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Onsite Wastewater System Design

Units 1-2
13-15 Barr Street
Lady Barron

October 2023

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Strata Geoscience and Environmental reserves the right to submit this report the relevant regulatory agencies where it has a responsibility to do so.

1. Introduction

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

Client and Site Details	
Client Name	CB&M Sustainable Design
Site Address	Units 1-2 13-15 Barr Street Lady Barron
Proposed Development	New system for one 2 bed and one 3 Bed equivalent dwellings

The investigation was conducted with reference to Australian Standards AS1567-2012 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 primary treatment
Key Site and Soil Limitations to System Design	• Variable soil profiles • High loadings • Potential for seasonal shallow groundwater
Summary of Proposed System Specification	Primary Treatment: 4500L Dual Purpose Septic tank and Grease Traps Secondary Treatment: In ground Land Application: In ground

3. Investigation

Please refer to Appendix 6 for Site and Soil Evaluation results.

6. Interpretation

The site is situated on a slight to moderate slope underlain by Quaternary aged sands overlying inferred Devonian Granite.

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 high permeability for the acceptance of wastewater flows and will show a moderate cation exchange complex for the absorption of nutrients from effluent.

Environmental Sensitivities – The development area is gently sloping with nearest surface water body located approximately 100+ m down slope of the proposed residence. Groundwater was not intersected throughout geotechnical investigation however it may flow over clayey subsoils as a perched watertable throughout wet periods.

Climate - the nearest weather station with long term data is the Whitemark Station with a mean annual rainfall of 769.8 m (BOM 2023) and no evaporation data.

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 6) found the following typical soil profile on site:

	Topsoils (A1-A3)
Description	SAND (SM)/GRAVELS (GM)
Soil Category (AS1567-2016)	1
Indicative Permeability (m/d)	2.0
Recommended DIR (mm/d)/DLR (L/D)	25
pH	6.9
EC	1.9
Emmerson Class	8

5.2 Risk Management of Site and Soil Constraints

Key site and soil constraints as well as their risk management:

Site/Soil Constraint	Risk Mitigation Measure
High soil hydraulic conductivity	• Maintain min 1.5m vertical separation to watertable
Runoff	• Appropriate hydraulic scaling of LAA

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	• Septic Tank and Grease Trap
Secondary Treatment	• In Ground
LAA Design	• Gravity Dosed Trenches

5.6 Effluent Flow Rate Modelling and LAA Sizing

The development proposal is for the construction of a new wastewater system to service the proposed One x 2 bedroom equivalent dwelling and One x 3 bedroom on town water with standard water savings fixtures. Therefore under AS1567-2012 the calculated effluent flows and required disposal area is as follows:

Wastewater System Modelling	
Number of Proposed Bedrooms	2+3
Number of Equivalent Persons	4+5
Water Source (Tank/Mains)	Town
Daily Loading (L/per person/D)	150
Total Daily Loading (L/D)	1350
Adopted Soil Category (AS1567-2012)	2
Indicative Permeability (m/d)	1.5
Adopted DLR/DIR (mm/d OR L/m^2/d)	20
Required LAA (m^2)	67.5

The absorption area could be catered for by two 20m x 1.7m trenches installed as shown on the site plan with adequate room for a 100% reserve if required (see Appendix 1). 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 1-3 for further details):

- Min DN100 Gravity fed sewer pipe
- Min two x 300L Domestic Grease Trap with Mesh outlet filter capturing all kitchen waste
- Min one x 4500L Common Dual Purpose Septic Tank with outlet filter
- Min one x 5000L Common Pump Well with dual auto changeover submersible pumps with audible high level alarm.
- Common 6 port pressure dosed sequencing valve (¨k-rain or similar)
- Min 68 m^2 Gravity Dosed Septic Trenches
- Provision for 100% reserve area (must remain free from development)

5.6 System Requirements

Nutrient, bacterial and viral reduction performance should be inline with the prescriptions of AS1566.3:2008 for primary treated effluent. It is noteworthy that the high CEC of the soils plus distances from ephemeral drainage lines will all serve to further reduce the risk of residual nutrients, bacterial or viruses entering any waterway.

5.7 Management Requirements

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 septic tank functions adequately and retains all solids over its design life asset owners have the following responsibilities:

- De-sludge (pump out) Septic Tanks at a maximum frequency of once every three years.
- Clean outlet filter and grease traps monthly
- Do not install ¨sinkerators¨
- Maintain a logbook recording the date and contractor details of the above.

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 mow grass 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.

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 1350 L/day.

- That such flows will require a land application area (LAA) comprising one 67.5 m^2 trenches.

