STAFF REPORT

TO: Environment & Planning Subcommittee

FROM: Rob Lieffering – Resource Consents Manager

REFERENCE: RM070285

SUBJECT: **M J & P M BOLAND – REPORT EP08/02/08** – Report prepared for 11 February 2008 hearing

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1. INTRODUCTION

My name is Robert Lieffering and I hold the position of Resource Consents Manager within the Council. I have undertaken many technical assessments of wastewater treatment and disposal systems, ranging from on-site wastewater treatment disposal systems through to municipal treatment plants. These assessments have been for the purpose of reporting and making decisions on discharge permit applications under the Resource Management Act.

2. THE APPLICATION

M J and P M Boland ("the applicants") have applied for a two resource consents associated with a proposal to increase the capacity of an existing tourist accommodation facility (known as "Twin Waters") located at 30 Totara Avenue, Pakawau, Golden Bay. This report covers the discharge permit application which seeks to discharge up to 2.52 cubic metres of treated wastewater per day to land.

The applicants engaged the services of Opus International Consultants Limited ("Opus") to: i) assess the capacity of the current wastewater treatment and disposal system; and ii) provide recommendations in respect of upgrades required to treat and discharge the increased wastewater flows associated with the proposed increase in occupancy of the accommodation facility. Opus prepared a report on the system and this report was included with the application.

Zoning

The subject site is zoned Rural 2 according to the proposed Tasman Resource Management Plan (TRMP) but this has little relevance to the discharge permit application. The property is not located in any special zones in respect to wastewater management.

Activity Status

The proposed discharge of treated wastewater to land does not meet all the criteria of permitted activity Rule 36.1.4 of the TRMP because the estimated average discharge volume exceeds 2 cubic metres per day (based on a weekly average) and the disposal area is located less than 20 metres from the coastal marine area. The discharge is therefore considered to be a discretionary activity in accordance with Rule 36.1.16 of the TRMP.

This report covers both the technical aspects of the wastewater treatment and disposal system as well as an analysis of how the discharge to land fits within the policy framework of the TRMP and the relevant matters of the Resource Management Act 1991 ("the Act").

3. SITE DESCRIPTION

The site is located at 30 Totara Avenue, Pakawau, Golden Bay (referred to on topographic maps as "Waikato"). The land is flat and low lying and lies between Totara Avenue and an estuarine area which lies between the Waikato coastal spit and the main Collingwood-Puponga Road. Whilst the legal area of the subject site is 0.83 hectares, a large part of the property is made up of salt marsh and the effective land area is closer to 0.29 hectares.

4. OVERVIEW OF EXISTING WASTEWATER TREATMENT AND DISPOSAL SYSTEM

The existing house, which incorporates a tourist accommodation facility, is serviced by what was initially thought to be a single septic tank of unknown capacity. Further information provided by Opus indicates that there are in fact two septic tanks installed in parallel, each of 3,000 litres capacity, one being used to treat the greywater generated from the house and one to treat the blackwater. The wastewater from these tanks is then combined and enters a single pump chamber where it is pumped to a mound disposal system. The system is approximately 15 years old and is deemed by Opus to be in good working condition.

Mound systems are designed so that wastewater is pumped to a distribution bed which is located within a constructed sand mound. The wastewater percolates downward through the sand before infiltrating the natural soil material located below the mound. Mounds are commonly used in areas where the groundwater level is close to the surface of natural soil, as is the case for the subject property.

The Opus report refers to the mound system as a "*Wisconsin mound*" but limited information is presented on the exact construction of the mound. However, information on the Council's property file indicates that the mound has the following specifications:

Distribution pipes:	Four 32 mm diameter LDPE pipes, each 9.1 m long
Perforations in distribution pipes:	Unknown number and unknown diameter
Distribution bed media:	200 mm depth coarse aggregate (12-50 mm diameter)
Area of distribution media:	36 m^2 (3.6 m wide by 10.0 m long)
Depth of sand below distribution bed:	500 mm (see discussion below)
Sand characteristics:	0.5 -1.0 mm diameter (unconfirmed)
Basal area of sand mound:	~67 m^2 (5.6 m wide by 12 m long)
Depth of topsoil over mound:	100 mm

The Opus report states that the basal area of the mound is 140 square metres (7 metres by 20 metres) however the design plans on the Council's file clearly show the width of the sand media in the mound to be 5.6 metres. Opus has subsequently confirmed that the basal area is likely to be 67 square metres (refer to emails presented in Appendix 1 attached), this being less than half that originally reported.

The design drawings on the Council's file suggests that the sand depth below the distribution media is 500 millimetres, however land level measurements undertaken by Opus clearly show that the top of the mound is ~0.6-0.7 metres above the surrounding land. Therefore, if one takes into account that there is 100 millimetres of topsoil, 300 millimetres of "filler", and 200 mm of distribution media in the mound, the resultant depth of sand would be in the order of 100 mm. Some settlement of both the topsoil and filler material may have occurred over time. Nevertheless, the depth of sand between the base of the distribution media and natural soil is very likely to be significantly less than the 500 millimetres specified in the design drawings.

Opus has provided further information by way of a series of emails (which are attached as Appendix 1 to this report) in which it considers that the actual mound is constructed as follows (described from top to bottom, based on a single test pit excavated "*at the base of the mound*"):

100-150 mm topsoil
150-200 mm gravel (being the distribution media)
250-350 mm sand
Overlying at least 400 mm of sand (to base of excavated pit)

The groundwater was measured at 300 millimetres beneath the natural soil level during the site visit undertaken by Opus, which was made around high tide. This visit was on 8 March 2007 and no information is provided in the Opus report in respect to the preceding weather conditions. Groundwater levels on the spit are influenced by both the tidal cycle and rainfall.

5. PROPOSED EXPANSION

Wastewater Flow Volumes

The applicants propose to construct a new building which would be used for visitor accommodation. The new building would have four bedrooms and be able to house up to 8 visitors. The current house on the property has four bedrooms and the applicants are proposing to convert one of these rooms to offices and use the other three for their own private use.

Opus and the applicants' agent (Golden Bay Surveyors) have presented a number of different wastewater flow figures as follows.

