DavidsonPartnersLtd

Structural Engineering
Civil Engineering
Building Design
Project Management

Practising in association with Ayson and Partners, Registered Surveyors

Our Ref: 23042

1 October 2004

SUBMISSION IN SUPPORT OF A RESOURCE CONSENT APPLICATION

ON SITE WASTEWATER MANAGEMENT
R G CAREW, LOT 7 DP 3395
THE PINES, ENDEAVOUR INLET

1. INTRODUCTION

Mr Carew proposes to construct a new holiday home within 'The Pines' residential area of Endeavour Inlet. The property has an existing sleepout which is to be retained.

The small allotments of 'The Pines' residential area limit the area available for land application of treated wastewater on individual sites. Further, the small stream running past the southern boundary of Mr Carew's property means there are no land application areas available on the site with a 30 m clearance to the stream. Drawing number 23042 sheets R1 and R2 refer.

A discharge permit is therefore requested for the land application of treated wastewater within 30 m of a stream, and within 50 m of existing effluent fields.

Davidson Partners Ltd was engaged to design an appropriate wastewater management system for the proposed development. We have carried out a site inspection and soil assessment, reviewed other Davidson Partners Ltd designs in similar conditions and have recommended measures for the suitable management of domestic wastewater.

An Application for Building Consent has already been submitted for the proposed new dwelling.

2. WASTEWATER INVESTIGATION

A site investigation was carried out in accordance with AS/NZS 1547:2000 'On Site Domestic Wastewater Management' on 5 July 2004, the site notes of which are appended to this report.

The site has an elevated westerly aspect out to Endeavour Inlet, with good exposure to the wind. The exposure to the sun will be less due to the surrounding ranges on either side of the inlet. The property has a good stream water supply.

ACENZ

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Principals Stephen Sheat, BE, M.IPENZ, ~~REGD~~
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Ross Davis, BE, M.IPENZ, ~~REGD~~
~~Ron Melton, BE, M.IPENZ, REGD~~

The vegetation cover consists of regenerating native bush on moderate slopes of up to 30°. The soils are best described as yellow brown, moist, soft clay loam with some silty gravels. The soil was assessed to be Category 4.

Stereoscopic photos indicate the stream south of the property is well incised, with a steep profile and narrow catchment which is not as extensive as the surrounding streams. Geotech Consulting Ltd have recently inspected the site and confirmed its suitability for residential development.

3. WASTEWATER ASSESSMENT

There is the need to maximise the use of the site with regard to obtaining adequate area for the effluent field and keeping back from the small stream.

Land application by shallow subsurface drip irrigation will assist achieving this. For a Category 4 soil the Design Irrigation Rate (DIR) is 3.6 mm per day. The two bedroom dwelling plus sleepout can be considered as equivalent to a three bedroom house. For a design loading of 900 litres/day (five persons @ 180 litres/person/day), 250 m^2 of irrigation area is required.

Sheet R1 shows a proposed 250 m^2 effluent field using available areas of the site, right up to the boundaries, such that the separation distance to the stream is no less than 8.0 m. As the slopes above the stream are typically 25-30°, the vertical separation distance between the discharge area and waterway will be in the order of 4.0 m (minimum).

For reliable functioning of the dripline, robust secondary treatment of the wastewater is required. A further consideration for this site is the difficulty of access for installation of large single-unit systems. A 'passive' treatment system is required for intermittent use applications such as this; either a lightweight proprietary system or system that can be put together on site is required. Full details of the treatment and distribution system will be required at the Building Consent stage.

4. ASSESSMENT OF EFFECTS

As stated above the small size of the property means it is unavoidable that application areas will be located in close proximity to the stream and existing effluent fields.

The limitations of the site means that a conservative design is required to mitigate, as much as is reasonably practical, the potential effects. These mitigation measures include treating the wastewater to a secondary level, and application at a conservative rate via subsurface drip irrigation to well vegetated areas to maximise evapotranspiration.

The short, steep narrow catchment above the property is more likely to produce shallow rapid flows rather than high prolonged events. The drip irrigation field is located well above the stream invert, and is very unlikely to be inundated.