- 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

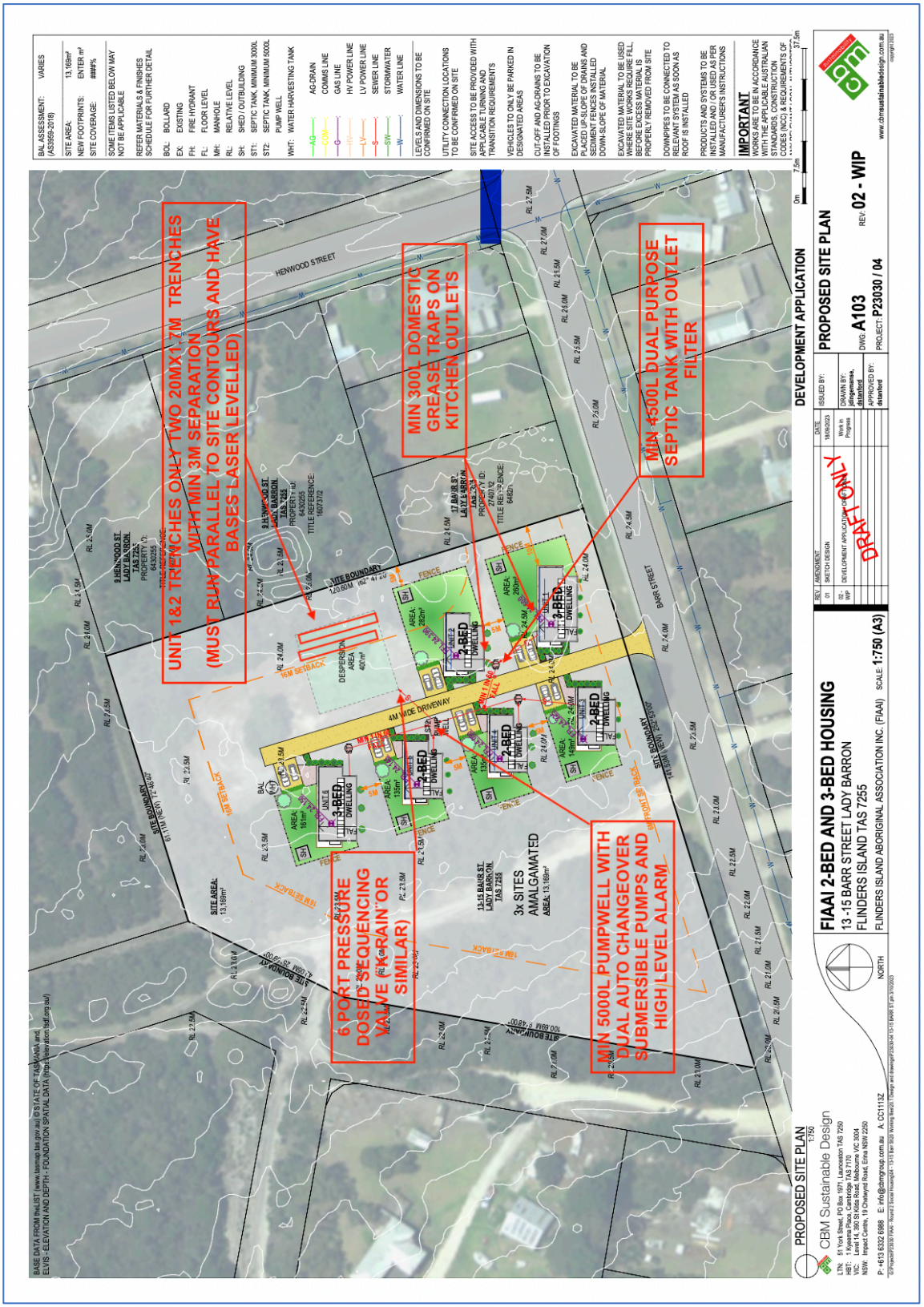
- AS1726-1993- Geotechnical Site Investigations
- AS1567-2012 Onsite Domestic Wastewater Management
- Bureau of Meteorology Website- Monthly Climate Statistics

