pond discharge does not comply with the bathing water standard based upon limited testing. This is to be expected of a single pond performance and is the primary reason for the proposal to utilise a second pond. It is difficult to precisely predict the pond microbiological effluent quality with a second pond and more difficult to predict downstream river quality which also depends upon dilution, die-off and other inputs of contaminants to the river.

The proposed second pond represents a substantial improvement to the Havelock sewage treatment plant that is affordable to this community and it is predicted that the effluent will meet the bathing water standard at the mixing zone. Other more advanced technologies may produce a better quality effluent but cost more to install and operate and require specialist trained personnel.

Pond systems are relatively simple to operate and obtain energy from the sun to produce oxygen to treat the sewage through biological means.

3. Biological Growths

Growths can reduce the aesthetic quality of a river. Although the biochemical oxygen demand (BOD) predicted at the edge of the 50 m mixing zone is likely to exceed the standard in the Marlborough Sounds Resource Management Plan of 2 g/m³, Cawthron notes that the actual BOD levels are likely to be lower due to oxygen depleting micro-organisms being flushed out to sea before having any significant effect on the river.

Phosphorus can cause excessive plant growth, however in the Kaituna River the strong tidal influence prevents biological growths forming.

Shellfish Gathering Purposes

The MSRMP requires all coastal areas to be managed for shellfish gathering in relation to surface water discharges and the report by Cawthron dated 17 April 2007 addresses this. Using a conservative approach, Cawthron concludes that the upgraded plant achieving an effluent quality with a median faecal coliform concentration of 10,000 cfu/100ml or better will be very close to, or meet, the median faecal coliform standards required for shellfish gathering at the Kaituna River mouth.

There is no evidence that shellfish exist in the immediate vicinity of the Kaituna River mouth. This could be due to the presence of the exotic saltmarsh cordgrass, *Spartina*.

Cawthron has modelled the discharge and river to estimate a dilution factor. The modelling is conservative in that it does not take account of die off of microbiological contaminants in the river environment.

Drivers for Upgrading

There are many options for wastewater treatment covering a large range in cost, both capital and operating. The aim for each community should be to provide a standard of treatment that satisfies public health protection and has acceptable effects on the environment and to achieve this at the lowest overall cost.

The environmental effects of the discharge on the receiving environment are relatively localised and minor. However, for public health reasons it is proposed to improve the microbiological treatment performance of the ponds and improve the means of disposal. The Kaituna River is accessible by the public at the point of discharge and a better, more consistent standard of microbiology quality is warranted. It is not considered necessary to remove the discharge from the Kaituna River.

Flood Hazard

The STP is located within the flood hazard zone. The oxidation ponds are located on the landward side of the stopbank, however the stopbank and the pond embankment are one in the same. The stopbank adjacent to the southern pond not currently in use is higher than the surrounding stopbank, the intention being that should the river flood, water would first pass over the stopbank upstream of the ponds and then flood the adjacent paddocks around the ponds. The stopbank beside the existing pond may be raised also to further reduce risk of flooding.

Effects of Construction

Effects during construction of the upgrade works are considered relatively localised, temporary and minor. Fill material and aggregate will be carted to site to build the internal bund and wave banding proposed for Pond 2 to bring it into service as a maturation pond. Quarry rock will be carted for the in-bank diffuser discharge. Earth fill will come from cutting the roadside batters on the Mahakipawa Hill, on Queen Charlotte Drive.

The construction of the in-bank diffuser discharge will cause some effects in the river, with sediments disturbed during excavation and placement of the rock. It is expected the work on the diffuser will take approximately five days to complete.

6. Assessment of Alternatives

6.1 Treatment Upgrade Option

The lowest cost treatment upgrade option to meet the requirements of public health protection and acceptable environmental effects, is to use the existing pond built to hold sludge as a maturation pond. This will produce a more consistent and better quality effluent, due to increased retention time and reduced short circuiting. Biochemical oxygen demand (BOD) and total suspended solids (TSS) will be at lower concentrations, but more importantly will be more consistent and will be predominantly due to algae rather than the micro-organisms breaking down the organic material in the raw sewage. Bacterial indicator concentrations will be more consistent and lower, with a median faecal coliforms concentration of less than 10,000/100 ml, compared with the current median of 94,000/100 ml.

6.2 Effluent Disposal Option

The outfall would be changed to an in-bank diffuser. To ensure blockage of the proposed new outfall by the action of the river leading to overflowing of the ponds cannot occur, a higher level overflow about the position of the current outfall would be retained. The performance of the river outfall would be regularly checked to ensure ongoing operation.

