INNOFLOW TECHNOLOGIES

INNOVATIVE WASTEWATER MANAGEMENT

PROPOSAL
FOR
WASTEWATER COLLECTION & MANAGEMENT SYSTEM

Jacks Point Subdivision, Queenstown – AX1800 rtPBR

Project Name	*: White Trust Vineyard Accomodation*
Project Reference	*: Q6067 - 07121207*
Prepared for	*: MWH Global – Juliet Westbury*
Date	*:12 February 2008*

SYSTEM DESIGN PARAMETERS

Wastewater Strength

Facility Description	White Trust Vineyard Acommodation
Nature of Wastewater	100% domestic, no industrial waste.
Influent Parameters	BOD < 450 mg/ltr SS < 400 mg/ltr Grease < 30 mg/ltr TN < 70 mg/ltr

Toxicity:

The assumption has been made that the influent strength detailed in the table above is domestic in nature and does not contain high concentrations of toxic substances that may adversely effect the performance of the biological processes required for the system to operate, these typically include but are not limited to:

- Chlorine (pool and spa pool overflow)
- Quaternary Ammonium Compounds (disinfectants, cleaning products)
- Formaldehyde (disinfectant, chemical toilet treatment)
- Dichlorobenzene (urinal tablets, sanitisers)
- Petrochemicals (waste oil, diesel, turpentine etc)
- Pharmaceuticals (drugs and or medicines)

Design Flow

The design flow is based on the following information supplied by MWH Global

Source	Occupancy (Peak)	Daily Flow allowance	Design Flow Allowance
Workers Accomodation, laundry, Kitchen and other facilities	200	100 L/person/day	20,000 L/day
House	6	140 L/person/day	840 L/day
		Peak Daily Design flow Allowance	**20,840 L/day**

Expected Treatment Level

The plant is expected to consistently meet the following treatment levels:

TSS:	< 20 mg/ltr
BOD_5:	< 20 mg/ltr

Treatment Plant Size

Total Design Flow	Septic Tank Volume	Recirculation Tank Volume	Textile Media Bed Area	Treated Effluent Tank Volume
20.8 m^3/day	54 m^3	23 m^3	20 m^2 (2 x AX100)	23 m^3

Land Application Area Requirements

As specified by MWH Global the disposal system will be via conventional trenches. The application rate is 30mm/day.

Peak Design Flow	Application Method	Loading Rate	Trench Area	Total Disposal Area
20.84 m^3/day	Conventional Trenches	30 L/m^2/day	695 m^2	1,895 m^2

WASTEWATER MANAGEMENT SYSTEM

Process Selection

Due to the complex nature of wastewater, there are a number of factors that must be taken into account when designing a wastewater management system. It is important to identify a treatment process that meets with all the criteria that have been identified. This project has the following factors to consider:

- Public health considerations
- End use of effluent
- Land use – aesthetic issues
- Available area
- Varying flows
- Stability of treatment process
- Ongoing cost to client
- Ease of operation
- Cultural requirements

Taking the above considerations and applying them against the various types of treatment processes that are available, we have been able to identify the treatment process most suited to this project. By assigning a value (weighted attribute) to each type of treatment process under the various criteria chosen, the process with the best score is identified as the most suitable for this project. The following table summarises this method.

The four types of treatment process available for this type of project are:

1. Rotating Biological Contactor (RBC)
2. Aerated Wastewater Treatment System (AWTS)
3. Membrane Bioreactor (MBR)
4. Recirculating Packed Bed Reactor (rPBR)

Weighted Attribute Table

Criteria	RBC	AWTS	MBR	rtPBR
Land Use (amenity value)	4	3	4	4
Treatment levels	3	3	5	5
Nitrogen removal	3	2	3	4
Process stability	4	1	3	5
Sludge production	2	2	3	3
Power consumption	2	1	1	4
Operator input	3	1	2	5
Odour potential	3	3	4	5
	24	**16**	**25**	**35**

Scores are from 1 – 5, with 1 being *not good* and 5 being *very good.*

The results of this table indicate that a Recirculating Packed Bed Reactor system is most suited for this application.

The following information pertains to recirculating packed bed reactor (rPBR) technology in general and focuses on the textile (rtPBR) option for this project.

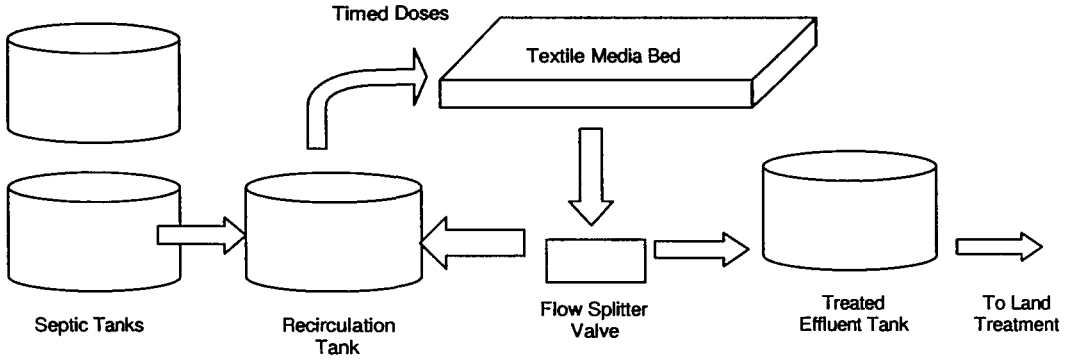
WASTEWATER TREATMENT PLANT

All wastewater from the facility is collected and treated to a high quality using an on-site treatment plant. The type of treatment plant proposed is a recirculating textile packed bed reactor (rtPBR). This design is well proven throughout the world and New Zealand especially for the type of project proposed. The modular nature of the system makes it ideal for staged or future potential development.

This standard design features the use of equipment specifically designed to optimise the system's treatment performance and stability and minimise its operation and maintenance requirements. A schedule of the simple operation and preventative maintenance tasks is included in the full management plan provided with every system.

Treatment Process Summary

Fig 1. Schematic of Recirculating Textile Packed Bed Reactor Treatment Plant



Flow Train Schematic

Septic Tanks

We utilise the septic tank in virtually all of our designs for primary treatment. It is an inexpensive passive process requiring no energy input. We have optimised its design based on empirical data obtained from over 25 years of study on thousands of tanks, and enhanced its performance with the installation of our Biotube™ effluent filters. To ensure that the septic tank efficiently removes solids from the wastewater stream it shall have the following properties:

(a) be watertight, including access risers
(b) have sufficient sludge storage and settling volume
(c) contain a flow-modulating Biotube™ effluent filter to enhance solids reduction

The Screened Vault Filter technology dramatically reduces the total suspended solids (TSS) exiting the tank (average 30ppm TSS) as well as protecting the down-line components. Effluent from the relatively clear zone of each tank, between the scum and sludge layers, enters the filter housing through influent holes to an annular space between the housing and a computer designed non-clog mesh screen. Particles larger than 3 mm are screened out and retained for further treatment (in fact biological growths on the screen filter out even smaller particles).

The septic tank and equipment are designed to be low maintenance and should require no on-site intervention. The effluent filters are very low maintenance, having a large surface area. The septic tank will require desludging periodically, typically between every 5-7 years depending on loading.

Recirculation Tank

Screened effluent from the septic tanks is received in a recirculation tank from where the dosing of the packed bed reactor is timer controlled and flow equalised utilising a submersible pump(s) fitted inside a screened pump vault. A small reliable turbine pump is proposed to minimise operating and maintenance costs. The pump vault houses the pumping assembly and is designed to ensure that no gross solids are pumped onto the rPBR. Float level switches installed inside the pump vault control and override the timer for high water on, and alarm in the

unlikely event of timer failure. By utilising timer controlled dosing we are able to buffer incoming and recycle flows, and uniformly apply effluent to the packed bed reactor.

The patented OSI recirculation/splitter float valve assembly ensures that the optimal recycle ratio is maintained at all times, maximising treatment efficiency for a consistently high quality effluent.

The recirculation tank ensures that the packed bed reactor receives a continuous source of oxygen and food during periods of little or no flow, ensuring that the micro-organisms are maintained at peak condition, ready to receive shock or varying loads.

Recirculating Textile Packed Bed Reactor

Our parent company OSI's dedication to research and development have further refined and optimised the rPBR processes to produce a design that is unsurpassed for efficiency, reliability, future expansion capabilities, and low maintenance requirements.

The sand and pebble aggregates used in sand contactor rPBR's have been replaced by an internationally patented textile media that can accept a loading rate up to 8 times higher than the recirculating sand contactor. This produces a reactor basin with a footprint only a fraction of the size of the conventional sand contactor requirements.