Appendix 1 Detailed Design Calculations

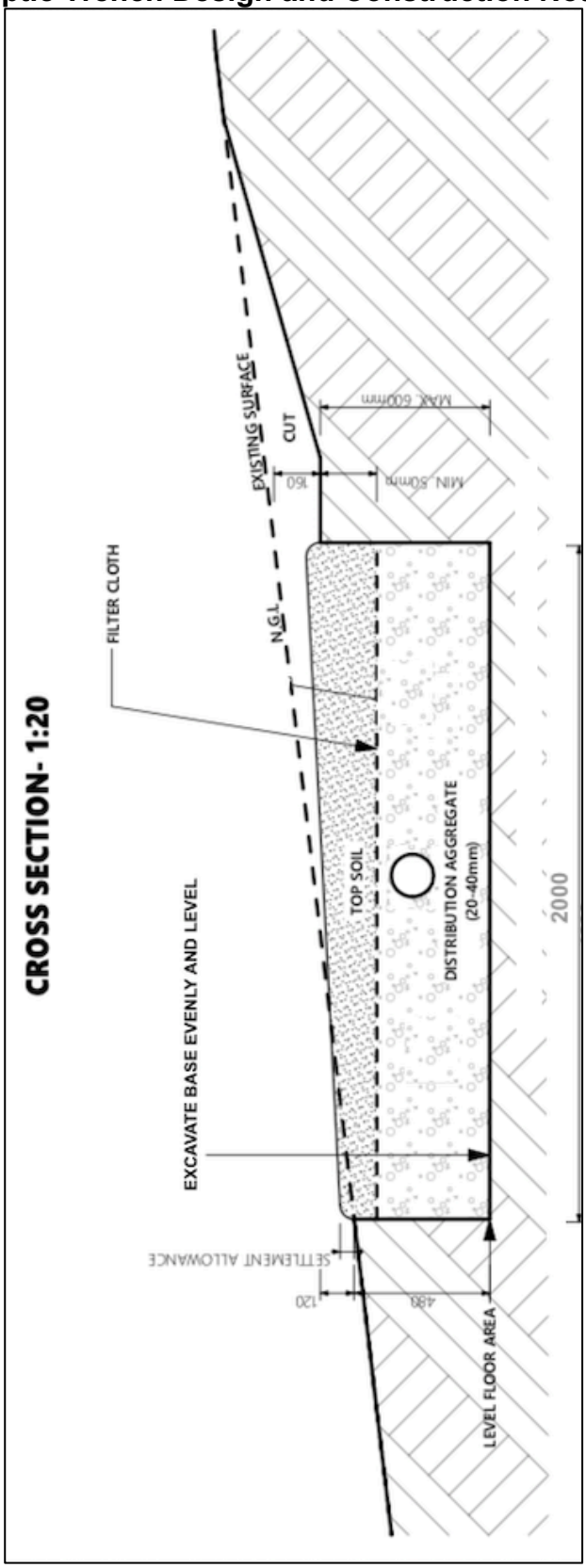
Wastewater Loading Certificate*	
System Capacity	9EP at 150L/person/day = 1350 L/D
Design Summary	
• Effluent Quality	Primary
• Adopted Soil category	2
• Amended Adopted Soil Category	Not amended
• Adopted DLR/DIR (mm/d OR L/m^2/d)	20
• LAA Design	Trench
• Primary LAA Requirement	67.5m^2
• Reserve Area	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 6.5 star
Consequences of Variation in Effluent Flows	
• High Flows	The system should be capable of buffering against flows of up to 110% in a 24 hr period or 105%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 Section 5.7 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 7.6.2(d) of AS/NZS 1567.2012.