Opus Report in Application

The Opus report states that the design occupancy of the facility (including the applicants' house) is 12, being 8 guests and 4 "resident staff". Water supply to the facility is via a community system. The Opus report has used a wastewater allowance of 160 litres per person per day, which is less than that recommended by Australian-New Zealand Standard for On-site Domestic-wastewater Management (AS/NZS1547:2000), and Opus consider that a lesser volume is appropriate because visitors typically eat breakfast and occasionally lunch or dinner but often eat out during their travel activities and as such wastewater generation will be less than that for a standard hotel or house. Opus considers that the total wastewater volume will therefore be **1,920** litres per day (equivalent to 1.92 cubic metres per day).

Application Cover Pages

Golden Bay Surveyors state in the application for resource consent that the maximum number of persons who could be accommodated on-site in the future is 14 and using a wastewater allowance of 180 litres per person per day have calculated a daily discharge volume of **2,520** litres. This figure was specified in the public notice.

Subsequent Information from Opus #1

Opus has provided a third set of figures in recent emails to the author (refer to Appendix 1 attached). Opus considered that for design purposes four persons should be allowed for in the applicants' house and that a wastewater allowance of 160 litres per person per day is appropriate for these four persons because the house has water reducing fixtures installed (no details on what fixtures are installed have been provided). For the new visitors' building Opus considers that a wastewater allowance of 140 litres per person per day for each of the eight guests should be used because water reducing fixtures will be installed. Furthermore, Opus considers that the guests would not be staying at the facility for their entire stay and as such would not be generating the full

wastewater volume normally allowed for when on-site wastewater systems are designed and sized. Therefore, Opus considered that the total daily wastewater flow from the house and visitor building will be **1,760** litres (4 persons at 160 L/p/d plus 8 guests at 140 L/p/d).

Subsequent Information from Opus #2

Opus provided a fourth set of figures in more recent emails to the author (refer to Appendix 1 attached). Opus now consider that for design purposes four persons should be allowed for in the applicants' house and that a wastewater allowance of 180 litres per person per day is appropriate for these four persons. However Opus is still of the view that for the new visitors' building a wastewater allowance of 140 litres per person per day for each of the eight guests should be used for the reasons stated in the previous paragraph. Therefore, Opus now consider that the total daily wastewater flow from the house and visitor building will be **1,840** litres (4 persons at 180 L/p/d plus 8 guests at 140 L/p/d).

Wastewater treatment and disposal systems should be conservatively designed so as to ensure their ongoing long-term successful operation. This is the philosophy of both AS/NZS1547:2000 as well as Auckland Regional Council's Technical Publication 58 (TP58), which are commonly used by designers in New Zealand.

AS/NZS1547:2000 specifies that for both households and motels/hotels that a wastewater allowance of 180 L/p/day should be used for design purposes. It does provide lower allowances where water reducing fixtures are installed, however one of the potential problems with accepting a reduced allowance figure is that the Council has no ability to monitor or enforce the maintenance of any such water reducing fixtures that may be installed in a building. Whilst they may be installed at present, there would be nothing preventing the owner (or subsequent owner) replacing the fixtures with models that use more water. For this reason the Council does not allow designers to use lower figures for design purposes. Where water reducing fixtures are installed, this provides an added level of safety in the design. It is interesting to note that in TP58 the wastewater allowances presented are higher than those in AS/NZS1547:2000.

It is considered appropriate that the wastewater system designed for the applicants' site be based on the following:

Applicants' house:	3 bedrooms = 5 persons at 180 L/p/day	= 900 L/day
Visitor building:	4 bedrooms = 8 guests at 180 L/p/day	= 1,440 L/day
	Total	**= 2,340 L/day**

Whilst the applicants' agent has applied for a greater volume, Opus has presented a number of lesser flow figures. It is my recommendation that the wastewater treatment and disposal system should be designed for 2,340 litres per day (this being in line with the requirements of AS/NZS1547:2000) so as to provide sufficient buffer in the system to ensure its successful operation in the long term.

Wastewater Tanks

Opus has confirmed that there are two separate treatment tanks in the ground, one for blackwater and one for greywater (refer to emails in Appendix 1 attached). Each tank is of 3,000 litres capacity. Greywater is wastewater produced from non-toilet sources (i.e. showers, washbasins, laundries, kitchens) and blackwater is wastewater produced from toilets. It is unknown whether there are any outlet filters on the two tanks but in any case Opus has recommended that such filters be installed. This is considered to be appropriate as it will minimise the unwanted carry-over of solids from the tanks to the pump chamber and through to the disposal mound.

The discussion in the previous section presents calculations of combined wastewater flows. The discharge to the disposal mound will in effect be of "combined" wastewater made up of greywater

and blackwater because the two tanks feed into a single pump chamber before being pumped to the disposal mound. The relative contributions of greywater and blackwater are typically at a ratio of two parts greywater to one part blackwater, meaning that for each 180 litres of combined wastewater generated per person, 120 litres will be greywater and 60 litres will be blackwater.

Of the 2,340 litres of combined wastewater predicted to be produced per day, ~780 litres will be blackwater and ~1,560 litres will be greywater. The greywater and blackwater tanks need to be of a sufficient volume to allow for a 24 hour settling time plus an allowance for scum and sludge accumulation according to AS/NZS1547:2000. The existing tanks are considered to be an adequate size for the predicted wastewater volumes.

6. MOUND DISPOSAL DESIGN

Disposal Mound Basal Loading Rate

When disposal mounds are designed their basal area is calculated on the basis of an appropriate design loading rate (DLR) for the underlying soils. As the wastewater migrates downward through the sand in the mound it must be able to infiltrate the underlying soils at a rate that the soil can accept. The soil type beneath the mound has been described as a sandy loam with some gravel and has been classified by Opus as a Category 2 soil according to AS/NZS1547:2000. The appropriate DLR for Category 2 soils is 24 millimetres per day according to AS/NZS1547:2000.

For a daily wastewater volume of 2,340 litres, a basal area of 98 square metres is required. The current mound has a basal area of 67 square metres and is therefore too small for the predicted discharge volumes. If 2,340 litres were to be discharged to the existing mound the basal loading rate would be 35 millimetres per day, which is nearly 150% of the DLR recommended by AS/NZS1547:2000. The current disposal mound is of a size to be able to receive only up to 1,610 litres of wastewater per day (equivalent to a population of ~9 persons).

Disposal Mound Distribution Media Bed Loading Rate

The loading rate of the distribution media bed within the mound is also very important. AS/NZS1547:2000 states that the loading should not exceed 50 millimetres per day. The distribution media in the current mound has a basal area of 36 square metres and therefore a daily wastewater volume of 2,340 litres would equate to a loading rate of 65 millimetres per day, which is 130% of that recommended in AS/NZS1547:2000.