There could be potential for runoff to carry contaminants from the irrigation field to the stream, over long duration rainfall events. It is therefore essential the driplines be buried to provide subsurface application at a conservative rate to mitigate against possible contaminant runoff.

It is unavoidable that any new effluent field will be located within 50 m of an existing field. It is our opinion that a number of effluent fields in close proximity which have been engineered and constructed to the appropriate standard should have no cumulative effect and in fact have no more impact than a single large effluent field.

5. ADDITIONAL WORK

Davidson Partners Ltd has carried out a site investigation and design in accordance with current codes and modern practice. However, the treatment and disposal system is a biological (living) process and modifications may have to be undertaken to the treatment or disposal 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.

6. SUMMARY

The small size of the allotments in 'The Pines' residential area requires conservative design of wastewater systems to mitigate potential effects on the environment.

The wastewater management system detailed herein would consist of drip irrigation of secondary treated effluent to well vegetated areas. We consider the potential contaminant runoff can be mitigated by locating the drip irrigation field well above the stream invert and ensuring subsurface irrigation by burying the driplines at shallow depths.

7. REFERENCES

7.1 AS/NZS 1547:2000 'On-Site Wastewater Management'.

7.2 AS/NZS 1546:1998 'On-Site Domestic Wastewater Treatment Units, Part 1 : Septic Tanks.

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

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

7.5 Marlborough Sounds Resource Management Plan.

DAVIDSON PARTNERS LTD

R W Davis

KRP:RLM

APPENDIX

A1. On Site Wastewater Management Details

A1.1 Field Assessment Report

A2. Plan 22720 sheets;

R1 Site & Locality Plans
R2 Section

A3. Davidson Partners Ltd – 'How to Get the Best from your On-Site Wastewater Management System".

A4. Davidson Partners Ltd – 'Guidelines for Installers of On-Site Domestic Wastewater Management Systems'.

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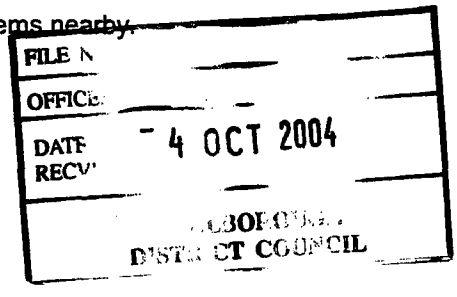
ON SITE WASTEWATER MANAGEMENT
FIELD ASSESSMENT REPORT

JOB NAME: R Carew **JOB NO.** 23042

LOCATION: The Pines **DATE:** 5 July 2004

REFERENCE: 1. ARC TP#58
2. AS/NZS 1547:2000 'On Site Domestic Wastewater Management'

1.	Percolation Rate (if available).		-
2.	Site Exposure	- to sun	Moderate
		- to wind	High
3.	Topsoil Depth.		100 mm
4.	Soil Description (colour, moisture, firmness, type).		Yellow brown, moist, soft, clay loam
5.	Soil Category (1 - 6)		4
6.	Coarse Fragments	- size/abundance	5-150 mm / 5-10%
7.	Ribbon Length		40 mm
8.	Soil Structure (Pedal Content)		High
9.	Performance of existing systems nearby.		Unknown
	- Type, septic and trench/pit		
10.	Nearby water bodies.		Yes
	- Separation Distance		< 30 m (see plans)
11.	Nearby wells.		No
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.		N/A
17.	Vegetation cover	- Existing	Yes
		- Type	Whitey woods & scrub
		- Proposed	Whitey woods & scrub
18.	Gravity head to proposed disposal field location.		Pump
19.	Reserve areas available?		No



20. Other Comments

Two bedroom house and sleepout. Small section with power on site.

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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)** Don't use powerful bleaches, whiteners, nappy soakers, spot removers and disinfectants including cold water washing products.
- **(vi)** Don't 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 where there is a full load.

(e) Space dishwasher and washing machine use out to avoid overloading the wastewater system. Try not to do a large amount of washing in 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 trenches or beds;

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

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;

(iii) Keep the vent and/or 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 house, 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.

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

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(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 10.3.3 of A.S./N.Z.S. 1546.1:1998 (copy attached).

(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 similar to septic tanks. 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) **<u>Land Application Area</u>**

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. Puddling, 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 can not 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.