Appendix 2 Land Application Design and Construction Notes



Septic Trench Design and Construction Notes

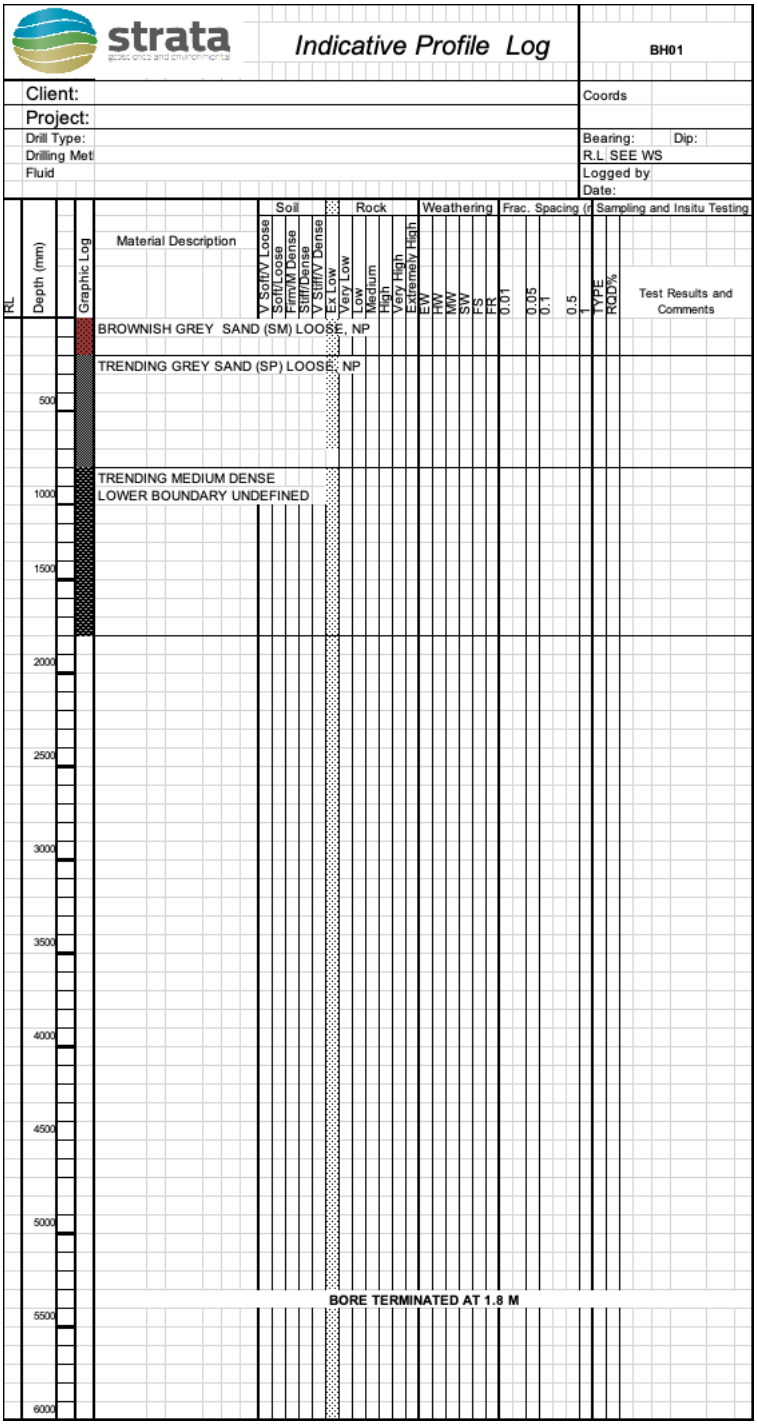


Septic Trench Design and Construction Notes

1. Each Trench has the dimensions of 20.0 m X 1.7 m X 0.5 m.
2. There are two trenches in total as located on site plan giving a total basal area of 68m^2 (See Appendix 1)
3. Trench must be positioned parallel with the contours of the land and the base of the trench **MUST** be excavated evenly and level. In clay soils smearing of walls and floors of trench **MUST** be avoided and should be scoured to a depth of 5-10 mm to reduce base and sidewall sealing after applying Gypsum at a rate of 0.5Kg/m^2.
4. The lower 250mm is to be filled with 20-40mm aggregate.
5. 100mm PVC pipe slotted in the 8'o'clock and 4'o'clock positions to be placed on top of aggregate as shown. The distribution pipe **MUST** be level to ensure flow of effluent to all areas of the trench. Failure to ensure this may cause preferential overloading of the trench and the potential for trench overflow.
6. A further 75mm of aggregate can be added around/over the distribution pipe before overlaying with geo-textile to prevent soil from clogging gravels/lateral slots. For sandy soils the sides of the trench should also be lined.
7. Backfilling of the bed to 150mm above original ground surface level with endemic topsoil (if a sand/loam) or imported loam should proceed. This layer should be mounded. Do not mechanically compact this layer.
8. An inspection outlet should be placed on each distribution pipe.
9. Vehicles and livestock **MUST** be excluded from the bed area.

Appendix 3 Site and Soil Evaluation

Table 3 Site Features	
Climate	The nearest weather station with long term data is Whitemark Station with a mean annual rainfall of 769 mm (BOM 2023) and no evaporation data. The region has a near Mediterranean climate with maximum temperatures and minimum rainfall in the summer.
Exposure	The site is relatively unshielded with exposure to winds which predominate from the NW/SW directions
Vegetation	Grass
Landform	Plain
Slope	Slight slopes
Fill	No fill evident
Rocks and Rock Outcrops	None evident
Erosion Potential	None known
Surface Water	100m+
Flood Potential	<1:100 AEP
Stormwater Run-on and Upslope Seepage	The dwelling and land application areas are expected to receive on minor amounts of stormwater run-on or groundwater recharge.
Groundwater	No groundwater was encountered throughout site reconnaissance however perched water tables likely to exist in wetter periods- upslope interceptor drainage required.
Site Drainage and Subsurface Drainage	Good
Available Land Application Area	There is surplus space to land application area requirements (including reserves).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Indicative Profile Log
BH01
Client:
Project:
Drill Type:
Drilling Met
Fluid
Coords
Bearing:
Dip:
R.L SEE WS
Logged by
Date:
RL
Depth (mm)
Graphic Log
Material Description
Soil
V Soft/V Loose
Soft/Loose
Firm/M Dense
Stiff/Dense
V Stiff/V Dense
Rock
Ex Low
Very Low
Low
Medium
High
Very High
Extremely High
Weathering
EW
HW
MW
SW
FS
FR
Frac. Spacing (
0.01
0.05
0.1
0.5
1
Sampling and Insitu Testing
TYPE
RQD%
Test Results and Comments
BROWNISH GREY SAND (SM) LOOSE, NP
TRENDING GREY SAND (SP) LOOSE, NP
TRENDING MEDIUM DENSE
LOWER BOUNDARY UNDEFINED
BORE TERMINATED AT 1.8 M
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000

Appendix 4 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.

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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 AS2870-2016
It must be emphasised that the site classification to AS2870-2016 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 - 2016. Other abnormal moisture conditions as defined in AS2870 – 2016 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 - 2016, 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 septic trench and bed 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.

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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.

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Nutrient, bacterial and viral reduction performance should be inline with the prescriptions of AS1566.3:2008 for primary treated effluent. It is noteworthy that the high CEC of the soils plus distances from ephemeral drainage lines will all serve to further reduce the risk of residual nutrients, bacterial or viruses entering any waterway.

