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WASTEWATER MANAGEMENT REPORT

H & C KINGI
4703 STATE HIGHWAY 6, CANVASTOWN

Our Ref: 24960.1
Date: July 2012

davidson group

PROJECT PLANNERS
RESOURCE MANAGERS
CIVIL & STRUCTURAL ENGINEERS
BUILDING DESIGNERS
ENVIRONMENTAL ENGINEERS

Our Ref: 24960.1

2 July 2012

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H & C KINGI
4703 STATE HIGHWAY 6, CANVASTOWN

Contents

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1 INTRODUCTION

Our clients require a new on-site wastewater management system to serve a proposed three bedroomed house.

We have been engaged to assess the site and confirm appropriate wastewater system details for the sustainable discharge of treated domestic wastewater. Our investigation included;

- a general visual inspection;
- excavation of test pits to evaluate the soil properties;
- an assessment of the potential environmental effects.

2 SITE DESCRIPTION

The property (Pt Lot 1 and Lot 2 DP 6322, and Sec 2 SO 6888) is located approximately 2.9km east of Canvastown, on the south side of State Highway 6. The slopes are generally north facing, moderately steep and covered in regenerating scrub. A broad spur extends in a north south direction across the western third of the site. Two gullies are present either side of the ridge.

3 DESIGN SUMMARY

• Soil Description	Silty clay
• Ribbon Length	> 50 mm
• Soil Category	5
• No. of Bedrooms	3
• No. of People	6 maximum
• Water Supply	Creek
• Wastewater Flow Allowance	200 L / person / day
• Daily Load	1,200 L
• Land Application Details	
◦ Method	Pump to drip irrigation
◦ Design Irrigation Rate (DIR)	3.0 mm / day
◦ Area (min)	400 m²
• Treatment Type	Secondary treatment plant

4 INVESTIGATION

The risk of the wastewater discharge initiating instability on site is considered to be low. The site is not identified as being in the Marlborough Sounds Resource Management Plan as being unstable. In addition the slopes on site show no signs of instability.

An investigation was carried out in accordance with ASNZS 1547:2012 "On-Site Domestic Wastewater Management" and the Marlborough District Council "Guidelines for New On-Site Wastewater Management Systems". Refer to the site notes in the Appendix.

The moderately sloping face, west of where the proposed dwelling is to be constructed, is clear of surface water and suitable for a wastewater land application system. Alternatively, large areas are available for pumped types of distribution. The exposure to the sun and wind is good and the vegetation is scrub, providing good evapotranspiration assistance.

Test pits were excavated by spade and logged. Refer to the site notes and logs in the Appendix.

The soil profile consisted of a 150mm to 250mm thick layer of brown, moist, organic rich clayey topsoil overlying a light brown, firm, silty clay. Weathered bedrock was seen in test pit TP2 at a depth of 1.0 m. The weathered bedrock consisted of a medium to coarse grained, micaceous rich, weakly metamorphosed sandstone, which represents the Marlborough Schist. The maximum depth of the test pits was 2.5 m.

Ribbon length tests were undertaken on samples from the silty clay soil horizon. The soil had a ribbon length greater than 50 mm. The ribbon lengths, smooth and silky nature and rate of drying of the soil indicate that the soil is a Category 5 silty clay. A 100% reserve area is available.

5 DESIGN

5.1 General

Any land application system should be kept shallow to make maximum benefit of evapotranspiration and biological activity in the upper soil. The system should also be kept as simple as is practically possible to keep costs and maintenance to a minimum.

In this instance, we consider that there will be no adverse effects on the environment and therefore no detailed descriptions are necessary. Nevertheless, we have assessed the alternative methods available and have recommended a system considered most appropriate for this site.

5.2 Loading

It is proposed to construct a three bedroomed dwelling with a creek water supply.

For design purposes, the design wastewater loading is therefore 6 persons at 200 L / person / day i.e. 1200 litres / day.

The wastewater allowance can be further reduced using water saving features within the dwelling but their enforceability is difficult and they are not generally recommended for design purposes.

5.3 Land Application System

5.3.1 Assessment of Land Application Options

The following options were reviewed:

a) Primary Treatment to Trenches

This is the most basic system and uses the pipe work and aggregate in the trench to evenly distribute effluent onto the surface of the underlying soil which then provides further treatment before being completely assimilated.

