Soil and Land
Conservation
Consulting

# Site and Soil Assessment for On-site Effluent Disposal

## Proposed lots 2 & 3
## Subdivision of Lot 3, DP 1074706
## 202 Goolabri Drive, Sutton

February 2014

Peter Fogarty BA, Dip Nat Res, Certified Professional Soil Scientist

PO Box 485, Jamison, ACT 2614 ph: 0409 129608 fax: 02 61614062 email: slcc@grapevine.com.au

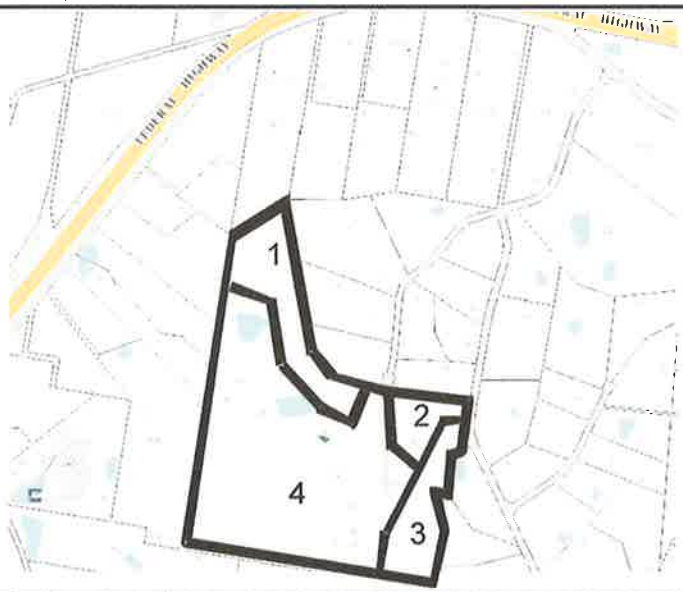
Soil survey and assessment for forestry, agriculture, urban development; land degradation assessment; catchment planning; soil conservation advice and planning; farm planning; land capability mapping
ABN 54 084 739 800

# Contents



**Good management of effluent protects the environment and the value of your property. See pages 6 to 9 for effluent management prescriptions.**

## Project Definition

| | |
|---|---|
| **Overview** | This report shows how sustainable on-site effluent management can be achieved on two new subdivision lots. The dwelling sizes are yet to be determined so the report covers dwellings with 3-6 bedrooms.<br><br>The report shows the sites are well suited to irrigation of secondary treated effluent from a NSW Health accredited treatment system. Other forms of effluent treatment and disposal may be suitable at particular locations, but should be addressed at the time of submitting building plans.<br><br>The effluent system at the existing dwelling on proposed lot 1, and at the dwellings and tourist accommodation on proposed lot 4, are in good working order, and have current maintenance agreements. |
| **Key References** | NSW Govt, 1998. *On-site Sewage Management for Single Households* (The Silver Book).<br><br>ANZ Standard 1547:2012 *On-site Domestic Wastewater Management*<br><br>Jenkins B (2000) Soil Landscapes of the Canberra 1:100,000 Sheet. DLWC |
| **Reporting** | The report assesses land over the whole area of lots 2 and 3 to determine suitability for irrigation of secondary treated effluent. The assessment is based on detailed description of the site and soil conditions.<br><br>The assessment is presented in the pro forma from the Silver Book (NSW Govt 1998), including management prescriptions, site plan and photograph, with supporting information including nutrient balance, water balance and limitation tables. |
| **Location** |  |
| **Terrain** | Gently graded hillslopes and low crests within undulating terrain developed on granite geology. Large area of gently sloping, freely drained land for effluent dispersal on each lot. Avoids drainage depressions and dams, and associated 40m buffer on dams, see fig 1. No bores within 100m of land mapped as suitable for effluent dispersal. |
| **Soils** | See appendix 1for soil profile description. Moderately deep sandy grey dermosol comprising sandy loam to 20cm overlying sandy clay loam subsoil. Soil depth around 60-80cm. |
| **Constraints** | Low lying land associated with drainage depressions, dams and associated buffers, all readily avoided by effluent dispersal areas, see figs 1&2. |

# Site and Soil Evaluation

| Site Evaluator Details | |
|---|---|
| **Name**<br>**Company** | Peter Fogarty<br>Soil and Land Conservation Consulting P/L |
| **Phone**<br>**Fax** | 0409129608<br>61614062 |
| **Date of Assessment** | February 17, 2014 |
| **Signature**<br>**Date** |  |

| Site Information | |
|---|---|
| **Local Government Area** | Palerang Council |
| **Address/locality** | Proposed lots 2 & 3<br>Subdivision of Lot 3, DP 1074706<br>202 Goolabri Drive, Sutton |
| **Owner** | As yet unknown |
| **Developer** | Gordon Luton |
| **Block configuration**<br>**plans attached**<br>**photo attached** | 7.2 & 8.4ha respectively<br>yes<br>yes |
| **Intended water supply** | Roofwater tank |
| **Expected wastewater volume (litres/day)** | Assume 200l/bedroom/day and 5 plus bedrooms at 100l/day; hence 3 bedrooms generates 600l/day, 4 bedrooms 800l/day and 5 bedrooms 900l/day, 6 bedrooms 1,000l/day |
| **Local experience** | Most systems work adequately in the area on appropriate soil and site conditions. Systems commonly malfunction due to lack of ongoing maintenance. System to be maintained regularly, in accordance with council regulations and prescriptions in this report. |

Site photos

Looking east to west across the BE for lot 2 showing gently sloping, freely drained land

Looking southeast to northwest across the BE for lot 3 showing elevated, freely drained land