Disposal Mound Construction

Details of the construction of the existing mound are sketchy but the best available information on its construction has been previously discussed (see Section 4 of this report). It appears that the distribution media is appropriate in respect to the size of the aggregate used, however limited information is presented on the nature of the sand that was used to construct the mound.

Opus appears to consider both the sandy material that was used to construct the mound as well as the natural sandy loam soil beneath the mound as contributing to the total sand depth beneath the distribution media. The sand is variously described by Opus as "*course* [sic] *sand likely to be 0.5-1.0 mm diameter*" and "*a mixture of sand and finer organic material*" (refer to emails in Appendix 1 attached).

The sand material that should be used to construct these types of disposal mounds should be of a high standard because it is this sand which provides "treatment" of the wastewater before it enters the natural soil beneath the mound (where further treatment occurs). The sand needs to be within reasonably tight grain size distribution ranges and must be free of clay or silt. The sand acts as a sand filter and a media that is too fine will clog, resulting in failure. The use of highly permeable sand results in inadequate treatment.

AS/NZS1547:2000 provides information on the type of sand that must be used in such mounds. The particle size distribution is important and no grading curve is available for the sand which was used to construct the existing mound so its suitability is unable to be assessed. Given the descriptions provided by Opus, it is my opinion that the existing sand probably does not meet the requirements specified in AS/NZS1547:2000.

Two other areas of the existing mound are of concern. The first relates to the design of the distribution media bed within the mound and the second relates to the depth of sand in the mound. From the design drawings it appears that the distribution media "sits" on top of the sand material. The correct design of these mounds would place the distribution media bed "within" the sand so that the top of the distribution media bed is flush with the top of the sand. The second matter of concern relates to the depth of the sand beneath the distribution media. It is clear that the original design included 500 millimetres of sand but information provided by Opus suggests that there may be only in the order of 250-350 millimetres of sand between the base of the distribution media bed and the natural soils below the mound (but in fact may be significantly less than this). As discussed previously, it appears that Opus may be confusing the imported sand depth with the natural sandy loam material of the natural soils. In any case, the depth of imported sand appears to be significantly less than the 600 millimetres required by AS/NZS1547:2000.

7. FLOODING MATTERS

The site is low lying and the applicants were requested to provide a report which assesses the risk of flooding of the property in respect to highest astronomical tide, storm surge, global warming, and river run up. Opus prepared a flooding report which includes discussion on the effects of flooding on the wastewater treatment and disposal system (this report is included in Mr Laurie Davidson's report).

The existing wastewater system has open gully traps outside the house and there are lids on the septic tanks and the pump chamber. Opus has surveyed the heights of these points as well as the mound. The following present the heights (levels in metres above mean sea level):

Septic tank vents: 2.68 and 2.79 m
Pump chamber lid: 2.29 m
Base of mound: 2.10 m
Top of mound: 2.70 m

Opus states that under normal mean high water spring (MHWS) conditions the wastewater system does not get inundated but when combined with an astronomical spring tide or a Council "design flood event" the disposal mound would become submerged and water could enter the wastewater tanks. Opus considers that "*all access points into the system*" can be raised above the design flood level (3.8 metres) however that would mean that the septic tanks would need to be raised above the ground as their access lids are a potential access point for water. How practical this is is unknown.

Opus further states that to minimise the risk of untreated wastewater in the disposal field contaminating floodwaters, pumping of the wastewater to the mound could be prevented during these periods. No information is provided on how this would be achieved. The pump chamber only has a finite volume (~1.86 cubic metres) and additional storage will be needed to achieve this. Interestingly, Opus further states that any contamination during these rare events will be significantly diluted by the tide volume and therefore the effects would be minor. It is unclear whether Opus is suggesting that there will be contamination during such events or whether the system should be modified such that there is no discharge during these periods.

8. ENVIRONMENTAL EFFECTS OF DISCHARGE TO LAND

The main contaminants of concern in domestic wastewater are bacteria, viruses, protozoa, and nutrients (nitrogen and phosphorous compounds). Some minor treatment of the wastewater occurs in the wastewater tanks but primarily these tanks only settle out solids and separate out fats and grease. The main treatment occurs in the land application system, which in this particular case is a disposal mound.

In a properly designed mound, the wastewater is "*treated*" during its movement downwards through the sand material used to build the mound. The sand is effectively a filter but a biofilm forms around the sand grains and further biological reactions take place which reduce the concentration of contaminants before the wastewater enters the natural soil beneath the mound. Further renovation of the wastewater occurs within the natural soil before entering groundwater, which migrates horizontally until it emerges in the coastal marine environment.

If the mound is either overloaded or not constructed using appropriate material and/or to the correct dimensions, there is a real risk that contaminants in the wastewater will enter both the groundwater beneath the site and adjacent coastal waters.

It is my opinion that the current mound is not constructed according to accepted standards and guidelines, and that adding more wastewater to it will either result in premature failure of the mound or unacceptable contamination of the adjacent coastal waters, which are located less than 20 metres from the disposal mound.

However, if a new mound was constructed to the correct dimensions and using appropriate materials, then I believe the adverse environmental effects would be no more than minor. There is sufficient space within the useable area of the subject property for a new mound to be constructed.

9. MITIGATION MEASURES

Opus has recommended a number of measures to improve the existing system. A number of these are supported such as:

- Cleaning out the wastewater tanks
- Installation of outlet filters on the tanks
- Raising all entry points above RL3.8 metres
- Improvements to the pump chamber

It is also considered appropriate that the wastewater tanks themselves be repositioned such that they are not at risk of being inundated during flood events or alternatively their lids should be sealed.

10 CONSIDERATION OF ALTERNATIVES

The applicant has not presented any alternatives to the current system. There are numerous alternatives that could be considered such as installing a secondary treatment system which would discharge the treated wastewater to land via pressure compensating drippers within landscaping areas.

11 SUBMISSIONS

Of the submissions received during the notification process, five related in some way to the wastewater discharge being proposed at the site. These are summarised below together with my commentary on the concerns raised.