10.3.2 *Thickness*
The thickness of the tank walls, base, access opening covers and lids shall be not less than 6 mm.

Polyolefin materials that allow a thinner component to be made shall meet the performance requirements and tests of this Standard.

10.3.3 *Anchorage*
All plastic (polyolefin) septic tanks shall be provided with a means of anchorage.

C10.3.3
Typical examples are:

(a) Hydrostatic flange
An integrally moulded flange of similar size to the anchor collar in 10.3.3 (b).

(b) Anchor collar to be affixed at the time of installation:
An L-shaped anchor collar section constructed not less than 65 mm wide and not less than 6 mm thick to be fixed to the outside circumference of the tank with durable material protected from the corrosive environment. The collar may be continuous around the circumference or may be in at least two sections each not less than 600 mm long and fixed to opposite sides of the tank.

For a vertical cylindrical tank the flange is fixed not more than 300 mm from the base, and for a horizontal cylindrical tank the flange is situated along the line of the great horizontal perimeter.

(c) Loops to be affixed at the time of installation
Each 'side' of the tank is held into the ground by a piece of pipe, typically 100 mm PVC sewer grade pipe, attached to the tank by two durable plastic ropes. These ropes are anchored in the rim of the tank and have a loop in the other end at excavation ground level. Both pipes have a length of not less than the diameter of the tank and each is passed through two loops. Backfilling then covers the pipes.

10.4 Manufacture

10.4.1 *Materials*

10.4.1.1 *Polymer*
The polymer utilised by the manufacturer shall be suitable so that the finished product meets the performance requirements as set out in this Standard.

10.4.1.2 *Fasteners*
All fasteners shall be of durable material, resistant to the corrosive environment, and be either:

(a) Stainless steel, grade 316 (see AS 1449 or NZS/BS 1449); or

(b) Copper alloy, grade 443 (see AS 2738.2 or NZS/BS 1400); or

(c) a suitable equivalent

10.4.2 *Manufacturing process*

10.4.2.1 *General*
The manufacturing process shall be carried out in a controlled manner to produce a consistent product checked by a quality assurance process.

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GUIDELINES FOR INSTALLERS OF ON-SITE DOMESTIC WASTEWATER MANAGEMENT SYSTEMS

References

A.S./N.Z.S. 1546.1:1998 'On-Site Domestic Wastewater Treatment Units, Part 1:Septic Tanks'
A.S./N.Z.S. 1546.3:2001 'On-Site Domestic Wastewater Treatment Units, Part 3 AWTS'
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 2.0 metres should be adequate but if in doubt check with Council or an Engineer. Tank vents should be located 3 metres minimum from dwellings.

(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.

(c) Secondary Treatment Systems

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

These systems will 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, drip irrigation field or mound) will be aided by regular attention including one or more of the following depending on the type of system:

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

(ii) The baffles or valves in the distribution system should be periodically (monthly or seasonally) changed to direct treated wastewater into alternative trenches or beds, as required by the design;

(iii) Evapotranspiration and irrigation areas should have their grass mowed and plants maintained to ensure that these areas take up nutrients with maximum efficiency;

(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 dispose of wastewater that has only been treated by a septic tank and filter must be flushed through with clean water before and after any significant period of non-use.

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

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GUIDELINES FOR INSTALLERS OF ON-SITE DOMESTIC WASTEWATER MANAGEMENT SYSTEMS