## Site Assessment

| | |
|---|---|
| **Climate** | Warm summers with large evaporative deficit, cool winters with small evaporative deficit; median summer monthly rainfall for Canberra airport 49mm; median monthly winter rainfall 38mm; mean monthly summer evap. 177mm, mean monthly winter evap 60mm. |

| | |
|---|---|
| **Rainfall water balance attached** | NA |
| **Land application area calculated** | Yes |
| **Wet weather storage calculation attached** | NA |
| **Flood potential:** | |
| **land application area above 1:20 yr flood** | Yes |
| **land application area above 1:100 yr flood** | Yes |
| **electrical components above 1:100 yr flood** | Yes |

| | |
|---|---|
| **Exposure** | Adequate exposure, no shading. |
| **Slope** | Gently sloping, 4-8% |
| **Landform** | Low crest and gently graded hillslopes within undulating terrain developed on granite geology. |
| **Run-on** | Minor, irrigation area will not require diversion drain |
| **Seepage** | None |
| **Erosion Potential** | Low due to adequate ground cover |
| **Site drainage** | Freely drained, no flood hazard; prone to saturation for short periods after major rainfall events |
| **Fill** | None |

| | |
|---|---|
| **Groundwater:** | |
| **Horizontal distance to groundwater well used for domestic supply** | None within 100m |
| **Groundwater vulnerability map category** | Moderate low |
| **Bores in area and purpose** | None within 100m |

| | |
|---|---|
| **Buffer distance from treatment system to:** | |
| **perennial rivers and creeks** | Not applicable to site |
| **drainage lines** | 40m buffer on dams on both lots |
| **other sensitive environments** | None |
| **boundary of premises** | >6m |
| **swimming pools** | >15m |
| **buildings** | At least 15m from dwelling |

| | |
|---|---|
| **Is there sufficient land area for:** | |
| **application system including buffers** | Yes |
| **reserve application system** | Yes, ample room within land designated as suitable |
| **Surface rock and outcrop** | Few small patches of rock outcrop, does not impact on effluent management |

| Soil Assessment | |
|---|---|
| **Depth to bedrock or hardpan** | 60-80cm |
| **Depth to high soil watertable** | >150cm |
| **Hydraulic loading rate**<br>**soil texture** | Sandy loam to 40cm overlying to sandy clay loam subsoil. |
| **soil structure** | Weak in topsoil, moderate in subsoil |
| **permeability (from table M1 of AS1547:2012)** | .5-1.5m/day |
| **recommended hydraulic loading for disposal system (from table M1 of AS1547:2012)** | Topsoil DIR of 3.8mm/day (irrigation area size based on P balance) |
| **Coarse fragments** | 0 |
| **Bulk density** | Estimate 1.4 |
| **pH (measured)** | Surface 5.2, subsoil 6.5 (acid) |
| **Electrical conductivity dS/m[1]** | Topsoil .1, subsoil .1 (low) |
| **Exchangeable sodium %[1]** | Topsoil 5, subsoil 6 (low) |
| **Cation exchange capacity[1]** | Topsoil 4, subsoil 12 (mod) cmol/100g |
| **Phosphorous sorption capacity[1]** | 2,500 (moderate) kg/m/ha |
| **Geological features**<br>**discontinuities**<br>**fractured rock** | <br>None<br>None |
| **Soil landscape reference [1]** | Celeys Creek |
| **Dispersiveness** | Low in surface and subsoil due to lack of clay (EAT 3(1) in each layer) |

[1] Jenkins B (2000) Soil Landscapes of the Canberra 1:100,000 Sheet. DLWC

## System Selection

| | |
|---|---|
| **Consideration of connection to centralised sewerage system**<br>**distance**<br>**potential for future connection**<br>**potential for reticulated water** | <br>>5km<br>none<br>none |
| **Type of treatment system best suited**<br><br>**Justification** | NSW Health accredited secondary treatment system, see appendix 2<br><br>Suitable site and soil conditions |
| **Type land application system best suited**<br><br>**Justification** | Irrigation<br><br>Suitable site and soil conditions |

## Effluent Management Prescriptions

**Irrigation of secondary treated effluent**

*Effluent Treatment System*

Effluent will be treated by a NSW Health accredited system capable of secondary standard treatment (see table 1).

Ensure the pump has capacity to achieve the lift and required pressure for the irrigation system to operate effectively.

Provide stormwater diversion to ensure runoff water does not drain into tank site.

*Effluent dispersal*

Effluent is to be dispersed by irrigation, either by surface or subsurface irrigation, depending on the requirements for the system as detailed in the NSW Health accreditation.

The effluent can be delivered by drip irrigation onto landscaped areas or by sprays onto grass areas. Note that any areas used for play should not receive spray irrigation.

An effluent irrigation area sized according to the table below should be located and marked out within the land shown as suitable on figs 1 or 2. The sizing has been developed to satisfy the water and nutrient balances, see page 12.

| Number of bedrooms | Size (sq m) |
|---|---|
| 3 or less | 430 |
| 4 | 540 |
| 5 | 650 |
| 6 | 750 |

The delivery line from the treatment system will be buried at a minimum of 300mm.

The irrigation area can be divided into at least two sections, connected by a valve which permits each part of the irrigation area to be isolated at a time. This permits areas to be rested if they become excessively moist.

*General management issues*

Stock and vehicular access must be excluded from the irrigation area as they compact the soil, thereby reducing the infiltration rate and water holding capacity.

Detergents low in phosphorous and sodium should be used as far as possible (see details in appendix) in order to protect the soil's capacity to absorb water and minimise nutrient loading.

Sewerage treatment occurs a result of bacterial activity in the treatment tank. Do not put anti-bacterial products such as bleach, disinfectant and anti biotics into the sewerage system as they will significantly impair the effectiveness of sewerage treatment.