5.7 Management Requirements

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 septic tank functions adequately and retains all solids over its design life asset owners have the following responsibilities:

- De-sludge (pump out) Septic Tanks at a maximum frequency of once every three years.
- Clean outlet filter and grease traps monthly
- Do not install ¨sinkerators¨
- Maintain a logbook recording the date and contractor details of the above.

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 mow grass 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.

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 1350 L/day.

- That such flows will require a land application area (LAA) comprising one 67.5 m^2 trenches.

- 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.**

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7. References

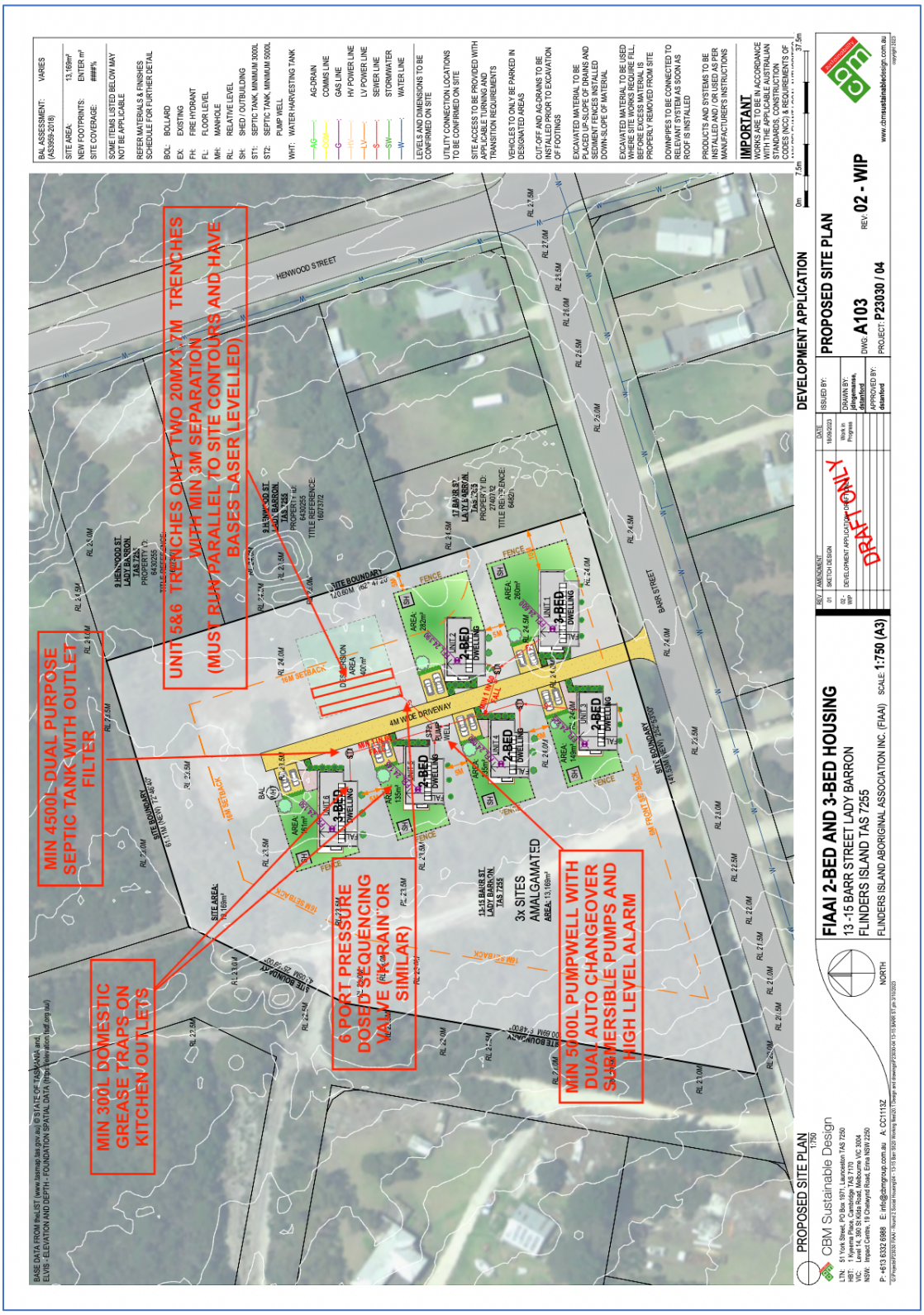
- AS1726-1993- Geotechnical Site Investigations
- AS1567-2012 Onsite Domestic Wastewater Management
- Bureau of Meteorology Website- Monthly Climate Statistics