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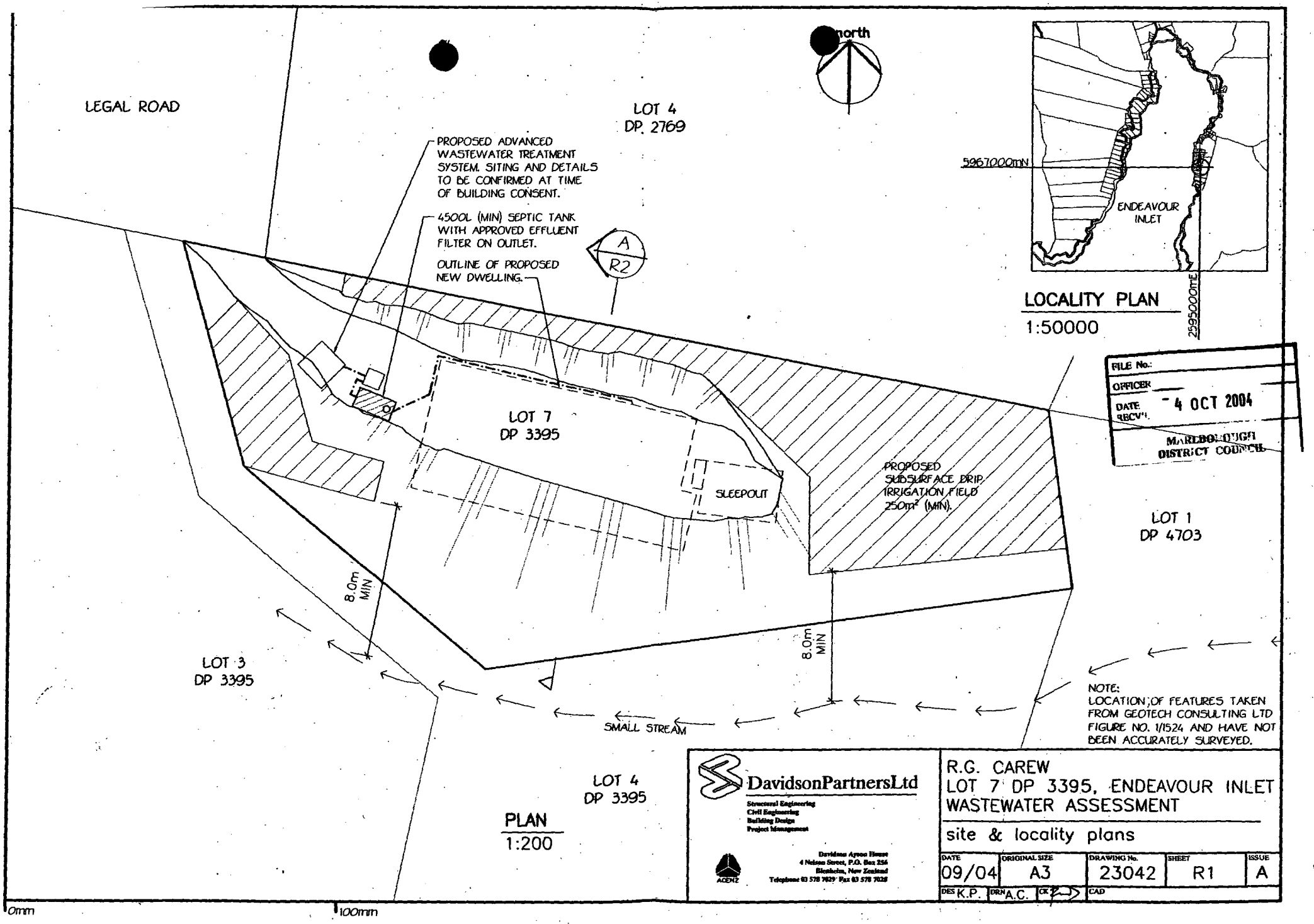

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NOTE:
LOCATION OF FEATURES TAKEN FROM GEOTECH CONSULTING LTD FIGURE NO. 1/1524 AND HAVE NOT BEEN ACCURATELY SURVEYED.