Table 1: NSW Health accredited effluent treatment systems for irrigation

| | | |
|---|---|---|
| **AWTS[1]** | | |
| AWTS Maintenance | Envirocycle 10NR | 62581378 |
| Bioseptic | Performa | 1300 658 111 |
| Clearwater Sewage and Watertanks | Biodigester II | 1300 132 760 |
| Earthsafe Environmental | Earthsafe ES10PC | 1300 327 847 |
| Eco Septic | Econocycle ENC 10-1, ENC 10-2 | 4774 1316 |
| Everhard Industries | Aqua Nova 10EP | 1800 062 201 |
| Fuji Clean | Fuji Clean CE 1200, CRX 1500, CE 1500 | 4033 7300 |
| Gardenmaster | Gardenmaster GM7100 | 1800 632 582 |
| Icon Septech | Turbojet 2000 | 1800 181918 |
| Jowa Group | Biocycle Bio 7000 | (08) 8381 9100 |
| Krystel Kleer | Krystel Kleer ADV 5000 | 62581378 |
| Magnesium Tech | Waterboy Model 10, Model S | 4055 1141 |
| Sun Coast Wastewater Management | Ozzie Kleen RP10 | 1300 360639 |
| Super Treat Systems | Super Treat SE 10 | 4422 3861 |
| Taylex Industries | Taylex compact | 07 34415200 |
| Ultra Clear Wastewater | Ultra Clear (3 models) | 1800 049911 |
| Water Gurus | Nova Clear | 1300 668 225 |
| **Biological filters[1]** | | |
| Aqua Clarus | Super Natural | 1300 368 158 |
| **Aerobic Textile and Sand Filters[1]** | | |
| Envirotech treatment systems | Super Envirotech ASF | 07 3362954 |
| **Constructed wetland treatment systems** | | |
| Rootzone Australia | Rootzone 1200 | 4632 7566 |

[1] details from NSW Health website, current as of Jan 2013

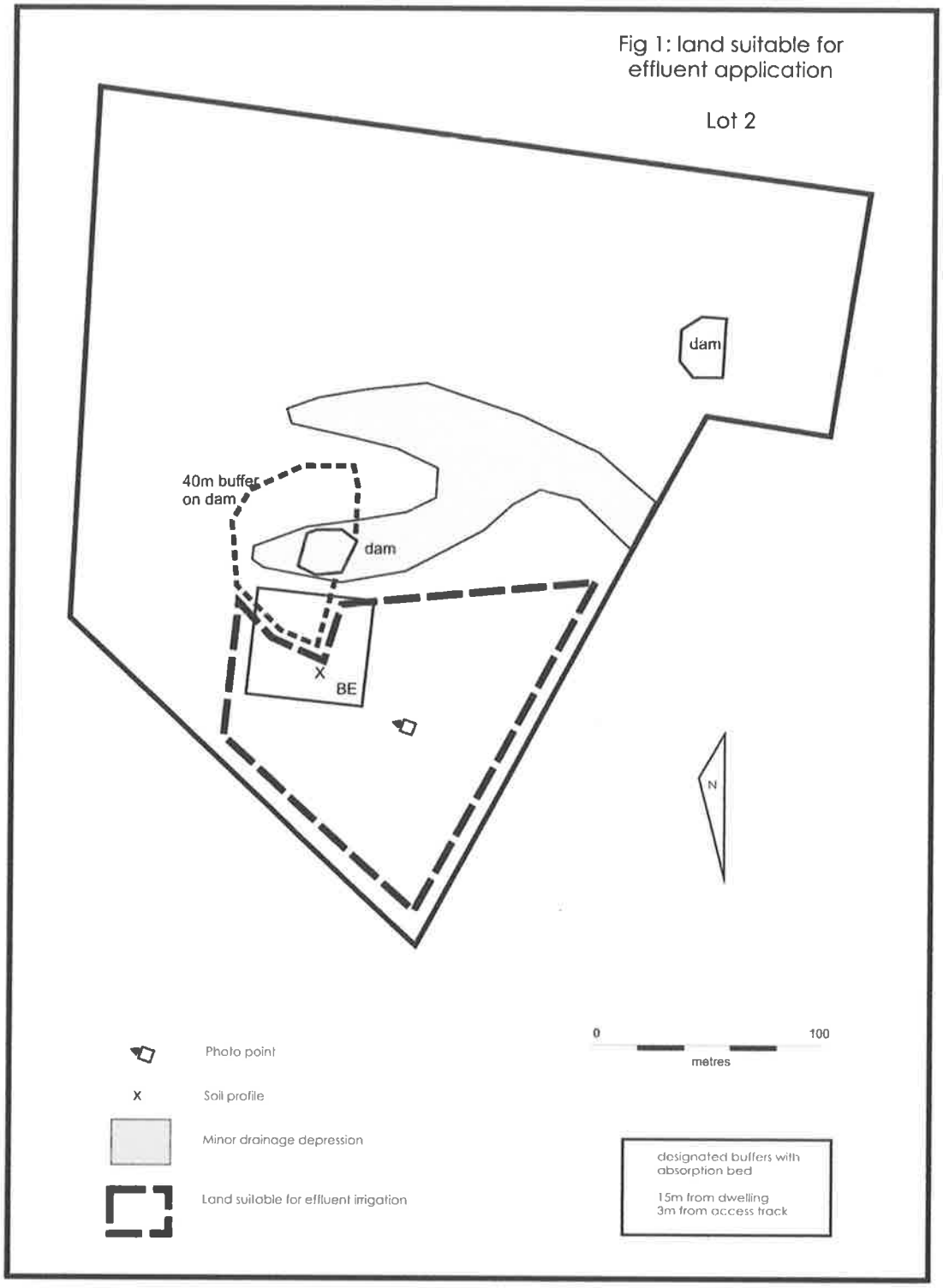


Fig 1: land suitable for effluent application
Lot 2
dam
40m buffer on dam
dam
X
BE
N
0
100
metres
Photo point
Soil profile
Minor drainage depression
Land suitable for effluent irrigation
designated buffers with absorption bed
15m from dwelling
3m from access track