The Textile rPBR (rtPBR) is essentially a bed of highly specialised textile nestled in a pre-made PODs to which the effluent is uniformly dosed through a pressure distribution system using a timer controlled dosing regime. These small precise doses at multiple point sources across the reactor bed ensure thin film application of the effluent maximising retention times within the reactor for renovation. This unique complex fibre structure of the textile media has an immense surface area for biomass colonisation, (up to 5 times greater than sand) and a much greater void space (~3 times higher than sand) to ensure free flow of oxygen through the media interstices. Its high field moisture capacity ensures long, intimate, contact times of the wastewater with the biomass for almost complete renovation.

The rtPBR is completely enclosed with green textured fibreglass lids and is installed either above ground and bunded or level with the ground. This means that the entire treatment plant is below ground with very low visual impact.

rPBR Features and Benefits

The packed bed reactor treatment process proposed is well suited to this application because:

- it is reliable and robust
- it is cost effective both in terms of capital investment and running costs
- it consistently produces a high quality of effluent under varying loads and conditions
- it has simple operational and management requirements
- it has a successful track record in similar applications both in New Zealand and world-wide
- It has virtually no impact on the development within which it is used.

Treated Effluent Storage Tank

We propose gravity feed of the treated effluent to a discharge tank. A submersible pump will be installed in this tank to provide timer controlled pressure dosing to the land application area. Float level switches installed inside the tank control and override the timer for high water on, low water off, and alarm in the unlikely event of timer failure. By utilising timer control we can optimise the application to the land application system. This tank will provide 24 hours emergency storage (in conjunction with the Recirculation Tank) above the high level alarm in the unlikely event of pump failure.

IRRIGATION DISPERSAL SYSTEM

The irrigation trenches will be constructed to AS/NZS 1547 standards. See figure 2 below for construction details.

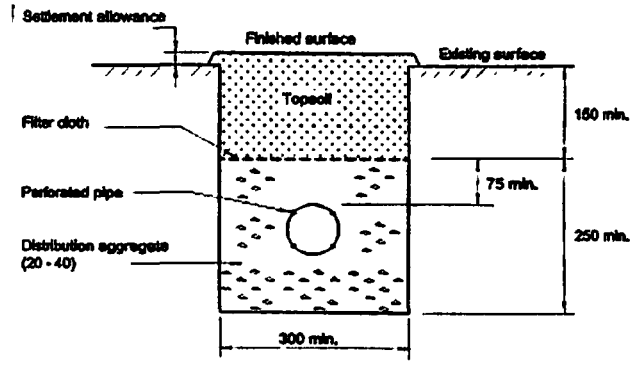


Figure 2: Conventional Piped Trench Construction Details (AS/NZS1547:2000)

CONTROL PANEL

A fibreglass enclosed electrical panel to control the pumps is supplied with each system. The panel will contain a microprocessor-based controller, current limiting circuit breakers with thermal magnetic tripping characteristics, timer controls, manual off/automatic control switches, audible and visual alarms, and run/fault indication. As previously mentioned a timer override, and high level alarm float control are also provided. All internal system wiring is included in this proposal.

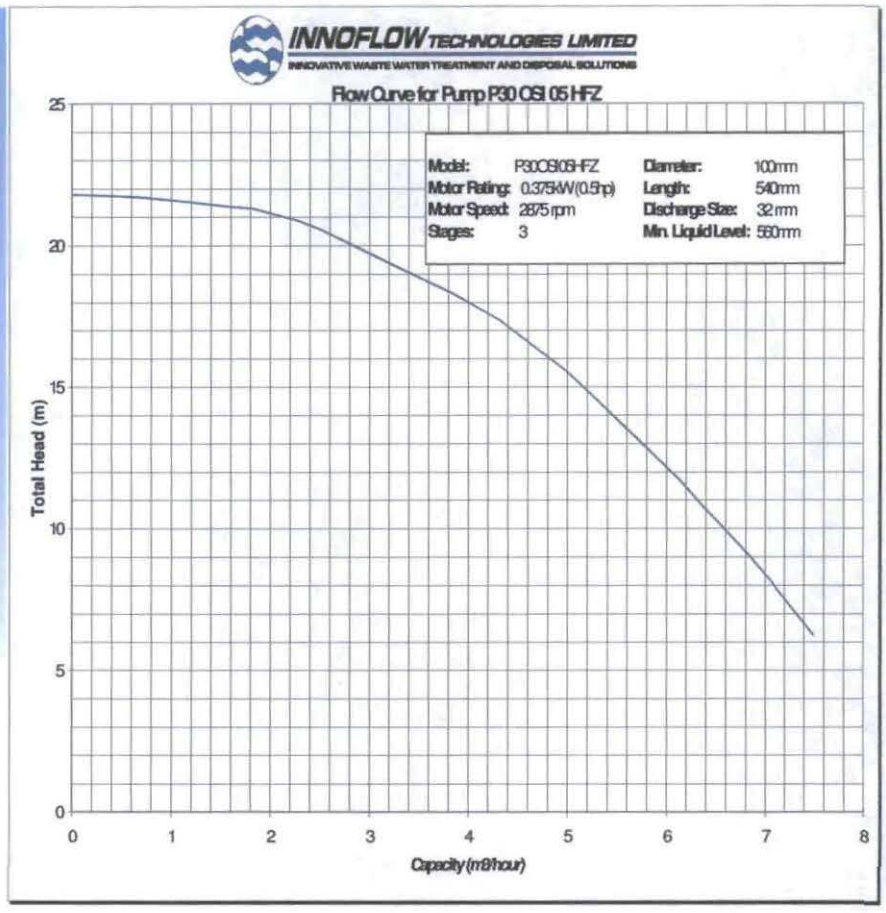
Remote Monitor Manage Control Panel

Much of the monitoring and control of the wastewater treatment plant will be done remotely using telemetry features built into the programmable control panel. The microprocessor-based controller in the panel integrates with standard control panel components (motor contactors, etc.) and provides digital and analogue sensor inputs as well as a two-way dialup function via a modem. This means that the Service Company can receive remote alarm callouts. For example a high level alarm could trigger the system to call Innoflow's office, or a pager. The system can then be checked remotely from the office to simplify troubleshooting, and facilitate accurate analysis.

System elements can also be controlled remotely (e.g. pumps turned on/off) allowing quick response and early preventative maintenance. This could involve reprogramming the control panel remotely to by-pass a float switch until a local contractor can be sent out to attend the situation. Standard logging and trending of data are also possible. Any type of event log can be captured and stored or programmed to trigger an alarm event. This includes pump run-times, high-level alarms, low-level alarms, effluent flows, pipe or orifice pressures, oxidation-reduction potential. Data can be stored for several years depending on input volume and report requirements. Reports can be viewed remotely or downloaded into common data management programmes (e.g. Microsoft Excel) for manipulation. This aids remote troubleshooting and monitoring for better maintenance and operational efficiency. **The following pricing includes Remote Monitor Manage Control.**

ORENCO PUMPS

The OSI multi-stage turbine pump used in the recirculation tank and treated effluent tank has been chosen because of its quality, long life, and extreme resistance to corrosion. Its steep performance curve characteristic is a valuable asset in prevention of orifice clogging within the rtPBR distribution system. If a few orifices begin to clog reduced flow increases pressure enough to clear clogging. When installed inside an OSI pump vault the pump carries a full *five year* warranty.



MANAGEMENT

Full training of an on site person for the operational requirements of the system is included in our proposal. However, to ensure that the system is operating to its optimal performance and to protect your investment, we recommend that our trained staff perform preventative maintenance checks for the first two years until a trends analysis can show actual service frequency requirements and the on site staff develop experience.

ELECTRICAL CONSUMPTION

AT PEAK CAPACITY

ACTIVITY	CALCULATION	DAILY COST
Recirc Tank Pumps	9.1 kWhrs/day @ $0.14 /kWhr	$1.27/day
Treated Effluent Tanks	TBC	TBC
Estimated Total Daily Cost (at peak occupancy)		$1.27/day + Discharge Pump

CAPITAL INVESTMENT COSTS - TEXTILE PACKED BED REACTOR

The capital investment for the supply, delivery and installation of a wastewater treatment and land application system as described above is summarised in the following table.