However, we consider that the length of trenches required will be excessive / not fit within the area available.

b) Secondary Treatment to Bed

This system has the advantage of reducing the area requirements. However, the slope precludes the practical construction of this system.

c) Primary Treatment to Low Pressure Effluent Distribution (LPED)

The principle of the Low Pressure Distribution System (LPED) is to discharge primary effluent through a small diameter pipe nestled within a larger pipe to evenly distribute into the topsoil for evapotranspiration uptake by the vegetation covering the area.

An LPED system was considered using a Design Irrigation Rate (DIR) of 2.5 mm / day. An area of 480 m² or a line length of 480 m is required. This is larger than of the area available west of the house site and the shape of the area available does not suit the preferred layout of an LPED field.

The area south of the proposed building may be suitable but requires bigger pumping demands, so is also not preferred.

d) Secondary Treatment to Drip Irrigation

The principle of the drip irrigation system is irrigation into the topsoil at a low application rate for evapotranspiration uptake by the vegetation covering the area. Use of drip irrigation will require secondary treatment.

The area proposed is on the moderately sloping area to the west of the proposed dwelling and is flexible enough to make use of the area available.

Overall, secondary treatment to Drip Irrigation is considered to be the Best Practicable Option.

5.3.2 Detailed Design of Land Application System

The drawings show the proposed wastewater application area on the south facing slope below the building site.

For Category 5 soil the Design Irrigation Rate (DIR) is 3.0 mm per day. The required irrigation field area is therefore 400 m². The best distribution option is the use of pressure-compensating drip irrigation laid into the undergrowth of the bushclad areas. We would recommend that the driplines are laid at 1.0 m maximum spacings, around the site on an even contour.

The final location and layout of the effluent field must be confirmed by the Designer at the time of installation to ensure the best possible siting of the field.

5.4 Distribution

It is proposed to distribute the treated effluent to the land application field by pump dose from within the treatment plant.

5.5 Treatment

Secondary treatment systems include aeration, media / textile filters, wetlands, composting or vermiculture. We encourage the use of passive media technologies as these are better at handling variable inflows.

The treatment system has not been selected at this time. Technical data, operation and maintenance documents shall be provided to Council at the Building Consent stage.

5.6 Installation, Operation and Maintenance

Appropriate operation and maintenance of the overall wastewater system is paramount to its performance and a service contract must be in place at the time of commissioning and remain so with the approved service agent. Records of maintenance work should be made available for Council inspection and records.

Davidson Group Ltd has carried out a site investigation and design in accordance with current codes and modern practice. However, the treatment and land application systems are biological (living) processes and modifications may have to be undertaken to the treatment and/or land application system in some circumstances, such as when there is/are;

(a) An increase in design load
(b) Disposal of inappropriate substances to the septic system
(c) Poor maintenance
(d) Poor workmanship or departure from construction drawings.

We strongly recommend that the homeowner and installer read and note the information included in the Appendix and shown on the drawings to ensure ongoing good practice and maintenance.

Note that inspections by the Designer are required at the time of setting out of the new system and at completion at which time a commissioning test using fresh water, prior to pipe work being covered, will be carried out.

6 ASSESSMENT OF ENVIRONMENTAL EFFECTS

The construction of a new wastewater system within the Marlborough Sounds Resource Management Plan area is a *Limited* Discretionary Activity.

Any potential adverse effects on the environment will be mitigated by the following ;

(a) The discharge will be at least 20 m from the nearest waterbody (the ephemeral watercourse) and 600 mm above water tables. The land application area is not within a Natural Hazard Overlay.

(b) There are no other properties directly down slope to the road, and the closest other (potential) land application system will be at least 60 m away.

(c) The separation distances and the proposed secondary treatment will ensure that the discharge will not adversely affect the water quality in the creek.

(d) The land is moderately sloping and there are no instability issues. The low application rate and pressure dosed distribution will ensure that surface instability will not be instigated.

(e) The proposed on-site system complies with current Council investigation, design and management guidelines.

(f) Assessment of alternatives have been considered.

We consider that, given appropriate installation, operation and maintenance, any potential adverse effects will be less than minor.

7 REFERENCES

7.1 Crites, R and Tchobanoglous, A (1998). 'Small and Decentralized Wastewater Management Systems'.

7.2 ARC Environment, Technical Paper No. 58, Third Edition 'On-Site Wastewater Disposal from Households and Institutions'.