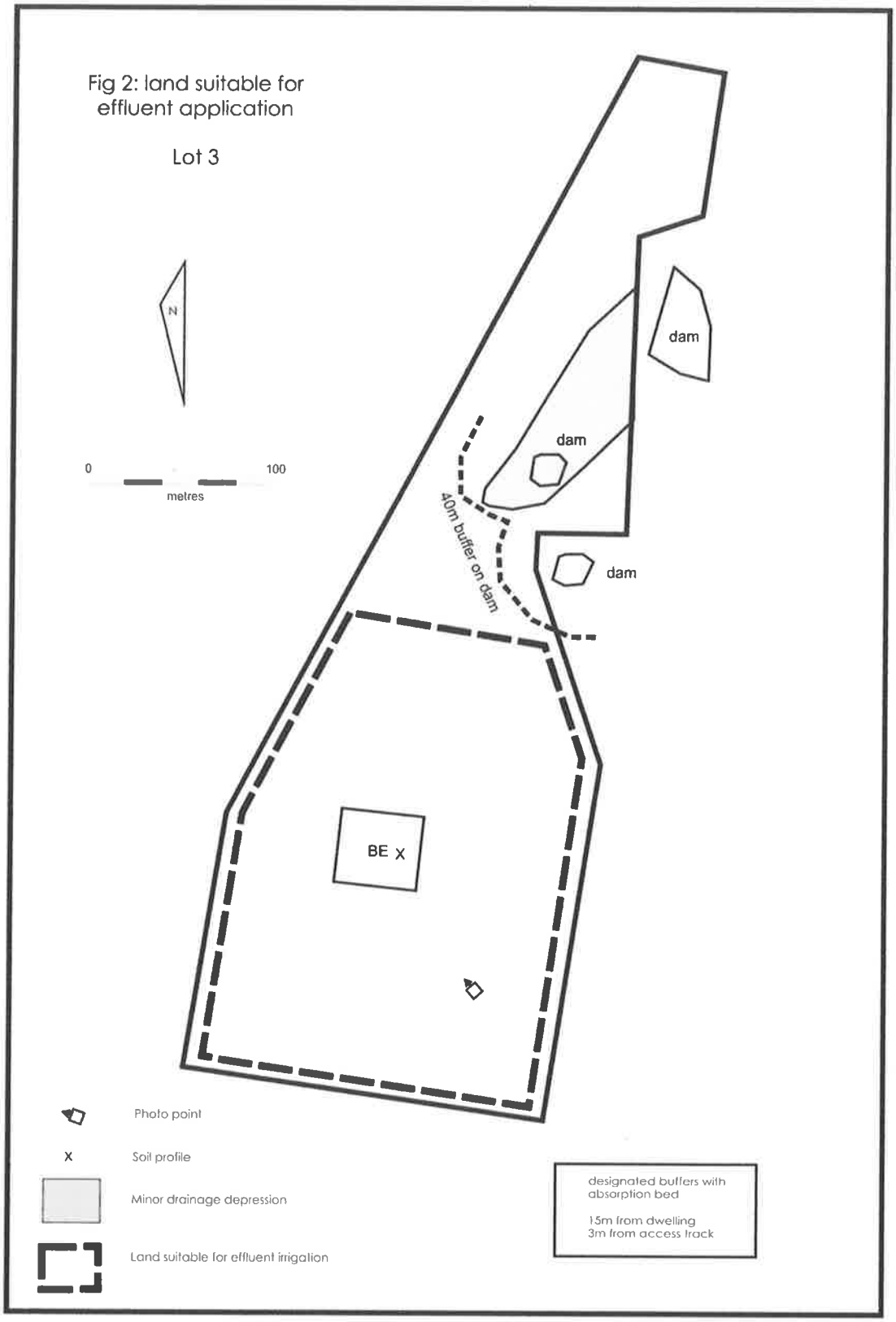


Fig 2: land suitable for effluent application
Lot 3
N
0
100
metres
dam
dam
dam
40m buffer on dam
BE x
Photo point
Soil profile
Minor drainage depression
Land suitable for effluent irrigation
designated buffers with absorption bed
15m from dwelling
3m from access track

# Site and Soil Limitation Assessment

The following two limitation tables are a standardised guide to the site and soil characteristics which may limit the suitability of the site for effluent disposal and which would require attention through specific management practices. The tables have been reproduced from *On-site Sewage Management for Single Households* (tables 4 and 6, Anon, 1998). The italicised categories represent site and soil conditions of the land covered in this report. The tables below show that the area has slight to moderate limitations, but no severe limitations.

## Site limitation assessment

| Site feature | Relevant system | Minor limitation | Moderate limitation | Major limitation | Restrictive feature |
|---|---|---|---|---|---|
| Flood potential | All land application systems | ***> 1 in 20 yrs*** | | Frequent, below 1 in 20 yrs | Transport in wastewater off site |
| | All treatment systems | ***components above 1 in 100 yrs*** | | Components below 1 in 100 yrs | Transport in wastewater off site, system failure |
| Exposure | All land application systems | ***High sun and wind exposure*** | | Low sun and wind exposure | Poor evapo-transpiration |
| Slope % | Surface irrigation | ***0-6*** | 6-12 | >12 | Runoff, erosion potential |
| | Sub-surface irrigation | ***0-10*** | 10-20 | >20 | Runoff, erosion potential |
| | Absorption | 0-10 | 10-20 | >20 | Runoff, erosion potential |
| Landform | All systems | ***Hillcrests, convex sideslopes and plains*** | Concave sideslopes and footslopes | Drainage plains and incised channels | Groundwater pollution hazard, resurfacing hazard |
| Run-on and seepage | All land application systems | ***None-low*** | Moderate | High, diversion not practical | Transport of wastewater off site |
| Erosion potential | All land application systems | ***No sign of erosion potential*** | | Indications of erosion eg rils, mass failure | Soil degradation and off-site impact |
| Site drainage | All land application systems | ***No visible signs of surface dampness*** | | Visible signs of surface dampness | Groundwater pollution hazard, resurfacing hazard |
| Fill | All systems | ***No fill*** | Fill present | | Subsidence |
| Land area | All systems | ***Area available*** | | Area not available | Health and pollution risk |
| Rock and rock outcrop | All land application systems | ***<10%*** | 10-20% | >20% | Limits system performance |
| Geology | All land application systems | ***None*** | | Major geological discontinuities, fractured or highly porous regolith | Groundwater pollution hazard |