Option 1:

SYSTEM	DESCRIPTION	COST
Septic Tanks	**Central Septic Tanks** Septic Tanks (54,000 L) 450mm high Watertight lockable access risers Biotube® effluent filter Carbon filter vent	
Treatment Plant	**Recirculation Tank and Equipment** Recirculation tank (23,000 L) 900 mm high Watertight lockable access risers Patented flow splitter valve Biotube® screened pump vault Triple float switch assembly High-head turbine pump 1 x Automatic hydraulic sequencing valve **Packed Media Bed and Associated Equipment (2 x AX100 POD)** 2 x Advantex Textile Packed Bed Reactor Treatment POD Distribution and flushing assembly Underdrain collection system and ventilation system **RTU Control Panel**	
Treated Effluent Pump Station	**Treated Effluent Tanks and Equipment** Treated effluent tank (23,000 litres) 900 mm high Watertight lockable access risers Triple float switch assembly Low-head turbine pump Pressure mainline (upto 100 m 63mm OD greenline polyethylene) to land application area	
Electrical Hookup	Electrical hookup of all pumps and floats to electrical control panels.	
Travel Expenses	Mileage, digger transport, miscellaneous freight.	
Miscellaneous	Expenses, management plans (x3), signage for plant, as built plans, commissioning.	
	INVESTMENT FOR TREATMENT PLANT	**$157,350.00 + GST**
Effluent Disposal Irrigation network	32 Trenches at 37m long constructed to AS/NZS 1547:2000 Standard	
	INVESTMENT FOR DISPOSAL TRENCHES	**TBC**

This quotation remains valid for a period of 4 weeks from the above date.

OPERATION AND MAINTENANCE

FUNCTION	WEEKLY	3 MONTHLY	12 MONTHLY
GENERAL			
Visual Inspect Plant For Obvious Faults	✓		
Record Water Discharge	As Per Resource Consent Conditions		(Daily by RTU)
Forward Reports and Meter Readings to Local Authority	As Per Resource Consent Conditions		
SEPTIC TANKS			
Measure and Record Sludge & Scum Levels in Septic Tanks			✓
Clean Biotube Effluent Filter	As Per Site Tests – Service Report Recommendations		
Recommend De-sludge Septic Tanks	As Per Site Tests – Service Report Recommendations		
RECIRCULATION TANK			
Inspect and Clean Recirculation Tank SPV Filter		✓	
Check and Adjust Operation of Recirc Splitter Valve Float		✓	
Record Operating Pressure of Recirc Pumps		✓	
Check Operation Recirc Tank Control Floats		✓	
Check Operation of Recirc Tank Pumps and Alarms		✓	
Inspect Sludge Level in Recirc Tanks		✓	
PACKED BED REACTOR			
Check and Log Operating Pressure in PBR Laterals		✓	
Confirm Orifice Flow Rate at Two Points on PBR			✓
Flush Build-up from PBR Laterals			✓
Inspect and Clean Sequencing Valve		✓	
Remove Debris and Vegetation From PBR	As Per Site Inspection		
TREATED EFFLUENT TANK			
Check Operation of Treated Effluent Tank Pumps, Alarms and Floats		✓	
Record Operating Pressure of TET Pumps		✓	
Check Operation of Treated Effluent Tank Floats		✓	
Inspect Control Panel Operation		✓	
Inspect Sludge Level in TET Tanks			✓
LAND APPLICATION SYSTEM			
Flush Build-up from Land Application System Pipes			✓
Visually Inspect Land Application Area		✓	

Innoflow Technologies Ltd excludes the following items in the above prices: -

- Goods and services tax
- Permits and consents
- Power supply and connection of power supply to the control panel
- Telecom connection for Remote Telemetry Unit control panel
- Modified access
- Spoils screening and/or removal if required
- Landscaping, planting or topsoiling
- Drainlaying from buildings to septic tanks
- Dewatering if required
- Site preparation of the disposal area if required
- Storm or ground water control if required
- Pumping if required to convey effluent to treatment plant

We trust the above meets with your requirements and look forward to hearing from you. Should you have any queries or would like to meet to discuss any aspects of the proposal please do not hesitate to contact the undersigned.

Yours faithfully
INNOFLOW TECHNOLOGIES LTD

Aidan Lee
PROCESS ENGINEER

INNOFLOW TECHNOLOGIES NZ LTD
INNOVATIVE WASTEWATER MANAGEMENT SOLUTIONS

Our Ref: L6067
Project Number: 07121207

12th February 2008

MWH Global
P O Box 3455
Richmond, 7050,
Nelson

Attention: Juliet Westbury

Dear Juliet,

DESIGN PROPOSAL
ADVANTEX WASTEWATER TREATMENT PLANT
WHITE TRUST VINEYARD ACCOMODATION

Thank you for the opportunity to provide a cost estimate and proposal for the above site. The team at Innoflow Technologies is committed to providing a wastewater management system that is most appropriate to the economic, environmental and regulatory constraints for this project.

Innoflow Technologies Ltd has considerable experience in the design, building and operation of wastewater systems for projects such as this. We can provide a full turnkey solution to the wastewater needs for this development.

Our parent company in the USA, Orenco Systems Incorporated (OSI) has over 25 years experience in wastewater management. They have pioneered many innovative technologies and are now recognised internationally as the world's foremost experts in the area of onsite and small community wastewater management systems. Over the last nine years Innoflow Technologies Ltd has enjoyed the privilege of being associated with this company as their sole distributor for Australasia. During this time we have been able to emulate OSI's considerable successes, with the installation and operation of hundreds of wastewater treatment and reuse systems throughout New Zealand, Australia and the Pacific Islands.

The wastewater management scheme proposed by Innoflow combines a holistic approach encompassing on-site primary treatment and solids retention, centralised treatment and land application of treated effluent. The design of the on-site treatment and community collection and reticulation relies on watertight components and construction techniques and as such no stormwater infiltration is allowed for in our design. In addition peak flow rates are carefully controlled and flow modulated to avoid overloading the treatment system during high season usage.

Depending on the flows of the various areas it may be beneficial to have multiple primary tanks around the development with the primary treated effluent then being conveyed to the treatment plant, either by gravity or pumped if required. This proposal only includes 2 x 27 m³ primary tanks at the plant.

The proposed concept and treatment plants are outlined in the following proposal and will contain central primary tanks (advanced septic tanks), a recirculation tank, and an AdvanTex® recirculating textile packed bed reactor (rtPBR). Final disposal of the effluent will occur onsite in LPED trenches.

P.O. Box 300 572, Albany 0752, Auckland, New Zealand. Phone (64 9) 426 1027 Fax (64 9) 426 1047
0800 INNOFLOW (0800 466 695) Web: www.innoflow.co.nz Email: info@innoflow.co.nz

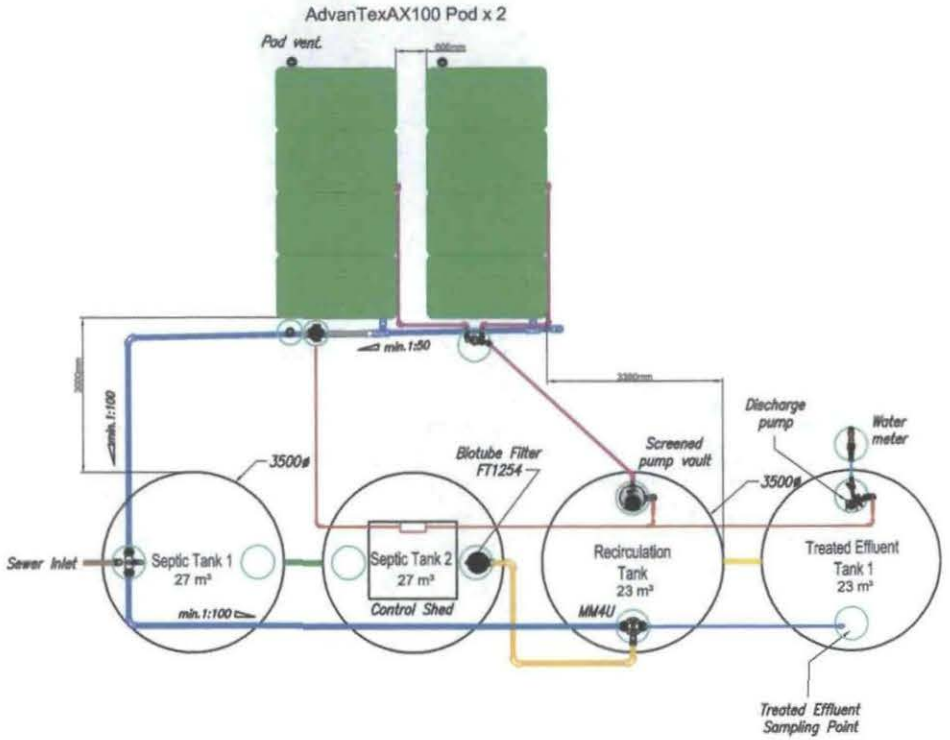
As mentioned previously to you, we are still waiting on finalised costs for the installation of the LPED disposal area; we will forward this onto you as soon as possible.

Please also find enclosed the Rotorua Trials Report. This was an independent trial that compares six systems from 5 suppliers. The results of this trial showed that our Advantex out-performed all other systems in terms of Nitrogen removal being the only manufacturer to meet TN < 25 mg/L consistently. The Advantex also used significantly less power then other system in the trial. This can be seen in Figure 5 of the Trial's report.

We trust the following proposal meets with your requirements, and look forward to hearing from you. Should you have any queries or require any further information please do not hesitate to contact the undersigned.

