



## STAFF REPORT

**TO:** Environment & Planning Subcommittee

**FROM:** Michael Durand, Consent Planner - Discharges

**REFERENCE:** RM060922

**SUBJECT:** **R and A LANGFORD - REPORT EP07/05/01** – Report prepared for 7 May 2007 hearing

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### 1. INTRODUCTION

My name is Michael Durand and I have been Consent Planner (Discharges) at TDC since May 2006. I hold a BSc (Hons) in Geographical Sciences and a PhD in Environmental Science, and have nine years professional experience as a scientist and researcher. In my position of Consent Planner my work is largely focussed on assessing wastewater system designs. Currently this involves the checking of every domestic wastewater system design submitted to Council through both the Resource Consent and Building Consent processes. I have attended numerous training courses and seminars on domestic wastewater treatment and disposal.

This report relates to on site wastewater treatment and disposal at the former Kahurangi Lodge, Tukurua. The Aorere Valley Church of Christ<sup>1</sup>, Golden Bay, proposes to establish a permanent operational base for its activities at the Lodge. The proposed activity requires resource consents for land use and for the discharge of domestic wastewater to land. This report discusses their discharge application. Extensive reference is made to the materials provided with the application: the Assessment of Environmental Effects<sup>2</sup> prepared by Golden Bay Surveyors and the document 'Wastewater Treatment Review and Site and Soil Evaluation August 2006'<sup>3</sup> prepared by Opus International Consultants Limited.

### 2. APPLICANT'S PROPOSAL

The applicant proposes to use the venue for a range of Church and community events such as morning and evening services (30-45 persons), group meetings (10-50 persons) and other community events including weddings, funerals, fun days etc. Forecasting occupancy numbers for such events is notoriously difficult. However, the applicant has proposed that up to 120 persons may be in attendance at occasional events. It is also proposed that the Church provide two guest rooms for overnight accommodation within the existing lodge.

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<sup>1</sup> The applicants, R & A Langford, are hereinafter referred to as the 'Church' or the 'applicants'.

<sup>2</sup> Hereinafter referred to as the 'AEE'.

<sup>3</sup> Hereinafter referred to as the 'Opus wastewater report'.

The property has no reticulated sewerage system and therefore is reliant upon its own on-site wastewater treatment and disposal system. An aerated wastewater system was installed at the Kahurangi Lodge in ~1993 and was maintained for several years before normal operation ceased in ~2006. That system was designed to treat and discharge up to 2,400 litres per day. The applicants propose to increase this volume to 2,600 litres per day.

The application states that the Opus wastewater report outlines '*the current capacity of the system and the upgrading required to serve the additional flows*' (pg. 3, section 2.3). Whilst this is correct, the Opus wastewater report also considers the alternative option of installing a new system (pg 8, section 7.3). It should be stressed that the Opus report does not recommend one option over another. It focuses on upgrades to the existing system that would be required should it be recommissioned, but does not recommend that this is the best course of action for the applicants. It should be noted that there are also discrepancies between the applicants' proposal and the activity described in the Opus report, such that different wastewater design flow volumes can be derived from each document; clearly this has implications for the design of the disposal system.

This is significant because the applicants have not stated **explicitly** in their AEE (neither in sections or 2.3 nor 4.4) that an upgrade to the existing system is their preferred option. The options presented in the Opus report are discussed further below.

### 3. STATUS UNDER THE TASMAN RESOURCE MANAGEMENT PLAN

The proposed activity lies within the Special Domestic Wastewater Disposal Area (SDWDA), in which there are special restrictions on the quality of domestic wastewater that may be discharged to land. The volume of water proposed to be discharged means that the activity does not meet the Permitted Activity rule 36.1.5(a) of the TRMP. There is no Controlled Activity rule within the SDWDA and therefore the proposed activity is deemed to be Discretionary in accordance with rule 36.1.16.

