strata
geoscience and environmental

Onsite Wastewater System Design

25A Selby Road
Kettering

November 2024

Important Notes:

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1. Introduction

Strata Geoscience and Environmental Pty Ltd was commissioned to conduct an onsite wastewater system design for:

	Client and Site Details
Client Name	Tasbuilt
Site Address	25a Selby Road Kettering
Proposed Development	New system for new dwelling

The investigation was conducted with reference to Australian Standards AS1547-2012 Onsite Domestic Wastewater Management and also follows the principles outlined in AS1726-1993 Geotechnical Site Investigations.

2. Summary of Site and Soil Evaluation and Design Outcomes

The investigation's key findings were:

	SSE and Design Outcomes
General Comments	Site suitable for disposal of secondary treatment
Key Site and Soil Limitations to System Design	• Variable rocky clay soils • Drainage • Slope
Summary of Proposed System Specification	Primary Treatment: AWTS Secondary Treatment: AWTS Land Application: Subsurface Irrigation

3. Investigation

Please refer to Appendix 3 for Site and Soil Evaluation results.

4. Interpretation

The site is situated on a slight slope underlain by inferred Jurassic Dolerite.

With respect to the sustainability of long term disposal of wastewater within the site boundaries the following comments are made:

Soils – Natural soils will have a low permeability for the acceptance of wastewater flows and will show a high cation exchange complex for the absorption of nutrients from effluent

Environmental Sensitivities – The development area is moderately sloping with nearest surface water body located approximately 50+ m downslope of the dwelling (open stormwater drain). Groundwater was not intersected throughout geotechnical investigation and is anticipated to be several meters beneath the existing ground surface however it may flow over clayey subsoils as a perched watertable throughout wet periods.

Climate - the nearest weather station with long term data is Woodbridge Station with a mean annual rainfall of 899.3 mm (BOM 2024) and no evaporation data. A net rainfall deficit would likely exist for the site.

Title Searches – Searches of the Land Title did not show any easements or right of ways which would affect the positioning of the wastewater land application system.

Given the above, the general environmental and public health risk associated with the site is regarded as low provided adequate setback distances and other controls are adopted.

5. Onsite Wastewater System Design

5.1 Site and Soil Considerations

Results of the SSE (Appendix 3) found the following typical soil profile on site:

	Topsoils (A1-A3)	Subsoils (B1-B3)
Description	CLAYEY SILT (ML)	Silty CLAY (CL)
Soil Category (AS1547-5152)	1	5
Indicative Permeability (m/d)	1.5-2.0	0.1-0.5
Recommended DIR (mm/d)/DLR (L/D)	5/40	3 /12
pH	6.1	5.8
EC	2.2	4.2
Emmerson Class	8	5

5.2 Risk Management of Site and Soil Constraints

Risk identification and reduction measures compliant with AS1547 – 2012 Clause A3.2 is presented below:

Risk	Factors that Increase Risk Likelihood	Design Risk Reduction Measures
Hydraulic Overloading of System	• Under scaled system • Prolonged overuse • Leaking taps • Shock Loading • Excessive solid disposal	• Scale to peak potential loading • Use Conservative DLR/DIR • Use water conservation practices eg water reduction fixtures
Biological Failure	• Overuse of household chemicals • Shock loading	• Limit detergents and bleach use where practical • System not fit for sinkerator installation
Marginal Soil Conditions	• Dispersive soils • Poor aspect/drainage	• Treat with gypsum, manage sodium inputs
Site Constraints	• Clays • Shallow rocky profiles • Proximal sensitive receivers	• Irrigation • Irrigation on flatter areas where possible • secondary treatment, subsurface irrigation, maintain maximum available setback

Risk	Factors that Increase Risk Likelihood	Design Risk Reduction Measures
High Rainfall/Torrential Rainfall	• Inappropriate LAA Scaling • Stormwater impacts	• Use suitable hydraulic scaling • Stormwater Diversion around LAA if required
Clogged Outlet Filter	• Overloading • Infrequent cleaning	• Clean monthly
Pipe Blockages	• Overloading • Infrequent de-sludging	• Reduce solids inflows • De-sludge septic max 3 year intervals • Check IO's regularly
Sludge transport to LAA	• Infrequent de-sludging • Clogged outlet filter • High organic loading	• De-sludge septic max 3 year intervals • Clean filter monthly • No sinkerator installation
Broken pipes in LAA	• Stock/vehicles	• Exclude stock/vehicles

5.3 Proposed Wastewater System Concept Design

It is therefore recommended that the following system be adopted:

Treatment Train Component	Proposed Concept Design
Primary Treatment	• AWTS
Secondary Treatment	• AWTS
LAA Design	• SUBSURACE IRRIGATION

5.4 Effluent Flow and Land Application Area Modelling

The development proposal is for the construction of a new wastewater system to service the proposed 2 bedroom equivalent house on tank water with standard water savings fixtures. Therefore under AS1547-2012 the calculated effluent flows and required disposal area is as follows:

Wastewater System Modelling	
Number of Proposed Bedrooms	2
Number of Equivalent Persons	4
Water Source (Tank/Mains)	Tank
Daily Loading (L/per person/D)	120
Total Daily Loading (L/D)	480
Adopted Soil Category (AS1547-5152)	5
Indicative Permeability (m/d)	0.3
Adopted DLR/DIR (mm/d OR L/m^2/d)	3
Required LAA (m^2)	160

The absorption area could be catered for by 160 m^2 subsurface Irrigation installed as shown on the site plan with adequate room for a 100% reserve if required (see Appendix 2). Refer to Appendix 2/3 for more detailed calculations as well as specific design and construction notes.

5.5 System Specifications

The system has the following specification (see Appendix 3 for further details):

- Min DN100 gravity fed sewer pipe
- Min 1500L/day treatment capacity AWTS
- Min 160 m^2 Subsurface Irrigation
- Provision for 100% reserve area (must remain free from development)

5.6 Management Requirements

It is imperative that regular servicing of the treatment unit compliant with the prescriptions of the manufacturer and Council permit occur.