Land disposal of pond effluent could be carried out, but would be problematic in the vicinity of the ponds for the following reasons:

- The only flat land available is subject to flooding, has a high water table, overlies a shallow aquifer and the land is currently used for dairying.
- The shallow aquifer under this area is used for water supply including the town of Havelock. It probably also supplies the mussel processor at Havelock wharf, at least in part.
- Until recently Fonterra would not accept milk from dairy farm land irrigated with wastewater from human sources no matter how well treated. Although Fonterra will now consider effluent irrigation, the required standards are very high.
- The surrounding hill country is relatively steep and this would present difficulties for applying effluent. Storage would likely be needed for wet weather.
- Pumping effluent to suitable land areas would be costly.

Although land treatment and disposal provides a reuse benefit, the area of land would be small due to the relatively small flow. Havelock is not generally water short, with substantial average rainfall.

Table 2 shows the relative merits of different discharge and treatment options and rough order capital costs ($\pm 30\%$). Note the higher the score the better.

Treatment/disposal options	Capital Cost 1 High 5 Low	Operating Cost 1 High 5 Low	Public Health Protection 5 High 1 Low	Environmental Impact 5 Least 1 Most	Operational Reliability 1 Poor 5 Excellent
Oxidation pond & maturation pond and river discharge	5 \$145,000	5	3	3	5
High standard of treatment and river discharge	2 \$1,200,000	3	5	4	3
Land treatment/disposal	1 \$1,600,000	1	4	4	2

Table 2: Simplified Upgrade Option Comparison

6.3 Predicted Performance of the Proposed Upgrade

With the addition of a maturation pond at Havelock, the effluent is expected to achieve the following quality:

Parameters	Units	Median
Biochemical Oxygen Demand	g/m ³	35
Total Suspended Solids	g/m ³	75
Faecal Coliforms	/100 ml	<10 ⁴
Enterococci	/100 ml	10 ³

It is proposed that effluent quality monitoring used in the current consent be increased but no ecological investigations be done as recommended by Cawthron unless there is a significant and persistent decrease in effluent quality. Increased monitoring would begin immediately following commissioning of the proposed upgrade.

Note that Cawthron’s recommendation to discontinue ecological investigations is based upon the current situation and with the upgraded treatment proposed the effluent quality will be improved.

7. Consultation

Two consultation meetings have been held.

The following list identifies the people invited to the first meeting and those that attended the first and second meetings:

Meeting One – 6 December 2006

Invitees:

Clr Barsanti – apology

Te Runanga O Ngati Kuia – Raymond Smith

Te Runanga A Rangitane O Wairau – Judith MacDonald

Havelock Residents' Association – Mr G T Bowes

Department of Conservation – Steve Cranwell

Fish and Game – Vaughn Lynn

Public Health Unit – Anaru Wilkie

Marlborough District Council – Assets and Services Department Manager – Mark Wheeler

Marlborough District Council – Consent Planner– Glen Parker

Attendees

Te Runanga O Ngati Kuia – Raymond Smith (RS)

Public Health Unit – Anaru Wilkie (AW)

Mark Wheeler – MDC

Jon Cunliffe – MDC

Glen Parker – MDC

Stuart Donaldson (SDo) – MDC

Meeting Two – 18 December 2006

Attendees:

Havelock Residents' Association – Geoffrey Bowes

Department of Conservation – Mike Aviss

Some Key Points from the Meetings

Meeting One

Te Runanga O Ngati Kuia

Eels are the main fish of interest in this part of Kaituna River.	Noted.
Should have signage on the riverbank to warn people of the mixing zone.	SDo to consider signage issue
Who will send out the application?	SDo will make sure Raymond Smith and Anaru Wilkie are sent a copy of the application.
Does discharge have to be at this point long term? Could it go elsewhere in the future?	SDo unable to answer as not considered in detail at this time. High cost an issue as would discharge to the shallow Pelorus Estuary which could have more impact than current discharge point.
Pond and discharge (and closed landfill) adjacent to Pa site. Would like ponds moved to another site in future (suggested five years) when hope to have settlement with the Crown. Thinks settlement should include return of Pa site.	Difficult to relocate the ponds. Plantings of natives on bunds could soften the view of the ponds. Some success at Blenheim ponds with this

Te Runanga O Ngati Kuia and Public Health

It would be useful if MDC could notify Ngati Kuia directly of events that could lead to a deterioration in the water quality of the Kaituna River – cultural process (Rahui) and share in monitoring results. Process for Ngati Kuia to notify its people and determine precautions to take on food gathering.	MDC can do this through email or text message.
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Meeting Two

Department of Conservation agrees in principle in upgrading to improve the environment.