Appendix 1 Detailed Design Calculations

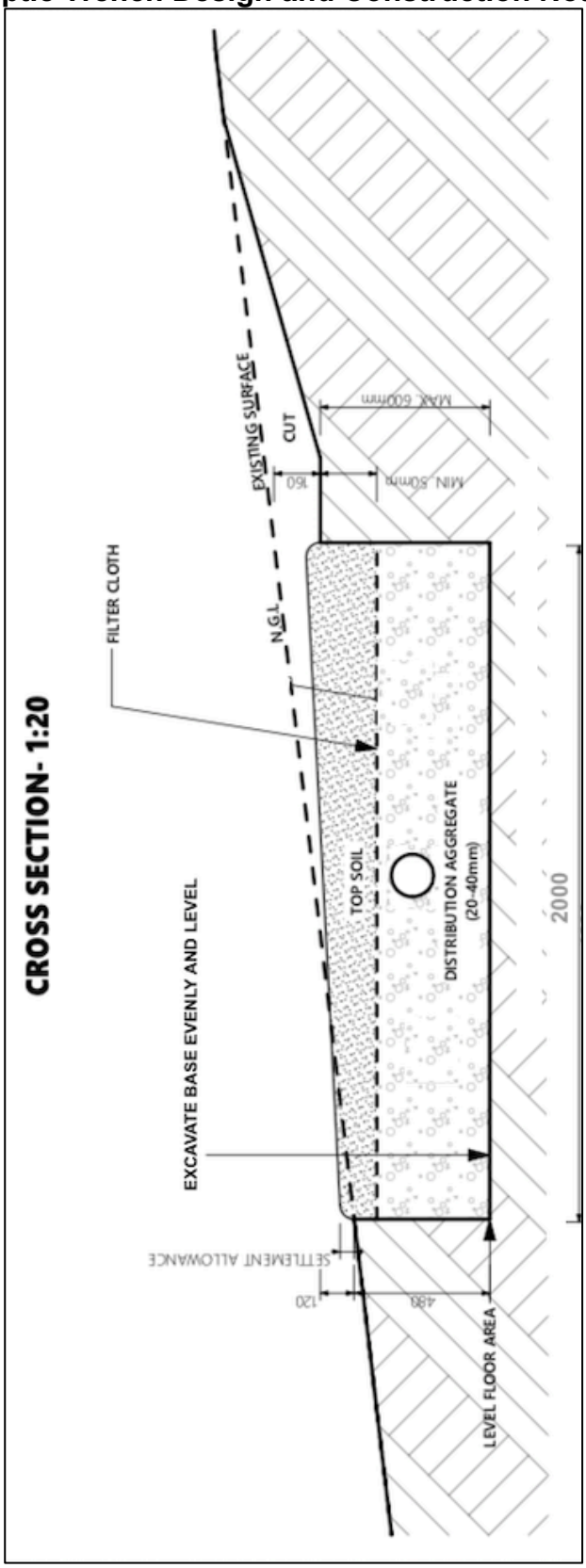
Wastewater Loading Certificate*	
System Capacity	9EP at 150L/person/day = 1350 L/D
Design Summary	
• Effluent Quality	Primary
• Adopted Soil category	2
• Amended Adopted Soil Category	Not amended
• Adopted DLR/DIR (mm/d OR L/m^2/d)	20
• LAA Design	Trench
• Primary LAA Requirement	67.5m^2
• Reserve Area	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 6.5 star
Consequences of Variation in Effluent Flows	
• High Flows	The system should be capable of buffering against flows of up to 110% in a 24 hr period or 105%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 Section 5.7 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 7.6.2(d) of AS/NZS 1567.2012.