To ensure that the treatment system functions adequately and provides effective treatment and disposal of effluent over its design life, asset owners have the following responsibilities:

- Suitably qualified maintenance contractors must be engaged to service the system, as required by Council under the approval to operate.
- Keep as much fat and oil out of the system as possible; and
- Conserve water.

To ensure that the land application area (LAA) functions adequately and provides effective treatment and disposal of effluent over its design life, asset owners have the following responsibilities:

- LAA should be checked regularly to ensure that effluent is draining freely, including flushing of lines and cleaning of inline filters.
- All vehicles, livestock and large trees should be excluded from around the irrigation area.
- Low sodium/phosphorous based detergents should be used to increase the service life of irrigation area.
- Regularly harvest (mow) vegetation within the LAA and remove this to maximise uptake of water and nutrients;
- Not to erect any structures over the LAA;
- Ensure that the LAA is kept level by filling any depressions with good quality topsoil (not clay).

Excessive surface dampness, smell or growth of vegetation around the LAA may indicate sub-optimal performance and professional advice should be sort.

5.7 Compliance Requirements

The setbacks as indicated on the site plan conform with Acceptable Solutions or Performance Criteria for setback distance outlined in the Tasmanian Building Code 2016.

Acceptable Solutions	Performance Criteria	Compliance
A1 Horizontal separation distance from a building to a land application area must comply with one of the following: a. be no less than 6m: b. be no less than: (i) 2m from an upslope or level building. (ii) If primary treated effluent to be no less than 4m plus 1m for every degree of average gradient from a downslope building (iii) If secondary treatment and subsurface application, no less than 2m plus 0.25m for every degree of average gradient from a downslope building	P1 a. The land application area is located so that the risk of wastewater reducing the bearing capacity of the buildings foundations is acceptably low	Complies with A1 a
A2 Horizontal separation distance from downslope water to a land application area must comply with (a) or (b). a) be no less than 100m b) be no less than the following: i) If primary treated effluent to be no less than 15m plus 7m for every degree of average gradient from a downslope surface water, or; ii) if secondary treatment and subsurface application, no less than 15m plus 2 m for every degree of average gradient from a downslope surface water	P2 Horizontal separation distance from downslope water to a land application area must comply with all of the following: a) Setbacks must be consistent with AS/NZS 1547 Appendix R b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable	Complies with A2 a
A3 Horizontal separation distance from a property boundary to a land application area must comply with either of the following:	P3 Horizontal separation distance from the boundary to a land application area must comply with all of the following:	Complies with A3 (B) (I and III)

a) be no less than 40m from a property boundary b) be no less than (i) 1.5m from an upslope or level property (ii) if primary treated effluent 2m fo downslope property boundary; or (iii) if secondary treated effluent and every degree of average gradient	a) Setbacks must be consistent with AS/NZS 1547 Appendix R, and b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable	
A4 Horizontal separation distance from a downslope bore, well or similar water supply to a land application area must be no less than 50m and not be within the zone of influence of the bore whether up or down gradient	P4 Horizontal separation distance from a downslope bore to a land application area must comply with all of the following: a) Setbacks must be consistent with AS/NZS 1547 Appendix R, and b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable	Complies with A4
A5 Vertical separation distance between groundwater and a land application area must be no less than1.5m	P5 Vertical separation distance between groundwater to a land application area must comply with all of the following: a) Setbacks must be consistent with AS/NZS 1547 Appendix R, and b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable	Complies with A5
A6 Vertical separation distance between a limiting layer and a land application area must be no less than 1.5m	P6 Vertical setback must be consistent with AS/NZS 1547 Appendix R,	Complies with A6
A7 The arrangement of a land application area must comply with both of the following: (a) not include areas beneath buildings, driv (b) have a minimum horizontal dimension of	P7 No performance criteria	Complies with A7(a/b)

6. Conclusions and Further Recommendations

In conclusion the following comments and recommendations are made:

- The maximum wastewater flow rate (MWWF) modelling conducted in this report shows that the generated flows are likely to be no more than 480 L/day.

- That such flows will require a land application area (LAA) comprising one 160 m^2 Subsurface Irrigation.

- It is likely that peak flows associated with the development should be within the buffering capacity of the system both in terms of the system sizing as well as for their acceptance into the disposal area.

- If the hydraulic capacity of soils underlying disposal areas is exceeded by effluent water flows, the disposal area has the capacity to be increased by up to 100%.

- **If the prescriptions of this report are followed the likely human and environmental health risks associated with effluent disposal onsite is rated as low.**

S Nielsen MEngSc CPSS
Director
Strata Geoscience and Environmental Pty Ltd
E:sven@strataconsulting.com.au