### 4. ASSESSMENT OF EFFECTS

#### Permitted Baseline

Within the SDWDA, rule 36.1.5 of the TRMP expects domestic wastewater to be treated to a 'secondary'<sup>4</sup> standard. While rule 36.1.5 does not apply directly in this case (as discussed above), the criteria of the rule provide important permitted baseline standards that should be achieved unless good reason exists not to. In the

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<sup>4</sup> By definition, secondary treatment usually means that the domestic wastewater (blackwater and greywater combined) goes through two stages of treatment in tanks that are arranged in series. First the separation of solids, grease and oils takes place in a 'septic tank'. Here there is also some anaerobic biodegradation of organic matter in the wastewater. Second, wastewater is treated under aerobic conditions in a second chamber or via dosing to a filter medium (e.g sand) in which aerobic conditions are maintained. From here wastewater is both recirculated to the primary tank and pumped to a land disposal system. Secondary treatment systems produce effluent that is of high quality relative to that from conventional septic tanks. Following discharge, bacteria in the soil breakdown organic components of the wastewater still further. The treated wastewater can be used for irrigation purposes and if the discharge is properly managed it should pose little risk of contamination to groundwater, to surface water bodies or to human health.

SDWDA it is expected that wastewater systems be designed to discharge relatively high quality wastewater at less than 20 milligrams per litre BOD<sub>5</sub> (5-day biochemical oxygen demand) and less than 30 milligrams per litre TSS (total suspended solids). Secondary treatment systems that are functioning correctly should meet these standards.

In the SDWDA there is also an expectation that concentrations of faecal coliforms are also relatively low at less than 1000 coliforms per litre of discharged treated wastewater<sup>5</sup>. This standard cannot be met by typical secondary wastewater treatment systems, and the water will require tertiary treatment by ultra-violet radiation or chlorine.

### **Consideration of Effects in the Application**

The Auckland Regional Council's publication TP58<sup>6</sup> (regarded in New Zealand as one of the two accepted design and management manuals for on-site wastewater systems) suggests that the following matters should be paid close regard when designing on-site wastewater systems (Table 1). Table 1 indicates whether or not each matter has been paid regard to in the application for resource consent, and whether or not the possible environmental effect is considered by Council to be more than minor.

Table 1 shows that all of the matters that should be considered in an AEE for wastewater discharge have been either (a) considered to a satisfactory degree by the applicant, or (b) were not addressed but shall be either in the final design stages or through appropriate consent conditions. Questions arise over the conservativeness of the design and these are discussed below.

### **Design Flow Volumes: Differences Between Opus Estimates and Applicants' Estimates**

The applicants' two documents containing wastewater information (the AEE and the Opus wastewater report) provide two sets of evidence regarding wastewater but these are not wholly consistent with each other. Table 2a below shows the estimated volume of effluent that may be generated by the wastewater system according to the Opus wastewater report. These calculations included wastewater generated by a café, but this café appears to be absent from the applicants' proposal. Unfortunately the AEE does not clarify the situation further because there is no statement provided on the anticipated volume of wastewater generation. Rather, the AEE describes, in section 2 the 'types of activities associated with the Church', without stating them explicitly. Furthermore, the AEE states clearly in section 4 that '*the attached report [Opus report] gives ample detail ... [and that the report has] ... estimated that peak flows – averaged over a week, would produce around 2600 L/day of effluent*'. The calculations made by Opus were based upon different activities to those listed in the AEE, which themselves do not appear to be explicit. Therefore, any decision on the volume of wastewater proposed to be generated, and any subsequent decision on the size of the effluent disposal field required, would seem in my judgement to be premature.

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<sup>5</sup> Converted from 100 coliforms per 100 millilitres as stated in the TRMP, for consistency with BOD<sub>5</sub> and TSS requirements.

<sup>6</sup> Ormiston, A.W. & Floyd, R.E. (2004). On-site Wastewater Systems: Design and Management Manual. Auckland Regional Council Technical Publication No. 58 (TP58). Third Edition.

**Table 1.**

Matters considered in the assessment of potential adverse effects on the environment.