Since the Meetings

Subsequent to the two meetings Council has received a further report from Cawthron, specifically addressing water quality in relation to shellfish. It is expected the upgraded plant will comply with shellfish gathering limits at the entrance to the estuary. Furthermore there are no known shellfish in the vicinity, probably as a result of the exotic saltmarsh cordgrass, *Spartina* in the area.

8. Marlborough Sounds Resource Management Plan - Volume One - Objectives and Policies

Utilities

Utilities such as sewage treatment ponds form an essential part of community infrastructure. Utilities must be maintained and developed in order to contribute to the health and safety, and social, cultural and economic wellbeing of the community.

Objective 20.3.1 The continuous operation, maintenance and development of essential utility networks necessary to sustain people and communities in the Plan area.

Objective 20.3.2 Establishment and operation of utility networks in a way that avoids, remedies and mitigates the adverse effects of those networks on the environment.

The operation and the performance of the STP over the last 21 years have demonstrated that the above objectives and policies have been achieved.

Furthermore, it is essential that for the health and wellbeing of the Havelock Community that the STP be able to continue to discharge as outlined in the application. While several assessments of alternatives have been carried out, it has been shown that the costs far outweigh the benefits to the environment and the community.

It is therefore concluded the proposal is not contrary to the objectives and policies identified in the MSRMP.

9. Recommended Conditions of Consent

Based on Council's experience of operating the STP over the last 21 years, the following monitoring and conditions will be put forward for inclusion in any resource consent conditions. The level of monitoring proposed is significantly greater than under the current consent.

1. That the discharge into the Kaituna River shall be undertaken in general accordance with Resource Consent Application, file reference U070013 Publicly notified on

2. That the consent shall expire 15 years from the date of issue.
3. That the maximum discharge rate based upon inflow to the ponds shall be 2400 m³/d.
4. That the mixing zone shall be 50 metres upstream and 50 metres downstream of the discharge point.
5. That the treated effluent from the Havelock Sewage Treatment Plant, after reasonable mixing (ie; beyond the mixing zone), shall not give rise to all or any of the following effects in the receiving waters:
 - The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials
 - Any conspicuous change in colour or visual clarity
 - Any significant adverse effects on aquatic life.
6. That the consent holder shall monitor as per condition 5 of the current resource consent (U960127) until such time as the proposed upgrade is commissioned, when monitoring shall be as follows, and provide The Manager, Resource Management and Regulatory Department of the Marlborough District Council, with monitoring results as requested. Note that the proposed monitoring regime is significantly more comprehensive than the current regime.

Effluent Monitoring:

- (a) A grab sample of pond effluent shall be taken by the Consent Holder once yearly in January or February and analysed for the following:

Pond Effluent

Chemical Oxygen Demand

Total Nitrogen

Ammonia-N

Nitrate-N

Nitrite-N

Total Kjeldahl Nitrogen

Total Phosphorus

Dissolved Reactive Phosphorus

- (b) A grab sample of pond effluent shall be taken by the Consent Holder once yearly in June or July, and analysed for the following:

Pond Effluent

Chemical Oxygen Demand

Carbonaceous Biochemical Oxygen Demand (5 day)

Carbonaceous Biochemical Oxygen Demand- soluble (5 day)

Total Suspended Solids

Total Nitrogen

Ammonia-N

Nitrate-N

Nitrite-N

Total Kjeldahl Nitrogen

Total Phosphorus

Dissolved Reactive Phosphorus

Conductivity*

Faecal coliforms

Enterococci,

Temperature*

Dissolved Oxygen*

pH*.

* may be measured on site.

- (c) Grab samples of pond effluent shall be taken by the Consent Holder each month from November to April inclusive and analysed for the following:

Pond Effluent

Carbonaceous Biochemical Oxygen Demand (5 day)

Carbonaceous Biochemical Oxygen Demand- soluble (5 day)

Total Suspended Solids

Conductivity*

Faecal coliforms

Enterococci,

Temperature*

Dissolved Oxygen*

pH*.

* may be measured on site.

7. That the consent holder shall monitor as per condition 6 of the current resource consent (U960127) until such time as the proposed upgrade is commissioned, when monitoring shall be as follows, and provide The Manager, Resource Management and Regulatory Department of the Marlborough District Council, with monitoring results as requested.