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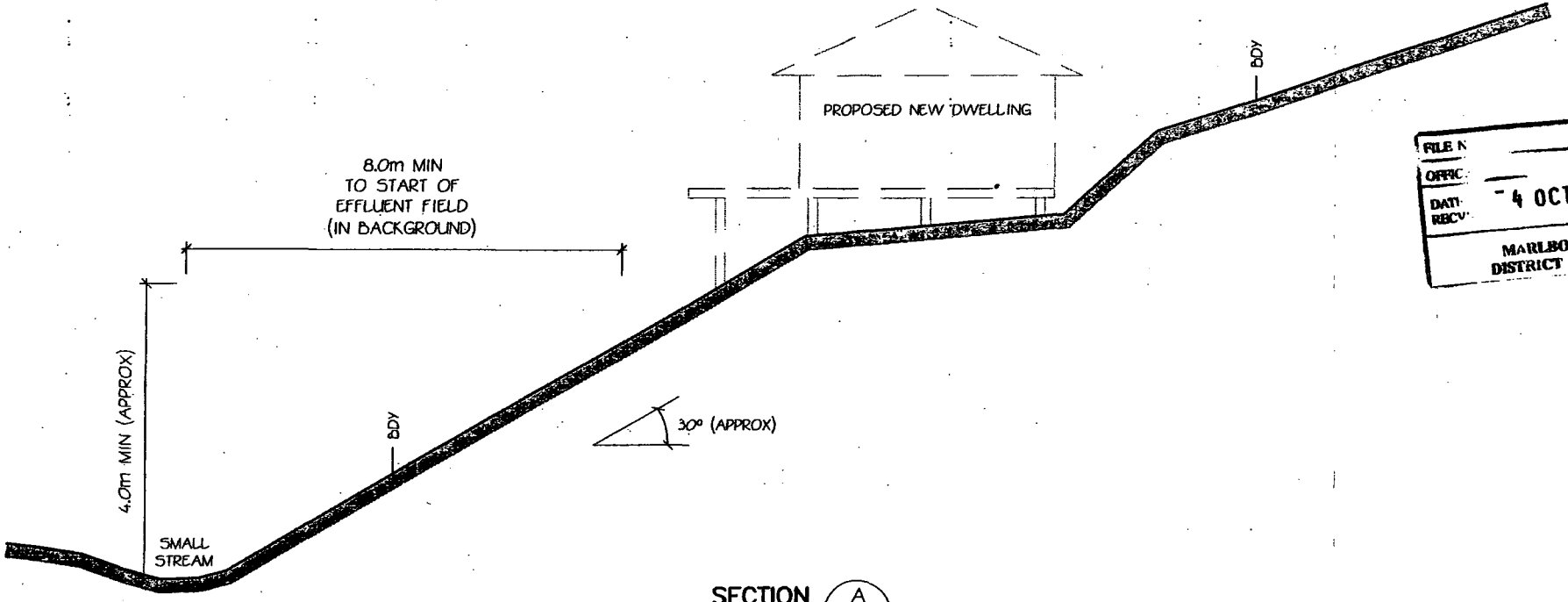
R.G. CAREW
LOT 7 DP 3395, ENDEAVOUR INLET
WASTEWATER ASSESSMENT

site & locality plans

DATE	ORIGINAL SIZE	DRAWING No.	SHEET	ISSUE
09/04	A3	23042	R1	A

DES K.P. DRN A.C. CK CAD



SECTION A
1:100 R1

FILE N
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DATE RECV - 4 OCT 2004
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R.G. CAREW
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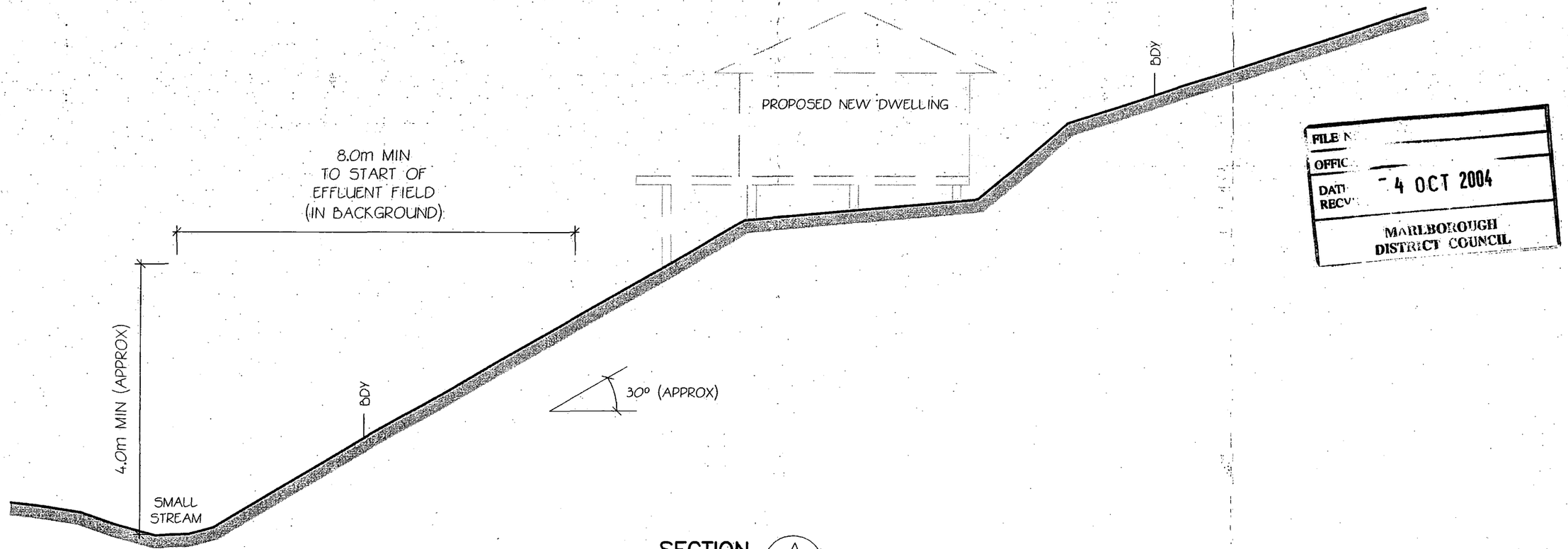
WASTEWATER ASSESSMENT