7. References

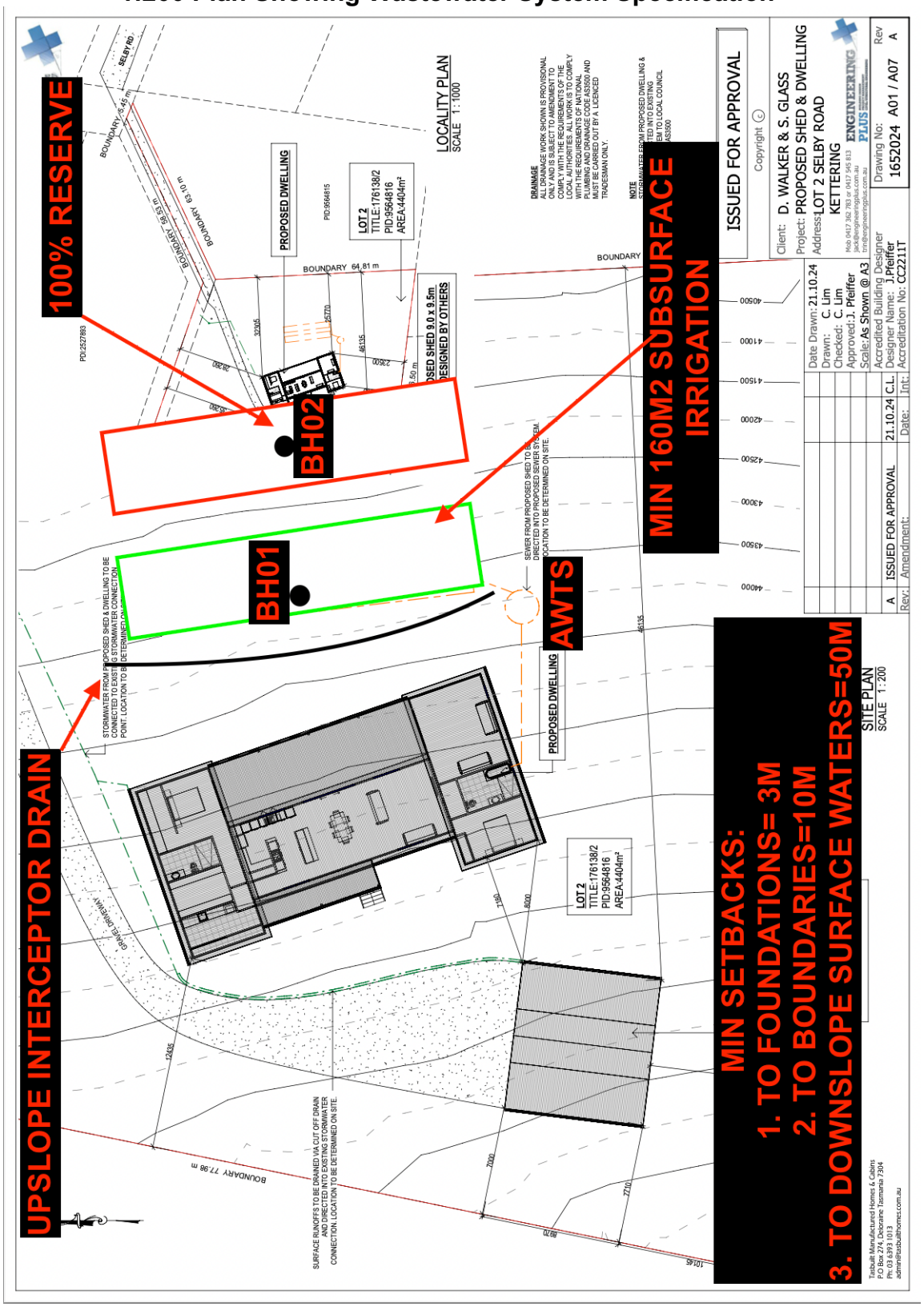
- AS1726-1993- Geotechnical Site Investigations
- AS1547-2012 Onsite Domestic Wastewater Management
- Bureau of Meteorology Website- Monthly Climate Statistics

Appendix 1 Wastewater Loading Certificate

Wastewater Loading Certificate*	
System Capacity	4EP at 120L/person/day = 480L/D
Design Summary	
• Effluent Quality	Secondary
• Adopted Soil category	5
• Amended Adopted Soil Category	Not amended
• Adopted DLR/DIR (mm/d OR L/m^2/d)	3
• LAA Design	Irrigation
• Primary LAA Requirement	160m^2
• Reserve Area	Min 100% reserve LAA must be maintained in an undeveloped state near the primary system as identified on the site plan
Fixtures	Assumes std water saving fixtures inc 6/3L dual flush toilets, aerator forcets, Washing/dishwashing machines with min WELSS rating 4.5 star
Consequences of Variation in Effluent Flows	
• High Flows	The system should be capable of buffering against flows of up to 10 % in a 24 hr period or 5% over a 7 day period. System not rated for spa installation.
• Low Flows	Should not affect system performance
Consequences of Variation in Effluent Quality	Residence to avoid the installation of sink disposal systems (eg “sinkerators”), or the addition of large amounts of household cleaning products or other solvents. These can overload system BOD or affect effluent treatment by system biota.
Consequences of Lack of Maintenance and Monitoring Attention	Owners should maintain the system in compliance with systems Home Owners Manual and council permit. All livestock, vehicles and persons to be excluded from the LAA. Failure to ensure the above may lead to infection of waterways, bores or the spread of disease, as well as production of foul odours, attraction of pests and excessive weed growth.

***** In accordance with Clause 7.4.2(d) of AS/NZS 1547-2012.

Appendix 2 Land Application Design Plans and Construction Notes
1:200 Plan Showing Wastewater System Specification



Irrigation Design (1:20)

