# On-site Wastewater Management and Effluent Disposal:

## Site & Soil Evaluation & Disposal System Design

## For a Proposed Development at: Lot 137 DP 1268670 No. 24 Malbec Drive, Murrumbateman

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**Signed:** 

### Document Certification

This report has been developed based on agreed requirements as understood by SEEC at the time of investigation. It applies only to a specific task on the nominated lands. Other interpretations must not be made, including changes in scale or application to other projects. The contents of this report are based on a professional appraisal of the conditions that existed at the time of our investigation. Where subsurface investigations have been done the results are only applicable to the specific sampling or testing locations and only to the depth(s) investigated. Because of natural geological variability, and/or because of possible anthropogenic influences, the subsurface conditions reported can change abruptly. Such changes can also occur after the site investigation. The accuracy of the conditions provided in this report is limited by these possible variations and influences and/or is limited by budget constraints imposed by others and/or by adequate accessibility.

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# List of Acronyms

| Acronym | Definition |
|---|---|
| AHD | Australian Height Datum |
| ARI | Average Recurrence Interval |
| AWTS | Aerated Wastewater Treatment System |
| BOM | Bureau of Meteorology |
| DIR | Design Irrigation Rate |
| DLR | Design Loading Rate |
| DP | Deposited Plan |
| DPIE | Department of Planning, Industry and Environment |
| EAA | Effluent Application Area |
| EAT | Emerson Aggregate Test |
| EMA | Effluent Management Area |
| EP | Equivalent Persons |
| ETA | Evapotranspiration/Absorption |
| GDA | Geocentric Datum of Australia |
| LTAR | Long Term Acceptance Rate |
| NorBE | Neutral or Beneficial Effect |
| NUA | Nutrient Uptake Area |
| QCV | Quick Coupling Valve |
| SEEC | Strategic Environmental and Engineering Consulting |
| TP | Test Pit |
| WEM | Wastewater Effluent Model |

# 1 EXECUTIVE SUMMARY

## 1.1 Scope of Work

SEEC has been commissioned by GJ Gardner Homes (the applicant) to provide this wastewater site assessment. It is required to accompany an application for a proposed dwelling at Lot 137 DP 1268670 No. 24 Malbec Drive, Murrumbateman (the site). At the time of inspection, the site was vacant (Figure 1). This assessment is required to show how treated wastewater generated from the proposed dwelling can be sustainably managed onsite.

## 1.2 Site Description

The site is a 6,500 m² (approx.) rural lot located on the southern side of Malbec Drive, Murrumbateman. The proposed dwelling is to be located on the central portion of the lot. The proposed EMA will be located to the north-west of the proposed dwelling where the site grades at 4% to the north-west (Figure 1). At the time of assessment, no natural surface water or groundwater features were identified within the prescribed buffer distances to the proposed EMA.

Soil investigations revealed 180 mm of pedal dark brown sandy loam topsoil over 520 mm of strongly pedal reddish brown sandy clay loam over strongly pedal reddish brown sandy clay loam to sandy light clay down to 1,000+ mm. Soil chemistry testing revealed the soils are slightly acidic and are unlikely to be dispersive.

## 1.3 Proposed Wastewater Management System

It is proposed to install a NSW Health approved AWTS to secondary-treat all wastewater generated by the proposed dwelling. Secondary–treated effluent will then be disposed of via subsurface irrigation.

Hydraulic modelling for zero storage requires a minimum EMA of 400 m². Nutrient modelling requires a minimum EMA of 438 m². The larger of these two will be adopted. Therefore, the total EMA will be 438 m² of subsurface irrigation, split into two equal fields of 219 m² and built to the requirements of AS/NZS1547:2012 (located in the position shown in Figure 1 and to the details shown in Figure 2). A two-way zone sequencing valve must be installed to alternatively dose each irrigation field.

## 1.4 Summary of Recommendations

We conclude the site is suited to dispose secondary-treated effluent via subsurface irrigation. Specifically, our recommendations are:

1. To install a NSW Health approved AWTS to secondary-treat all wastewater generated by the proposed dwelling;
2. To install at least "three-star" plumbing fixtures, or better, in the proposed dwelling to reduce wastewater loads;
3. To ensure that no other structures (existing or planned) are connected to the proposed wastewater management system unless the proper approval is granted by the Council;

4. To install 438 m² of subsurface irrigation, split into two equal fields of 219 m² and built to the requirements of AS/NZS1547:2012 (in the area shown in Figure 1, following the details in Figure 2) to dispose treated wastewater from the NSW Health approved AWTS;
5. To install a two-way zone sequencing valve to alternately dose each irrigation field;
6. To maintain a good cover of vegetation (preferably fully managed lawn (clippings removed)) over the entire EMA;
7. To protect the EMA from vehicle and stock access (fence off if necessary);
8. To erect a minimum of two Warning Signs along the edge of the EMA. Refer to Section 5.8;
9. To preferentially select low phosphorus, liquid detergents;
10. To only use septic friendly cleaning products; and
11. To install and manage the wastewater system according to the details of this report, its appendices, and the manufacturer's recommendations.

**Note: This system design might be altered slightly by the Conditions of Consent. It is the responsibility of the owner/builder to check the conditions of consent prior to commencing works.**