## Soil limitation assessment

| Soil feature | Relevant system | Minor limitation | Moderate limitation | Major limitation | Restrictive feature |
|---|---|---|---|---|---|
| Depth to bedrock | Surface and sub surface irrigation | > 1.0 | ***.5-1.0*** | < 0.5 | Restricts plant growth |
| or hardpan (m) | Absorption | > 1.5 | 1.0-1.5 | < 1.0 | Groundwater pollution hazard |
| Depth to seasonal | Surface and sub surface irrigation | ***> 1.0*** | 0.5-1.0 | < 0.5 | Groundwater pollution hazard |
| water table (m) | Absorption | > 1.5 | 1.0-1.5 | < 1.0 | Groundwater pollution hazard |
| Permeability | Surface and sub surface irrigation | ***2b, 3 and 4*** | 2a, 5 | 1 and 6 | Excessive runoff and waterlogging |
| Class | Absorption | 3, 4 | | 1, 2, 5, 6 | Percolation |
| Coarse fragments % | All systems | ***0-20*** | 20-45 | >40 | Restricts plant growth, affects trench installation |
| Bulk density (g/cc)<br><br>SL<br>L, CL<br>C | All land application systems | <br><br>< 1.8<br>***< 1.6***<br>< 1.4 | | <br><br>> 1.8<br>> 1.6<br>>1.4 | restricts plant growth, indicator of permeability |
| pH | All land application systems | > 6.0 | ***4.5-6.0*** | - | Reduces plant growth |
| Electrical conductivity (dS/m) | All land application systems | ***<4*** | 4-8 | >8 | Restricts plant growth |
| Sodicity (ESP) | Irrigation 0-40cm; absorption 0-1.2mtr | ***0-5*** | 5-10 | > 10 | Potential for structural degradation |
| CEC mequiv/100g | Irrigation systems | > 15 | ***5-15*** | < 5 | Nutrient leaching |
| P sorption kg/ha | All land application systems | > 6000 | ***2000-6000*** | < 2000 | Capacity to immobilise P |
| Aggregate stability | All land application systems | ***Classes 3-8*** | class 2 | class1 | Erosion hazard |

# Sizing of Effluent Disposal Area

The irrigation area size has been evaluated from the water balance, nitrogen balance and phosphorous balance. The largest area so determined represents the sustainable area for effluent irrigation. Balances assume generation rate for 4 bedroom dwelling of 800l/day.

Water Balance:

A = Q (l/day)/DIR (mm/day);
where Q = 800l/day; DIR = 4mm/day (from ANZ Standard 1547:2000)
A = 800/4 = 200m$^2$

Nitrogen balance:

A = Q(l/day) X TN (mg/l)/$L_n$ (critical loading of TN, mg/m$^2$/day)
Q = 800l/day; TN = 25mg/l (from Silver Book);

Assume 20% loss by denitrification; 25mg/l – (25 X .2) = 20mg/l
$L_n$ = 12,000mg/m$^2$/yr (ie 120kg/ha/yr for mix of native and introduced species)
A = 800 X 20 X 365/12,000 = 486m$^2$

Phosphorous balance:

P sorption capacity in upper 50cm
$P_{sorb}$ = 2000kg/ha = .2kg/m$^2$

P uptake for design period of 50 years
$P_{uptake}$ = 4mg/m$^2$/day X 365 X 50 = .073kg/m$^2$

P generated over 50yr design period
$P_{gen}$ = 10mg/l X 800 X 365 X 50 =146kg

A = $P_{gen}$/( $P_{uptake}$ + $P_{sorb}$) = 146/(.2 + .073) = 534m$^2$

**Thus, irrigation area size of 540m$^2$ is based on P balance. On a pro rate basis, for a 3 bedroom dwelling, application area is 430m$^2$, for 5 bedroom dwelling, application area is 650m$^2$, 6 bedroom dwelling, application area is 750m$^2$.**

## Appendix 1: Soil Profile Description

| Soil classification | Depth (cm) | Properties |
|---|---|---|
| Lot 2<br><br>Yellow dermosoll | 0-5 | A1 horizon: dark grey brown organic rich coarse sandy loam, whole coloured, no gravel, moderate crumb structure; moist firm consistence, high content fine roots, gradual boundary to |
| | 5-20 | A2 horizon: pale grey brown sandy loam, whole coloured, no gravel, massive structure; dry firm consistence, few fine roots, clear boundary to |
| | 20-65 | B2 horizon: yellow brown sandy clay loam, whole coloured, 5% quartz gravels, weak medium blocky structure, dry very firm consistence, non plastic, grades to weathered bedrock. |
| Lot 3<br><br>Grey dermosoll | 0-8 | A1 horizon: dark grey brown organic rich sandy loam, whole coloured, no gravel, weak crumb structure; moist firm consistence, high content fine roots, gradual boundary to |
| | 8-30 | A2 horizon: grey brown sandy loam, whole coloured, no gravel, massive structure; dry firm consistence, few fine roots, clear boundary to |
| | 30-60 | B2 horizon: pale grey sandy clay loam, whole coloured, no gravels, massive structure, dry very firm consistence, non plastic, grades to weathered bedrock. |

Soil profile augered on lot 2


Soil profile augered on lot 3

## Appendix 2: Useful General Information

**Phone** Office/Lab (02) 6775 1157
Fax (02) 6775 1043
ABN: 72 212 385 096
email: lanfax.labs@science.com.au
Website: http://www.lanfaxlabs.com.au
493 Old Inverell Road
(P.O. Box W90) Armidale NSW 2350
Director: Dr Robert Patterson CPSS. CPAg. FIEAust
Soil Scientists and Environmental Engineers

Lanfax Laboratories

Proficiency tested with Aust. Soil & Plant Analysis Council

### LAUNDRY PRODUCTS RESEARCH

The data, from which the graph on the reverse of this page was produced, were from research financed and undertaken by Lanfax Laboratories in July 1999, independent of any other organisation.