Submitter	Concerns Raised	Commentary
CFW & DA McKay	▪ Concerned about flooding and the effects it may have on the disposal mound, especially during spring and king tides. ▪ During such events water can be present for some hours and occasionally some days.	These concerns are acknowledged and the disposal mound should either be reconstructed or replaced with a new mound. All entry points into the wastewater system should be such that no inundation into the system occurs.
P & M Besier	▪ Volume of wastewater to be handled. ▪ Concern about contaminated runoff into estuary during spring tides when salt marsh and road flooded	See discussion on volumes in report. Provided the system is designed properly contamination of the estuary will be insignificant.
C Schurmann	▪ The area where septic tank is located is frequently flooded when there is a high tide. ▪ Discharge to the estuary will have adverse effects. ▪ There are no mature trees on the property to assist in the "adsorption of biosolids".	See comments above. There will be no biosolids but in any case the areas surrounding the mound should be planted to assist in evapotranspiration of the wastewater.
Royal Forest and Bird Protection Society of New Zealand	▪ Considers that the Opus report should have been based on 16 persons, not 12. ▪ Concerned that any expansion to the mound (if necessary) closer to the salt marsh would be a concern.	See discussion on wastewater allowances in report and other comments above. There is sufficient land for a new mound to be constructed if this option is selected, its location would be the same distance to the adjacent salt marsh. Provided it is constructed and sized properly, the wastewater will receive sufficient treatment before entering groundwater and coastal water and the water quality will not be adversely affected to a more than minor degree.
AP & KWT Holcroft	▪ Location of wastewater disposal area relative to the coast. ▪ Danger of erosion and inundation. ▪ Potential contamination of the nature reserve.	See comments above.

12 ASSESSMENT OF PART II, SECTION 104, AND SECTION 105 MATTERS

Part II of the Resource Management Act 1991

Important sections of Part II of the RMA relating to these applications are summarised below.

Purpose (Section 5)

The purpose of the RMA is to promote the sustainable management of natural and physical resources.

In the RMA, "*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:

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

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.

Matters of National Importance (Section 6)

No matters of national importance have been identified as being relevant to this application.

Other Matters (Section 7)

In achieving the purposes of the RMA, the Council in managing the natural and physical resource shall have particular regard to:

a) kaitiakitanga;

b) the efficient use and development of natural and physical resources;

c) the maintenance and enhancement of amenity values;

d) intrinsic values of ecosystems;

e) repealed

f) maintenance and enhancement of the quality of the environment; and

g) any finite characteristics of natural and physical resources.

Treaty of Waitangi (Section 8)

The Council shall take into account the principles of the Treaty of Waitangi (Te Tiriti O Waitangi).

Section 104

In considering an application for resource consent, the Council is required under Section 104 of the RMA, to have regard to a range of matters as may be relevant for any particular application. Those parts of Section 104(1) of the RMA that are relevant for these applications are:

- Any actual and potential effects on the environment of allowing the activity;
- The Tasman Regional Policy Statement;
- The proposed Tasman Resource Management Plan;

The actual and potential effects on the environment have been discussed earlier in this report. How this application conforms with the objectives and policies of both the RPS and TRMP is discussed in Section 13 of this report.

Section 105

Section 105 of the RMA also applies to these applications and requires the Council to have regard to:

- The nature of the discharge and the sensitivity of the proposed receiving environment to adverse effects and the Applicant's reasons for making the proposed choice; and
- Any possible alternative methods of discharge, including discharge into any other receiving environment.

These matters have been discussed earlier in this report.

13. ASSESSMENT OF THE OBJECTIVES AND POLICIES OF THE TASMAN REGIONAL POLICY STATEMENT AND TASMAN RESOURCE MANAGEMENT PLAN

Tasman Regional Policy Statement

The objectives and policies stated in the Tasman Regional Policy Statement (RPS) relevant to the discharge of treated wastewater to land are (Note: only a brief summary of the intent of each objective and policy is presented here and the reader is referred to the RPS document for the full wording):

- Objective 10.1 (Maintenance and enhancement of the quality of soils and water);
- Objective 10.2 (Avoiding, remedying, or mitigating adverse effects of contaminants of soil and water); and
- Objective 10.4 (Minimising risks of contamination arising from the storage, treatment, or disposal of wastes).

- Policy 10.2 (Adverse effects are avoided, remedied, or mitigated where there is no water classification);
- Policy 10.4 (Seek that liquid discharges be to land where this is the best practicable option);
- Policy 10.5 (Reduction of the risk of emergency discharges to land and water by requiring contingency plans); and
- Policy 10.9 (Ensuring contamination from storage, treatment, and disposal of wastes is avoided, remedied, or mitigated).

In its current form it is considered that the proposed discharge of treated wastewater to land does not meet the above objectives and will be inconsistent with the above policies. However, provided the recommended conditions of consent are complied with, which involve upgrading the treatment and disposal system, the discharge would meet the above objectives and will be consistent with the above policies.

Tasman Resource Management Plan

The objectives and policies stated in the proposed Tasman Resource Management Plan (TRMP) relevant to the discharge of treated wastewater to land are (Note: only a brief summary of the intent of each objective and policy is presented here and the reader is referred to the TRMP document for the full wording):

- Objective 33.1.0 (Discharge of contaminants in a way that avoids, remedies, or mitigates adverse effects whilst maintaining existing water quality); and

- Objective 33.2.0 (Avoiding, remedying, or mitigating adverse effects resulting from emergency discharges or accidental spills).

- Policy 33.1.2 (To avoid, remedy, or mitigate the adverse effects of discharges so that relevant water quality classification standards are met);
- Policy 33.1.8 (Avoid, remedy, or mitigate adverse effects of non-point source contamination arising from discharge activities);
- Policy 33.1.10 (Promote and encourage discharges of waste to land in preference to water);
- Policy 33.2.1 (Promote the development of site contingency plans to avoid, remedy, or mitigate the likely adverse effects of any emergency discharges or accidental spills); and
- Policy 33.2.2 (Ensure discharge activities are carried out having regard to contingency planning measures appropriate to the nature and scale of any discharge and risk to the environment for any accidental discharge)

In its current form it is considered that the proposed discharge of treated wastewater to land does not meet the above objectives and will be inconsistent with the above policies. However, provided the recommended conditions of consent are complied with, which involve upgrading the treatment and disposal system, the discharge would meet the above objectives and will be consistent with the above policies.

14. CONCLUSIONS

When considering the application made to the Council, and the potential impacts of the discharge on natural and physical resources, it is necessary to take into account matters raised in Part II of the Act. Section 104 also requires the Council to *"have regard to"* existing and proposed plans. It is important to note that *"having regard to"* the objectives and policies of plans does not bind the Council in making its decision. Despite this, it is considered that there would need to be a good reason for going against the Council's policy.