<b>Matters to be considered</b>	<b>Considered in application?</b>	<b>Adverse environmental effect more than minor?</b>
Conservative approach at design stage	Y/N*	Y/N*
Robust treatment system	Y	N
High level of treatment	Y	N
Mitigation measures to protect against failure	Y/N/C	N
Conservative hydraulic loading rates	Y	N
Measures to ensure even distribution of wastewater disposal	Y	N
Protection of land disposal area with stormwater cut off drains	D	N
Description of the soil types and categories on the property	Y	N
Description of the land application area	Y	N
Separation from surface water	Y	N
Separation from groundwater	Y	N
Separation from surface water bores	Y	N
Determination of potential flood risk	N	N
Provision for reserve allocation	N	N
Provisions to discourage access	N/C	N
Odour effects	N	N
System management plan	N/C	N
System maintenance contract	N/C	N
Education of system users	N/C	N

Notes:

Y – Yes ; N – No

C – Not addressed in the application, but to be addressed by consent conditions, which should ensure that effects are no more than minor;

D – Not addressed in the application, but to be addressed by the applicants at the final design stage. Plans should be submitted to Council before the installation of any system and prior to the exercise of any consent granted.

\* – See following discussion on design flow volumes.

In light of this I would recommend conditions be imposed on any consent granted to the effect that: (i) the applicant provide complete plans of the proposed upgrades to (or replacement of) the wastewater system, (ii) that these upgrades be justified by accurate descriptions of the anticipated activities to be taking place at the Church, and (iii) that these plans be approved by Council prior to the exercise of that consent.

**Table 2a.**Estimated effluent generation: Modified from Opus wastewater report<sup>7</sup>

Activity	Max no. of people	No. of occasions/week	Effluent (litres/pers/day)	Weekly total (litres)
Cottage accommodation	5	7	180	6,300
Lodge accommodation	3	5	180	2,700
Café	40	2	30	2,400
Wedding	120	1	30	3,600
Sunday service	120	1	15	1,800
Community meeting	40	1	15	600
<b>Total (Weekly)</b>				<b>17,400</b>
<b>Total (Daily average)</b>				<b>2,485.7</b>

**Table 2b.**

Estimated effluent generation: from applicants' AEE

Activity	Max no. of people	No. of occasions/week	Effluent (litres/pers/day)	Weekly total (litres)
Cottage accommodation*	5	7	180	6,300
Lodge accommodation	3	7	180	3,780
Sunday morning service	35	1	15	525
Fortnightly Sunday evening serv.	45	0.5	15	337.5
Group meetings	50	5	15	3,750
Monthly community events	120	0.25	30	900
<b>Total (Weekly)</b>				<b>15,592.5</b>
<b>Total (Daily average)</b>				<b>2,227.5</b>

\* Added here as not discussed in AEE

## Receiving Environment

The characteristics of the environment into which the treated wastewater is proposed to be discharged can be summarised as follows:

- Rainfall is relatively high with the site being near the western ranges;
- The site is undulating with gulleys and low-lying areas characterised by relatively poor drainage and a potential for waterlogging. Drainage is better on the higher ridges, although;

<sup>7</sup> AS/NZS 1547 (2000) Australian/New Zealand Standard: On-site domestic wastewater management. Standards New Zealand / Standards Australia

- The soil across the site has clay-containing horizons overlying a hard pan at 1.5-2m depth. This poses limitations for on-site wastewater disposal. However, on the higher areas, test pits found clay loam topsoil of up to 250 mm depth overlying clay. These conditions are suitable for the receipt of secondary treated wastewater at a suitable rate.
- The higher lying areas are also heavily vegetated with scrub and have north-facing slopes. These areas provide high levels of potential evapotranspiration.

The soil has been categorised in the Opus wastewater report as being category 5 or 6 (most poorly draining). A conservative loading rate on such soils is 2 mm per day (2 litres per square metres per day). The likely disposal method was proposed to be sub surface drip irrigation to trees under mulch. This is considered to be a suitable rate of wastewater discharge for the site. Suitable disposal areas identified by Opus are shown as Area 2 and 3 on the attached Figure 1, reproduced from their report.

## **5. ASSESSMENT: KEY POTENTIAL ENVIRONMENTAL EFFECTS**

Key potential environmental effects that may be associated with discharges from the proposed on-site wastewater treatment and disposal systems are (in this case):

- Impact on groundwater quality
- Impact on soils
- Impact on amenity values

### **Impact on Groundwater Quality**

Depth to groundwater measurements were not provided in the application. However, test pits (to unknown depth) in Areas 2 and 3 showed no evidence of proximal groundwater. These are the existing disposal areas and are elevated above Area 1. The description on pg 4 of the Opus report suggests these sites are good for wastewater disposal. A conservative irrigation rate and high potential for evapotranspiration suggest that the site is suitable and that groundwater should not be adversely affected by wastewater discharges. It should also be noted that the quality of the wastewater discharge will be relatively high, further reducing any potential for adverse effects on groundwater. The proposed wastewater discharges are to be located more than 500 m from the nearest bore and therefore contamination of bore water from the proposed wastewater discharges is not a concern. These potential wastewater disposal areas are shown on Figure 1.