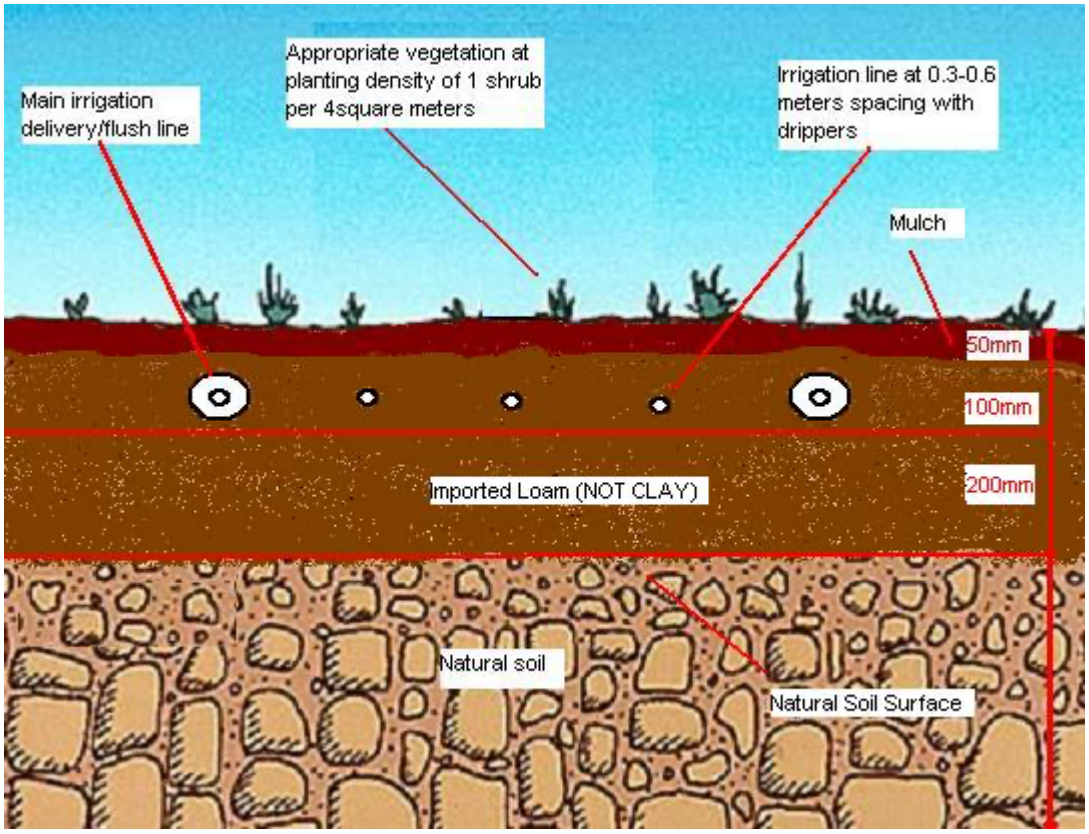


Figure 1 Irrigation cross section showing major delivery/flush lines and irrigation lines

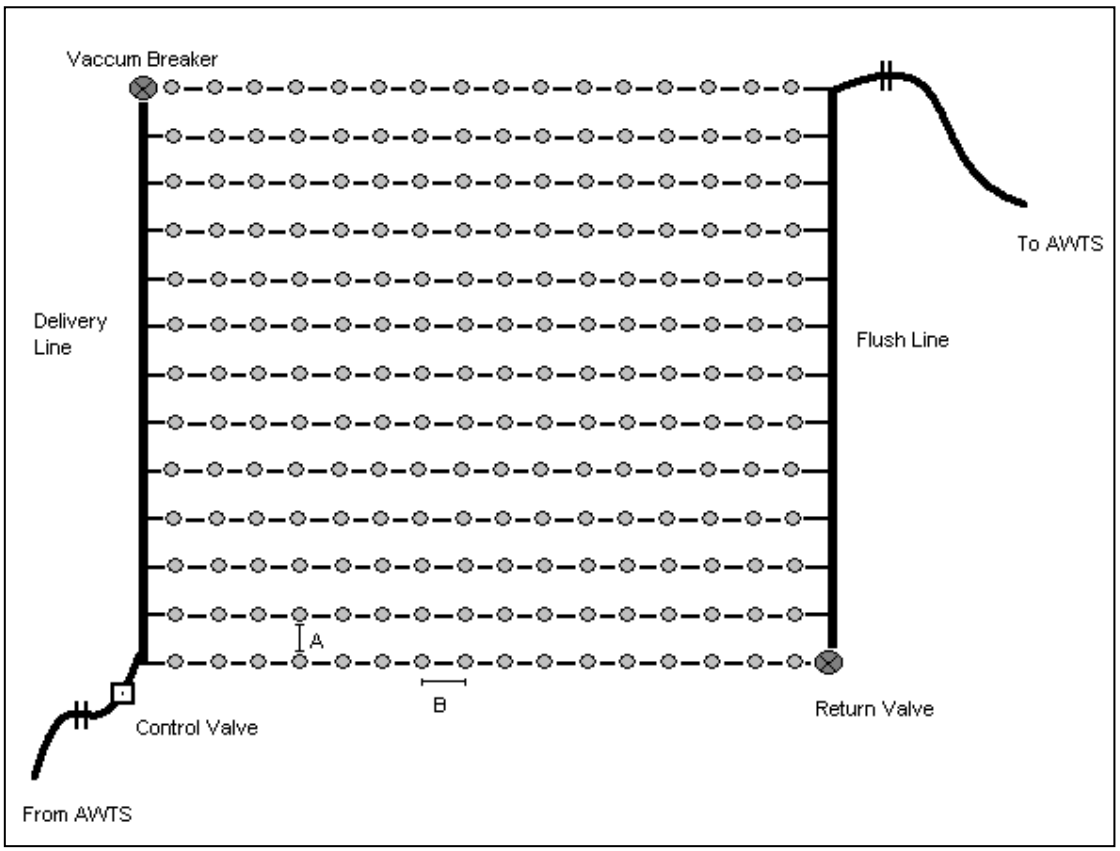


Figure 2 Irrigation Plan View

Land Application Area Design and Construction Notes

1. Delivery/flush line diameter = 25 -30 mm
2. Irrigation line diameter = 12-16mm
3. Irrigation line spacing (A) =300 mm for Sands, Sandy Loams and Loams to 600mm for Clay Loams, Light Clays and Heavy Clays (see the wastewater flow modelling section of this report for soil classification).
4. Dripper/Sprinkler spacing (B) as per manufacturers specifications.
5. A vacuum breaker should be installed at the highest point of the irrigation area (or in the case of multiple irrigation lots at each lot). This breaker should be protected and marked).
6. A flush line should be installed at the lowest point of the irrigation area incorporating a return valve for back flushing of the system back into the treatment chamber.
7. **All lateral lines MUST be installed parallel to the contours of the land. All minimum setbacks MUST be adhered to.**
8. An inline filter must be inserted into the delivery line.
9. The first 100mm of the natural soil below the ground surface should be mechanically tilled to aid line installation and soil permeability
10. Gypsum should be incorporated at the rate of 1kg/5m^2 in dispersive soils.
11. Imported topsoil (not clay) should be applied as shown above.
12. Irrigation areas greater than 400 m^2 should be split into 100 m^2 cells with effluent flows switched between irrigation lots with an automatic valve system.
13. Where practical a 50% reserve area should be identified on the site to allow movement of the irrigation area if required.
14. In areas of moderate to steep slopes (>10%) then upslope cut off drainage should be installed to minimise shallow ground water recharge of the irrigation area from upslope.
15. All livestock and Vehicles MUST be excluded from irrigation area.

