

MANGAWHAI COMMUNITY WASTEWATER SCHEME

RECLAIMED WATER DISPOSAL STUDY

INFORMATION PACK

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1. BACKGROUND

The Mangawhai Community Wastewater Scheme (MCWS) currently disposes of the treated effluent by spray irrigation onto a council owned farm at Brown Road Mangawhai. Currently approximately 30 ha is under irrigation. With increasing numbers of connected properties the current irrigated area is insufficient to dispose of all the treated effluent in a typical year. Before proceeding to increase the irrigated area council has decided to review the options for water disposal to determine if there are more cost effective options for disposal of all or a proportion of the effluent. Council also recognises that in the medium term the farm simply does not have sufficient irrigable area to handle all the effluent and therefore desires to establish a long term strategy that takes account of this. Council therefore invites expressions of interest from consulting firms to conduct a study to review options for disposal.

The collection system, treatment plant and irrigation system operate under a resource consent granted by Northland Regional Council (NRC)¹.

The MCWS is operated by Water Infrastructure Group under a contract with the council while a local farmer has a grazing licence and is responsible for general farm maintenance.

2. SCHEME DESCRIPTION

Mangawhai is a beachside community with perhaps 20 – 25% of the houses permanently occupied. Peak load occurs at New Year and is of relatively short duration. Sewage is collected via a mix of grinder pumps and gravity sewers and is delivered to the treatment plant located in Mangawhai Park via a network of pump stations. There are no significant industrial wastes.

Treatment is by preliminary screening < 6mm followed by an activated sludge stage using a proprietary CASS continuous feed sequencing batch reactor. Effluent from the CASS reactor is filtered in pressure filters using a ground glass filter media followed by disinfection with sodium hypochlorite solution prior to storage in the final effluent tank and transfer to the farm.

From the plant reclaimed water is pumped some 10 km to the Lincoln Downs farm where it is stored in a large earth dam capable of holding 170 ML constructed for the purpose. The irrigation system draws water from this dam.

Reclaimed water is pumped from the dam and applied using fixed sprinklers post mounted at approximately 25m centres. The sprinklers are organised into zones of between 15 and 30 sprinklers. (Some of the smaller zones have been paired up to increase application rates.) Irrigation is controlled by a dedicated PLC. Schedules can be set up either on a touch panel at the farm or via an internet connection. Details of the irrigation system are available in supplier manuals.

The system is designed to use deficit irrigation as described in the Environmental Management Plan – Lincoln Downs April 2010. Details of operation in the 2011/12 year are contained in the report on operation prepared for NRC. (These documents will be made available to the successful consultant.) Council has discussed with NRC a change to the consent allowing irrigation to saturation as per the letter attached in Appendix 2. This change is expected to allow an increase in the amount applied per hectare; the consultant is required to evaluate the effect of this change as part of this study.

At present approximately 30 ha is irrigated; 24 ha installed under the initial contract and an additional 6 ha installed in 2012 which are “piggy backed” onto zones 15 to 18. (These “A” zones

¹ Resource consent CON 20121496901

are manually switched over and any future work at the farm should include linking them into the control system.)

3. RECLAIMED WATER QUALITY

The treatment plant operator is required to deliver reclaimed water meeting the standards set out in the resource consent namely:

At the treatment plant (after disinfection):

Parameter	Units	Performance Requirements		
		Median	Average	90 th %ile
E. coli	MPN	10		100
Total Dissolved Solids	Mg/l		500	
Total Nitrogen	Mg/l		30	
Phosphorus	Mg/l		15	
Total Suspended Solids	Mg/l		10	
Carbonaceous Biochemical Oxygen Demand	Mg/l		10	

Irrigation water (ex dam)

Parameter	Units	Trigger Level	Maximum
E. coli	MPN	1000	10,000

Typical plant output composition is as follows (average for 24 months 2011-2013)

TM	Units	Typical composition
Total Dissolved Solids	Mg/l	380
Total Nitrogen	Mg/l	13.5
Phosphorus	Mg/l	8.2
Total Suspended Solids	Mg/l	3.5
Carbonaceous Biochemical Oxygen Demand	Mg/l	3

The treatment standard at exit from the plant, on which the design was based, is California code 22 for disinfected secondary – 23 recycled water. This standard is accepted by Fonterra for application to pasture which is fed to lactating cows as per Article 3 section 6304 of the code. (Because of contamination in the dam the irrigation water has higher total coliform levels than permitted under this code.) Fonterra have confirmed that irrigation must cease for 30 days before grazing or making silage intended for feeding lactating cows. Presently dry cows are being grazed on the irrigated blocks.