Yours faithfully,
INNOFLOW Technologies NZ Ltd

Aidan Lee
Process Engineer



Legend:

- Raw Wastewater
- Screened Effluent
- Underdrain Collection
- Pod Dosing
- Pod Ventilation
- Discharge
- Electrical
- Tank Inter-connection (450mm from Base)
- Tank Inter-connection (High Level under soffit)

Plan

0 5 10
GRAPHIC SCALE (m)

INNOFLOW TECHNOLOGIES NZ LTD
INNOVATIVE WASTEWATER MANAGEMENT SOLUTIONS

P.O. Box 300 572
Albany
Auckland

Ph: (09) 426 1027
Fax: (09) 426 1047
info@innoflow.co.nz

Designed by	Checked by	Approved by - date	Scale	Ref.
BH	JB	12.02.08	1:50 - A1	07121207-3

INNOFLOW TECHNOLOGIES NZ LTD

AX200 - Mode 3 Configuration

AdvanTex Wastewater Treatment Plant - Plan

White Trust

On-Site Wastewater Treatment & Disposal System Design Report

February 2008

This document has been prepared for the benefit of White Trust. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

This disclaimer shall apply notwithstanding that the report may be made available to Marlborough District Council and other persons for an application for permission or approval to fulfil a legal requirement.

Quality Assurance Statement	
MWH New Zealand Limited 1st Floor 281 Queen Street P O Box 3455 Richmond 7050 New Zealand Phone : 64-3-546 8728 Fax : 64-3-548 2016	**Project Manager:** Juliet Westbury
	Prepared by: Juliet Westbury
	Reviewed by: Paul Russell
	Approved for issue by: Juliet Westbury

White Trust

On-Site Wastewater Treatment & Disposal System Design Report

Contents

1 Introduction

White Trust is proposing to convert an existing Campground on SH 1 near Blenheim, into vineyard workers accommodation catering for up to 200 workers. Appendix A contains a plan of the proposal. The conversion will require the replacement of the existing on-site wastewater treatment and disposal system with a new system designed to cater for the loadings from the proposed accommodation development.

The site is located at 3043 SH 1, about a kilometre south of Blenheim on the road to Seddon. The legal description for the property is Lot 1 DP 9804 and which is 1.94 ha in area.

Figure 1. Location of Site at 3043 SH 1 – (outlined in yellow).

MWH was engaged by White Trust to assess the proposal against NZS 1457:2000 and the Marlborough District Council Guidelines for New On-site Wastewater Systems.

The current owner of the property is Mr T Crispin, however White Trust have had a conditional offer on the property accepted by Mr Crispin.

2 Site and Soil Evaluation

The underlying geology of the Wairau Plains on which the site is located, is made up of sands, silts, and gravels, however in the Riverlands area on the southern edge of the Wairau aquifer there is a 20m thick seam of marine clays between the sands and silts, and the water bearing gravels.

This report references the original site and soil evaluation completed for the Duncannon Campground in May 1986 by Paul Russell of Royds Garden Ltd (now MWH). A new evaluation was not considered necessary as the site has not been modified since the original disposal system was constructed and sufficient information was collected to assess the soil capacity.

2.1 Testpits

Six testpits were hand excavated within the proposed disposal area and a permeability test was conducted in each pit. The following is a summary of the soil characteristics from the assessment completed on 22 May 1986. The soil was consistent across all six testpits, however only one was dug to greater than 900mm deep. The full soil log and plan showing pit locations is included in Appendix B.

The first 350mm consisted of blackish brown topsoil, beneath this to a depth of 900mm was a firm dry light brown silt, with some flecks of clay. The silt continued to a depth of 1500mm becoming silty clay with depth. At 1500 – 2000mm the soil became fine silty sand. The soil became damp at 2000mm with slightly plastic silty clay encountered at 2150mm, the bottom of the testpit.

Two bores have been driven/drilled on the property and the bore logs from these are included in Appendix B. The more detailed drill log from 1983 shows similar soil types with topsoil for the first 300mm, followed by coarse sand and yellow (light brown) silt down to 4 metres. A further 2 metres of grey silt followed by 6 metres of grey sand before encountering marine mud, sand, shells at 12 metres – the start of the confining layer above the aquifer. Groundwater was encountered at around 20 metres below ground for both bores.

The result of the assessment is that the soil is categorised as a weakly structured or massive loam, which equates to a category 3 soil under table 4.2A1 of NZS 1547:2000. No site constraints exist.

Soil conditions should be checked during construction of the disposal field to confirm that soil is as expected.

2.2 Soil Permeability

Percolation tests were completed on all six testpits. The sides of the holes were scarified and holes were filled with water and left to soak for 24 hours before percolation tests were undertaken. Testing was completed as per NZS4610:1982, which has since been superseded by NZS1546 and NZS1547. Holes were refilled at the start of the test and the depth of water monitored over the next 4 hours. Percolation rates varied between 0.6m/d to 1.5m/d. This permeability confirms that the soil lies within Category 3.

2.3 Site Stability

The property is generally flat with a total difference in level of no more than 1.7m across the entire site on the southern side of the stopbank. The lowest point is against the stopbank with the house situated at the highest point. The existing and proposed disposal field is 0.7m below the highest point and gently slopes towards the State Highway. The proposed disposal area is grassed and is currently partly used as as disposal field with the remainder used for camping.

2.4 Environmental Considerations

The water supply for the current Campground is from an artesian bore located approximately halfway between the road and the Opawa River, within the camp ground. The White Trust propose to continue using this water source for the workers accommodation. The water is taken from the confined Wairau aquifer, over 20 metres below ground. Historical testing of the water from the bore has shown no bacterial contamination, see Nelson Marlborough District Health Board results in Appendix C.

Groundwater in this aquifer is recharged from a combination of local rainfall or Taylor River leakage, and seepage from the Wairau River at Renwick. There is no possibility of seepage from the disposal field contaminating the aquifer due to the confining mud layer and artesian nature of the aquifer under the site.

The Opawa River is over 100m from the proposed disposal field. The proposed disposal field is unlikely to impact on the river water quality due to the long seepage combined with the low soil permeability.

2.5 Soil Evaluation Summary

The soil evaluation concludes that the soil is categorised as a weakly structured or massive loam, or category 3 soils under table 4.2A1 of NZS 1547:2000. No site constraints exist and therefore conventional subsurface piped trench system is a suitable disposal method.

3 On-site Wastewater Treatment and Disposal Design

3.1 Design Loadings

The maximum number of people accommodated by the proposal is 200 residents in the workers accommodation with a further 6 people resident in the existing house.

Using appendix 4.2D of NZS 1547:2000 the typical maximum wastewater flow allowance has been assessed as follows. The vineyard works accommodation is similar in nature to a fully serviced Campground where the standard wastewater allowance is 130l/person/day. As full water reduction fixtures will be used throughout the new development, a reduced allowance of 100 l/person/day has been used in the design. An allowance of 140 l/person/day has been used for the house as some water reduction fixtures exist.

The total wastewater loading with the accommodation at full capacity is 20,840 l/day. This loading has been used in the design for both the treatment and disposal systems. While the proposal is to maximise occupancy throughout the year there will be at least minor fluctuations in occupancy.

3.2 Treatment Design

White Trust propose to contract Innoflow Technologies, a leading on-site wastewater design, build, and operations company, to design and build a secondary wastewater treatment system for the proposed workers accommodation development.

A copy of the Innoflow on-site wastewater treatment proposal is included in Appendix D.

In summary the proposed wastewater treatment system consists of:

- two primary 27m³ septic tanks with effluent filter on second tank outlet
- one 23m³ recirculation tank which doses the packed bed reactor
- two AdvanTexAX100 packed bed reactors
- final 23m³ effluent storage tank and pump vault
- The system contains 24hr emergency storage combined in the recirculation and final storage tanks.

Features of the system include:

- reliability
- lower power consumption and operational cost
- consistent high quality effluent, even with variable flow conditions
- simple operation and management requirements

The treatment plant is expected to consistently meet the following effluent quality:

Total suspended soilds (TSS)	<20 g/m³
5-day biochemical oxygen demand (BOD_5)	<20 g/m³
Total nitrogen (TN)	<25 g/m³.

The preferred location for the treatment plant is central to the ablution and dining buildings. The overall footprint of the treatment facility is approximately 190m² (17m x 11m). There is plenty of area available for siting the treatment facility, even allowing for a 2 m buffer from buildings. Potentially some of the septic tanks could be located under carparking so long as the tanks are design for traffic loading.

3.3 Disposal Design

An early assessment of the area available for disposal concluded that there was insufficient land area available if effluent was only treated to a primary standard. Therefore secondary treatment was needed in order for the development proposal to go ahead.