Interceptor Spoon Drain Design and Construction Notes

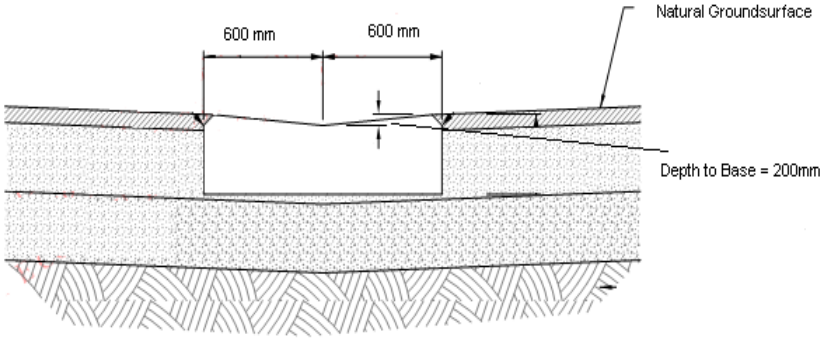
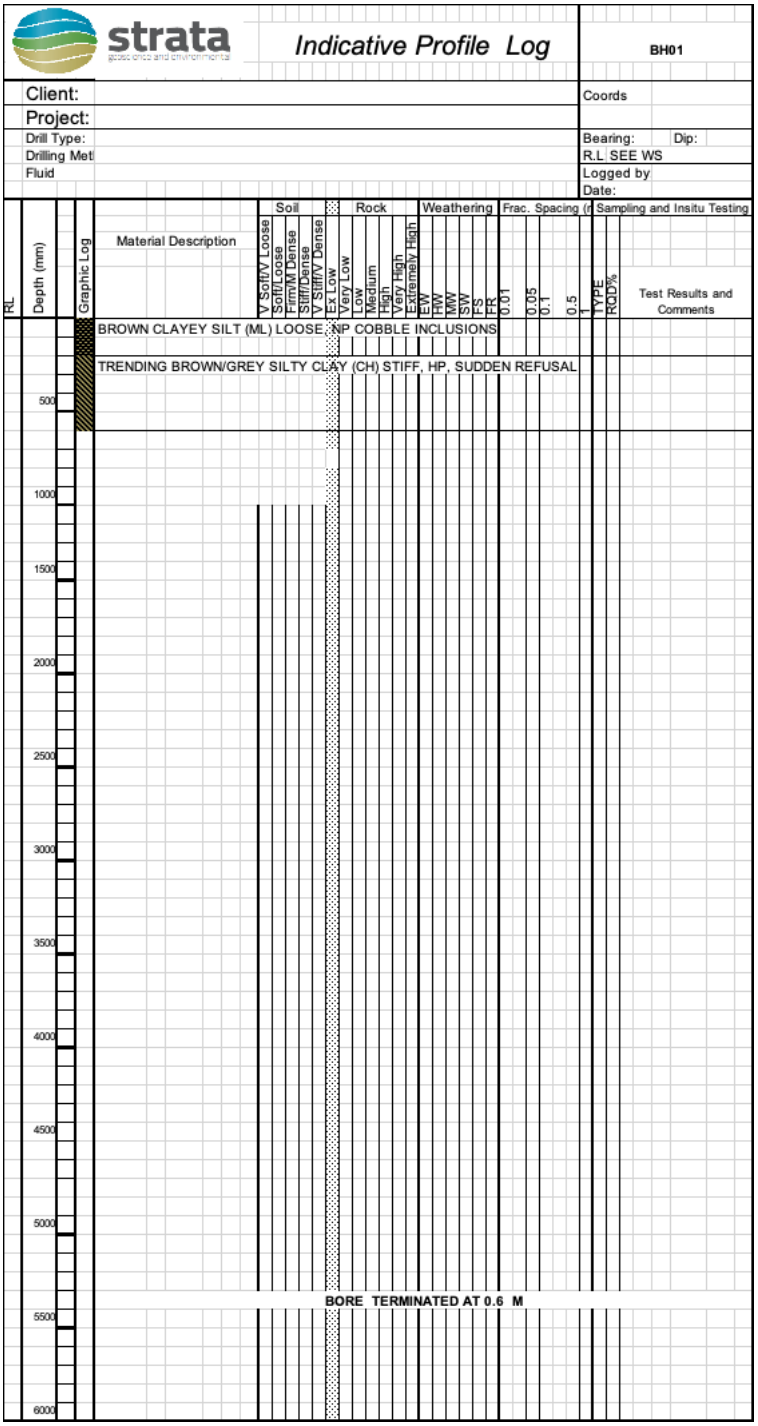


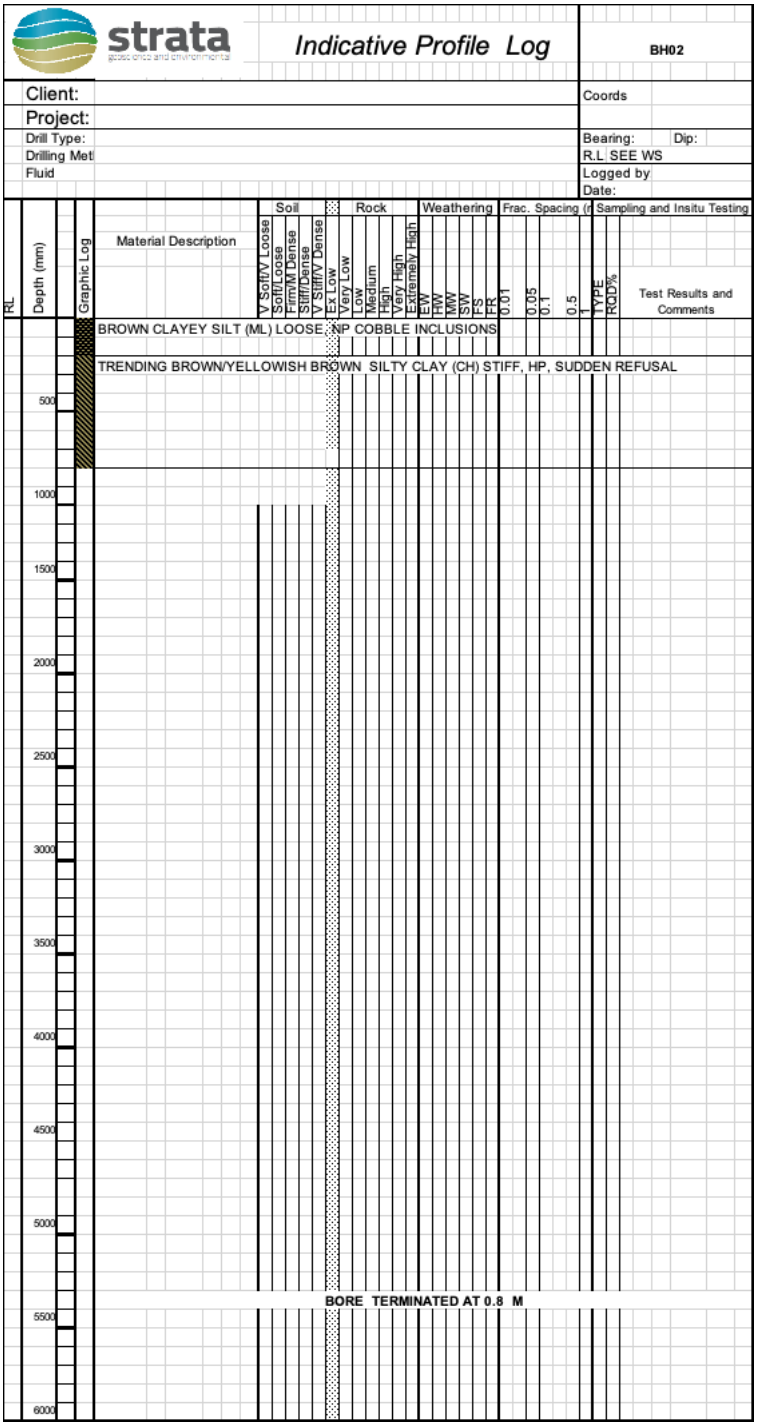
Figure 3 Spoon drain cross section showing key dimensions