4. RECLAIMED WATER VOLUMES

Records are kept of effluent volumes received daily at the plant. Monthly intake is summarised in the spreadsheet *Irrigation study April 2013.pdf* (Excel versions will be supplied to the selected consultant.) There is considerable variation in monthly data due to weather; With virtually all houses on tank supply the drought this year has seen a 25% drop in daily inflows for February and March.

This spreadsheet also details expected increases in inflow over the next 10 years and a typical irrigation water balance based on the existing 30ha irrigated area.

5. STUDY PARAMETERS

A study² undertaken before the scheme was constructed considered a number of options before recommending the irrigation to farm land scheme now installed. Because at that time the objective was to provide a system to handle the total output of the treatment plant options that would use part of the output only were discounted. This is no longer the case and opportunities to use a part of the effluent can now be considered.

The irrigation balance referred to above shows that over the next 10 years it will be necessary to provide additional facilities to handle up to 100,000 cum per year and that towards the end of the period Lincoln Downs on its own will be insufficient even if the irrigated area is expanded.. At present cash flow from the irrigated areas is negative so there is no problem with diverting water that would otherwise be applied at Lincoln Downs to other users.

While previous studies and information on the system (see list in Appendix 4) will be made available to the successful consultant the primary aim of this study is to take a fresh look at the options for handling reclaimed water in excess of the capacity of the current irrigated area. In particular the following options shall be considered together with any other options suggested by the consultant.

1. Mangawhai Golf Course
2. Te Arai Golf Course and Subdivision
3. Mangawhai Park
4. Other land based options
5. Other alternatives including discharges to water

Council has had preliminary discussions with the Te Arai developer and Mangawhai golf club; notes of the discussions with Te Aria are included in Appendix 1.

6. STUDY OUTPUTS

1. A report describing the options considered, initial and ultimate capacity of these, capital cost estimates (assuming development is staged to match increasing inflows), risks (both physical and regulatory) capital and operating costs (summarised as a NPV calculation) leading to a ranking of the options.
2. Note that it is not required to repeat information included in previous studies – this can be included by reference.
3. Where to from here? A summary of the steps required to advance the recommended scheme to the stage where regulatory approval is achieved and construction tenders can be called.

² Earth Tech May 2006

4. Recommendations.

7.SUBMISSIONS

Proposals will be evaluated on the basis of:

Qualifications of the consultant.

- experience in similar projects
- expertise of assigned staff

Approach and methodology

- understanding of the context, requirements and objectives of study
- methodology
- innovation
- presentation of proposal.

Submissions shall include:

1. A written statement describing the consultants proposed approach and methodology.
2. A listing of deliverables to be provided under the consultancy contract.
3. Staff proposed for the study, with brief CV's and a description of their roles in the overall project team.
4. Hourly rates and an estimate or proposed time allocation required to complete the study.

It is intended that submitters will be evaluated by the Principal against the requirements set out in this expression of interest scoping document. However, the Principal reserves the right to depart from such requirements at its sole and absolute discretion.

An evaluation panel of a minimum of two persons and any advisors as required by the Principal will evaluate the expression of interest submissions in accordance with the tender evaluation process. The tenders will be evaluated on the basis of price and assessment of the non price attribute information submitted by each Tenderer.

APPENDIX 1

Notes from meeting between KDC and Darby Partners re Te Arai golf course irrigation

Hi John

Thanks for meeting with Peter and I recently.

As discussed Te Arai Coastal Lands (TACL) are interested in proceeding further with the potential use of the treated wastewater from Mangawhai wastewater scheme for Irrigation on the coastal land north of Te Arai Point.

There are several potential uses on the site and these include Golf Course Irrigation, Irrigation of native re-vegetation areas and irrigation of forestry.

The Golf Course has potential to use between 500 and 1000m³ per day during the irrigation season (100 days). A similar quantity could be utilised in re-vegetation and or forestry areas but this obviously depends on the area allocation for irrigation and the application rates.

It may be possible to incorporate a combination of options so that the Golf Course has water available when required but if not there are alternative disposal sites that can be used.

As you are aware the site is on sand soils and parts of the site are elevated on older dune formations so there is potential for quite high hydraulic loading rates to be used (although obviously other environmental effects would need to be considered.

Potential pipeline routes that we think are feasible are running along black swamp road and then cutting across the farmland near to the AC / NRC Boundary or running into the site along the main access Pacific Road.

We would be happy to provide further details and undertake further feasibility work but would probably need an understanding of volumes of wastewater that would make the proposition viable from your perspective.

If you need further information or wish to discuss further please don't hesitate to let me know.