Appendix 2 Land Application Design and Construction Notes



Septic Trench Design and Construction Notes

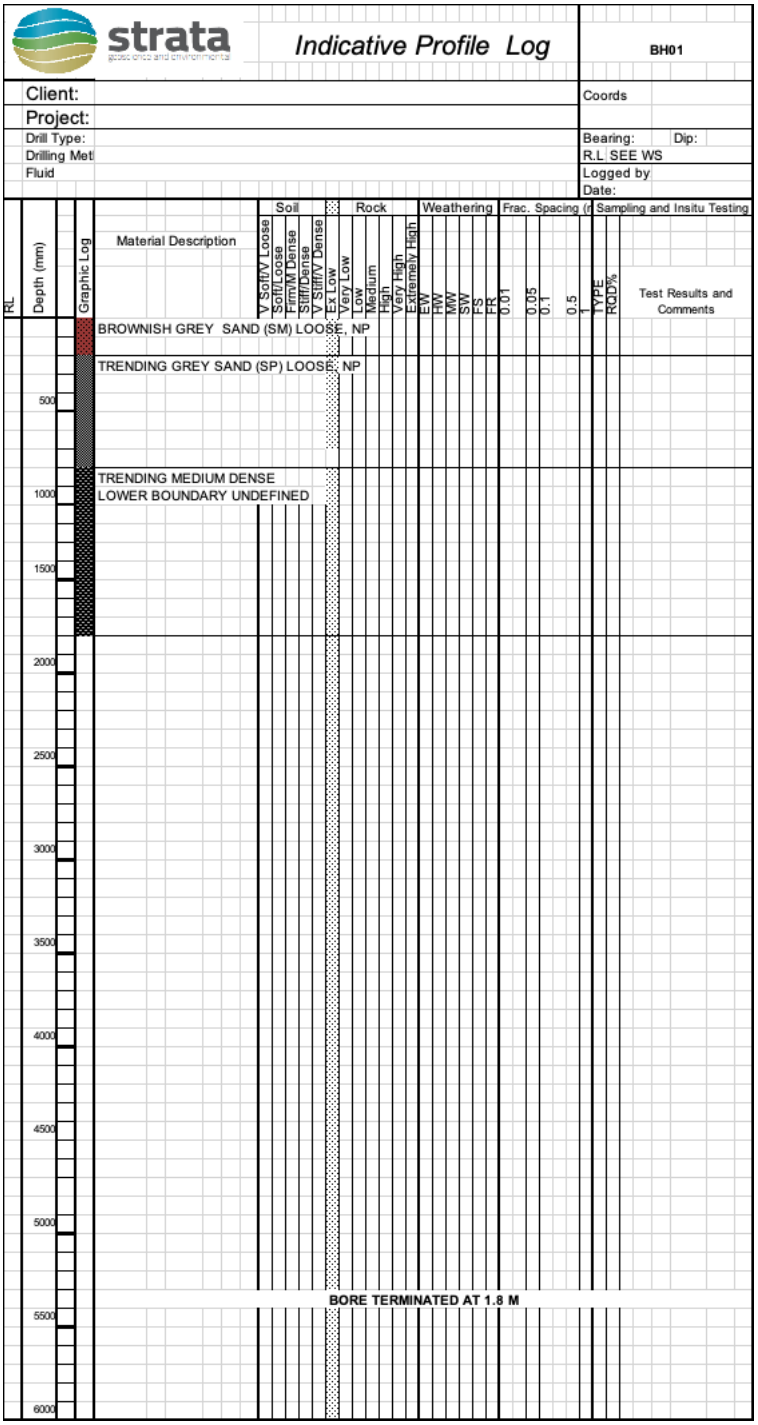


Septic Trench Design and Construction Notes

1. Each Trench has the dimensions of 20.0 m X 1.7 m X 0.5 m.
2. There are two trenches in total as located on site plan giving a total basal area of 68m^2 (See Appendix 1)
3. Trench must be positioned parallel with the contours of the land and the base of the trench **MUST** be excavated evenly and level. In clay soils smearing of walls and floors of trench **MUST** be avoided and should be scoured to a depth of 5-10 mm to reduce base and sidewall sealing after applying Gypsum at a rate of 0.5Kg/m^2.
4. The lower 250mm is to be filled with 20-40mm aggregate.
5. 100mm PVC pipe slotted in the 8'o'clock and 4'o'clock positions to be placed on top of aggregate as shown. The distribution pipe **MUST** be level to ensure flow of effluent to all areas of the trench. Failure to ensure this may cause preferential overloading of the trench and the potential for trench overflow.
6. A further 75mm of aggregate can be added around/over the distribution pipe before overlaying with geo-textile to prevent soil from clogging gravels/lateral slots. For sandy soils the sides of the trench should also be lined.
7. Backfilling of the bed to 150mm above original ground surface level with endemic topsoil (if a sand/loam) or imported loam should proceed. This layer should be mounded. Do not mechanically compact this layer.
8. An inspection outlet should be placed on each distribution pipe.
9. Vehicles and livestock **MUST** be excluded from the bed area.

Appendix 3 Site and Soil Evaluation

Table 3 Site Features	
Climate	The nearest weather station with long term data is Whitemark Station with a mean annual rainfall of 769 mm (BOM 2023) and no evaporation data. The region has a near Mediterranean climate with maximum temperatures and minimum rainfall in the summer.
Exposure	The site is relatively unshielded with exposure to winds which predominate from the NW/SW directions
Vegetation	Grass
Landform	Plain
Slope	Slight slopes
Fill	No fill evident
Rocks and Rock Outcrops	None evident
Erosion Potential	None known
Surface Water	100m+
Flood Potential	<1:100 AEP
Stormwater Run-on and Upslope Seepage	The dwelling and land application areas are expected to receive on minor amounts of stormwater run-on or groundwater recharge.
Groundwater	No groundwater was encountered throughout site reconnaissance however perched water tables likely to exist in wetter periods- upslope interceptor drainage required.
Site Drainage and Subsurface Drainage	Good
Available Land Application Area	There is surplus space to land application area requirements (including reserves).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Indicative Profile Log
BH01
Client:
Project:
Drill Type:
Drilling Met
Fluid
Coords
Bearing:
Dip:
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Logged by
Date:
RL
Depth (mm)
Graphic Log
Material Description
Soil
V Soft/V Loose
Soft/Loose
Firm/M Dense
Stiff/Dense
V Stiff/V Dense
Rock
Ex Low
Very Low
Low
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Weathering
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TYPE
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Test Results and Comments
BROWNISH GREY SAND (SM) LOOSE, NP
TRENDING GREY SAND (SP) LOOSE, NP
TRENDING MEDIUM DENSE
LOWER BOUNDARY UNDEFINED
BORE TERMINATED AT 1.8 M
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000

Appendix 4 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 AS2870-2016
It must be emphasised that the site classification to AS2870-2016 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 - 2016. Other abnormal moisture conditions as defined in AS2870 – 2016 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 - 2016, 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 septic trench and bed 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.

strata
geoscience and environmental

Onsite Wastewater System Design

Units 3-4
13-15 Barr Street
Lady Barron

October 2023

Important Notes:

The author, Strata Geoscience and Environmental, gives permission for this report to be copied and distributed to interested parties only if it is reproduced in colour and in full including all appendicies. No responsibility is taken for the contents and recommendations of this report if it is not reproduced as requested.