### **Impact on Soils**

Long term clogging of soils is possible when primary treated (septic tank) wastewater is discharged to land. However, in this case the proposed discharge will be a high quality and is proposed to be discharged over a wide area. A conservative discharge rate and dosing will allow soils to 'rest' between wastewater doses. Current professional opinion is that irreparable clogging is extremely unlikely from secondary treated wastewater discharges. In the majority of cases, disposal fields that are suitably planted sustain healthy vegetation and there is little or no adverse effect on soil quality in the long term. In this case, since heavy vegetation already exists on the site, the impact on soils should be no more than minor.

## **Impact on Amenity Values**

The proposed location of the discharge has large set-back from other properties. Notwithstanding this, there should not be any odours or other adverse cross-boundary effects. There should be no adverse visual impact from such a system.

## **6. SUBMISSIONS**

None of the submitters raised objections to the applicants' proposals regarding domestic wastewater treatment and disposal.

## **7. SUMMARY AND CONCLUSION**

After considering the application in detail I consider that the environmental effects of both of the proposed options for wastewater treatment and discharge (i.e. recommissioning of the existing system, or a new system) will be no more than minor. The proposed discharge shall be of wastewater that has been treated to a high standard, and the discharge shall occur into an environment that is suitable for the receipt of such wastewater.

## **8. RECOMMENDATION**

Having given the proposed discharge of domestic wastewater to land detailed consideration, I recommend that resource consent be granted subject to the conditions suggested below.

## **CONDITIONS**

### **General Conditions**

1. The rate of discharge shall not exceed 2,600 litres per day.
2. The discharge shall consist only of domestic wastewater that has been treated to secondary standards.

### **Treatment and Disposal System**

3. A detailed design for the on-site domestic wastewater treatment and disposal system shall be submitted to Council for approval prior to the exercise of this consent. In the case that the existing system is recommissioned prior to the exercise of this consent, this work shall be in general accordance with that described in the material provided with application for resource consent RM060922, unless inconsistent with the conditions of this consent, in which case the conditions shall prevail

### **Advice Note:**

This design should be based upon findings from a complete site and soil assessment carried out by a suitably qualified or experienced wastewater engineer.

4. The maximum loading rate at which the wastewater is applied to land shall not exceed 2 millimetres per day (2 litres per square metre per day). The disposal area shall be no less than 1,300 square metres in area and incorporate no less than 1,300 lineal metres of pressure-compensating drip irrigation line. The emitters in the drip irrigation line shall be spaced no more than 0.6 metres apart along the line and each dripper shall emit wastewater at a rate of not exceeding 1.6 litres per hour. Lateral lines shall be laid at no more than 1 metre spacings.
5. The treated wastewater entering the disposal field, as measured at the sampling point required to be installed in accordance with Condition 10, shall comply at all times with the following limits:
  - (a) the five day biochemical oxygen demand (BOD<sub>5</sub>) in any single sample shall not exceed 20 milligrams per litre; and
  - (b) the concentration of total suspended solids (TSS) in any single sample shall not exceed 30 milligrams per litre; and
  - (c) the concentration of faecal coliforms in any single sample shall not exceed 1000 coliforms per litre.
6. There shall be no ponding of wastewater on the ground surface, or any direct discharge or run-off of wastewater to surface water.
7. The modification or construction and installation of the wastewater treatment plant and disposal system shall be carried out under the supervision of a person who is suitably qualified and experienced in wastewater treatment and disposal systems.