1. Spoon drain should be located upslope of the proposed irrigation area/trenches/beds as shown in site plan.
2. Spoon Drains should be 1200mm wide and 200mm deep.
3. Spoon drains are best employed for areas where surface water run on from upslope areas is possible with little immediate subsurface recharge anticipated.
4. The drainage channel can be armoured with 50-100mm Dolerite aggregate if soils are anticipated to be dispersive or intensive peak flows are expected (ie if immediately down slope from hardstand surfaces).
5. Spoon drains should be constructed to ensure adequate fall to appropriate stormwater discharge points or other suitable areas provided that any water is not disposed of over site boundaries.

Appendix 3 Site and Soil Evaluation

Site and Soil Evaluation with Reference to AS1547 Table D1 Appendix D1	
Site Factor	**Result**
Slope (over proposed system/LAA)	Approximately 5 degrees
Shape	Planar, Convergent
Aspect	E
Exposure	High exposure to both sun and wind
Erosion, mass movements landslip	No evidence of erosion, mass movement or landslip
Boulders/Rock Outcrops	Shallow rocky profiles anticipated
Vegetation	Grass, weeds
Watercourse	See site plans >50m from LAA.
Soil Water Regime	Perched water possible in flatter areas. Upslope interceptor drain to mitigate shallow groundwater impacts. Depth to permanent groundwater >10m
Fill	None observed
Run-on/Flooding	Not anticipated over the development area or LAA. Upslope interceptor to capture any surface, near surface flows.
Channeled Runoff	No concentrated runoff over proposed LAA. See storm water management plan (or similar) for details of onsite storm water management.
Soil Surface Condition	Grass/weeds
Salinity	No saline tolerant species, salt scald or bare earth observed.
Other Site and Soil Factors	Adequate slope to ensure gravity dosing of both tank and LAA





Appendix 4 Form 35 and System Accreditation Certificate

CERTIFICATE OF THE RESPONSIBLE DESIGNER

Section 94
Section 106
Section 129
Section 155

To: TASBUILT *Owner name*

Address

Suburb/postcode

Form **35**

Designer details:

Name: S NIELSEN

Category: HYDRAULIC SERVICES

Business name: STRATA GEOSCIENCE AND ENVIRONMNETAL P/L

Phone No: 0413545358

Business address: 72-74 LAMBECK DRIVE

TULLAMARINE 3043

Fax No:

Licence No: CC6113K Email address: sven@strataconsulting.com.au

Details of the proposed work:

Owner/Applicant TASBUILT

Designer's project reference No. SR05973

Address: 25A SELBY ROAD

Lot No:

KETTERING

Type of work: Building work ☐ Plumbing work X *(X all applicable)*

Description of work:

WASTEWATER SYSTEM SPECIFICATION

(new building / alteration / addition / repair / removal / re-erection water / sewerage / stormwater / on-site wastewater management system / backflow prevention / other)

Description of the Design Work (Scope, limitations or exclusions): *(X all applicable certificates)*

Certificate Type:	Certificate	Responsible Practitioner
	☐ Building design	Architect or Building Designer
	☐ Structural design	Engineer or Civil Designer
	☐ Fire Safety design	Fire Engineer
	☐ Civil design	Civil Engineer or Civil Designer
	☐X Hydraulic design	Building Services Designer
	☐ Fire service design	Building Services Designer
	☐ Electrical design	Building Services Designer
	☐ Mechanical design	Building Service Designer

	☐ Plumbing design	Plumber-Certifier; Architect, Building Designer or Engineer
	☐ Other (specify)	
Deemed-to-Satisfy: ☐X	Performance Solution: ☐ (*X the appropriate box*)	
Other details:		

Design documents provided:

The following documents are provided with this Certificate –

Document description:

Drawing numbers:	Prepared by: SN	Date:
Schedules:	Prepared by: SN	Date
Specifications:	Prepared by: SN	Date11/11/24
Computations	Prepared by: SN	Date 11/11/24
Performance solution proposals:	Prepared by: SN	Date:
Test reports:	Prepared by: NA	Date

Standards, codes or guidelines relied on in design process:

AS1547-2012

Any other relevant documentation:
STRATA REPORT SR05973

Attribution as designer:

I SVEN NIESLEN..... am responsible for the design of that part of the work as described in this certificate;

The documentation relating to the design includes sufficient information for the assessment of the work in accordance with the *Building Act 2016* and sufficient detail for the builder or plumber to carry out the work i accordance with the documents and the Act;

This certificate confirms compliance and is evidence of suitability of this design with the requirements of the National Construction Code.