section

DATE	ORIGINAL SIZE	DRAWING No.	SHEET	ISSUE
09/04	A3	23042	R2	A

DES K.P. DRN A.C. CK RJS CAD

041681



SECTION A
1:100 R1

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WASTEWATER ASSESSMENT

section

DATE	ORIGINAL SIZE	DRAWING No.	SHEET	ISSUE
09/04	A3	23042	R2	A

DES K.P. DRN A.C. CK RJS CAD

0mm 100mm

041681

041681

LEGAL ROAD

LOT 4
DP 2769

north

PROPOSED ADVANCED WASTEWATER TREATMENT SYSTEM. SITING AND DETAILS TO BE CONFIRMED AT TIME OF BUILDING CONSENT.

4500L (MIN) SEPTIC TANK WITH APPROVED EFFLUENT FILTER ON OUTLET.

OUTLINE OF PROPOSED NEW DWELLING.

A
R2

LOT 7
DP 3395

SLEEPOUT

PROPOSED SUBSURFACE DRIP IRRIGATION FIELD 250m² (MIN).

LOT 1
DP 4703

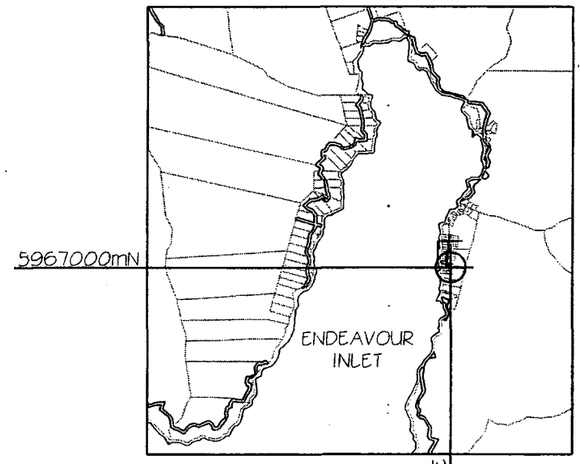
8.0m MIN

8.0m MIN

LOT 3
DP 3395

SMALL STREAM

LOT 4
DP 3395



LOCALITY PLAN
1:50000

PLAN
1:200

NOTE:
LOCATION OF FEATURES TAKEN FROM GEOTECH CONSULTING LTD FIGURE NO. 1/1524 AND HAVE NOT BEEN ACCURATELY SURVEYED.

FILE No.:
OFFICER
DATE RECV'D - 4 OCT 2004
MARLBOROUGH DISTRICT COUNCIL

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R.G. CAREW
LOT 7 DP 3395, ENDEAVOUR INLET
WASTEWATER ASSESSMENT

site & locality plans

DATE	ORIGINAL SIZE	DRAWING No.	SHEET	ISSUE
09/04	A3	23042	R1	A

DES K.P. DRN A.C. CK CAD

0mm 100mm