As the proposed development would mean up to 206 people would be resident at the property at any one time, the most appropriate effluent disposal method is subsurface. This would mitigate any potential exposure pathways and address human health concerns. There are no soil or site limitations preventing conventional piped trench disposal, refer Figure 4.5A1 of NZS 1547:2000. Disposal pipe will be laid level and inspection ports will be incorporated into the disposal field for checking fluid levels within the field.

Key assumptions and design criteria are summarised below.

- Wastewater Loading: 200 people @ 100 l/person/d, 6 people @ 140 l/person/day = 20.84 m³/d
- Soil category: 3 weakly structured or massive loam (Table 4.1.1 NZS 1547:2000)
- Secondary Treatment with effluent dosing
- Design Loading Rate: 30 mm/day (Table 4.2A1, NZS 1547:2000)
- Trench dimensions: 0.6mm wide x 37m long @ 1m spacing
- Minimum trench area required: 695m²
- Minimum disposal area required: 1,894m²
- Reserve area (100%): 1,894m².

Due to the consistent high level of treatment that will be provided by the AvanTex system and the dosed subsurface disposal system, it is unlikely a reserve area of 100% is necessary. However there is sufficient undeveloped land, between the existing house and the proposed disposal area, to provide a 100% reserve area.

The proposed trench lengths exceed the MDC design standard 20m length. To mitigate MDC concerns the disposal system will be pump dosed using the pump specified in the Innoflow Design Report, P30 OSI 05 HFZ. This pump has been chosen as it can mitigate orifice clogging. As clogging occurs the flow reduces and pressure increases enough to clear clogging.

The disposal trenches have been located 2m from the road boundary closer than the minimum 4m required by the MDC design standard. The disposal trenches are more than 4m from all other property boundaries. The trenches will be laid a minimum of 400mm below ground surface and even though the site is gently sloping towards the road (gradient of about 1 in 75), this combined with the low soil permeability will mean the will be no impact on the road reserve.

The disposal field should be sited outside the dripline of any trees. Therefore some trees, including the hedge inside the boundary with SH1, may need to be removed to allow the installation of the disposal trenches.

4 Conclusion

The soil at the Duncannon Campground has been assessed as suitable for on-site wastewater disposal. Due to the large volume of effluent generated by the proposed development, secondary treatment is required in order to minimise the land being set aside for effluent disposal.

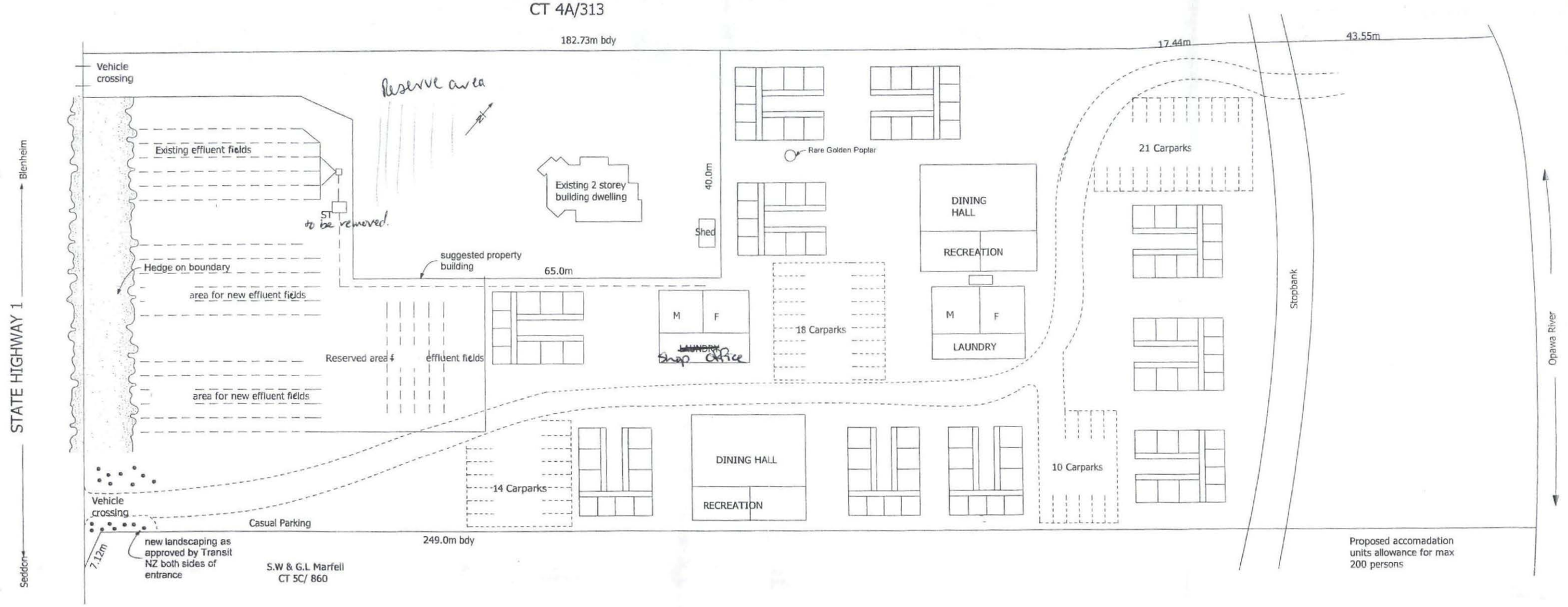
The AdvanTex treatment system proposed by Innoflow provides secondary treated effluent and will consistently meet the following effluent quality:

TSS	<20 g/m^3
BOD_5	<20 g/m^3
TN	<25 g/m^3.

It is also reliable, has lower power consumption and operating costs, is simple to operate and mange, and can be remotely monitored by Innoflow.

Appendix A Plan of Vineyard Workers Accommodation Proposal

Rosemere Investment Ltd
CT 4A/313



SITE PLAN SCALE 1:700

RECEIVED
18 FEB 2008
MARLBOROUGH DISTRICT COUNCIL

Graeme J. Savage
M.D.A.N.Z. A.D.N.Z.
Architectural & Structural Designer 10 High St. Blenheim
Telephone (03) 578 2769, Fax (03) 578 9361, Mobile 027 434 3466

ADDITIONS TO DUNCANNON ACCOMODATION FOR WHITE TRUST

ALL CONSTRUCTION TO COMPLY WITH LOCAL AUTHORITY REQUIREMENTS, NZ BUILDING CODE / APPROVED DOCUMENTS AND MEANS OF COMPLIANCE, INCL. NZS 3604

ALL DIMENSIONS AND LEVELS TO BE CHECKED BY CONTRACTOR BEFORE COMMENCEMENT OF WORK CONTRACTOR TO REPORT ANY DISCREPANCY.

8107
Sheet 01
Drawn: NOV 07

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

15 February 2008 - 8:38am

VINEYARD WORKERS ACCOMODATION

1 : 750

NOT FOR CONSTRUCTION

REV	AMENDMENTS	INITIAL	DATE	INITIAL	DATE
		CHECKED		APPROVED	
B	RESERVE AREAS AMENDED	JCW	08-02-08	JCW	08-02-08
A	WORKING PLOT	JCW	17-10-07	JCW	17-10-07

Job Number : Z1614700

TAB/DWG : DUNCANNON A3 750 / Z1614700_01_B.dwg
SERVER : NELSON

XREFS :

FIELDBOOK	Name	Date
SURVEYED		
DESIGNED	AW	17-10
DRAWN	AW	17-10
CHECKED	JCW	17-10
APPROVED		17-10-07

MWH

WHITE TRUST

2 HIGHFIELD GROVE
BLENHEIM
MOBILE: 027 4755 808

PROPOSED VINEYARD WORKERS ACCOMODATION FOR WHITE TRUST

SITE LAYOUT PLAN
WASTEWATER DISPOSAL FIELD

Status Stamp: **WORKING PLOT**

Date Stamp: **08 FEBRUARY 2008**

SCALES (A1) 1:1500 (A3) 1:750

Job No.	Sheet No.	Rev.
Z1614700	01	B

\\nznelfs01\projects\Z\16147 Duncannon Accommodation\00 Duncannon Accommodation\Cad\Z1614700_01_B.dwg

P:\Z\16147 Duncannon Accommodation\00 Duncannon Accommodation\Cad\Z1614700_01_B.dwg

Appendix B Test Pit Soil Log – May 1986 and Bore Logs

Soil Evaluation undertaken by: Paul Russell, Senior Engineer at Royds Garden, Chartered and Registered Engineer.