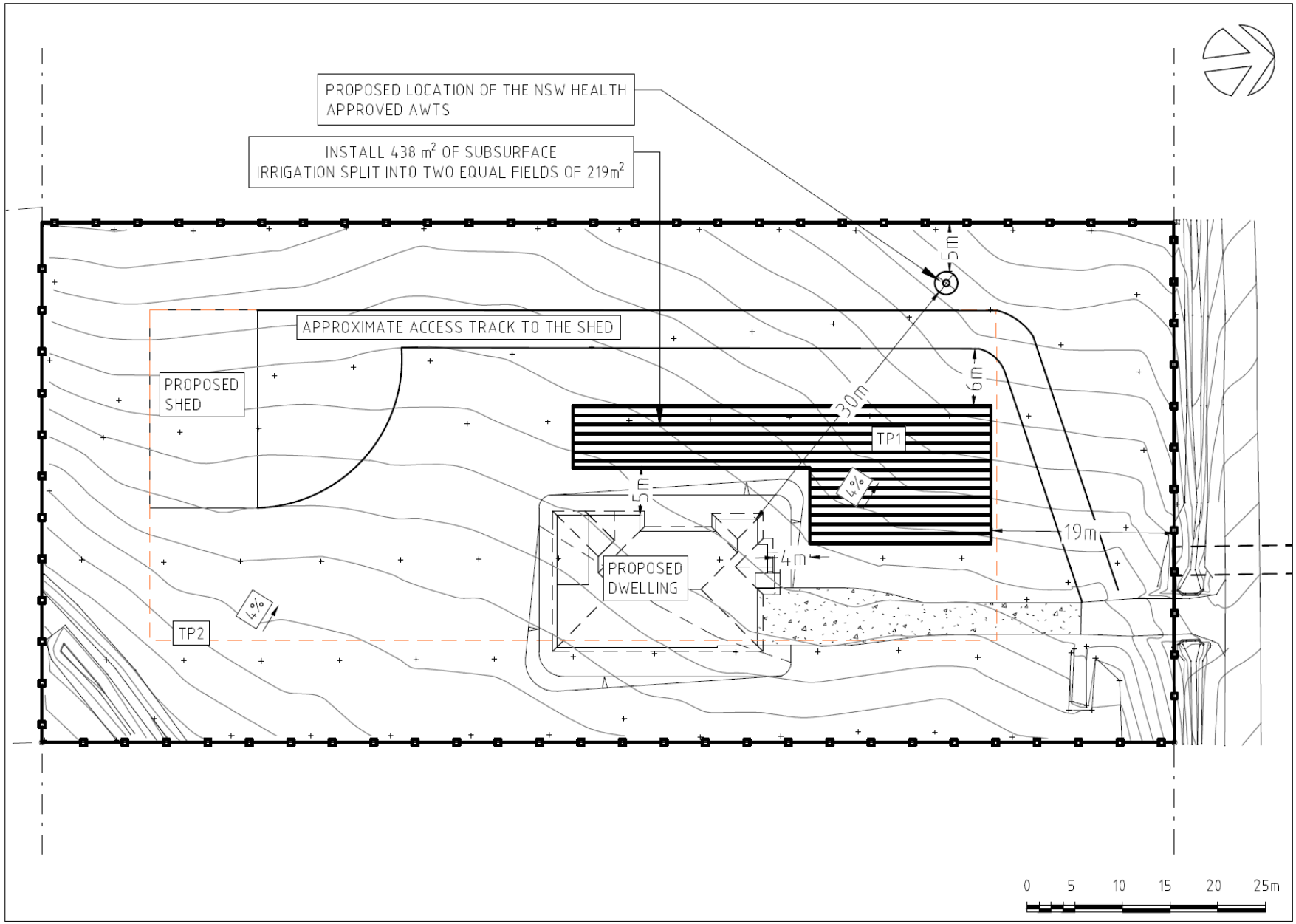



**Figure 1 - Site plan and EMA Location. This Figure must be read in conjunction with the accompanying report by SEEC.**

# 2 SITE DETAILS

**Table 1: Site Details.**

| Detail | Value |
|---|---|
| Site Address | Lot 137 DP 1268670 No. 24 Malbec Drive, Murrumbateman |
| Coordinates[1] | Latitude: -34.971964 Longitude: 149.004865 |
| Applicant | GJ Gardner Homes |
| Allotment Size | 6,500 $m^2$ (approx.) |
| Proposed Development | Single storey dwelling |
| Water Supply | Tank |
| No. Potential Bedrooms[2] | 4 |
| Local Government Authority | Yass Valley |

## 2.1 Design Wastewater Loading

AS/NZS 1547:2012, Table H1 gives a per person loading of 120L/day or 150L/day for tank water or town water supply respectively. This assumes that at least three-star rated plumbing appliances are fitted.

It is proposed to build a single storey dwelling with four potential bedrooms at this site. Therefore, the Design Wastewater Loading rate for the proposed dwelling is 960 L/day based on a maximum occupancy of eight people on tank water supply (AS/NZS 1547:2012).

**Table 2 Design wastewater loading calculations (for a dwelling) (AS/NZS 1547:2012)**

| Source | Typical wastewater design flows (L/person/day) | |
|---|---|---|
| Residential premises | On-site roof tank supply | Reticulated water supply |
| | 120 | 150 |

[1] Coordinates are referenced in GDA2020-Geographic
[2] A potential bedroom is considered as a room with a closable door(s), at least one window and a minimum of eight square metres (WaterNSW, 2023).

# 3 PHYSICAL SITE ASSESSMENT

The site and soil evaluation has been undertaken following AS/NZS 1547:2012: *On-site Domestic Wastewater Management,* Sections 2.1 & 2.2 of the WaterNSW *Designing and Installing On-Site Wastewater Systems* (2023) and Appendix 2 of the Environment & Health Protection Guidelines: *On-site Sewage Management for Single Households* (the 'Silver Book', Department of Local Government, 1998).

## 3.1 Climate

Climate is an important factor in onsite wastewater management. Areas that have high evaporation and low rainfall are better suited to effluent management than those with a cold and/or wet climate. Climate data for this assessment has been sourced from the BoM. According to the BoM the site is in an area where average monthly evaporation is significantly higher than median monthly rainfall for a large portion of the year. This is considered a minor limitation to the application of treated effluent.

## 3.2 Flood Potential

It is required to locate all EMAs above the 1:20 Average Recurrence Interval (ARI) flood level. This is to reduce the risk of effluent being transported off the site during a flood event. In addition, all electrical components, vents, and inspection ports of all wastewater management infrastructure must be located above the 1:100 ARI flood level. This might involve locating the electrical components (if applicable) remote from the tanks, e.g., on a wall or similar. At the time of this assessment, we were not aware of any flood study having been undertaken on this property. However there does not appear to be any threat of flooding in the proposed EMA. This is considered a minor limitation to the application of treated effluent.

## 3.3 Exposure

Sun and wind exposure over the EMA must be maximised to help with evaporation. Factors that affect this are local topography, vegetation, and the built environment. Improper location of an EMA in the shade can reduce evaporation by up to 30%. At the time of this assessment, we found the proposed EMA to be well exposed to sun and wind. This is considered a minor limitation to the application of treated effluent.

## 3.4 Slope Gradient

Slope is an important parameter affecting the choice of an EMA. Excessive slope increases the risk of effluent leaving the site as run-off, particularly during prolonged or high rainfall events. It also makes the installation of EMAs difficult as heavy machinery such as a backhoe or tractor may have limited access to the EMA. If slope conditions are not ideal a more conservative approach for effluent management may be adopted. A site investigation conducted by SEEC found that slope in the proposed EMA is between 0-6%. This is considered a minor limitation to the application of treated effluent and, provided other site and soil constraints are not present, all disposal types are permissible.

### 3.5 Landform

Different landforms pose different limitations to effluent management. The risk of run-on and hence the risk of run-off from an EMA is directly related to the type of landform and the position of the EMA on it. A site investigation conducted by SEEC found that the proposed EMA is on a crest/convex side slope. Therefore, the risk of effluent runoff is considered low. This is considered a minor limitation to the application of treated effluent.

### 3.6 Run-on and Seepage

Surface stormwater run-on must not be permitted onto an EMA. This is because it could transport effluent offsite and into receiving waters. In addition, regular run-on might inhibit vegetative growth over the EMA. A site investigation conducted by SEEC found there is a moderate risk of stormwater run on from the proposed development. This is a moderate limitation to the application of treated effluent. All stormwater overflows must be diverted away from the proposed EMA.

### 3.7 Erosion Potential

Active erosion features must be stabilised or be avoided altogether for the purpose of effluent management. At the time of assessment, no significant erosion features were identified within proximity to the proposed EMA. This is considered a minor limitation to the application of treated effluent.