It is my opinion that the proposed wastewater discharge to land as set out in the application would result in a degradation of water quality, both surface and groundwater, and is therefore inconsistent with the objectives and policies in the Tasman Regional Policy Statement and the Tasman Resource Management Plan.

However, I consider that there is a technical solution available to the applicants but it would mean a change to what is being recommended by Opus. Whilst it is not my duty to design an appropriate system for the site, there are clearly many options available to the applicants. It appears that the applicants wish to utilise the existing wastewater tanks and to discharge primary treated wastewater to land via a disposal mound, but for the reasons discussed elsewhere in this report, it is my opinion that the existing mound is unsuitable for the increased volume of wastewater that needs to be disposed of. If a mound is the preferred option, it is my view that an entirely new mound needs to be constructed which has a larger basal area as well as a larger distribution media bed. In addition, the mound should be constructed using imported sand that meets the recommendations set out in AS/NZS1547:2000 and be of at least 600 mm depth. In addition to constructing a new larger mound, the existing wastewater tanks and pump chamber would need to be raised or modified so that water does not inundate the tanks on occasions when the property floods. An appropriately sized temporary holding tank should also be incorporated in the current system to allow wastewater to be stored during periods when wastewater disposal is not possible (during flooding periods).

Alternatively, the applicants could choose to completely replace the wastewater treatment and land application system with an alternative system. Given the nature of the site, I would recommend

that thought be given to some type of secondary treatment system which is able to cope with shock loadings and seasonal use (e.g. packed bed reactor, septic tank-sand filter, vermiculture system) with the treated wastewater being used to irrigate landscape plantings around the property.

Provided the treatment and disposal system is upgraded (or entirely replaced) and it is properly operated and maintained, there should be no significant adverse environmental effects in respect of groundwater or surface water quality degradation.

It is recommended that resource consents for the discharge of treated wastewater to land as applied for by the applicant should be **declined** but I would recommend that a resource consent could be **granted** subject to conditions requiring the necessary upgrade works to be undertaken, or alternatively the wastewater system replaced by a system that meets current standards and guidelines. Provided the system is upgraded or replaced in accordance with my recommended conditions, it is considered that there will be only minor adverse effects on the environment.

The applicant has not requested a specific term of consent for the discharge of wastewater to land. In considering the term of consent, the Council should take into account a variety such as:

- The sustainable nature of the resource affected by the proposal;
- The extent of knowledge of the environmental effects associated with the activity;
- The capital costs of the development and the anticipated "life" of any structure which is the subject of the application;
- The expiry date of other resource consents in the same catchment area where comprehensive reviews of all resource consents within that area are desirable; and
- The knowledge that the environmental effects of wastewater discharges are reasonably well known.

It is recommended that, if the Committee is of the mind to grant consent, that a term of consent of 10 years be granted for the discharge consent. This term is considered appropriate to provide the applicant with security but also provides the Council the ability to fully scrutinise the consent in light of changes in technology and community aspirations in respect of wastewater discharges that may occur over this period.

15. RECOMMENDED CONDITIONS OF CONSENT

Pursuant to Section 104B of the Resource Management Act 1991 ("the Act"), the Tasman District Council ("the Council") hereby grants resource consent to:

Michael John and Patricia Marie Boland

(hereinafter referred to as "the Consent Holder")

Activity authorised by this consent: Discharge of treated domestic wastewater to land.

Location details:

Address of property:	30 Totara Avenue, Pakawau
Legal description:	Lot 18 DP 6442
Certificate of tite:	13A/716
Valuation numbers:	1860013200
Location of discharge:	2482925 E 6064927 N (NZ Map Grid)

Pursuant to Section 108 of the Act, this consent is issued subject to the following conditions:

CONDITIONS

Discharge Restrictions

1 The maximum rate of discharge shall not exceed 2,340 litres per day (2.34 cubic metres per day). Notwithstanding this, no discharge shall occur during periods when there is free water visible within 10 metres of the base of the disposal mound. In such conditions all wastewater generated shall be directed to the temporary storage tank required to be constructed in accordance with Condition 7 until such time as the water is no longer present after which the wastewater may be discharged to the disposal mound.

2 The discharge shall contain only treated wastewater which is of a domestic nature. For the purposes of this condition, wastewater which is of a "domestic nature" includes wastewater from toilets, urinals, kitchens, showers, washbasins, spa baths, and laundries but does not include water from spa pools and large-scale laundry activities. No industrial or tradewaste shall be included.

Advice Note:
Wastewater generated from tourist accommodation units and any associated food preparation areas is considered to be of a "domestic nature".

Disposal Mound Replacement and System Upgrades

3 Prior to any paying guests being accommodated in the new visitors accommodation building the wastewater treatment and disposal system shall be upgraded as set out in Conditions 4 to 9 (below).

4 The Consent Holder shall either construct a new disposal mound or reconstruct the existing mound such that it has a basal sand area of not less than 98 square metres. The mound shall be designed and constructed in accordance with the specifications and dimensions outlined in Appendix 4.5B (Construction of Mound Systems) of AS/NZS1547:2000, a copy of which is attached to this consent. Only "approved" sand (refer to Condition 5) shall be used to construct the mound. The distribution bed within the mound shall have a basal area of not less than 47 square metres.

Advice Note:
This basal sand area will result in a calculated loading rate of 24 millimetres per day and the basal area of the distribution bed within the mound will result in a calculated loading rate of 50 millimetres per day when fully loaded.

5 Prior to construction of the mound required by Condition 4, the Consent Holder shall provide the design details to the Co-ordinator Compliance Monitoring including a grading curve for the sand to be used for the construction of the mound. The design, including the sand, shall be approved in writing by the Co-ordinator prior to the construction of the mound. This approval will be given if the mound conforms with the requirements of Condition 4 and the sand will be approved if it all (100%) has a grain size of between 0.3 and 1.0 millimetres and a uniformity coefficient of between 3.8 and 4.2.

Advice Note:
The sand may need to be sourced from outside the district if local sand cannot meet these requirements. Uniformity coefficient equals D_{60}/D_{10}, where D_{60} and D_{10} are the effective grain size that is the 60% and 10% (respectively) size by weight for a wet sieve analysis.