Testpit 1	Testpit 2	Testpit 3	Testpit 4	Testpit 5	Testpit 6
0-250mm blackish brown topsoil (OM), friable	0-350mm blackish brown topsoil (OM), friable	0-350mm blackish brown topsoil (OM), friable	0-430mm blackish brown topsoil (OM), friable	0-350mm blackish brown topsoil (OM), friable	0-340mm blackish brown topsoil (OM), friable
250-350mm greyish brown silt (ML), firm and dry	350-900mm light brown silt with very minor flecks of clay (ML), firm and dry	350-900mm light brown silt, (ML), firm and dry	430-900mm light brown silt, (ML), firm and dry	350-900mm light brown silt, (ML), firm and dry	340-900mm light brown silt (ML), firm and dry. Silt becoming lighter grey brown and finer with depth.
350-1000mm light brown silt with very minor flecks of clay (ML), firm and dry	End of hole at 900mm	End of hole at 900mm	End of hole at 900mm	End of hole at 900mm	End of hole at 900mm
1000-1500mm reddish brown clayey silt (ML), firm and dry					
1500-2000mm reddish brown silty sand (SM)					
2000-2150mm reddish grey silty sand (SM), damp					
2150mm greyish brown silty clay (ML), slight plasticity					

N.Z.D.F.
member

WAIMEA DRILLING CO. LTD

DRILLERS WATER WELL LOG FORM

RECEIVED
20 FEB 1984
MARLBOROUGH CATCHMENT BOARD

No. 1684

WELL-OWNER Neil Fletcher.
ADDRESS P.O. Box 522 / Blenheim.
DRILLING FIRM W.D. Co.
DRILLER W. Bradley.
DRILLING DATE 13 - Sept 1983.
LOCALITY St. Andrews Looop.

MAP SHEET No. P28
GRID REFERENCE* 915 652
N.Z.G.S. WELL No. 1336
PERMIT NO. 427
WATER RIGHT No. _____ Reduced Level _____

STRATA				DETAILS OF AQUIFERS		
DEPTH FROM SURFACE (m)		COLOUR	DESCRIPTION	DEPTH FROM SURFACE (m)		STATIC WATER LEVEL (m)
Top	Bottom			Top	Bottom	
0.0	0.3		Top Soil			
0.3	4.0		Coarse sand and yellow silt.			
4.0	6.0		Grey Silt.			
6.0	12.		Grey Sand.			
12.0	18.6	Grey	Mud, sand - shells and wood.			
18.6	20.	Grey	medium gravel, tight Clay bound.			
20.0	21.0		Cobbles and coarse sand, Clay bound - yellow. (P.W.B)			
21.0	22.5		Cobbles and course sand, some cream to Brown Gravel (W.B)			
22.5	23.0	Yellow, Brown	gravel, Clay bound Cobbles and coarse sand.			
23.0	24.5		Coarse sand to coarse gravel. (W.B)			
24.5	25.5	Some	yellow clay, Cobbles to coarse sand. (P.W.B)			

CASING DIAMETER (cm) 200 mm. LENGTH (m) _____
SCREEN TYPE Slotted Casing. 150mm. SET AT 22 - 25.5.
SCREEN LENGTH (m)‡ 4 m. SLOT SIZE 6 Rows 8mm Slots. 6".
DRAWDOWN (m) 2.7 from static AFTER _____ HOURS PUMPING AT 454. (LITRES/MIN)
REMARKS (INCLUDING NOTES ON CORES AND SAMPLES TAKEN) _____
Static 900 Above ground.

* If no grid reference available supply rough sketch of locality relative to road intersections on the back of this form.
‡ If more than one list depth of all screens.

Rudco

N.Z.D.F.
member

WAIMEA DRILLING CO. LTD

RECEIVED
No 1930

DRILLERS WATER WELL LOG FORM

WELL-OWNER Mr. N. Fletcher
ADDRESS P.O. Box 522, Blenheim.
DRILLING FIRM As Above.
DRILLER D. Eves
DRILLING DATE Sept 1985.
LOCALITY St. Andrews Lodge.

MAP SHEET No. P28
GRID REFERENCE* 9170 6516
N.Z.G.S. WELL No. 1645
WATER RIGHT No. _____ Reduced Level _____

STRATA				DETAILS OF AQUIFERS		
DEPTH FROM SURFACE (m)		COLOUR	DESCRIPTION	DEPTH FROM SURFACE (m)		STATIC WATER LEVEL (m)
Top	Bottom			Top	Bottom	
25.5			Existing Bore No 1648.			
25.5	30.0		Coarse to fine gravel. (W.B)			
30.0	31.0		Clay bound gravels, sand.			
31.0			E.O.H.			

CASING DIAMETER (cm) 200 mm. LENGTH (m) _____
SCREEN TYPE Slotted 150 mm. Casing SET AT 22m - 29m.
SCREEN LENGTH (m)‡ 8m. SLOT SIZE 6 Rows
DRAWDOWN (m) 4.5 AFTER 1½ HOURS PUMPING AT 2273 (LITRES/MIN)
REMARKS (INCLUDING NOTES ON CORES AND SAMPLES TAKEN)— Pump to test set at 7m.

* If no grid reference available supply rough sketch of locality relative to road intersections on the back of this form.
‡ If more than one list depth of all screens.

Rudco

Appendix C Groundwater Quality Test Results

TE WAI ORA
Nelson Marlborough District Health Board

Public Health
Wairau Hospital

Hospital Road
P.O Box 46
Blenheim, New Zealand

Fax: (03) 578-9517
Phone: (03) 520-9661

File: SS_5_DUN005

05 October 2006

Terry Crispin
Duncannon Caravan Park
Main South Road
Blenheim

Dear Terry

Drinking Water Test Results – Duncannon Caravan Park

On 25 September 2006 I took a routine water sample from the laundry tap.

No faecal coliforms (*E. coli*) were detected in the sample.

The Drinking Water Standards for NZ 2000 state there should be no faecal coliforms (*E. coli*) detected in a 100ml sample.

This shows that at the time of sampling the results complied with the microbiological criteria of the Drinking Water Standards.

Yours sincerely

Kirsten Todd
Health Protection Technician
kirsten.todd@nmhs.govt.nz

DAVID
LAST INSPECTION BY NMDHB
I AM STILL WAITING FROM COUNCIL FOR THEIR REPORT AS THIS IS MISSING.
REGARDS
TERRY CRISPIN 11-2-08

Huarangi Aotearoa

Gracefield Research Centre
Gracefield Road
P.O. Box 30547
Lower Hutt, New Zealand

Facsimile: +64 4 569 4500

Nelson Marlborough Health
Public Health Unit
Private Box 46
Blenheim
Attention: David Speedy

Job Number: J001522
Client order: –
20 September 2000

ANALYTICAL REPORT

Job registered:	13 September 2000
Number of samples:	2
Reason for Sampling:	Health - P2 B 00/01

SAMPLE DETAILS

Lab No.	Client No.	Taken from	Map Ref	Sampling Location
62605	DJS922	Source	–	Bore
62606	DJS922	Reticulation	–	Amenity block kitchen sink

Lab No.	Received	Sampled on	Sampled by	Treatment
62605	13 Sep 00	30 Aug 00	David Speedy	none
62606	13 Sep 00	30 Aug 00	David Speedy	none

SUPPLY COMPONENTS

Lab No.	Type	Code	Name
62605	Source	G00709	Duncannon Caravan Park Bore
62606	Zone	DUN005DU	Duncannon Caravan Pk.Blenheim

Note: The table above shows sampled community supply components. For component relationships and the full community structure, refer to the community's listing in the "Register of Community Drinking-Water Supplies in New Zealand".

ANALYTICAL RESULTS

Laboratory No.	62605	62606	units	method
Client Sample No.	DJS922	DJS922	–	
pH	–	7.1	–	phm
Total Alkalinity to pH4.5 as HCO_3	–	61	mg/L	auti
Turbidity	–	0.10	NTU	tmet
Conductivity at 25°C	–	12	mS/m	cmet
Fluoride	–	0.2	mg/L	ic
Cadmium	<0.0003	<0.0003	mg/L	icpms
Lead	<0.0005	0.011	mg/L	icpms
Arsenic	–	<0.001	mg/L	icpms
Selenium	–	0.002	mg/L	icpms
Antimony	<0.0005	<0.0005	mg/L	icpms
Boron	–	0.03	mg/L	icpms

ANALYTICAL RESULTS continued

Laboratory No.	62605	62606	units	method
Client Sample No.	DJS922	DJS922	-	
Calcium	-	8.5	mg/L	icpms
Chromium	<0.002	<0.002	mg/L	icpms
Copper	0.004	0.021	mg/L	icpms
Nickel	<0.001	<0.001	mg/L	icpms
Manganese	-	0.001	mg/L	icpms
Silver	-	<0.0005	mg/L	icpms
Barium	-	0.005	mg/L	icpms
Tin	<0.001	<0.001	mg/L	icpms
Molybdenum	-	<0.0005	mg/L	icpms
Total Cyanide (as CN)	-	<0.010	mg/L	discol
Beryllium	-	<0.001	mg/L	icpms
Uranium	-	<0.0005	mg/L	icpms

Analytical results relate only to the sample as received.