### 3.8 Site Drainage

An EMA must not be placed in areas that show signs of increased surface moisture or areas on known high groundwater. This is to reduce the risk of effluent leaving the site by either surface waters or groundwater. The type of vegetation and the condition of the soils give good indications of the site's drainage. At the time of assessment, no moisture tolerant vegetation or significant grey mottling of the subsoil was observed on this site. This is considered a minor limitation to the application of treated effluent.

### 3.9 Cut and Fill

The presence of cut and fill might affect the choice of an effluent management system, particularly if very high or very low permeability soils have been imported. Fill might also be prone to settlement and might also be detrimental to the establishment of good vegetative cover. A site investigation conducted by SEEC found that there are no signs of unexpected fill near the proposed EMA. This is considered a minor limitation to the application of treated effluent.

### 3.10 Surface Rock

The presence of frequent rock outcrops or surface rock fragments is usually an indication of shallow and variable soil depth and/or significant site erosion. Construction of absorption systems can be difficult on such sites and special measures might need to be adopted or irrigation disposal methods considered. A site investigation conducted by SEEC found the site has less than 10% rock outcrops. This is considered a minor limitation to the application of treated effluent.

### 3.11 Proximity to Surface Waters

The proximity of natural watercourses drainage depressions or farm dams is one of the most important factors in the selection of an EMA. It will be necessary to maintain buffers anywhere from 40 m to 100 m between the EMA and a surface water feature.

Section 5.4 provides further information on the required buffer distances between the proposed EMA and site features.

At the time of assessment, we found no surface water feature was within the prescribed buffer distance to the proposed EMA. This is considered a minor limitation to the application of treated effluent.

### 3.12 Groundwater Use

WaterNSW recommends that EMAs are not located within 100 m from the high-water level in bores that are used for domestic potable water. A search of WaterNSW's ground water map did not identify any groundwater bores licensed for potable water within 100 m of the proposed EMA. This is considered a minor limitation to the application of treated effluent.

### 3.13 Land Availability

After summarising all the above, particularly regarding buffer distances, we have found more than enough land is suitable for effluent management at this site. This is considered a minor limitation to the application of treated effluent. Figure 1 shows where we believe the most suitable location of an EMA is for the proposed development.

### 3.14 Vegetation

The suitability of the existing vegetation (if any) must be considered. The most common, and one of the most suitable, types of vegetation for effluent management is managed lawn grass. Lawn grass efficiently covers large areas and provides a good opportunity for evapotranspiration and nutrient uptake (particularly nitrogen). Some native vegetation, particularly that which has developed on poor sandy soils, will not respond well to nutrient-rich wastewater and, if possible, must be avoided or replaced with more suitable species. A site investigation conducted by SEEC found the existing vegetation onsite is improved pasture where the proposed EMA has a good cover of suitable vegetation.

As soils are expected to be moderately fertile SEEC believe the property owner will be able to successfully maintain fully managed lawn (clippings removed) over the entire EMA. This was observed being achieved on neighbouring developments. Clippings can be removed by using a mower catch, blower, rake, or similar.

### 3.15 Biodiversity

While sensitive terrestrial biodiversity does not directly impact how an EMA will perform treated effluent has the potential to cause adverse harm to sensitive terrestrial biodiversity and if possible, must be avoided when siting an EMA. According to the DPIE Biodiversity Values Map and Threshold tool (accessed, 2024) the area near the proposed EMA is unaffected by any threatened species or communities with potential for serious and irreversible impacts.

### 3.16 Stock Present

Stock can cause damage to wastewater management infrastructure and must be kept out of the EMA by fencing or another physical barrier. At the time of assessment, no stock were observed onsite. Considering this is a rural property stock may be introduced in the future. If this occurs, all wastewater management infrastructure must be fully fenced from the stock.

### 3.17 Risk of Frost

Periodic freezing and thawing can cause damage to wastewater management infrastructure. All distribution pipes must be well buried to ensure they are adequately insulated. Based on the geographical location of the site we believe there is moderate risk of frost at this site.

# 4 SOIL ASSESSMENT

The site and soil assessment has been undertaken following AS/NZS1547:2012 On-*site Domestic Wastewater Management*, Sections 2.1 & 2.2 of WaterNSW *Designing and Installing On-Site Wastewater Systems* (2023) and Appendix 2 of the 'Environment & Health Protection Guidelines: *On-site Sewage Management for Single Households* (the 'Silver Book', Department of Local Government, 1998).

## 4.1 Soil Landscape Mapping

Soil Landscape mapping sourced from the NSW Government eSPADE portal (2024), identifies the site to be on the Boorowa Soil landscape.

## 4.2 On-site Soil Description

### *4.2.1 Soil Profile Descriptions*

TP 1

| Depth | | | Field Description |
|---|---|---|---|
| 0 | to | 180 mm | Pedal brown sandy loam topsoil. |
| 180 | to | 700 mm | Strongly pedal reddish brown sandy clay loam. 45 to 50 mm ribbons. |
| 700 | to | 1,000 mm | Strongly pedal reddish brown sandy clay loam to sandy light clay. 50 to 60 mm ribbons. |

TP 2

| Depth | | | Field Description |
|---|---|---|---|
| 0 | to | 180 mm | Pedal brown sandy loam topsoil. |
| 180 | to | 700 mm | Strongly pedal reddish brown sandy clay loam. 45 to 50 mm ribbons. |
| 700 | to | 1,000 mm | Strongly pedal reddish brown sandy clay loam to sandy light clay. 50 to 60 mm ribbons. |

### *4.2.2 Soil Classification and (DLR/DIR)*

Table 3 shows the selected soil category and corresponding DLR/DIR applied to hydraulic calculations used in determining the hydraulic minimum size of the EMA. The soil category was selected based on what we believe to be the limiting layer at this site relating to the specific disposal option chosen.

**Table 3: Selected soil classification and corresponding DLR/DIR.**

| Soil Category | Soil Texture | Structure | Indicative Permeability (m/day) | | DLR/DIR (mm/day) (AS/NZS 1547:2012) |
|---|---|---|---|---|---|
| | | | | | Subsurface Irrigation 0-10% Slope |
| 1 | Gravels & Sands | Massive | >3.0 | | |
| 2 | Sandy Loams | Weak | >3.0 | | |
| | | Massive | 1.4 - 3.0 | | |
| 3 | Loams | High/ Moderate | 1.5 - 3.0 | | |
| | | Weak or Massive | 0.5 - 1.5 | | |
| 4 | Clay Loams | High/ Moderate | 0.5 - 1.5 | x | 3.5 |
| | | Weak | 0.12 - 0.5 | | |
| | | Massive | 0.06 - 0.12 | | |
| 5 | Light Clays | Strong | 0.12 - 0.5 | | |
| | | Moderate | 0.06 - 0.12 | | |
| | | Weak/ Massive | < 0.06 | | |
| 6 | Medium to Heavy Clays | Strong | 0.06 - 0.5 | | |
| | | Moderate | < 0.06 | | |
| | | Weak/ Massive | < 0.06 | | |

## 4.3 Soil Constraints

### *4.3.1 Soil Depth to a Limiting Layer (e.g bedrock or watertable)*

Soil depth is an important factor in choosing a suitable effluent disposal method. The depth of soil is measured to a limiting layer - i.e. bedrock or a periodically high watertable (shown by grey mottling in the soils – refer to Section 3.8 and 4.2.1). Generally, soil is a very good medium for providing treatment to effluent. As the effluent passes through soil, it is filtered and there is adsorption of chemicals (particularly phosphorous) onto the soil particles. In addition, this allows time for viruses to die (as they are usually outside their preferred environment). At least 600 mm of soil is required under the base of absorption/mound systems or to allow for the utilization of an irrigation system. Where soil depth is limited the soil profile can be raised to facilitate the installation of an EMA.