A range of laundry products was purchased from the local supermarkets comprising 20 liquid and 40 powder products. The selection covered the major brands, as determined from previous research, but included some lesser known brands, and five dishwashing detergents.

For each of the detergents, the mass of a 40 mL freshly poured sample was determined. Using the manufacturers' recommended loading rates for an average wash in a top loading automatic washing machine, an equivalent weight of each product was mixed with water from a rainwater system to represent the recommended dose of product with the full water load, that is, 160 litres of wash, rinse, deep rinse and spin cycle.

The samples were shaken for 1 hour at room temperature and the concentration of each of the elements of interest determined at the University of New England using an Inductively Coupled Plasma (ICP). Other chemical properties were measured by Lanfax Labs.

Only the sodium and phosphorus results are reported here. Other information from the research is available at our web site:

www.lanfaxlabs.com.au/publications.html

PATTERSON, R.A. (2000). *Water Quality Relationships with Reuse Options*. in3rd International Symposium on Waste Water Reclamation, Recycling and Reuse. 3-5 July 2000. Paris France. International Water Association .Preprint Book 8, pp 205-212.

and

PATTERSON, R.A. (1999) *Reuse Initiatives Start in the Supermarket.* NSW Country Convention. Institution of Engineers Australia. 6-8 August 1999. Northern Group, Institution of Engineers Australia, Armidale.

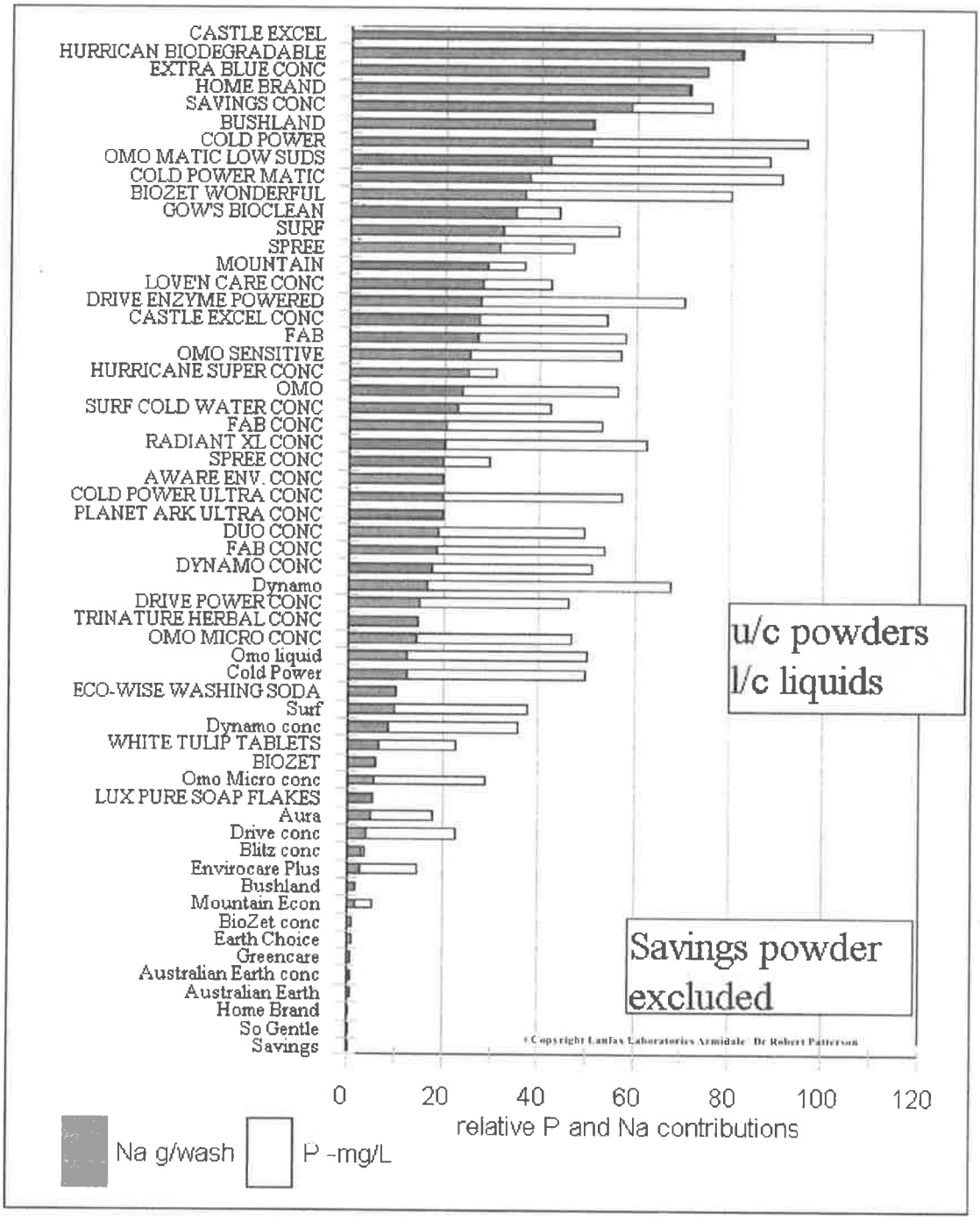
**How to read this graph:**
For all on-site systems that apply the effluent by surface or subsurface application, the levels of sodium are critical. Choose the product with the lowest sodium. Levels over 20 g/wash are likely to be detrimental to plants and the soil.

The levels of phosphorus will depend upon the soil type and the use of the effluent. In some soils, phosphorus is not a real concern because it is immobile. In other soils it is likely to build up to high levels. It is preferable to choose the lower phosphorus values as well as the low sodium.

The detergents with long sodium bars (greater than 20 g/wash) should not be thrown out on your favourite garden as the sodium may be detrimental to the plants. High pH is also detrimental to plants and soils.