6 The Consent Holder shall raise the levels of the blackwater tank, greywater tank, the temporary storage tank (refer Condition 7) and the pump chamber such that their lids are at a level of RL 3.8 metres (mean sea level datum). As an alternative to raising the tanks the

Consent Holder shall modify the lids so that they are completely sealed and can not allow any water which may pond on the property to inundate the tanks. In the event that the Consent Holder chooses the option of sealing the lids, the vents of the tanks shall be raised such that their openings are at a level of not lower than RL 3.8 (mean sea level datum).

7 A temporary storage tank shall be constructed into which wastewater shall be pumped and stored during periods when there is surface water ponding within 10 metres of the base of the disposal mound. The storage tank shall have a capacity of not less than 10 cubic metres. The details of the storage tank, including its location within the wastewater system and how flows will be managed, shall be submitted to the Co-ordinator Compliance Monitoring. The storage tank design shall be approved in writing by the Co-ordinator prior to the construction of the mound.

Advice Note:
The temporary storage tank capacity required by this condition will provide in excess of 4 days storage of wastewater at full occupancy. Following flooding events the contents of the tank will need to be discharged to the disposal mound, however the Consent Holder will need to carefully manage this process so to always comply with the discharge rate restriction specified in Condition 1.

8 The Consent Holder shall install and maintain at all times a calibrated flow meter, with an accuracy of ±5%, between wastewater treatment/storage system and the disposal mound to measure the quantities of wastewater discharged to the mound.

9 Outlet filters that have holes or slots no greater than 3 millimeters in diameter shall be installed on the outlets of both the blackwater and greywater tanks to minimise the carry over of solids to the disposal mound.

10 A person who is suitably qualified and experienced in design and construction of wastewater systems shall supervise the construction of the upgrade works. The person supervising the construction and installation of the upgrade works shall provide a written certificate or producer statement to the Council's Coordinator 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 Conditions 4-9 (inclusive). In addition, the certificate or statement shall also confirm the following:

i) that the wastewater system is capable of treating the design flows and that it has been designed generally in accordance with standard engineering practice;

ii) that all components of the wastewater system have been inspected and installed in accordance with the manufacturer's specifications and standard engineering practice; and

iii) that the components used in the wastewater system are in sound condition for continued use for the term of this resource consent.

11 Prior to the exercise of this consent, the Consent Holder shall submit a set of final "as-built" plans to the Council's Coordinator Compliance Monitoring which show the siting of all components of the wastewater collection, 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 officer to locate all structures identified on the plans.

Reserve Area

12 A suitable wastewater disposal reserve area equivalent to the size of the upgraded mound required to be constructed in accordance with Condition 3 shall be kept available for future

use for wastewater disposal. For the purposes of this condition "undeveloped" means that no permanent buildings or structures shall be constructed on the area set aside as reserve area, however the reserve area may be planted with trees and other vegetation.

General Conditions

13 The treatment and storage tanks shall be inspected not less than once every six months and the grinder pumps and tanks shall be inspected not less than once every six months. Where appropriate, all tanks shall as a minimum be cleaned out once the combined depth of the sludge and scum in any tank occupies half of the tank's volume. Material collected from the desludging of tanks shall be removed from site for disposal at a facility authorised to receive such material.

Monitoring and Reporting

14 The flow meter required to be installed in accordance with Condition 8 shall be read manually or electronically and recorded at the same time daily. Copies of these records shall be forwarded to the Council's Coordinator Compliance Monitoring quarterly.

15 Any exceedance of the authorised discharge volume (refer Condition 1) shall be reported to the Council's Coordinator Compliance Monitoring in writing within three days of the reading. This report must include any explanation for the non-compliance.

16 The Consent Holder shall notify the Council's Coordinator Compliance Monitoring of any wastewater discharge to land or water from the system which is not authorised by this consent in writing as soon as practicable (but no more than 24 hours) after the discharge commenced.

17 The treatment tanks, storage tank, and pumping chamber shall be located, and the surrounding area maintained, so that vehicular access for maintenance is readily available at all times.

18 The Council may, in the period 1 May to 1 September 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:

i) 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

ii) 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

iii) reviewing the loading rates and/or discharge volumes and flow rates of this consent if it is appropriate to do so; and/or

iv) reviewing the frequency of flow monitoring if the results indicate that this is required and/or appropriate.

Duration of Consent

19 This consent expires on 1 March 2018.

ADVICE NOTES

1 This resource consent only authorises the activity described above. Any matters or activities not referred to in this consent or covered by the conditions must either: 1) comply with all the criteria of a relevant permitted activity rule in the Proposed Tasman Resource Management Plan (PTRMP); 2) be allowed by the Resource Management Act; or 3) be authorised by a separate resource consent.

2 The Consent Holder shall meet the requirements of Council with regard to all Building and Health Bylaws, Regulations and Acts.

3 All reporting required by Council shall be made in the first instance to the Council's Coordinator Compliance Monitoring.

4 Council draws your attention to the provisions of the Historic Places Act 1993 that require you in the event of discovering an archaeological find (eg, shell, midden, hangi or ovens, garden soils, pit, depressions, occupation evidence, burials, taonga) to cease works immediately, and tangata whenua, the Tasman District Council and the New Zealand Historic Places Trust shall be notified within 24 hours. Works may recommence with the written approval of the Council's Environment & Planning Manager, and the New Zealand Historic Places Trust.

Rob Lieffering
Resource Consents Manager

APPENDIX 1

Rob Lieffering

From: Jonathan Thorpe [Jonathan.Thorpe@opus.co.nz]
Sent: Monday, 21 January 2008 4:38 p.m.
To: Rob Lieffering
Subject: RE: Twin Waters
Attachments: DCP_0253.JPG; DCP_0254.JPG; DCP_0255.JPG

Hi Rob,

We do intend to keep the grey, and black water seperate.

My instruction has been to calculate for a maximum 12 people.

I can accept TDC not accepting lower wastewater allowances for anticipated occupation patturns. However I do not think it is reasonable not to accept reduced allowances in the case where water reducing fixtures, and low water use is designed into a system in order to fit within environmetal constraints of a site. Given the risk you identify of potential for fixtures to be changed in the future, I think a more reasonable approach in this case would be to require a consent condition for flows to be recorded, and kept within a maximum limit.

Calculating the flows based on ASNZS 1547 results in the following:

Private dwelling community water 2bdr at 180 L/p/d: 720 L
Guest units Rainwater supply 4bdr at 140 L/p/day: 1120 L
Total 1840 L

I will also suggest that a meter is installed now, to gain some information on water use prior to the consent hearing.