The natural soil profile has been recorded by SEEC staff while onsite. The result of our investigations revealed the natural soil profile is more than 1,000 mm in depth. This is considered a minor limitation to the application of treated effluent. Provided there are no other limiting factors, all disposal types are permissible.

### *4.3.2 Coarse Fragments*

Coarse fragments are those over 2 mm in diameter. They can pose limitations to vegetative growth by lowering the soil's ability to supply water and nutrients. The result of our investigations revealed there are less than 20% coarse fragments within the soil. This is considered a minor limitation to the application of treated effluent.

### *4.3.3 Soil pH*

The pH of a soil influences its ability to supply nutrients to vegetation. If the soil is too acidic vegetative growth would be inhibited. Soil pH was tested in-house by SEEC staff and was found to be 6.1. This is considered to be slightly acidic and is considered a minor limitation to the application of treated effluent as it is unlikely to inhibit vegetative growth.

### *4.3.4 Electrical Conductivity*

The electrical conductivity of the soil indicates potential salinity within the soil. Salinity in soils can inhibit vegetative growth and affect water resources. Electrical Conductivity was tested in-house by SEEC staff and was found to be less than 4 dS/m. This is considered a minor limitation to the application of treated effluent as it is unlikely to inhibit vegetative growth.

### *4.3.5 Emerson Aggregate Test*

The EAT is a measure of soil dispersibility and susceptibility to erosion. It assesses the physical changes that occur to a single ped of soil when immersed in water - specifically whether it slakes and falls apart or disperses and clouds the water. An EAT was conducted in-house by SEEC staff. We have classified the soil as Class 7 which means the soils are unlikely to be dispersive. This is considered a minor limitation to the application of treated effluent.

### *4.3.6 Phosphorus Sorption*

The capacity of a soil to adsorb phosphorus is expressed as its phosphorus sorption capacity. Soils with a high capacity to sorb phosphorous are preferred and can result in smaller disposal areas. The estimated p-sorption for the site is 400 mg/kg (WaterNSW, 2023). This is considered a minor limitation to the application of treated effluent.

# 5 RECOMMENDATIONS

The following recommendations are based on the site and soil evaluation above and have been developed specifically for this site and associated proposed development. Any changes to the site or development scope after the date of inspection could result in further assessment being required.

## 5.1 Wastewater Treatment System and Disposal Method

The following disposal method has been chosen by the client and/or is considered the most suitable:

Subsurface irrigation following treatment in a NSW Health approved AWTS.

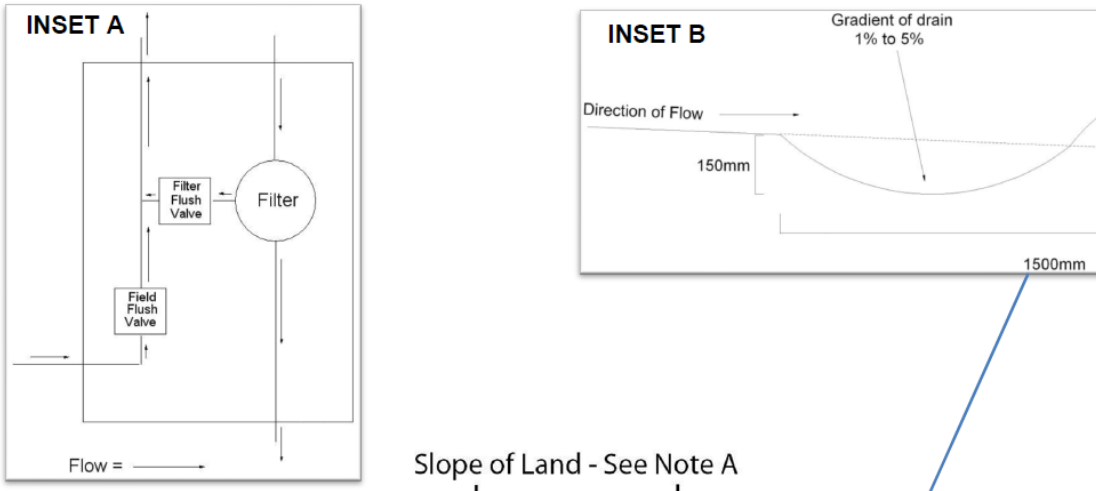
## 5.2 Sizing of the EMA

A Hydraulic Balance for Zero Storage (Appendix 1) and nitrogen/phosphorus Nutrient Balance modelling (Appendix 2) has been undertaken to determine the minimum required EMA for the development. The DIR given in Section 4.2.2 has been adopted in the hydraulic balance.

Hydraulic modelling for zero storage requires a minimum EMA of 400 m$^2$. Nutrient modelling requires a minimum EMA of 438 m$^2$. The larger of these two will be adopted. Therefore, the total EMA will be 438 m$^2$ of subsurface irrigation, split into two equal fields of 219 m$^2$ and built to the requirements of AS/NZS1547:2012 (located in the position shown in Figure 1 and to the details shown in Figure 2). A two-way zone sequencing valve must be installed to alternatively dose each irrigation field.