Kaituna River Monitoring:

- a) The Consent Holder shall take grab samples of Kaituna River water 50 metres upstream and 50 metres downstream of the discharge, to be taken once yearly in January or February and analysed for the following:

Upstream

Total Nitrogen
Ammonia-N
Nitrate-N
Nitrite-N
Total Kjeldahl Nitrogen
Total Phosphorus
Dissolved Reactive Phosphorus

Downstream

Total Nitrogen
Ammonia-N
Nitrate-N
Nitrite-N
Total Kjeldahl Nitrogen
Total Phosphorus
Dissolved Reactive Phosphorus

Sampling is to be undertaken between two and four hours after high tide.

- b) The Consent Holder shall take grab samples of Kaituna River water 50 metres upstream and 50 metres downstream of the discharge, to be taken once yearly in June or July and analysed for the following:

Upstream

Total Nitrogen
Ammonia-N
Nitrate-N

Nitrite-N
Total Kjeldahl Nitrogen
Total Phosphorus
Dissolved Reactive Phosphorus
Conductivity*
Faecal coliforms
Enterococci
pH*
Temperature*
Dissolved oxygen*

Downstream

Total Nitrogen
Ammonia-N
Nitrate-N
Nitrite-N
Total Kjeldahl Nitrogen
Total Phosphorus
Dissolved Reactive Phosphorus
Conductivity*
Faecal coliforms
Enterococci
pH*
Temperature*
Dissolved oxygen*

Sampling is to be undertaken between two and four hours after high tide.

* may be measured on-site.

- c) The Consent Holder shall take grab samples of Kaituna River water 50 metres upstream and 50 metres downstream of the discharge each month from November to April inclusive and analysed for the following:

Upstream

Conductivity*
Faecal coliforms
Enterococci

pH*
Temperature*
Dissolved oxygen*
Turbidity *

Downstream

Conductivity*
Faecal coliforms
Enterococci
pH*
Temperature*
Dissolved oxygen*
Turbidity*

Sampling is to be undertaken between two and four hours after high tide.

* may be measured on-site.

Influent Sewage Monitoring

8. The Consent Holder shall take a 24 hour composite sample of Havelock raw sewage annually in January or February and analysed for the following:

Chemical Oxygen Demand
Biochemical Oxygen Demand
Total Suspended Solids
Conductivity*
Total Nitrogen
Ammonia-N
Nitrate-N
Nitrite-N
Total Kjeldahl Nitrogen
Total Phosphorus
Dissolved Reactive Phosphorus
Faecal coliforms
Enterococci
pH*

* may be measured on site.

Reports

9. An annual monitoring report shall be prepared that summarises the performance of the sewage treatment system. Copies of all analyses and comments shall be made available to the Monitoring Officer upon request.
10. The reports, which are to include information regarding the impact of the treated effluent on the receiving environment, shall be provided to the Marlborough District Council, Attn: Manager, Resource Management and Regulatory Department by 30 June each year for the term of the consent.

Review of Conditions

11. That at annual intervals from (the period) the Marlborough District Council may review the conditions of consent, pursuant to Section 128 of the Resource Management Act 1991, for the purposes of:
 - Evaluating the performance of the treatment system
 - Evaluating the monitoring programme for the discharge
 - Evaluating any adverse effects on the surrounding environment

to enable Council's Resource Management and Regulatory Department to impose any further conditions or take any further action requiring the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment arising from the discharge of treated sewage effluent.

Discharge to Air

12. That there shall be no odour detectable beyond the boundary of the property that in the opinion of a Council officer is offensive and objectionable.

10. Conclusion

The STP has provided the Havelock community with a cost effective treatment plant for the last 21 years. Similar pond systems have served many towns and cities in New Zealand well over many decades. Ponds offer a low cost, reliable, energy efficient treatment option particularly well suited to small towns.

The proposed treatment upgrade will see an improvement in the quality of the treated effluent discharged into the Kaituna River. In addition, it will not require significant continuous energy input. The oxygen required for the breakdown of organic wastes is provided almost entirely by

algae which derive their energy from the sun. Although algae is discharged from the pond to the Kaituna River, that algae does not die off immediately and therefore does not impose a significant immediate organic loading on the receiving environment.

The proposed improvement of incorporating a maturation pond after the oxidation pond has been assessed as providing the best practicable option to improve the performance of the ponds in terms of reducing the effects on the environment and reducing risk to the public health. It also provides the Havelock community with a cost effective sewage treatment plant.

Given the past performance of the ponds combined with the proposed improvements to the discharge, an increased term of consent is sought to a period of 15 years.

Some specific one off surveys will be carried out following upgrading to confirm the performance of the ponds and effects of the discharge as recommended by Cawthron. The surveys will be done in consultation with Cawthron.

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