Regards

Marcus

Marcus Bird · Darby Partners

APPENDIX 2

Proposed Changes to Resource Consent

Colin Dall

Consents/Monitoring Programme Manager

Northland Regional Council

Dear Colin,

Introduction

This purpose of this letter is to outline a proposed trial change to irrigation scheduling that Kaipara District Council (KDC) intends to undertake at the Mangawhai Wastewater Treatment Scheme site and to seek Northland Regional Council's (NRC) agreement on the trial before proceeding.

Whilst this letter does not seek to alter any existing resource consent conditions for resource consents CON20051496901 (01, 03-08), KDC wishes to advise of a minor change to the Environmental Management Plan (EMP) required under Condition 39 of the existing consent and the potential that Condition 8 may be exceeded that 'limits the rate of application to no more than 5,000 cubic metres per hectare between 1 July and 30 June'.

Purpose of Seeking Change to Environmental Management Plan

Irrigation at the Lincoln Downs farm is currently based on deficit irrigation as described in the EMP and associated irrigation scheduling tool. KDC are seeking to investigate the potential to increase treated wastewater irrigation rates above the current limits to saturation. Irrigation to saturation has potential benefits as increasing the rate of treated wastewater applied to land will potentially defer the need to extent the irrigated area.

Current Environmental Management Plan Approach

The existing EMP provides details of a deficit irrigation scheme based on maintaining a deficit of between 10 and 20 mm after irrigation (scheduling tool Figure 3.1 of EMP April 2010). Based on the existing approach irrigation is run on weekly cycles with the soil allowed to dry for several days and is then irrigated again to bring the soil back up to a deficit of between 10 and 20 mm and the cycle repeated.

To allow grass to be removed it is necessary to allow paddocks to dry out further (typically three times a season) to allow grass to be harvested either by feeding livestock in the paddocks or cutting and removing as feed. Substantial water is then required to bring soil moisture back up to around a 10 mm deficit in the period following cutting.

Proposed Change to Environmental Management Plan Approach

It is proposed to trial a modification to the EMP that will allow moisture levels to be maintained closer to saturation and to operate by applying water several times a day (whilst the irrigation is operated) with a typical maximum of around 3 mm per cycle.

This will have the potential positive effect of increasing evaporation off the plant surfaces compared to the existing irrigation regime.

There is the potential for runoff to occur outside the irrigation zones into the buffer areas should the irrigation not be managed appropriately. Condition 9 of the existing consent states that:

"Notwithstanding Condition 8, the instantaneous irrigation rate shall not result in any overland flow of treated effluent beyond the irrigation area into any buffer area, as defined by Condition 7"

KDC currently monitors compliance with this Condition 8 by a number of means including regular visual observations and spade testing to determine soil moisture levels (observations and results are noted in a farm log book which also provides details of water applied in each of the log zones).

With the above approach of irrigating close to saturation, it may be possible that the maximum annual application rate of 5,000 cubic metres per day may be exceeded. This annual application will continue to be monitored and reported as required by Schedule 4.

Given the above proposed change, the irrigation scheduling procedure outlined in Table 3.4 is proposed to be modified as follows:

1. Estimate soil moisture content of the soil using visual methods (i.e. the spade test);
2. Set application rates for groups of zones based on observation of soil moisture levels;
3. Monitor irrigation to ensure there is no runoff into the buffer zones;
4. Cease irrigation when daily rainfall is greater than 5 mm;
5. Resume irrigation after rain based on the result of the spade tests; and
6. Irrigation will continue in winter if the above criteria are satisfied.

In determining the irrigation scheduling procedure, it is proposed to utilise the above method rather than irrigation rates being determined primarily by the annual application rate.

Management of Irrigation

It is proposed that the management roles are changed from the current arrangement to transfer greater responsibility for day to day operation to the Water Infrastructure Group (WIG). WIG will become responsible for setting up irrigation schedules and carrying out regular soil moisture tests and monitoring system operation.

Summary

KDC are seeking NRC's approval of the proposed change to the irrigation scheduling as outlined in this letter and seek approval in writing prior to commencing the trial.

Please contact John Burt at Kaipara District Council should you wish to discuss these matters further.

Kind regards,

APPENDIX 3

Reports and files provided with this RFP.

File – reclaimed water study april 2013.pdf

APPENDIX 4

Additional reports and files available to the successful consultant.

Irrigation application data 2011-12 and 2012-13 years. (Daily volume applied per zone and rainfall) .xls file.

Mangawhai Treated Wastewater Disposal – Assessment of Land Disposal Options. URS March 2006.

Disposal Options Report May 2006 Earth Tech Ltd.

Mangawhai Golf Course Site Investigation – URS August 2006

Environmental Management Plan – Lincoln Downs Farm –RMG 2009

Details of farm irrigation as installed.

Resource consent CON 20121496901