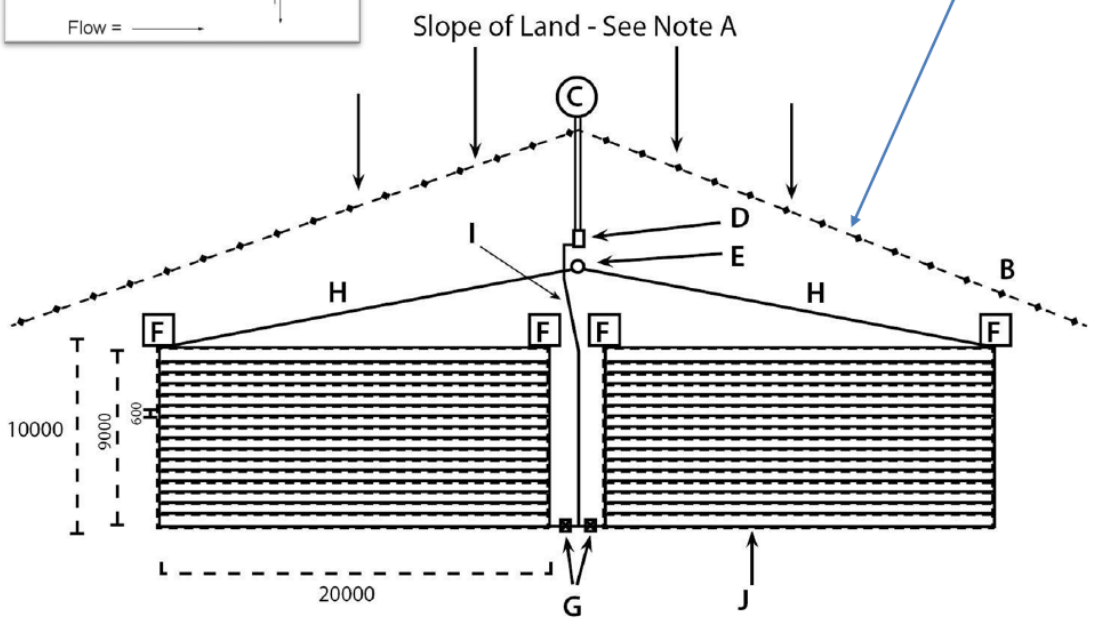
## 5.3 Professional Construction

A licensed plumber familiar with the design of wastewater disposal systems must be employed to install the disposal system. A combination of manual and/or automatic switching valves will be used to help switch the wastewater flow between the different areas of the EMA as required. The typical details of the disposal system are given in the accompanying design drawing and notes.










**Subsurface Irrigation Area Construction**

A Design for relatively uniform slope. Additional design work may be required where slope exceeds 12% or if system is to be installed over undulating ground.

B An earth bank diversion drain must be constructed upslope of the area to divert stormwater run-on if this is appreciable (see Inset B and Standard Drawing 1).

C Secondary treatment system – the irrigation pump must provide a *minimum* 20 m head and a flow rate that matches the design output of the selected dripline. Flow rate will vary depending on emitter spacing, flow rate and lineal metres of line. A full hydraulic design must be carried out. Each area should be capable of discharging a minimum of 80 L/min.

D Filtration and flushing mechanism (see Inset A) – a field flush valve must be installed on the return line to facilitate periodic flushing to the treatment tank. An additional filter flush valve should be installed downstream of the field flush valve. A 100-150 micron cylindrical filter should be installed and cleaned regularly. Where there are potential problems in returning irrigation field flush back to the treatment tank, a small (approximately 3 m x 0.6 m) absorption area sited below the effluent irrigation area can be used to accommodate the flushed effluent.

E An automatic, hydraulically operated sequencing valve should be installed to deliver effluent evenly to the two areas.

F Air release valves must be installed at high points in each area. Additional air release valves may be required in undulating terrain.

G Check valves are required for each irrigation field to facilitate periodic flushing.

H Distribution manifolds should be 25 mm uPVC or polyethylene pipe buried 300 mm below the ground surface.

I Flushing return manifold should be 25 mm uPVC or polyethylene pipe buried 100-150 mm below the ground surface within the irrigation area. Outside this area, the pipe must be buried at a minimum of 300 mm depth.

J Pressure compensating (PC) subsurface drip line laterals (typically 16 mm) with emitters and laterals at approximately 600 mm spacings (maximum 1,000 mm spacings) and buried to a depth 100-150 mm. Only subsurface dripline specifically designed for effluent irrigation must be used.

*This standard design has been based on a generic area of 400 m² for irrigation based on typical conditions. It does not eliminate the need for a site and soil evaluation to be carried out or any additional consideration of site specific issues. It should be used as a generic guide only.*

**Standard Drawing 13A – Subsurface Effluent Irrigation**

(not to scale)

**Figure 2: Proposed Disposal System (Typical details). This Figure must be read in conjunction with the accompanying report by SEEC.**

## 5.4 Required Buffer Distances

Buffer distances required between an EMA and different site features as specified by WaterNSW (2019) are outlined in Table 4.

**Table 4: Specified Buffer Distances.**

| Site Feature | Subsurface Irrigation |
|---|---|
| Buildings and retaining walls | 2 m downslope or flat, 6 m upslope |
| Premise's boundaries, paths, drives and walkways, recreation areas | 3 m downslope or flat, 4 m upslope |
| In-ground potable water tanks, in-ground swimming pools | 4 m not to be located upslope |
| Permanent and intermittent watercourses | 100 m from high water level |
| Bore or well used for domestic consumption | 100 m from high water level |
| Dams, drainage depressions, roadside drainage, and stormwater improvement devices | 40 m from high water level |

Refer to Figure 1 for the recommended positioning of the EMA.

## 5.5 Detergent Use

Liquid detergents must be used in the household as powdered detergents contain elevated concentrations of salts which could alter the soil's chemical properties and significantly reduce its ability to percolate water.

## 5.6 Septic Friendly Products

The property owner must ensure that only septic friendly products are used to clean all plumbing fixtures connected to the wastewater treatment system thought-out the entire development. This is particularly important in the kitchen as many cleaners used in cleaning kitchen surfaces and appliances contain high chemical loads which are detrimental to maintaining efficient biological processes in wastewater treatment systems.

The system manufacturer must provide to the property owner a list of products which can be disposed into the system without causing it significant harm. Furthermore, the wastewater treatment system would benefit from the regular application of odour control products and dosing of activity enzyme products to improve the treatment process.

## 5.7 Water Saving Fixtures

This design assumes full water reduction fixtures are used in the development. Full water reduction are 3/6 litre dual flush toilets, shower flow restrictors, aerator taps, front load washing machines, and flow/pressure control valves on all water use outlets.

## 5.8 Signs

A minimum of two Warning Signs must be installed along the edge of the EMA. The signs shall read "WARNING: RECLAIMED EFFLUENT/RECYCLED WATER, DO NOT DRINK, AVOID CONTACT" or similar. Lettering must be clearly visible from three meters away.

## 5.9 Vehicle Access

Vehicle traffic can cause damage to wastewater management infrastructure and must be kept out of the EMA by fencing or another physical barrier. It is the responsibility of the property owner to ensure no vehicles are permitted to track over a constructed EMA.

## 5.10 Pools and Spa Pools

Wastewater from pools and spa pools generate a large volume of flow if emptied into an onsite wastewater management system. This wastewater will often contain chlorine and/or mineral salts which have the potential to harm bacterial cultures found in septic tanks or septic chambers of an AWTS. Incoming loads from a pool or spa pool could potentially overload a treatment system flushing accumulated sludge into drainage lines or the pump chamber of an AWTS. NSW Ministry of Health (2018) states that wastewater coming from pool or spa pool is not classified as household sewage and therefore must not be connected to an onsite wastewater management system. The property owner must ensure that no pool or spa pool is connected to the proposed wastewater management system.