7.3 A.S./N.Z.S. 1547:2012 'On-Site Domestic Wastewater Management'.

7.4 MDC (11 July 2005) 'Guidelines for New On-Site Wastewater Management Systems'.

7.5 Marlborough Sounds Resource Management Plan.

7.6 Centre for Environment Training 'On-Site Wastewater Management Training Course', Christchurch 2001.

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R W Davis

BMH:RM

APPENDIX

A1. Site Investigation
- Field Assessment Report
- Test Pit Logs

A2. Owner & Installer Guidelines

A3. Construction Monitoring Schedule

A4. Drawing Numbers 24960.1 sheets;
C1 Locality and Site Plans
C2 Plan

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ON SITE WASTEWATER MANAGEMENT
FIELD ASSESSMENT REPORT

JOB NAME: H & C KINGI **JOB NO.** 24960.1

LOCATION: 4703 State Highway 6, CANVASTOWN **DATE:** 22 June 2012

REFERENCE: **1.** ARC TP#58
2. AS/NZS 1547:2012 'On Site Domestic Wastewater Management'

1.	Percolation Rate (if available)		N/A
2.	Site Exposure	- to sun - to wind	Good Good
3.	Topsoil Depth		150 to 250mm
4.	Soil Description:		Light Brown, moist, firm, silty clay
5.	Soil Category (1 - 6)		5
6.	Coarse Fragments - size/abundance		None
7.	Ribbon Length		> 50 mm
8.	Soil Structure (Pedal Content)		High
9.	Performance of existing systems nearby		Unknown
10.	Nearby water bodies - Separation Distance		Ephemeral watercourse - 20m, Creek – 60m
11.	Nearby wells		N/A
12.	Intended water supply		Creek
13.	Runoff to be controlled		No
14.	Ground water to be controlled		No
15.	Any stability considerations, If yes, comment.		No
16.	Depth to water table		>2.0 m
17.	Vegetation cover	- Existing - Proposed	Scrub and pine trees Scrub
18.	Gravity head to proposed field?		Variable
19.	Reserve areas available?		Yes

20. Other Comments

Drip irrigation appropriate.

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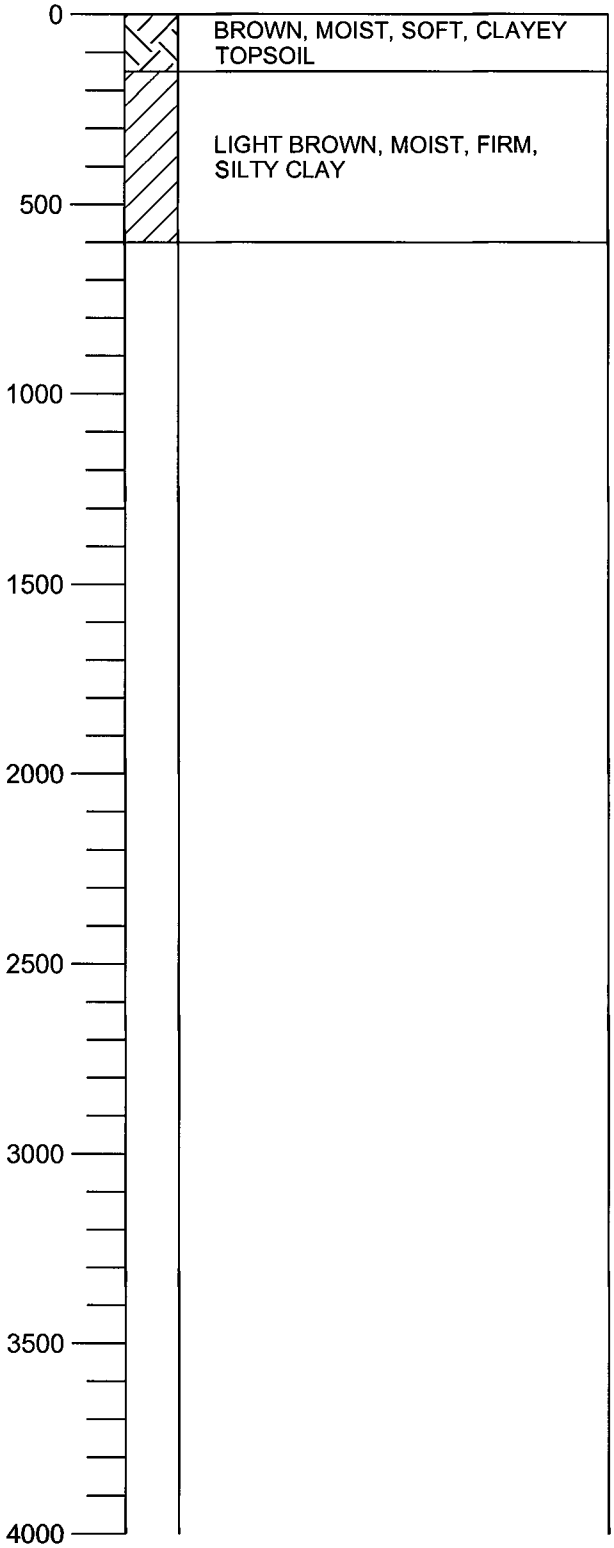
H & C KINGI
4703 STATE HIGHWAY 6, CANVASTOWN
SECOND DWELLING PROJECT