Sand Depth:
The test pit completed at the base of the mound indicated sandy loam material down to the base of the hole at 400mm.
The mound is 600mm higher than this. The existing profile based on the K Forsman section drawing, and site observations is determined as follows:

100 - 150 top soil
150 - 200mm gravel
350 - 250mm sand to adjacent ground level (to make 600mm)
400mm sand to base of test pit

The sand depth is therefore likely a minimum of 650mm depth.
The depth of sand to the water table (at 300mm below GL) is estimated at between 550mm - 650mm.

A sand grading has not been completed, however the photos, (attached) and observations on site indicated a mixture of sand and finer organic material.

I appreciate that this is a difficult site, requiring ongoing careful operation. The system as it is has performed consistantly over the time since installation in 1992. Apropriate consent conditions are needed defining monitoring and maintainance, and appropriate limits to ensure any problems are prevented or dealt with quickly if they arise.

I hope this has clarified the proposal for you in terms of the effluent system.

Let me know if there is anything else.

Regards,

21/01/2008

Right-click here to download pictures. To help protect your privacy, Outlook prevented automatic download of this picture from th

Civic House 4th Floor, 106 Trafalgar Street, Private Bag 36, Nelson, New Zealand

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From: Rob Lieffering [mailto:rob.lieffering@tdc.govt.nz]
Sent: Monday, 21 January 2008 1:35 p.m.
To: Jonathan Thorpe
Subject: RE: Twin Waters

Jonathan,

Thanks for the reply.

Are you proposing to continue with separation of greywater and blackwater from the new building? This is not clear in any of the information on file.

I have some concerns regarding the wastewater allowances and calculated daily wastewater flows.

- Your original report calculates 1,920 L/day
- The application prepared by Golden Bay Surveyors states 2,520 L/day (based on 14 people [as they state that this is the maximum number of persons who could be accomodated on-site in the future] @ 180 L/p/day). It should be noted that the application as notified was based on this volume and it is this volume that I am basing my report on.
- Your email below presents a different figure again, now 1,760 L/day.

As previously advised, the Council does not accept reductions in wastewater allowances where water reducing fixtures are installed or proposed to be installed as there is absolutely no guarantee that such fixture will remain in the building in the future and there is no mechanism by which the Council can monitor this. We have previously advised those who work within Tasman on wastewater matters that this is our position.

Likewise, we do not accept lower wastewater allowances because of "anticipated" occupation patterns. Again these can not be guaranteed and for design purposes the allowances in AS/NZS1547:2000 should be used (this appears to have been accepted by Golden Bay Surveyors in their application). One option may be to have a meter installed to assess actual discharge volumes and should they be greater than expected then the mound system may need to be modified.

I am concerned about the reduced depth of sand in the mound. Mounds should have at least 600 mm of sand but it is very likely that this mound has significantly less depth than this. This may mean that the wastewater is not receiving much treatment before entering the natural soil beneath the mound. From your inspections, what is your assessment on the depth of the sand below the distribution media?

Also, did you undertake a particle size analysis on the sand material? I would be interested in its uniformity coefficient and other vital statistics.

Finally, I have concerns regarding the low lying natur

Regards

Rob

21/01/2008

From: Jonathan Thorpe [mailto:Jonathan.Thorpe@opus.co.nz]
Sent: Monday, 21 January 2008 11:59 a.m.
To: Rob Lieffering
Subject: RE: Twin Waters

Rob,

I have adressed your points raised below. Let me know if you require any more information, or want to discuss it further.

1. We had the septic tanks cleaned out jast after christmas, and have identified two tanks sitting parallel to eachother, each 3000 L volume. The one nearest the road is for blackwater only. The second is for greywater only. They both feed into the pump chamber.

Total tank volume 6,000 L.

2. The pump volume has not been confirmed on site. The chamber appeared to be the same size as the Kevin Foresman drawings. The best estimate for the dose volume is from His drawings is 0.73 m3.

3.Based on Kevin's plan, the basal area is 5.6m wide (3.6m plus 1m each side). The length will be 10m (from plan) plus an extra 1m each end i.e 12m. The toal basal area will therefore be 67.2m2. and observations on site,

4.The distribultion bed media was observed as a clean coarse gravel likely to be between 12-50mm.

5.The sand material for the mound was observed in the test pit, and was a course sand likely to be 0.5 - 1 mm diameter. Photos 5 and 6 in the original report indicate this size.

6. The distribution area is confirmed as 10m long (from K Foresman's Plan.) and 3.6m wide. This gives a total distribution area of 36m2.

7. The best information on the distribution pipework is from Kevin Forsmans plans. It was not practical to uncover this to confirm the asbuilt size, and hole spacing.

General:
Observations on site indicate that the system has been built at least to the plan size indicated within the Keven Forseman drawings, although the total height is less than dimesioned. This may be due to settlement over time.

There have been no reports of problems with the system under its current use, and no signs of breakout around the base of the mound.

Loading rates:
I have spoken again with Mike Boland regarding the maximum loading rates for the existing system, and as a result adjusted the expected water use per person, from what we proposed previously.

Water use:
Private dwelling area: 2 bdr. community supply, with some water reducing facilities. 160 l/p x 4p =640 L/day.

Bed and breakfast area: 4 bdr rainwater supply, with standard water reducing facilities, and only present for breakfast, and an occasional evening meal (35% of guests order an evening meal). From ASNZS 1547 typical design allowances, the volume per person could range from 100 up to 140 l/p/d depending on the exact degree of water savings. 140 L/p/d is used here, but it may be less than this. 140 l/p x 8p =1120 L.

Total = 1760 L

Basal Loading: 1760L / 67.2 m2 = 26mm/day
Distribution Area Loading: 1760 L / 36 m2 = 49mm/day

The maximum proposed basal loading is slightly higher than that recommended by ASNZS 1547 for mounds of 24mm/day for a category 2 soil. This is considered acceptable, given that the maximum loading case will

21/01/2008

only occur occasionally when the private dwelling spare room is being used, and all the B & B guest rooms are full. In reality, the guest rooms are not occupied 100% during the peak season. In addition, the system experiences a long rest period during the off season, with guest numbers building up, and tapering off over the summer period.

Do not hesitate to contact me if you require any further information.