## 5.11 Summary of Recommendations

We conclude the site is suited to dispose secondary-treated effluent via subsurface irrigation. Specifically, our recommendations are:

1. To install a NSW Health approved AWTS to secondary-treat all wastewater generated by the proposed dwelling;
2. To install at least "three-star" plumbing fixtures, or better, in the proposed dwelling to reduce wastewater loads;
3. To ensure that no other structures (existing or planned) are connected to the proposed wastewater management system unless the proper approval is granted by the Council;
4. To install 438 m$^2$ of subsurface irrigation, split into two equal fields of 219 m$^2$ and built to the requirements of AS/NZS1547:2012 (in the area shown in Figure 1, following the details in Figure 2) to dispose treated wastewater from the NSW Health approved AWTS;
5. To install a two-way zone sequencing valve to alternately dose each irrigation field;
6. To maintain a good cover of vegetation (preferably fully managed lawn (clippings removed)) over the entire EMA;
7. To protect the EMA from vehicle and stock access (fence off if necessary);
8. To erect a minimum of two Warning Signs along the edge of the EMA. Refer to Section 5.8;
9. To preferentially select low phosphorus, liquid detergents;
10. To only use septic friendly cleaning products; and
11. To install and manage the wastewater system according to the details of this report, its appendices, and the manufacturer's recommendations.

# 6 SYSTEM DESIGN

**Note: This system design might be altered slightly by the Conditions of Consent. It is the responsibility of the owner/builder to check the conditions of consent prior to commencing works.**

This design assumes a certain design wastewater load. It will be invalidated if that load were to significantly increase (>10 percent): This might occur due to (but not limited to):

- If a spa bath or in-sink food grinder were installed.
- If the home is occupied by more than two EP per bedroom.
- If full water reduction plumbing fixtures are not installed.
- If plumbing leaks are not attended to.

The design is warranted to meet the required design guidelines and standards at the time of writing. However, that does not preclude the requirement of the homeowner to satisfactorily use and maintain the system to the requirements of the manufacturers and to the generic guidelines given in the appendices. There are requirements to:

- Ensure that only "septic-friendly" substances are disposed into the system (materials and chemicals).
- Periodically (once per 3-5 years) clean out the septic tank or septic chamber of the AWTS.
- Regularly (once per three months) clean the septic outlet filter or the in-line filter.
- Regularly (once per three months) manually flush the system.
- Periodically (one per year) check the disposal area for signs of seepage.
- Periodically (one per year) check the upslope diversion device (if applicable) to ensure stormwater is adequately diverted.

Your system will be inspected as required by Council. The Wastewater Contractor must inspect both the treatment system and the disposal area following the checklist given in the appendices and submit the results to Council. Should there be a problem with your system you must initially consult the licensed contractors who installed the system and/or your regular maintenance contractor.

# 7 REFERENCES

Department of Local Government (1998). Environment and Health Protection Guidelines: *Onsite Sewage Management for Single Household.*

eSPADE (2024). NSW Office of Environment and Heritage.

NSW Ministry of Health (2018). *Secondary Treatment System Accreditation Guideline.*

Standards Australia / Standards New Zealand (2012). AS/NZS 1547:2012 *On-site Domestic Wastewater Management.*

WaterNSW (2022). *Neutral or Beneficial Effect on Water Quality Assessment Guideline.*

WaterNSW (2022). *Neutral or Beneficial Effect on Water Quality Assessment Tool CONSULTANTS AND CONSULTANT ADMINISTRATORS.*

WaterNSW (2023). *Designing and Installing On-Site Wastewater Systems. A WaterNSW Current Recommended Practice.*

WaterNSW (2023). *Developments in the Sydney Drinking Water Catchment – Water Quality Information Requirements.*

# 8 APPENDICES

## 8.1 Appendix 1 – Hydraulic Balance for Zero Storage

| | | |
|---|---|---|
| Rainfall Station | Hall (Lochleigh) | |
| Evaporation Zone | Burrinjuck Dam | |
| | | |
| Wastewater Load | 960 | L/day |
| Design Irrigation Rate | 3.5 | mm/day |
| | | |
| Land Area | 400 | sqm |
| | | |
| Storage required: | 0.0 | cubic m |
| | | |

| Month | Days in month | Median Precipitation (mm) | Evaporation (mm) | Crop Factor |
|---|---|---|---|---|
| Jan | 31 | 47.8 | 182.9 | 0.8 |
| Feb | 28 | 39.9 | 148.4 | 0.8 |
| Mar | 31 | 42.2 | 117.8 | 0.8 |
| Apr | 30 | 37.4 | 66 | 0.8 |
| May | 31 | 40.6 | 40.3 | 0.7 |
| Jun | 30 | 49.1 | 27 | 0.6 |
| Jul | 31 | 50.1 | 27.9 | 0.6 |
| Aug | 31 | 57.8 | 40.3 | 0.6 |
| Sep | 30 | 55.8 | 60 | 0.7 |
| Oct | 31 | 55.9 | 96.1 | 0.8 |
| Nov | 30 | 56.8 | 129 | 0.8 |
| Dec | 31 | 55.6 | 167.4 | 0.8 |

**INPUTS**

| | Median Precipitation (mm) | Effluent Irrigation (mm) | Inputs (mm) |
|---|---|---|---|
| Jan | 47.8 | 74.40 | 122.20 |
| Feb | 39.9 | 67.20 | 107.10 |
| Mar | 42.2 | 74.40 | 116.60 |
| Apr | 37.4 | 72.00 | 109.40 |
| May | 40.6 | 74.40 | 115.00 |
| Jun | 49.1 | 72.00 | 121.10 |
| Jul | 50.1 | 74.40 | 124.50 |
| Aug | 57.8 | 74.40 | 132.20 |
| Sep | 55.8 | 72.00 | 127.80 |
| Oct | 55.9 | 74.40 | 130.30 |
| Nov | 56.8 | 72.00 | 128.80 |
| Dec | 55.6 | 74.40 | 130.00 |

**OUTPUTS**

| | Evapotranspiration (mm) | Percolation (mm) | Outputs (mm) | Storage (mm) | Cumulative |
|---|---|---|---|---|---|
| Jan | 146.32 | 108.50 | 254.82 | -132.62 | 0.00 |
| Feb | 118.72 | 98.00 | 216.72 | -109.62 | 0.00 |
| Mar | 94.24 | 108.50 | 202.74 | -86.14 | 0.00 |
| Apr | 52.8 | 105.00 | 157.80 | -48.40 | 0.00 |
| May | 28.21 | 108.50 | 136.71 | -21.71 | 0.00 |
| Jun | 16.2 | 105.00 | 121.20 | -0.10 | 0.00 |
| Jul | 16.74 | 108.50 | 125.24 | -0.74 | 0.00 |
| Aug | 24.18 | 108.50 | 132.68 | -0.48 | 0.00 |
| Sep | 42 | 105.00 | 147.00 | -19.20 | 0.00 |
| Oct | 76.88 | 108.50 | 185.38 | -55.08 | 0.00 |
| Nov | 103.2 | 105.00 | 208.20 | -79.40 | 0.00 |
| Dec | 133.92 | 108.50 | 242.42 | -112.42 | 0.00 |

## *8.2 Appendix 2 – Nutrient Balance*

| | |
|---|---|
| Wastewater Volume | 960 (L/day) |
| Vegetation in EMA | Lawn - Fully managed |
| Limiting Soil in EMA | Clay Loams |

**Hydraulic Balance (AS/NZS1547:2012)**

A=Q/DLR
Where:

| | | | |
|---|---|---|---|
| A = Area ($m^2$) | | | |
| Q = Wastewater Flow = | 960 | L/day | |
| DLR = Design Loading Rate = | 3.5 | mm/day | |
| Area Requred: | | | |
| A = | 274 | $m^2$ of | Irrigation |

**Nitrogen Balance (WaterNSW, 2021)**

A = 3.65(C x Q) / Lx
Where:

| | | | |
|---|---|---|---|
| A = Area ($m^2$) | | | |
| C = Concentration of Nutrient = | 30 | mg/L | |
| Q = Wastewater Flow = | 960 | L/day | |
| Lx = Critical Loading Rate = | 240 | (Kg/ha/year) | |
| Area Required: | | | |
| A = | 438 | $m^2$ of | Lawn - Fully managed |

**Phosphorus Balance (WaterNSW, 2021)**

$A=3.65(CxQ)/U_R+0.2d(1-n_p)G_sX_{sorp}$ Basalt soils?