test pit results

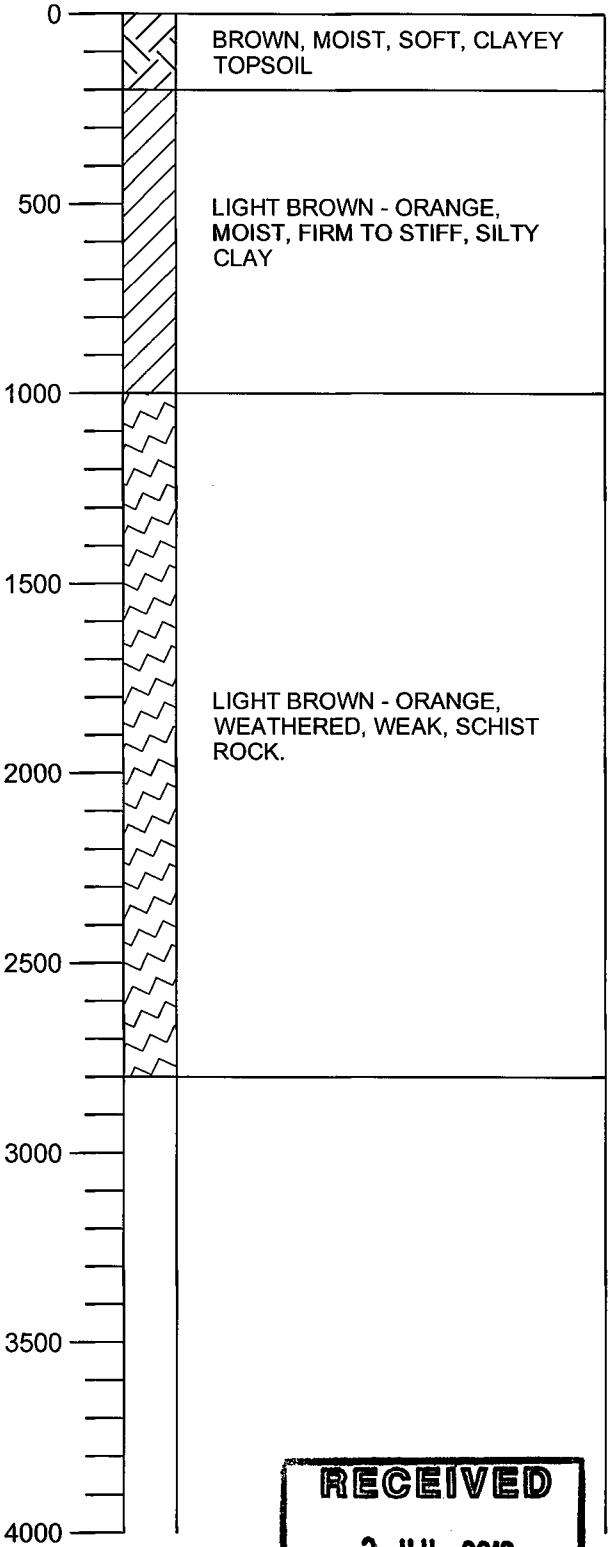
Job No 24960.1
Sheet No 2
Name BH
Date 22/06/2012

EXCAVATION METHOD SPADE / EXCAVATOR

TEST PIT 1



TEST PIT 2 - (Bank Cutting)



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HOW TO GET THE BEST FROM YOUR ON-SITE WASTEWATER MANAGEMENT SYSTEM

Helpful Information for Homeowners/Occupiers

1. GOOD HOUSEHOLD PRACTICES

(a) Reduce solids disposal to treatment tanks as much as possible including food scraps, fats, grease etc. Scrape all dishes before washing and do not install a waste disposal unit unless the wastewater system has been specifically designed to carry the extra load.