Kind regards,

Right-click here to download pictures. To help protect your privacy, Outlook prevented automatic download of this picture from th

Civic House 4th Floor, 106 Trafalgar Street, Private Bag 36, Nelson, New Zealand

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From: Rob Lieffering [mailto:rob.lieffering@tdc.govt.nz]
Sent: Friday, 18 January 2008 11:22 a.m.
To: Jonathan Thorpe
Subject: RE: Twin Waters

Hi again,

I have just been sent the design plan of the existing mound prepared by K Forsman.

See my comments below. It is interesting to note that the land levels you measured in Aug 2007 suggest that the mound is in fact only ~0.7 metres above surrounding ground levels. This doesn't seem to tally up with the design which suggests that it was constructed as a 1.2 metre high mound.

Rob

From: Rob Lieffering
Sent: Friday, 18 January 2008 9:44 a.m.
To: 'Jonathan Thorpe'
Subject: Twin Waters

Hi Jonathan

I am writing up my report for the Twin Waters hearing. Can you help me with the following questions:

1. How many septic tanks are there? I have a plan which shows two in series followed by a pump chamber but your report suggests only one tank.[I still need answers to this]

2. What is the capacity of the septic tank(s) and pump chamber? And what is the pumping volume per dose? [It appears the total pump chamber is 1.86 m3 capacity but the minimum dosing volume is 0.9 m3. I still need to know the capacity of the septic tank(s)]

3. Do you have any design or construction drawings of the actual mound? [I appear to have this now, but the basal area of the mound is different to what is in your report. I suspect that you measured the entire area occupied by the mound, which includes the topsoil cover. The plan shows the basal area of the sand part of the mound to be 5.6 metres wide but the length is not given, however I suspect that it will be less than the 10

metres in your report and probably closer to 8.6 metres, so the actual basal area of the sand in the mound would be ~50 m2 and not 70 m2. This has implications in respect to loading rates]

4. What is the distribution bed media in the mound (particle size)? [12-50 mm coarse aggregate]
5. What material was used to construct the mound (particle size of source material)? [sand - 0.5-1.0 mm, no grading curve provided]

6. Your original report states that the distribution area is 3.6 by 10 metres (36 m2) but the reply to further information refers to an "Irrigation pipe area" of 10.9 by 3.6 metres (39.24 m2). Why are these two figures different and how was this figure assessed? [Plan shows distribution bed is definitely 3.6 metres by 10 metres, not 10.9 metres. This has implications for loading rate to the distribution bed]

6. How many distribution laterals are there in the distribution bed and what are the hole spacings and sizes and pipe diameter? [Four LDPE laterals, 32 mm diametre. No information on perforations but a note states that this is to be determined on site after pumping chamber is commissioned]

Thanks

Rob Lieffering
Resource Consents Manager
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Private Bag 4
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21/01/2008

APPENDIX 4.5B

CONSTRUCTION OF MOUND SYSTEMS

(Normative)

4.5B1 SCOPE

This is an Appendix to Clause 4.5 of this Standard and sets out the construction and installation requirements for mound systems.

4.5B2 PRINCIPLE

An area of aggregate is used to distribute primary effluent onto the surface of the sand-fill media beneath (see Figure. 4.5B1). This sand filters the effluent and provides the within-mound treatment. The basal area of the mound covers the natural soil which then absorbs the filtered effluent.

4.5B3 CONSTRUCTION AND INSTALLATION

4.5B3.1 General

The ground surface and mound shall be constructed with care.

Comment. *It is essential that both the ground surface and the mound itself are properly prepared and that attention is given to the details of mound design, if the mound system is to function properly.*

4.5B3.2 Site protection

Before on-site construction work is commenced, the site shall be protected from vehicular traffic (to avoid compaction) and shall be isolated or marked out so that other nearby construction activity does not damage the area.

4.5B3.3 Construction preparation

Before construction commences:

(a) The site shall be cleared of shrubs and trees. Trees shall be cut at ground surface and the stumps removed and backfilled to natural surrounding soil conditions.

(b) The mound perimeter and bed shall be marked out in proper orientation.

Comment. *Reference stakes set some distance from the mound perimeter are also required in case the corner markers are disturbed.*

(c) The area within the mound perimeter shall be ploughed.

Comment. *Use a twin or larger mouldboard plough, ploughing 18 – 20 cm deep. Single ploughs should not be used, as the trace wheel runs in every furrow, compacting soil. A chisel plough may be used in place of a mouldboard plough. Roughening the surface with backhoe teeth may be satisfactory. Rototilling is not recommended because of the damage it does to the soil structure.*

(d) Ploughing shall not be done when the soil is too wet. This leads to smearing and compacting of the soil.

Comment. *If a sample of the soil taken from the bottom of the plough furrow forms a wire when rolled between the palms, the soil is too wet. If it crumbles, ploughing may proceed.*

4.5B3.4.5 *Pre-commissioning tests*

A pre-commissioning test shall be carried out after all on-site components including the pump, have been installed but prior to covering the effluent distribution system in the distribution bed (see also Clause 4.5.6.2):

(a) Fill pump to 'pump-on' level with water;

(b) Start pump;

(c) Check effluent distribution pipework to ensure water flows uniformly from all perforations;

(d) Record time taken to pump from 'pump-on' level to the 'pump-off' level. This shall be approximately 3 minutes. Record time in the on-system log.

(e) Follow pump manufacturer's recommendations for commissioning pump;

(f) Check pumping main to ensure there are no leaks and that the air-release valve is functioning.

4.5B3.4.6 *Finish of distribution bed*

To finish the distribution bed:

(a) Additional aggregate shall be placed on the distribution bed to a total depth of 225 mm.

(b) A suitable backfill barrier shall be installed over the aggregate such as a filter cloth.

(c) A fine textured soil material such as silt loam shall be placed over the top of the distribution bed to a depth of approximately 300 mm with thickness reducing towards the sides.

(d) A further 150 mm (minimum) layer of good quality topsoil shall be placed over the entire mound surface.

(e) The mound surface shall be grassed using grasses adapted to the area. Shallow rooting ground cover can be planted around the base and up the side slopes.

Comment. *Shrubs planted around the base of the mound should be tolerant of moisture, as mound perimeter may become moist. Planting on top of the mound should be drought-tolerant, as the upper portion of the mound can become dry.*

4.5B4 COMMISSIONING

The on-site wastewater system shall be inspected, checked and commissioned according to Clause 4.5.6.

4.5B5 REPORTING

An installation and commissioning report shall be produced to include the 'as-built' details following construction, the results of construction inspections and the commissioning process. This report shall be provided to the owner of the wastewater system and to the approval authority, if required (see Clause 4.5.6.4).