Name: (print)SVEN NIELSEN *SN*

Designer:	SVEN NIELSEN		11/11/24

Licence No: CC6113K

Assessment of Certifiable Works: (TasWater)

Note: single residential dwellings and outbuildings on a lot with an existing sewer connection are not considered to increase demand and are not certifiable.

If you cannot check ALL of these boxes, LEAVE THIS SECTION BLANK.

TasWater must then be contacted to determine if the proposed works are Certifiable Works.

I confirm that the proposed works are not Certifiable Works, in accordance with the Guidelines for TasWater CCW Assessments, by virtue that all of the following are satisfied:

- [X] The works will not increase the demand for water supplied by TasWater
- [X] The works will not increase or decrease the amount of sewage or toxins that is to be removed by, or discharged into, TasWater's sewerage infrastructure
- [X] The works will not require a new connection, or a modification to an existing connection, to be made to TasWater's infrastructure
- [X] The works will not damage or interfere with TasWater's works
- [X] The works will not adversely affect TasWater's operations
- [X] The work are not within 2m of TasWater's infrastructure and are outside any TasWater easement

X I have checked the LISTMap to confirm the location of TasWater infrastructure

X If the property is connected to TasWater's water system, a water meter is in place, or has been applied for to TasWater.

Certification:

I .....SVEN NIELSEN..... being responsible for the proposed work, am satisfied that the works described above are not Certifiable Works, as defined within the *Water and Sewerage Industry Act 2008,* that I have answered the above questions with all due diligence and have read and understood the Guidelines for TasWater CCW Assessments.

Note: the Guidelines for TasWater Certification of Certifiable Works Assessments are available at: www.taswater.com.au

	Name: (print)	*Signed*	*Date*
Designer:	SVEN NIELSEN		Date: 11/11/24

Tasmanian Government

Certificate of Accreditation

On-Site Wastewater Management System

This Certificate of Accreditation is hereby issued by the Director of Building Control pursuant to Section 18(1) of the *Building Act 2016* (accreditation of products).

System:	Taylex® Advanced Blower System 1500 a) Concrete ABS 1500 (10EP) and b) Poly ABS 1500 (10EP)
Manufacturer or Supplier:	Taylex Australia Pty Ltd ABN: 43 646 051 989
Of:	56 Prairie Rd, Ormeau, QLD 4208

This is to certify that the Taylex® Advanced Blower System as described in Schedule 1, is accredited as an AWTS for use in plumbing installations in Tasmania for single dwellings.

This accreditation is subject to the conditions and permitted uses specified in Schedule 2, and the National Construction Code.

Peter John Graham
Director of Building Control
Consumer, Building and Occupational Services
Department of Justice

Date of Issue: 5 April 2022 **Certificate Number:** DOC/20/89089(V2)

This Certificate of Accreditation is in force until 6 November 2025, unless withdrawn earlier at the discretion of the Director of Building Control

P: 1300 654 499 | PO Box 56, Rosny Park TAS 7018 | cbos.info@justice.tas.gov.au | www.cbos.tas.gov.au

Appendix 5 Terms and Conditions

Scope of Work
These Terms and Conditions apply to any services provided to you ("the Client") by Strata Geoscience and Environmental Pty Ltd ("Strata"). By continuing to instruct Strata to act after receiving the Terms and Conditions or by using this report and its findings for design and/or permit application processes and not objecting to any of the Terms and Conditions the Client agrees to be bound by these Terms and Conditions, and any other terms and conditions supplied by Strata from time to time at Strata's sole and absolute discretion. The scope of the services provided to the Client by Strata is limited to the services and specified purpose agreed between Strata and the Client and set out in the correspondence to which this document is enclosed or annexed ("the Services"). Strata does not purport to advise beyond the Services.

Third Parties
The Services are supplied to the Client for the sole benefit of the Client and must not be relied upon by any person or entity other than the Client. Strata is not responsible or liable to any third party. All parties other than the Client are advised to seek their own advice before proceeding with any course of action.

Provision of Information
The Client is responsible for the provision of all legal, survey and other particulars concerning the site on which Strata is providing the Services, including particulars of existing structures and services and features for the site and for adjoining sites and structures. The Client is also responsible for the provision of specialised services not provided by Strata. If Strata obtains these particulars or specialised services on the instruction of the Client, Strata does so as agent of the Client and at the Client's expense. Strata is not obliged to confirm the accuracy and completeness of information supplied by the Client or any third party service provider. The Client is responsible for the accuracy and completeness of all particulars or services provided by the Client or obtained on the Client's behalf. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person or entity resulting from the failure of the Client or third party to provide accurate and complete information. In the event additional information becomes available to the Client, the Client must inform Strata in writing of that information as soon as possible. Further advice will be provided at the Client's cost. Any report is prepared on the assumption that the instructions and information supplied to Strata has been provided in good faith and is all of the information relevant to the provision of the Services by Strata. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if Strata has been supplied with insufficient, incorrect, incomplete, false or misleading information.

Integrity
Any report provided by Strata presents the findings of the site assessment. While all reasonable care is taken when conducting site investigations and reporting to the Client, Strata does not warrant that the information contained in any report is free from errors or omissions. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from errors in a report. Any report should be read in its entirety, inclusive of any summary and annexures. Strata does not accept any responsibility where part of any report is relied upon without reference to the full report.

Project Specific Criteria
Any report provided by Strata will be prepared on the basis of unique project development plans which apply only to the site that is being investigated. Reports provided by Strata do not apply to any project other than that originally specified by the Client to Strata. The Report must not be used or relied upon if any changes to the project are made. The Client should engage Strata to further advise on the effect of any change to the project. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever where any change to the project is made without obtaining a further written report from Strata. Changes to the project may include, but are not limited to, changes to the investigated site or neighbouring sites, for instance, variation of the location of proposed building envelopes/footprints, changes to building design which may impact upon building settlement or slope stability, or changes to earthworks, including removal (site cutting) or deposition of sediments or rock from the site.