The person supervising the modification or construction and installation of the system shall provide a written certificate or producer statement to the Council's Co-ordinator Compliance Monitoring prior to the exercise of this resource consent. This certificate or statement shall include sufficient information to enable the Council to determine compliance with Condition 4 and shall also confirm the following:

- (a) that all components of the wastewater system (including the treatment plant and the disposal area) have been inspected and installed in accordance with standard engineering practice and the manufacturers' specifications; and
  - (b) that all components of the wastewater system are in sound condition for continued use for the term of this resource consent.
8. The Consent Holder shall submit a set of final "as-built" plans to the Council's Co-ordinator Compliance Monitoring that shows the location of all components of the wastewater treatment and disposal system. For the purpose of this condition, the Consent Holder shall ensure that the "as-built" plans are drawn to scale and provide sufficient detail for a Council monitoring officer to locate all structures identified on the plans, with particular regard to the sampling point (required to be installed in accordance with Condition 10).



9. No large grazing stock (such as sheep, cattle or horses) shall be allowed access to the disposal field at any time. In the event that such stock are held elsewhere on the property, suitable fences shall be installed around the disposal area to prevent access by such animals.
10. A sampling point to allow collection of a sample of the treated wastewater shall be provided at a point located after the final pump-out chamber and before the point where the wastewater discharges to the disposal area.

### **Maintenance and Monitoring**

11. Samples of the treated wastewater shall be taken at 6, 12 and 24 months following the exercise of this consent. The samples shall be tested for BOD<sub>5</sub> and TSS by an accredited environmental testing laboratory. Results of these tests shall be forwarded to Council's Co-ordinator Compliance Monitoring within 10 working days of the results of each test being received by the Consent Holder.

The samples required by this condition shall be taken at times where the wastewater treatment and disposal system is being used in a typical fashion. Typical fashion means that the occupancy, at the time of sampling and during the preceding 48 hours, varies by no more than 1 person from the number of people that normally reside in the dwelling. The samples shall be taken using appropriate procedures as directed by the accredited environmental testing laboratory and shall be transported to the laboratory under chain of custody.

12. The Consent Holder shall enter into, and maintain in force at all times, a written maintenance and monitoring contract with an experienced wastewater treatment plant operator, or a person trained in the wastewater treatment operation by the system designer, for the ongoing maintenance of the treatment and disposal systems.

The contract shall specify the frequency of treatment plant inspections and maintenance during the term of this resource consent and shall include an inspection and maintenance schedule that is in accordance with the conditions of this consent.

A signed copy of this contract shall be forwarded to the Council's Co-ordinator Compliance Monitoring prior to the exercise of this consent.

13. Notwithstanding Condition 12, the wastewater treatment and disposal system shall be inspected and serviced not less than every six months and a copy of the service provider's maintenance report shall be forwarded to the Council's Co-ordinator Compliance Monitoring within two weeks of each inspection. The inspection report shall include, but not be limited to, the following information:
  - (a) the date the inspection was undertaken and the name of the service provider;
  - (b) a list of all components of the treatment and disposal systems that were inspected and the state of those components;
  - (c) any maintenance undertaken during the visit or still required;
  - (d) a description of the appearance of the filter/s and tanks;

- (e) the location and source of any odour detected from the system during the inspection; and
- (f) a description of the appearance of the disposal area (ponding, vegetation growth etc).

### **Reserve Area**

- 14. A reserve area equivalent to 100% of the disposal field should be kept free from development on the site and be made available for wastewater disposal in the event that the first disposal field fails.

### **Review of Consent Conditions**

- 15. The Council may, during the month of April each year, review any or all of the conditions of the consent pursuant to Section 128 of the Resource Management Act 1991 for all or any of the following purposes:
  - (a) to deal with any adverse effect on the environment which may arise from the exercise of the consent that was not foreseen at the time of granting of the consent, and which is therefore more appropriate to deal with at a later stage; and/or
  - (b) to require the Consent Holder to adopt the best practical option to remove or reduce any adverse effects on the environment resulting from the discharge; and/or
  - (c) to review the contaminant limits, loading rates and/or discharge volumes and flow rates of this consent if it is appropriate to do so; and/or
  - (d) to review the frequency of sampling and/or number of determinands analysed if the results indicate that this is required and/or appropriate.
  - (e) to require consistency with any relevant Regional Plan, District Plan, National Environmental Standard or Act of Parliament.

### **Expiry**

- 16. This resource consent expires on 31 April 2022.

Michael Durand  
**Consent Planner, Discharges**