METHODS OF ANALYSIS

auti	Auto titrator (ASTM D 1067-92 modified)
cmet	Conductivity Meter (APHA 19TH Ed 2510)
discol	Dist/ colorimetry
ic	Ion Chromatography (APHA 19th Ed 4110 B)
icpms	Ind. Coupled Plasma/Mass Spec.
phm	pH meter (APHA 19th Ed 4500-H-B)
tmet	Turbidity Meter (APHA 19th Ed 2130 B)

Units of g/m^3 are equivalent to mg/L.
Method precision is available on request.

This laboratory is registered by International Accreditation New Zealand. The tests reported herein have been performed in accordance with its terms of registration. This report may not be reproduced except in full.

new zealand accredited laboratory

Stuart Sanderson
IANZ Signatory

Please direct any sample enquiries to Dianne Taylor phone (04) 560-5593.

AgriQuality Water Report: J001522

RESULTS OF HEALTH SIGNIFICANCE (NZ DRINKING-WATER STANDARDS 1995)

Lab No.	Test	Result	Maximum Acceptable Value (MAV)
62606	Lead	0.011 mg/L	Transgresses MAV of 0.01 mg/L

Supply not bore Bore lead result O.K.

Appendix D Innoflow Technologies Design Proposal

INNOFLOW TECHNOLOGIES NZ LTD
INNOVATIVE WASTEWATER MANAGEMENT SOLUTIONS

Our Ref: L6067
Project Number: 07121207

12th February 2008

MWH Global
P O Box 3455
Richmond, 7050,
Nelson

Attention: Juliet Westbury

Dear Juliet,

DESIGN PROPOSAL
ADVANTEX WASTEWATER TREATMENT PLANT
WHITE TRUST VINEYARD ACCOMODATION

Thank you for the opportunity to provide a cost estimate and proposal for the above site. The team at Innoflow Technologies is committed to providing a wastewater management system that is most appropriate to the economic, environmental and regulatory constraints for this project.

Innoflow Technologies Ltd has considerable experience in the design, building and operation of wastewater systems for projects such as this. We can provide a full turnkey solution to the wastewater needs for this development.

Our parent company in the USA, Orenco Systems Incorporated (OSI) has over 25 years experience in wastewater management. They have pioneered many innovative technologies and are now recognised internationally as the world's foremost experts in the area of onsite and small community wastewater management systems. Over the last nine years Innoflow Technologies Ltd has enjoyed the privilege of being associated with this company as their sole distributor for Australasia. During this time we have been able to emulate OSI's considerable successes, with the installation and operation of hundreds of wastewater treatment and reuse systems throughout New Zealand, Australia and the Pacific Islands.

The wastewater management scheme proposed by Innoflow combines a holistic approach encompassing on-site primary treatment and solids retention, centralised treatment and land application of treated effluent. The design of the on-site treatment and community collection and reticulation relies on watertight components and construction techniques and as such no stormwater infiltration is allowed for in our design. In addition peak flow rates are carefully controlled and flow modulated to avoid overloading the treatment system during high season usage.

Depending on the flows of the various areas it may be beneficial to have multiple primary tanks around the development with the primary treated effluent then being conveyed to the treatment plant, either by gravity or pumped if required. This proposal only includes 2 x 27 m^3 primary tanks at the plant.

The proposed concept and treatment plants are outlined in the following proposal and will contain central primary tanks (advanced septic tanks), a recirculation tank, and an AdvanTex® recirculating textile packed bed reactor (rtPBR). Final disposal of the effluent will occur onsite in LPED Trenches.

MARLBOROUGH DISTRICT COUNCIL
PO BOX 443
BLENHEIM 7240
NEW ZEALAND

TELEPHONE (0064) 3 520 7400
FACSIMILE (0064) 3 520 7496
EMAIL mdc@marlborough.govt.nz
WEB www.marlborough.govt.nz

MARLBOROUGH DISTRICT COUNCIL

File Ref: U071227

Case Officer: Emma Richardson

ISO 9002
Form Ref CI 751

18/2/2008

S92 RMA 1991
Acceptance letter

COPY

Gilbert Haymes & Associates Limited
PO Box 380
Blenheim 7240

Dear Mr Haymes,

Request for Further Information Pursuant to s92 of the RMA 1991 - U071227 - White Trust - 3043 State Highway 1 St Andrews

Further to previous requests for further information made pursuant to section 92 of the Act in relation to Resource Consent Application U0712227, please supply the following further information:

- *A site management strategy, particularly with regard to control of activity, noise, rubbish, lighting, vehicle movements and parking.*
- *Evidence that the facility can operate within the plan standards for permitted water take. i.e. 15m^3 per day.*

The above information has been requested pursuant to section 92 of the Act. Section 92A of the RMA 1991 requires you, to within 15 days, take one of the following options:

1. Provide the information, or
2. Advise in writing that you agree to provide the information, or
3. Advise in writing that you refuse to provide the information.

I look forward to receiving the information requested above.

Please do not hesitate to contact me if you have any questions or concerns regarding the matters identified above.

Yours faithfully

Emma Richardson
RESOURCE MANAGEMENT OFFICER

MARLBOROUGH DISTRICT COUNCIL
PO BOX 443
BLENHEIM 7240
NEW ZEALAND

TELEPHONE (0064) 3 520 7400
FACSIMILE (0064) 3 520 7496
EMAIL mdc@marlborough.govt.nz
WEB www.marlborough.govt.nz

MARLBOROUGH DISTRICT COUNCIL

File Ref: U071227

Case Officer: Emma Richardson

ISO 9002
Form Ref CI 751

14/2/2008

S92 RMA 1991
Acceptance letter

COPY

Gilbert Haymes & Associates Limited
PO Box 380
Blenheim 7240

Dear Mr Haymes,

Request for Further Information Pursuant to s92 of the RMA 1991 - U071227 - White Trust - 3043 State Highway 1 St Andrews

I am currently assessing your resource consent application on behalf of White Trust to establish a Worker Accommodation Facility for 200 people, located at 3043 State Highway 1, St Andrews, Blenheim. While I have not yet completed my assessment, by way of mitigation it seems appropriate that landscaping buffers be created around the development. In order for these buffers to be effective, I recommend they be 8m in width along the northern and southern site boundaries, and 10m in width along the Road Reserve Boundary.

Pursuant to section 92 please supply:

1) An amended Site Plan set to a scale of 1:500, showing the landscaping buffers, the distance of building set back to the northern, southern and western boundaries, and the set back distance from buildings to the Council Stop Bank.

2) An amended Aborist's Plan, to a scale of 1:500 prepared by David James Tree Services, which accurately shows the location of trees in relation to both the Stop Banks located on site.

3) A Landscape Plan superimposed over the Site/Development Plan, which shows which trees are to be removed as a result of the development.

4) Please also advise Council whether the people staying in the facility will be tied in to minimum/maximum length of stay duration?

The above information has been requested pursuant to section 92 of the Act, but should be considered in conjunction to the Waste Water Disposal information requested in my previous letter dated 21st January 2008. Further, in relation to Waste Water Disposal, as queried in my first letter to you on the 14th November 2007, I advise that Council Standards for On-Site Domestic Waste Water do not permit vehicle movement over an effluent disposal bed. This will need to be factored into the pending Waste Water Disposal Design Report, which is to be submitted to Council.

Section 92A of the RMA 1991 requires you, to within 15 days, take one of the following options:

1. Provide the information, or

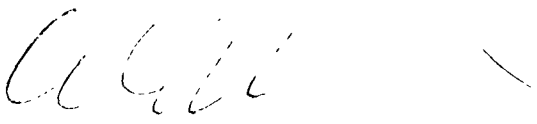
2. Advise in writing that you agree to provide the information, or

3. Advise in writing that you refuse to provide the information.

I look forward to receiving the information requested above.

Please do not hesitate to contact me if you have any questions or concerns regarding the matters identified above.

Yours faithfully



Emma Richardson
RESOURCE MANAGEMENT OFFICER

\\eri....O:\TemplatesForms\RegQualitySystems\1ResourceMgmtControlChapter\s88AcceptanceSQL.doc Saved 09/03/2007 13:19:00

DAVID JAMES TREE SERVICES

RECEIVED
23 JAN 2008
MARLBOROUGH DISTRICT COUNCIL

David James Tree Services Limited
157 Alabama Road
Blenheim
New Zealand
Office Ph. (03) 577 5430
Fax (03) 577 5369
Email: DJTS@xtra.co.nz

Qualified Arborists | Tree Care / Landscaping

21 January 2008

Mr G. Haymes
Gilbert Haymes & Associates Ltd
P.O. Box 380
Blenheim.

Dear Graham,

Report on Trees at Duncannon Motor Camp.

As per your request I have undertaken a ground based inspection of the trees throughout this property.

The property is well treed with some large mature specimens which are a significant element in the landscape of both this site and of the Riverlands locality generally.