(b) Do not put any of the following down sinks, drains or the toilet.

- **(i)** Oil/grease from e.g. a deep fryer;
- **(ii)** Stormwater and any drainage other than wastewater generated in the house;
- **(iii)** Petrol, oil and other flammable/explosive substances;
- **(iv)** Household, garden, garage and workshop chemicals (e.g. pesticides, paint cleaners, photographic chemicals, motor oil and trade waste);
- **(v)** Disposable nappies and sanitary napkins.

(c) In order to keep the bacteria working in the tank and in the land application area:

- **(i)** Use biodegradable soaps;
- **(ii)** Use a low-phosphorus detergent;
- **(iii)** Use a low-sodium detergent in the dispersive soil areas;
- **(iv)** Use detergents in the recommended quantities;
- **(v)** Do not use powerful bleaches, whiteners, nappy soakers, spot removers and disinfectants including cold water washing products.
- **(vi)** Do not put chemicals or paint down the drain.

(d) Conserve water. Less water means a lower load on the treatment system and land application area, with ensuing improved and more reliable performance. Conservation measures include:

- **(i)** Installation of water-conservation fittings such as low water use toilets, spray taps and water saving automatic washing machines;
- **(ii)** Taking showers instead of baths;

(iii) Only putting the dishwasher or washing machine on when there is a full load.

(e) Space washing machine and dishwasher use out to avoid overloading the wastewater system. Try not to do a large amount of washing in any one day and avoid running the washing machine and dishwasher at the same time.

(f) For the physical protection of treatment and land application systems:

(i) The treatment unit must be protected from vehicles;

(ii) Pedestrian traffic routes should not cross effluent field areas;

(iii) No vehicles or heavy stock should be allowed on effluent fields;

(iv) Deep rooting trees or shrubs should not be grown over absorption trenches or beds.

2. MAINTENANCE

(a) General

The appropriate maintenance of your treatment and land application systems will be the key to their effective and reliable performance. Please contact a drainlayer or Council if you are unsure about anything or require further advice.

(b) Septic Tanks

Any septic tank (primary wastewater treatment unit) will need to:

(i) Be cleaned out regularly i.e. every three to five years or when scum and sludge occupy two thirds of the volume of the tank (or first stage of a two-stage system). All scum, sludge and septage material must be disposed of in an approved manner. Pump chambers should be cleaned out at the same time if necessary;

(ii) Have grease traps cleaned out regularly (typically three monthly or as required);

(iii) Keep the access cover of the septic tank exposed;

(iv) Have any outlet filter inspected and cleaned, normally at the same time as septic tank cleaning. Remove the cartridge and rinse off with a garden hose, being careful to rinse all septage material back into the tank. It is not necessary that the cartridge be cleaned "spotless". The biomass growing on the filter aids in the pre-treatment process and should be left on the cartridge.

(c) Secondary Treatment Systems

Improved treatment systems, such as aerated plants or media systems, require specialist maintenance and must be looked after under a maintenance contract. Owners should ensure that they are aware of the manufacturers/suppliers recommended maintenance intervals and that a contract is in place for routine checks of mechanical components.

These systems will typically have a primary treatment stage which should be treated as in (b) above.

(d) Effluent Field

Reliable performance from your effluent field (including shallow trenches or beds, drip or LPED irrigation fields) will be aided by regular attention including one or more of the following depending on the type of system:

(i) Keep any surface water diversion drains upslope of and around the land application area clear to reduce absorption of rainwater into trenches or beds;

(ii) Evapotranspiration and irrigation areas should have their vegetation maintained to ensure that these areas take up nutrients with maximum efficiency;

(iii) Ensure pumps, alarms and sequencing valves are operating correctly;

(iv) Clean disc filters or filter screens on irrigation-dosing equipment periodically by rinsing back into the primary wastewater treatment unit;

(v) Irrigation systems which discharge wastewater that has only been treated by a septic tank and filter (i.e. LPED systems), must be flushed through with clean water before and after any significant period of non-use.