Where:

| | | | |
|---|---|---|---|
| A = Area ($m^2$) | | | |
| Wastewater Flow (Q) = | 960 | L/day | |
| Phosphorus Sorption ($X_{sorp}$) = | 400 | mg/kg | |
| Design Soil Depth (d) = | 1 | m | |
| Bulk Density = | 1.5 | $g/cm^3$ | |
| Soil Specific Gravity ($G_{s)}$ = | 2.65 | $g/cm^3$ | |
| P uptake ($U_R$) = | 30 | kg/ha/year | |
| Concentration of phosphorus = | 12 | mg/L | |
| Area Required: | | | |
| A = | 280 | $m^2$ of | Lawn - Fully managed |

Adapted from WaterNSW, 2022 and WaterNSW, 2023

## *8.3 Appendix 3 – Annual Checklist for Owners (WaterNSW 2023)*

| **Checklist 13.2 Operation inspection(1) of land application area for use by service agents, Council inspectors and system owners** | | | | |
|---|---|---|---|---|
| Owner: | | | | |
| Address: | | | | |
| Installation date: | | | | |
| Land Application Area coordinates: | | | | |
| Does the system owner have a set of plans of the irrigation system and an Operational and Maintenance Manual? | | | ☐ Yes | ☐ No |
| **Land Application Area** | | | | |
| Is there evidence of irrigation area damage by vehicle, livestock or domestic animal activities? | ☐ Yes | ☐ No | Comment: | |
| Is a good vegetation cover established over the effluent irrigation area? | ☐ Yes | ☐ No | Comment: | |
| Are there any green or boggy areas or surface ponding of effluent liquid in the irrigation area? | ☐ Yes | ☐ No | Comment: | |
| Are there dry areas or areas lacking vegetation in the irrigation area? | ☐ Yes | ☐ No | Comment: | |
| Is the effluent irrigation area associated with an unpleasant smell that would suggest untreated or poorly treated effluent is being used to irrigate? | ☐ Yes | ☐ No | Comment: | |
| Has the effluent irrigation area been mown to maintain the grass short? | | | ☐ Yes | ☐ No |
| **Treatment and Irrigation System** | | | | |
| Is any stormwater run-on effectively diverted around the irrigation area? | | | ☐ Yes | ☐ No |
| Is the irrigation pump working? | | | ☐ Yes | ☐ No |
| Is the irrigation system working without leaks? | | | ☐ Yes | ☐ No |
| Has the effluent irrigation area been back flushed? | | | ☐ Yes | ☐ No |
| Have the irrigation filters been checked and cleaned? | | | ☐ Yes | ☐ No |
| Does the system require air bleeding? | | | ☐ Yes | ☐ No |

## *8.4 Appendix 4 – Fact Sheets for Owners (DLG, 1998)*

# 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.

**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.

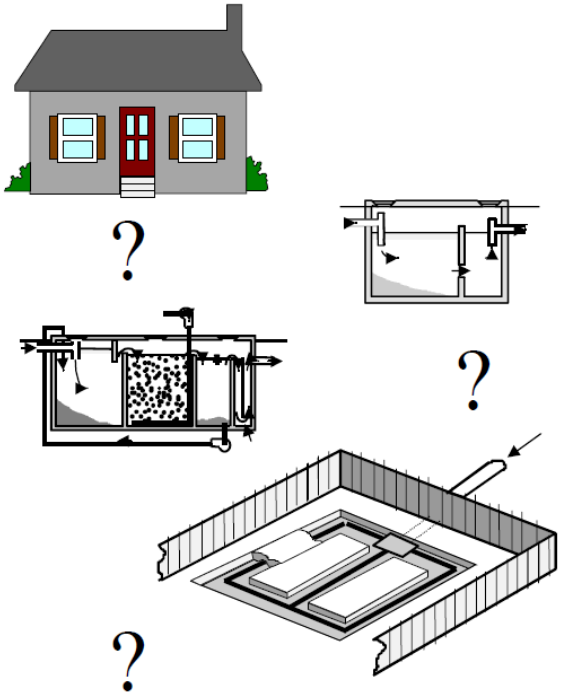
**HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT**

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




SEEC

# 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.

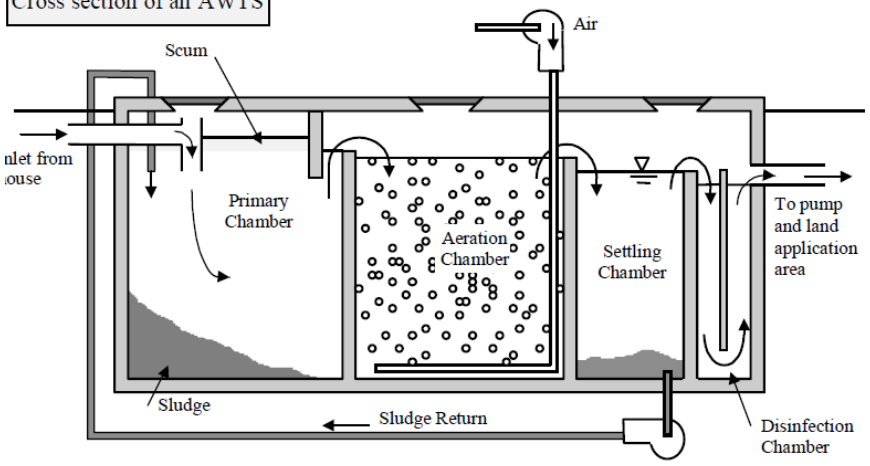
It consists of a series of treatment chambers combined with an irrigation system. An AWTS enables people living in unsewered areas to treat and utilise their wastewater.

## 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.

Cross section of an AWTS




## 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

### 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.

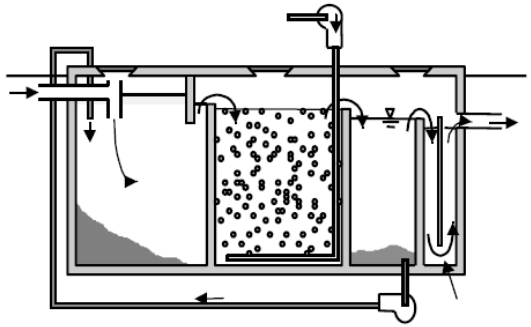
### HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

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



SEEC

# LAND APPLICATION AREAS

The reuse of domestic wastewater on-site can be an economical and environmentally sound use of resources.