Figure 1. Ranking of laundry products according to sodium concentration with phosphorus concentration shown as tail. Ideal choice for on-site systems is one with a low sodium and a low phosphorus concentration.





**DO**

- ✓ Learn how your sewage management system works and its operational and maintenance requirements.
- ✓ Learn the location and layout of your sewage management system.
- ✓ Have your AWTS (if installed) inspected and serviced four times per year by an approved contractor. Other systems should be inspected at least once every year. Assessment should be applicable to the system design.
- ✓ Keep a record of desludgings, inspections, and other maintenance.
- ✓ Have your septic tank or AWTS desludged every three years to prevent sludge build up, which may 'clog' the pipes.
- ✓ Conserve water. Conservative water use around the house will reduce the amount of wastewater which is produced and needs to be treated.
- ✓ Discuss with your local council the adequacy of your existing sewage management system if you are considering house extensions for increased occupancy.

**DON'T**

- ✗ Don't let children or pets play on land application areas.
- ✗ Don't water fruit and vegetables with effluent.
- ✗ Don't extract untreated groundwater for cooking and drinking.
- ✗ Don't put large quantities of bleaches, disinfectants, whiteners, nappy soakers and spot removers into your system via the sink, washing machine or toilet.
- ✗ Don't allow any foreign materials such as nappies, sanitary napkins, condoms and other hygiene products to enter the system.
- ✗ Don't put fats and oils down the drain and keep food waste out of your system.
- ✗ Don't install or use a garbage grinder or spa bath if your system is not designed for it.

### Reducing water usage

Reducing water usage will lessen the likelihood of problems such as overloading with your septic system. Overloading may result in wastewater backing up into your house, contamination of your yard with improperly treated effluent, and effluent from your system contaminating groundwater or a nearby waterway.

Your sewage management system is also unable to cope with large volumes of water such as several showers or loads of washing over a short period of time. You should try to avoid these 'shock loads' by ensuring water use is spread more evenly throughout the day and week.

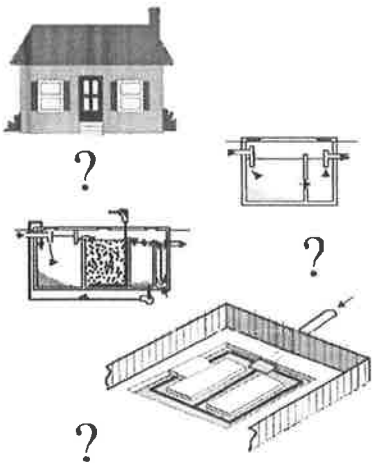
### HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

Poorly maintained sewage management systems are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

By looking after your management system you can do your part in helping to protect the environment and the health of you and your community.

For more information please contact:

# Managing Wastewater In Your Backyard



## ON-SITE SEWAGE MANAGEMENT SYSTEMS

If you live in or rent a house that is not connected to the main sewer then chances are that your yard contains an on-site sewage management system. If this is the case then you have a special responsibility to ensure that it is working as well as it can.

The aim of this pamphlet is to introduce you to some of the most popular types of on-site sewage management systems and provide some general information to help you maintain your system effectively. You should find out what type of system you have and how it works.

More information can be obtained from the pamphlets:

Your Septic System
Your Aerated Wastewater Treatment System
Your Composting Toilet
Your Land Application Area

You can get a copy of these pamphlets from your local council or the address marked on the back of this pamphlet.

It is important to keep in mind that maintenance needs to be performed properly and regularly. Poorly maintained on-site sewage management systems can significantly affect you and your family's health as well as the local environment.

### What is an on-site sewage management system?

A domestic on-site sewage management system is made up of various components which - if properly designed, installed and maintained - allow the treatment and utilisation of wastewater from a house, completely within the boundary of the property.

Wastewater may be blackwater (toilet waste), or greywater (water from showers, sinks, and washing machines), or a combination of both.

Partial on-site systems - eg. pump out and common effluent systems (CES) - also exist. These usually involve the preliminary on-site treatment of wastewater in a septic tank, followed by collection and transport of the treated wastewater to an off-site management facility. Pump out systems use road tankers to transport the effluent, and CES use a network of small diameter pipes.

### How does an on-site sewage management system work?

For complete on-site systems there are two main processes:

1. treatment of wastewater to a certain standard
2. its application to a dedicated area of land.

The type of application permitted depends on the quality of treatment, although you should try to avoid contact with all treated and untreated wastewater, and thoroughly wash affected areas if contact does occur.

Treatment and application can be carried out using various methods:

*Septic Tank*
Septic tanks treat both greywater and blackwater, but they provide only limited treatment through the settling of solids and the flotation of fats and greases. Bacteria in the tank break down the solids over a period of time. Wastewater that has been treated in a septic tank can only be applied to land through a covered soil absorption system, as the effluent is still too contaminated for above ground or near surface irrigation.

*AWTS*
Aerated wastewater treatment systems (AWTS) treat all household wastewater and have several treatment compartments. The first is like a septic tank, but in the second compartment air is mixed with the wastewater to assist bacteria to break down solids. A third compartment allows settling of more solids and a final chlorination contact chamber allows disinfection. Some AWTS are constructed with all the compartments inside a single tank. The effluent produced may be surface or sub-surface irrigated in a dedicated area.

*Composting Toilets*
Composting toilets collect and treat toilet waste only. Water from the shower, sinks and the washing machine needs to be treated separately (for example in a septic tank or AWTS as above). The compost produced by a composting toilet has special requirements but is usually buried on-site.

These are just some of the treatment and application methods available, and there are many other types such as sand filter beds, wetlands, and amended earth mounds. Your local council or the NSW Department of Health have more information on these systems if you need it.

### Regulations and recommendations

The NSW Department of Health determines the design and structural requirements for treatment systems for single households. Local councils are primarily responsible for approving the installation of smaller domestic septic tank systems, composting toilets and AWTSs in their area, and are also responsible for approving land application areas. The NSW Environment Protection Authority approves larger systems.