(vi) Regular maintenance of the treatment system (as per manufacturers recommendations), especially for aerated and media-type systems.

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GUIDELINES FOR INSTALLERS OF ON-SITE DOMESTIC WASTEWATER MANAGEMENT SYSTEMS

References

A.S./N.Z.S. 1546.1:2008 'On-Site Domestic Wastewater Treatment Units, Part 1:Septic Tanks'
A.S./N.Z.S. 1547:2000 'On-Site Wastewater Management'

1. GENERAL

(a) All products and construction shall be in accordance with the relevant standards and in general the best trade practices shall prevail. If there are any questions about any aspect of the work, please contact Council in the first instance.

(b) The Contractor shall act to protect the health and safety of staff and private persons at all times.

(c) The Contractor must be aware of the inspection requirements of Council and/or the Engineer and the need to provide As-Built locations of the treatment and land application systems to Council and the Owner.

(d) The Contractor should also educate the Owner about the functioning of their system, especially the maintenance requirements, and where appropriate put in place a maintenance contract for systems which rely on mechanical action in order to function properly.

2. LOCATION OF TREATMENT AND DISTRIBUTION SYSTEMS AND LAND APPLICATION AREAS

(a) All tanks and the land application area shall be located clear of structures to avoid the undermining of foundations. In general, a minimum clearance of 3.0 metres should be adequate but if in doubt check with Council or an Engineer.

(b) The Contractor must be aware of the required separation distances of tanks and/or the land application area to surface water (ponds, water courses and drainage paths), wells and/or boundaries.

(c) Treatment systems should be sited with consideration for access by desludging trucks.

3. GOOD CONSTRUCTION TECHNIQUE

(a) Treatment and Distribution Systems

(i) When working with existing systems or carrying out maintenance tasks, measures shall be in place to ensure staff are adequately protected from contact with wastewater.

(ii) All tanks located in areas where high seasonal groundwater levels are known to occur shall be weighted down or provided with anchorage in accordance with clause 3.2.2 of A.S./N.Z.S. 1546.1:2008.

(iii) The Contractor shall allow to carry out any treated effluent testing required by Council. Samples should be taken once the system has been in operation for approximately three months. In a holiday home situation, testing should be done in January.

(iv) All pump chambers shall be vented. The commissioning of pumped distribution systems shall consist of at least the following:

- A check of pump out and emergency storage volumes (reserve capacity equivalent to the peak daily flow should be provided).
- Three drawdown tests.
- Testing of the operation of controls and alarms.
- Checking of uniform flow throughout any pressurised distribution network prior to covering over.

(b) **Land Application Area**

The following excavation techniques shall be observed so as to minimise the risk of damage to the soil.

(i) Plan to excavate only when the weather is fine. Pudding, where washed clay settles on the base of the trench to form a relatively impermeable layer, must be avoided.

(ii) Avoid excavation when the soil has a moisture content above the plastic limit. This can be tested by seeing if the soil forms a "wire" when rolled between the palms.

(iii) During wet seasons or when construction cannot be delayed until the weather becomes fine, smeared soil (smooth) surfaces should be raked to reinstate a more natural soil surface taking care to use fine tines and only at the surface.

(iv) When excavating by machine, fit the bucket with "raker teeth" if possible, and excavate in small "bites" to minimise compaction.

(v) Avoid compaction by keeping people off the finished trench or bed floor.

In particular for trenches and beds:

(vi) If rain is forecast, cover any open trenches to protect them from rain damage.

(vii) Excavate perpendicular to the line of fall or parallel to the contour levels.

(viii) Ensure that the inverts are horizontal or sloped at not more than 1 in 200.

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Our Ref: 24960.1

2 July 2012

CONSTRUCTION MONITORING SCHEDULE

OWNER: H & C Kingi

PROJECT: Wastewater System

LOCATION: 4703 State Highway 6, Canvastown

	Inspections Proposed	Estimated Number
1.	Joint site visit with Drainlayer prior to work commencing.	1
2.	Commissioning of system.	1

Notes

1. The Builder/Contractor is to keep the Engineer informed of progress and in particular of the dates that the work will be ready for the inspections above to be made. At least 24 hours notice shall be given to the Engineer.

2. Additional inspections may well be required to satisfy ourselves that the work is in accordance with the documentation or if rework needs to be undertaken.

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