## What are land application areas?

These are areas that allow treated domestic wastewater to be managed entirely on-site.

The area must be able to utilise the wastewater and treat any organic matter and wastes it may contain. The wastewater is rich in nutrients, and can provide excellent nourishment for flower gardens, lawns, certain shrubs and trees. The vegetation should be suitably tolerant of high water and nutrient loads.

## How does a land application area work?

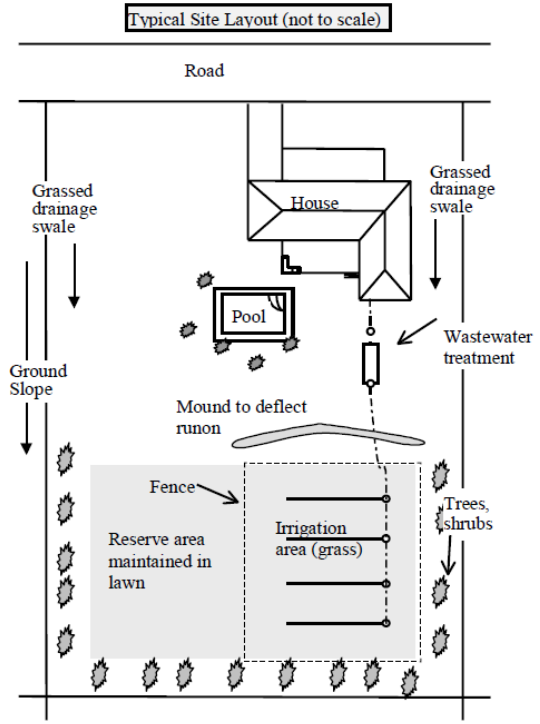
Treated wastewater applied to a land application area may be utilised or simply disposed, depending on the type of application system that is used. The application of the wastewater can be through a soil absorption system (based on disposal) or through an irrigation system (based on utilisation).

***Soil absorption systems*** do not require highly treated effluent, and wastewater treated by a septic tank is reasonable as the solids content in the effluent has been reduced. Absorption systems release the effluent into the soil at a depth that cannot be reached by the roots of most small shrubs and grasses. They rely mainly on the processes of soil treatment and then transmission to the water table, with minimal evaporation and up-take by plants. **These systems are not recommended in sensitive areas as they may lead to contamination of surface water and groundwater.**

***Irrigation systems*** may be classed as either subsurface or surface irrigation. If an irrigation system is to be used, wastewater needs to be pre-treated to at least the quality produced by an aerated wastewater treatment system (AWTS).

*Subsurface irrigation* requires highly treated effluent that is introduced into the soil close to the surface. The effluent is utilised mainly by plants and evaporation.

*Surface irrigation* requires highly treated effluent that has undergone aeration and disinfection treatments, so as to reduce the possibility of bacteria and virus contamination.




The effluent is then applied to the land area through a series of drip, trickle, or spray points which are designed to eliminate airborne drift and run-off into neighbouring properties.

There are some public health and environmental concerns about surface irrigation. There is the risk of contact with treated effluent and the potential for surface run-off. Given these problems, subsurface irrigation is arguably the safest, most efficient and effective method of effluent utilisation.

## Regulations and recommendations

The design and installation of land application areas should only be carried out by suitably qualified or experienced people, and only after a site and soil evaluation is done by a soil scientist. Care should be taken to ensure correct buffer distances are left between the application area and bores, waterways, buildings, and neighbouring properties.

Heavy fines may be imposed under the Clean Waters Act if effluent is managed improperly.

At least two warning signs should be installed along the boundary of a land application area. The signs should comprise of 20mm high Series C lettering in black or white on a green background with the words:

**RECLAIMED EFFLUENT**
**NOT FOR DRINKING**
**AVOID CONTACT**

Depending on the requirements of your local council, wet weather storage and soil moisture sensors may need to be installed to ensure that effluent is only irrigated when the soil is not saturated.

Regular checks should be undertaken of any mechanical equipment to ensure that it is operating correctly. Local councils may require periodic analysis of soil or groundwater characteristics

Humans and animals should be excluded from land application areas during and immediately after the application of treated wastewater. The longer the period of exclusion from an area, the lower the risk to public health.

The householder is required to enter into a service contract with the installation company, its agent or the manufacturer of their sewage management system, this will ensure that the system operates efficiently.

## Location of the application area

Treated wastewater has the potential to have negative impacts on public health and the environment. For this reason the application area must be located in accordance with the results of a site evaluation, and approved landscaping must be completed prior to occupation of the building. Sandy soil and clayey soils may present special problems.

The system must allow even distribution of treated wastewater over the land application area.

### Maintaining your land application area

The effectiveness of the application area is governed by the activities of the owner.

**DO**

- ✓ Construct and maintain diversion drains around the top side of the application area to divert surface water.
- ✓ Ensure that your application area is kept level by filling any depressions with good quality top soil (not clay).
- ✓ Keep the grass regularly mowed and plant small trees around the perimeter to aid absorption and transpiration of the effluent.
- ✓ Ensure that any run off from the roof, driveway and other impermeable surfaces is directed away from the application area.
- ✓ Fence irrigation areas.
- ✓ Ensure appropriate warning signs are visible at all times in the vicinity of a spray irrigation area.
- ✓ Have your irrigation system checked by the service agent when they are carrying out service on the treatment system.

**DON'T**

- ✗ Don't erect any structures, construct paths, graze animals or drive over the land application area.
- ✗ Don't plant large trees that shade the land application area, as the area needs sunlight to aid in the evaporation and transpiration of the effluent.
- ✗ Don't plant trees or shrubs near or on house drains.
- ✗ Don't alter stormwater lines to discharge into or near the land application area.
- ✗ Don't flood the land application area through the use of hoses or sprinklers.
- ✗ Don't let children or pets play on land application areas.
- ✗ Don't water fruit and vegetables with the effluent.
- ✗ Don't extract untreated groundwater for potable use.

### Warning signs

Regular visual checking of the system will ensure that problems are located and fixed early.

The visual signs of system failure include:

- surface ponding and run-off of treated wastewater
- soil quality deterioration
- poor vegetation growth
- unusual odours

### Volume of water

Land application areas and systems for on-site application are designed and constructed in anticipation of the volume of waste to be discharged. Uncontrolled use of water may lead to poorly treated effluent being released from the system.

If the land application area is waterlogged and soggy the following are possible reasons:

- Λ Overloading the treatment system with wastewater.
- Λ The clogging of the trench with solids not trapped by the septic tank. The tank may require desludging.
- Λ The application area has been poorly designed.
- Λ Stormwater is running onto the area.

**HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT**

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

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

For more information please contact:

# Your Land Application Area