The design and installation of on-site sewage management systems, including plumbing and drainage, should only be carried out by suitably qualified or experienced people. Care is needed to ensure correct sizing of the treatment system and application area.

Heavy fines may be imposed under the Clean Waters Act if wastewater is not managed properly.

### Keeping your on-site sewage management system operating well

What you put down your drains and toilets has a lot to do with how well your system performs. Maintenance of your sewage management system also needs to be done well and on-time. The following is a guide to the types of things you should and should not do with your system.

### Reducing water usage

Reducing water usage will lessen the likelihood of problems such as overloading with your AWTS. Overloading may result in wastewater backing up into your house, contamination of your yard with improperly treated effluent, and effluent from your system entering a nearby river, creek or dam.

Conservative water use around the house will reduce the amount of wastewater which is produced and needs to be treated

Your AWTS is also unable to cope with large volumes of water such as several showers or loads of washing over a short period of time. You should try to avoid these 'shock loads' by ensuring water use is spread more evenly throughout the day and week.

### Warning signs

You can look out for a few warning signs that signal to you that there are troubles with your AWTS Ensure that these problems are attended to immediately to protect your health and the environment.

Look out for the following warning signs:

- Water that drains too slowly.
- Drain pipes that gurgle or make noises when air bubbles are forced back through the system.
- Sewage smells, this indicates a serious problem.
- Water backing up into your sink which may indicate that your system is already failing.
- Wastewater pooling over the land application area.
- Black coloured effluent in the aerated tank.
- Excess noise from the blower or pumping equipment
- Poor vegetation growth in irrigated area.

Odour problems from a vent on the AWTS can be a result of slow or inadequate breakdown of solids. Call a technician to service the system.

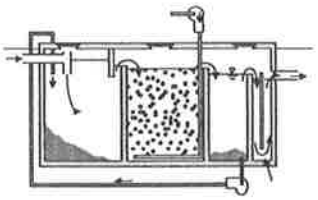
**HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT**

Poorly maintained AWTSs are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

By looking after your treatment system you can do your part in helping to protect the environment and the health of you and your family.

If you would like more information please contact:

# Your Aerated Wastewater Treatment System



## Aerated Wastewater Treatment Systems (AWTS)

In unsewered areas, the proper treatment and utilisation of household wastewater on-site is critical in preserving the health of the public and the environment. AWTS have been developed as a way of achieving this.

### What is an AWTS?

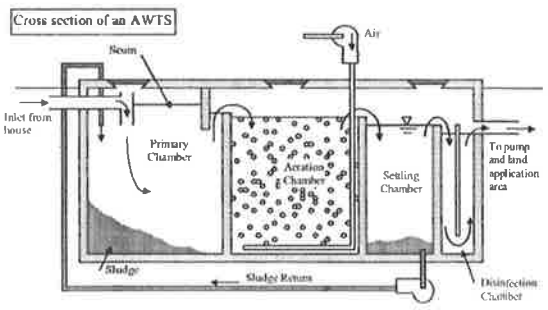
An AWTS is a purpose built system used for the treatment of sewage and liquid wastes from a single household or multiple dwellings.

It consists of a series of treatment chambers combined with an irrigation system. An AWTS enables people living in unsewered areas to treat and utilise their wastewater.

### How does an AWTS work?

Wastewater from a household is treated in stages in several separate chambers. The first chamber is similar to a conventional septic tank. The wastewater enters the chamber where the solids settle to the bottom and are retained in the tank forming a sludge layer. Scum collects at the top, and the partially clarified wastewater flows into a second chamber. Here the wastewater is mixed with air to assist bacteria to further treat it. A third chamber allows additional clarification through the settling of solids, which are returned for further treatment to either the septic chamber (as shown) or to the aeration chamber. The clarified effluent is disinfected in another chamber (usually by chlorination) before irrigation can take place.

Bacteria in the first chamber break down the solid matter in the sludge and scum layers. Material that cannot be fully broken down gradually builds up in the chamber and must be pumped out periodically.




### Regulations and recommendations

Local councils are primarily responsible for approving the smaller, domestic AWTSs in their area. The Environment Protection Authority (EPA) approves larger units, whilst the NSW Department of Health determines the design and structural requirements for all AWTSs.

At present AWTSs need to be serviced quarterly by an approved contractor at a cost to the owner. Local councils should also maintain a register of the servicing of each system within their area.

AWTSs should be fitted with an alarm having visual and audible components to indicate mechanical and electrical equipment malfunctions. The alarm should provide a signal adjacent to the alarm and at a relevant position inside the house. The alarm should incorporate a warning lamp which may only be reset by the service agent.

### Maintaining your AWTS

The effectiveness of the system will, in part, depend on how it is used and maintained. The following is a guide on good maintenance procedures that you should follow:

**DO**

- ✓ Have your AWTS inspected and serviced four times per year by an approved contractor. Assessment should be applicable to the system design.
- ✓ Have your system service include assessment of sludge and scum levels in all tanks, and performance of irrigation areas.
- ✓ Have all your tanks desludged at least every three years.
- ✓ Have your disinfection chamber inspected and tested quarterly to ensure correct disinfectant levels.
- ✓ Have your grease trap (if installed) cleaned out at least every two months.
- ✓ Keep a record of pumping, inspections, and other maintenance.
- ✓ Learn the location and layout of your AWTS and land application area.
- ✓ Use biodegradable liquid detergents such as concentrates with low sodium and phosphorous levels.
- ✓ Conserve water.

**DON'T**

- ✗ Don't put bleaches, disinfectants, whiteners, nappy soakers and spot removers in large quantities into your AWTS via the sink, washing machine or toilet.
- ✗ Don't allow any foreign materials such as nappies, sanitary napkins, condoms and other hygiene products to enter the system.
- ✗ Don't use more than the recommended amounts of detergents.
- ✗ Don't put fats and oils down the drain and keep food waste out of your system.
- ✗ Don't switch off power to the AWTS, even if you are going on holidays