At the entrance on the south side of the drive there is a group of five large gum trees [*Eucalyptus globulus*] two of which are a significant size and along with several similar size Macrocarpas[*Cupressus macrocarpa*] further along the boundary contribute to the larger landscape of the Riverlands area.

There are two groups of large mature Walnut trees [*Juglans regia*]. A group of six along the west boundary fence of the two storey dwelling and, a group of ten along the stop bank east of the buildings both are significant elements of the landscape.

All of these trees are relatively common in Marlborough and are often associated with developments of the period when Duncannon was built.

There is a mature native Black Beech [*Nothofagus solandri*] on the boundary fence south of the two storey dwelling. This tree would be notable as a possible remnant of the original vegetation except that it is currently in poor health with a substantial amount of small branch dieback. It is likely that this tree will continue to decline in future and could eventually pose a risk to people and property.

In the paddock area next to the shed to the east of the two storey dwelling is a mature specimen Golden Poplar [*Populus* sp. possibly serotinia 'aurea']. This is not a species common to either the area or even the region. This tree has shed a large limb in the past leaving a wound at approximately 8m. The tree shows no sign of poor health, form or structure that would indicate likelihood of future branch failures of this kind. Other species of

Poplars in the Marlborough region have shown susceptibility to similar damage or loss of large limbs.

There are a number of smaller trees of varying maturity and species that also contribute to the woodland feel of the property. These would all fit the A1 category for retention. (see explanatory notes appendix X)

With the exception of a few individuals all of the trees are in reasonable health and have good vigour. Attached is a schedule of the trees significant to the site with more details.
Tree numbering is as per the attached site plan.

I have used the categories as outlined in appendix X to indicate suitability of trees for retention.

Development as indicated on the site plan raises some issues in terms of potential damage to and effects on future tree health. Where construction activity will interfere with root zones of trees particularly there will be inevitable adverse effects on future tree health. These effects may not be manifest immediately but will occur over the subsequent 10 to 15 year period. Physical damage to the above ground parts of trees is more obvious with consequent effects on appearance and visual appeal.

Where trees are to be retained they will need to be protected during any site works. This is best achieved by fencing around each tree at the canopy drip line. Exclusion of pedestrian and vehicle traffic around root zones of trees will ensure their future health and prevent accidental damage and contamination.

Yours sincerely,

pp.

Tim Lovejoy.

No	Tree species	Location	Height	Diameter at breast height (1.4m)	Health	Form	Comments	Priority.
1	Eucalyptus globulus	At entrance S. of drive			Good	Multistemmed	This tree is not a good specimen	Z11
2	Eucalyptus globulus	South boundary	32m	1.97m	Good	Good	This tree is significant to the site and the locality	A1
3	Eucalyptus globulus	South boundary			Good	Good		A1
4	Eucalyptus globulus	South boundary			Poor Some dieback	O K.	This tree is a poor specimen. Suppressed by its larger neighbour and unlikely to improve its appearance.	Z11
5	Eucalyptus globulus	South boundary	38m	2.07m	Good	Good	This tree is significant to the site and the locality	A1
6	Cupressus macrocarpa	South boundary in front of cabins			Good	O K.	This group of trees contributes to the park like character of the property	A1
7	Cupressus macrocarpa	South boundary in front of cabins			Good	O.K.	This group of trees contributes to the park like character of the property	A1
8	Cupressus macrocarpa	South boundary in front of cabins			Good	O.K.	This group of trees contributes to the park like character of the property	A1
9	Cupressus macrocarpa	South boundary in front of cabins			Good	O K.	This group of trees contributes to the park like character of the property	A1
10	Cupressus macrocarpa	South boundary in front of cabins			Good	O.K.	This group of trees contributes to the park like character of the property	A1
11	Cupressus macrocarpa	South boundary in front of cabins			Good	O.K.	This group of trees contributes to the park like character of the property	A1
12	Cupressus macrocarpa	South boundary on slope down to stop bank			Good	O.K.	Two trees together	A1
13	Cupressus macrocarpa	South boundary on slope down to stop bank			Good	O.K.		A1
14	Cupressus macrocarpa	South boundary between stop bank and river			Good	O.K.	This single tree is a feature of the riverside camping area	A1
15	Quercus palustris	Camping area west of stop bank			Good	Good	Semi-mature specimen significant for its succession value	A1
16	Fraxinus excelsior	Camping area west of stop bank			Good	Good	Semi-mature specimen significant for its succession value	A1
17	Betula sp.	Camping area west of stop bank			Good	Good	Semi-mature specimen significant for its succession value	A1
18	No Tree	—						
19	No Tree	—						

No	Tree species	Location	Height	Diameter at breast height (1.4m)	Health	Form	Comments	Priority.
20	Juglans regia	Top of stop bank			Good	O.K. multistemmed	Group of ten mature Walnut trees along the stop bank providing a significant element of the park-like character of the site	A1
21	Juglans regia	Top of stop bank			Good	O.K. multistemmed		A1
22	Juglans regia	Top of stop bank			Poor severe dieback	O.K. multistemmed	This tree poses a risk to people and property from potential failure of major dead limbs and should be removed	Z4
23	Juglans regia	Top of stop bank			Good	O K. multistemmed		A1
24	Juglans regia	Top of stop bank	17m		O.K. some major deadwood	O.K. multistemmed	This tree has some large dead branches that should be pruned out to reduce risk to people and property	A2
25	Juglans regia	Top of stop bank			Good	O K. multistemmed	Large stem on the E. side of the tree has been removed in the past leaving a wound that will decay *and form a cavity With continued good health and* vigour the risks associated are low	A2
26	Juglans regia	Top of stop bank			Good	O K. multistemmed		A1
28	Juglans regia	Top of stop bank			Good	O.K. multistemmed		A1
29	Juglans regia	Top of stop bank	22.6m		Good	O.K. multistemmed	Large stem on the S E. side of the tree has been removed in the past leaving a wound that will decay and form a cavity With continued good health and vigour the risks associated are low	A!
30	Populus sp [Possibly P serotinia 'aurea']	Paddock area east of house	25 5m	1 26m	Good	Good	This mature specimen tree is significant for its rarity There are no others of this species or size in the District.	A3
31	Nothofagus solandri	Garden area south of house			Extensive small branch dieback	O K		Z11
32	Juglans regia	West boundary of garden area around house			Good	O.K.	This group of mature Walnut trees also makes a significant contribution to the park-like character of the site	A!
33	Juglans regia				Good	O K.		A!
34	Juglans regia				Good	O.K.		A!
35	Juglans regia		17m		Good	O K.		A!
36	Juglans regia				Good	O.K.		A!
37	Juglans regia	South boundary of garden area around house			Good	O K.		A!
38	*Fraxinus excelsior*	Camping area west of house			Good	Good	Semi-mature specimen significant for its succession value	A!
39	Betula sp.	Camping area west of house			Good	Good	Semi-mature specimen significant for its succession value	A!

No	Tree species	Location	Height	Diameter at breast height (1.4m)	Health	Form	Comments	Priority.
40	Liquidambar styraciflua	Camping area west of house			Good	Good	Semi-mature specimen significant for its succession value	A1

Appendix X
Tree schedule and explanatory notes

TreeAZ retention categories (Version 3.08)

Z **Trees not worthy of being a material constraint:** Not suitable for retention for more than 10 years

(Small, young or regularly pruned trees/hedges that could be replaced like for like)

Z1	Small or young
Z2	Formal hedges and trees regularly pruned to restrict size

(Trees that would be removed within 10 years because they are a high risk)

Z3	Dead, dying, diseased or declining
Z4	Severe damage/structural defects that cannot be properly addressed by remedial care including cavities, decay, included bark, wounds and excessively unbalanced
Z5	Present or future instability because of poor anchorage or recently increased exposure

(Trees that need severe pruning or removal within 10 years for good management reasons)

Z6	Severe damage/structural defects that can be temporarily addressed by remedial care including cavities, decay, included bark, wounds and excessively unbalanced
Z7	Overgrown/unmanaged hedge that is beyond recovery by remedial pruning
Z8	Causing damage to existing structures
Z9	Causing unreasonable inconvenience to existing properties
Z10	Adversely interfering with better trees
Z11	Poor trees occupying space for potentially better new trees
Z12	Unacceptably expensive to retain

A **Trees worthy of being a material constraint:** Suitable for retention for more than 10 years (**Note:** This excludes small and young trees)

A1	No significant defects and could be retained without remedial care
A2	Minor defects that could be addressed by limited remedial care or work to adjacent trees
A3	Special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to retain for more than 10 years
A4	Trees that may have legislative protection for ecological reasons (Advisory and will require specialist investigation)

NOTE: Trees that are very good examples of category A can be noted as AA and trees that are the worst examples of category Z can be noted as ZZ summarised as follows:-

AA **Most suitable for retention**
A **Suitable for retention**
Z **Not particularly suitable for retention**
ZZ **Unsuitable for retention**