Classification to AS2870-5151
It must be emphasised that the site classification to AS2870-5151 and recommendations referred to in this report are based solely on the observed soil profile at the time of the investigation for this report and account has been taken of Clause 2.1.1 of AS2870 - 5151. Other abnormal moisture conditions as defined in AS2870 – 5151 Clause 1.3.3 (a) (b) (c) and (d) may need to be considered in the design of the structure. Without designing for the possibility of all abnormal moisture conditions as defined in Clause 1.3.3, distresses will occur and may result in non "acceptable probabilities of serviceability and safety of the building during its design life", as defined in AS2870 - 5151, Clause 1.3.1. Furthermore the classification is preliminary in nature and needs verification at the founding surface inspection phase . The classification may be changed at this time based upon the nature of the founding surface over the entire footprint of the project area. Any costs associated with a change in the site classification are to be incurred by the client. Furthermore any costs associated with delayed works associated with a founding surface inspection or a change in classification are to be borne by the client. Where founding surface inspections are not commissioned the classifications contained within this report are void.

Subsurface Variations with Time
Any report provided by Strata is based upon subsurface conditions encountered at the time of the investigation. Conditions can and do change significantly and unexpectedly over a short period of time. For example groundwater levels may fluctuate over time, affecting latent soil bearing capacity and ex-situ/insitu fill sediments may be placed/removed from the site. Changes to the subsurface conditions that were encountered at the time of the investigation void all recommendations made by Strata in any report. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any change to the subsurface conditions that were encountered at the time of the investigation. In the event of a delay in the commencement of a project or if additional information becomes available to the Client about a change in conditions becomes available to the Client, the Client should engage Strata to make a further investigation to ensure that the conditions initially encountered still exist. Further advice will be provided at the Client's cost. Without limiting the generality of the above statement, Strata does not accept liability where any report is relied upon after three months from the date of the report, (unless otherwise provided in the report or required by the Australian Standard which the report purports to comply with), or the date when the Client becomes aware of any change in condition. Any report should be reviewed regularly to ensure that it continues to be accurate and further advice requested from Strata where applicable.

Interpretation
Site investigation identifies subsurface conditions only at the discrete points of geotechnical drilling, and at the time of drilling. All data received from the geotechnical drilling is interpreted to report to the Client about overall site conditions as well as their anticipated impact upon the specific project. Actual site conditions may vary from those inferred to exist as it is virtually impossible to provide a definitive subsurface profile which accounts for all the possible variability inherent in earth materials. This is particularly pertinent to some weathered sedimentary geologies or colluvial/alluvial clast deposits which may show significant variability in depth to refusal over a development area. Rock incongruities such as joints, dips or faults may also result in subsurface variability. Soil depths and composition can vary due to natural and anthopogenic processes. Variability may lead to differences between the design depth of bored/driven piers compared with the actual depth of individual piers constructed onsite. It may also affect the founding depth of conventional strip, pier and beam or slab footings, which may result in increased costs associated with excavation (particularly of rock) or materials costs of foundations. Founding surface inspections should be commissioned by the Client prior to foundation construction to verify the results of initial site characterisation and failure to insure this will void the classifications and recommendations contained within this report. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any variation from the site conditions inferred to exist.

Strata is not responsible for the interpretation of site data or report findings by other parties, including parties involved in the design and construction process. The Client must seek advice from Strata about the interpretation of the site data or report.

Report Recommendations
Any report recommendations provided by Strata are only preliminary. A report is based upon the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until earthworks and/or foundation construction is almost complete. Where variations in conditions are encountered, Strata should be engaged to provide further advice. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if the results of selective point sampling are not indicative of actual conditions throughout an area or if the Client becomes aware of variations in conditions and does not engage Strata for further advice.

Geo-environmental Considerations
Where onsite wastewater site investigation and land application system designs are provided by Strata, reasonable effort will be made to minimise environmental and public health risks associated with the disposal of effluent within site boundaries with respect to relevant Australian guidelines and industry best practise at the time of investigation. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from:

(i) changes to either the project or site conditions that affect the onsite wastewater land application system's ability to safely dispose of modelled wastewater flows; or
(ii) seepage, pollution or contamination or the cost of removing, nullifying or clearing up seepage, polluting or contaminating substances; or
(iii) poor system performance where septic tanks have not been de-sludged at maximum intervals of 3 years or AWTS systems have not been serviced in compliance with the manufacturers recommendations; or
(iv) failure of the client to commission both interim and final inspections by the designer throughout the system construction; or
(v) the selection of inappropriate plants for irrigation areas; or
(vi) damage to any infrastructure including but not limited to foundations, walls, driveways and pavements; or
(vii) land instability, soil erosion or dispersion; or
(viii) design changes requested by the Permit Authority.

Furthermore Strata does not guarantee land application area design life beyond 2 years from installation.

Strata does not consider site contamination, unless the Client specifically instructs Strata to consider the site contamination in writing. If a request is made by the Client to consider site contamination, Strata will provide additional terms and conditions that will apply to the engagement.

Copyright and Use of Documents
Copyright in all drawings, reports, specifications, calculations and other documents provided by Strata or its employees in connection with the Services remain vested in Strata. The Client has a licence to use the documents for the purpose of completing the project. However, the Client must not otherwise use the documents, make copies of the documents or amend the documents unless express approval in writing is given in advance by Strata. The Client must not publish or allow to be published, in whole or in part, any document provided by Strata or the name or professional affiliations of Strata, without first obtaining the written consent of Strata as to the form and context in which it is to appear.

If, during the course of providing the Services, Strata develops, discovers or first reduces to practice a concept, product or process which is capable of being patented then such concept, product or process is and remains the property of Strata and:

(i) the Client must not use, infringe or otherwise appropriate the same other than for the purpose of the project without first obtaining the written consent of Strata; and

(ii) the Client is entitled to a royalty free licence to use the same during the life of the works comprising the project.

Digital Copies of Report
If any report is provided to the Client in an electronic copy except directly from Strata, the Client should verify the report contents with Strata to ensure they have not been altered or varied from the report provided by Strata.