Strata Geoscience and Environmental reserves the right to submit this report the relevant regulatory agencies where it has a responsibility to do so.

1. Introduction

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

Client and Site Details	
Client Name	CB&M Sustainable Design
Site Address	Units 3-4 13-15 Barr Street Lady Barron
Proposed Development	New system for one 2 bed and one 3 Bed equivalent dwellings

The investigation was conducted with reference to Australian Standards AS1567-2012 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 primary treatment
Key Site and Soil Limitations to System Design	• Variable soil profiles • High loadings • Potential for seasonal shallow groundwater
Summary of Proposed System Specification	Primary Treatment: 4500L Dual Purpose Septic tank and Grease Traps Secondary Treatment: In ground Land Application: In ground

3. Investigation

Please refer to Appendix 6 for Site and Soil Evaluation results.

6. Interpretation

The site is situated on a slight to moderate slope underlain by Quaternary aged sands overlying inferred Devonian Granite.

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 high permeability for the acceptance of wastewater flows and will show a moderate cation exchange complex for the absorption of nutrients from effluent.

Environmental Sensitivities – The development area is gently sloping with nearest surface water body located approximately 100+ m down slope of the proposed residence. Groundwater was not intersected throughout geotechnical investigation however it may flow over clayey subsoils as a perched watertable throughout wet periods.

Climate - the nearest weather station with long term data is the Whitemark Station with a mean annual rainfall of 769.8 m (BOM 2023) and no evaporation data.

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 6) found the following typical soil profile on site:

	Topsoils (A1-A3)
Description	SAND (SM)/GRAVELS (GM)
Soil Category (AS1567-2016)	1
Indicative Permeability (m/d)	2.0
Recommended DIR (mm/d)/DLR (L/D)	25
pH	6.9
EC	1.9
Emmerson Class	8

5.2 Risk Management of Site and Soil Constraints

Key site and soil constraints as well as their risk management:

Site/Soil Constraint	Risk Mitigation Measure
High soil hydraulic conductivity	• Maintain min 1.5m vertical separation to watertable
Runoff	• Appropriate hydraulic scaling of LAA

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	• Septic Tank and Grease Trap
Secondary Treatment	• In Ground
LAA Design	• Gravity Dosed Trenches

5.6 Effluent Flow Rate Modelling and LAA Sizing

The development proposal is for the construction of a new wastewater system to service the proposed two x 2 bedroom equivalent dwelling on town water with standard water savings fixtures. Therefore under AS1567-2012 the calculated effluent flows and required disposal area is as follows:

Wastewater System Modelling	
Number of Proposed Bedrooms	2+2
Number of Equivalent Persons	4+4
Water Source (Tank/Mains)	Town
Daily Loading (L/per person/D)	150
Total Daily Loading (L/D)	1200
Adopted Soil Category (AS1567-2012)	2
Indicative Permeability (m/d)	1.5
Adopted DLR/DIR (mm/d OR L/m^2/d)	20
Required LAA (m^2)	60

The absorption area could be catered for by two 20m x 1.7m trenches installed as shown on the site plan with adequate room for a 100% reserve if required (see Appendix 1). 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 1-3 for further details):

- Min DN100 Gravity fed sewer pipe
- Min two x 300L Domestic Grease Trap with Mesh outlet filter capturing all kitchen waste
- Min one x 4500L Common Dual Purpose Septic Tank with outlet filter
- Min one x 5000L Common Pump Well with dual auto changeover submersible pumps with audible high level alarm.
- Common 6 port pressure dosed sequencing valve (¨k-rain or similar)
- Min 68 m^2 Gravity Dosed Septic Trenches
- Provision for 100% reserve area (must remain free from development)

5.6 System Requirements

Nutrient, bacterial and viral reduction performance should be inline with the prescriptions of AS1566.3:2008 for primary treated effluent. It is noteworthy that the high CEC of the soils plus distances from ephemeral drainage lines will all serve to further reduce the risk of residual nutrients, bacterial or viruses entering any waterway.

5.7 Management Requirements

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 septic tank functions adequately and retains all solids over its design life asset owners have the following responsibilities:

- De-sludge (pump out) Septic Tanks at a maximum frequency of once every three years.
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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 mow grass 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.

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 1350 L/day.

- That such flows will require a land application area (LAA) comprising one 67.5 m^2 trenches.

- 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
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7. References

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Appendix 1 Detailed Design Calculations

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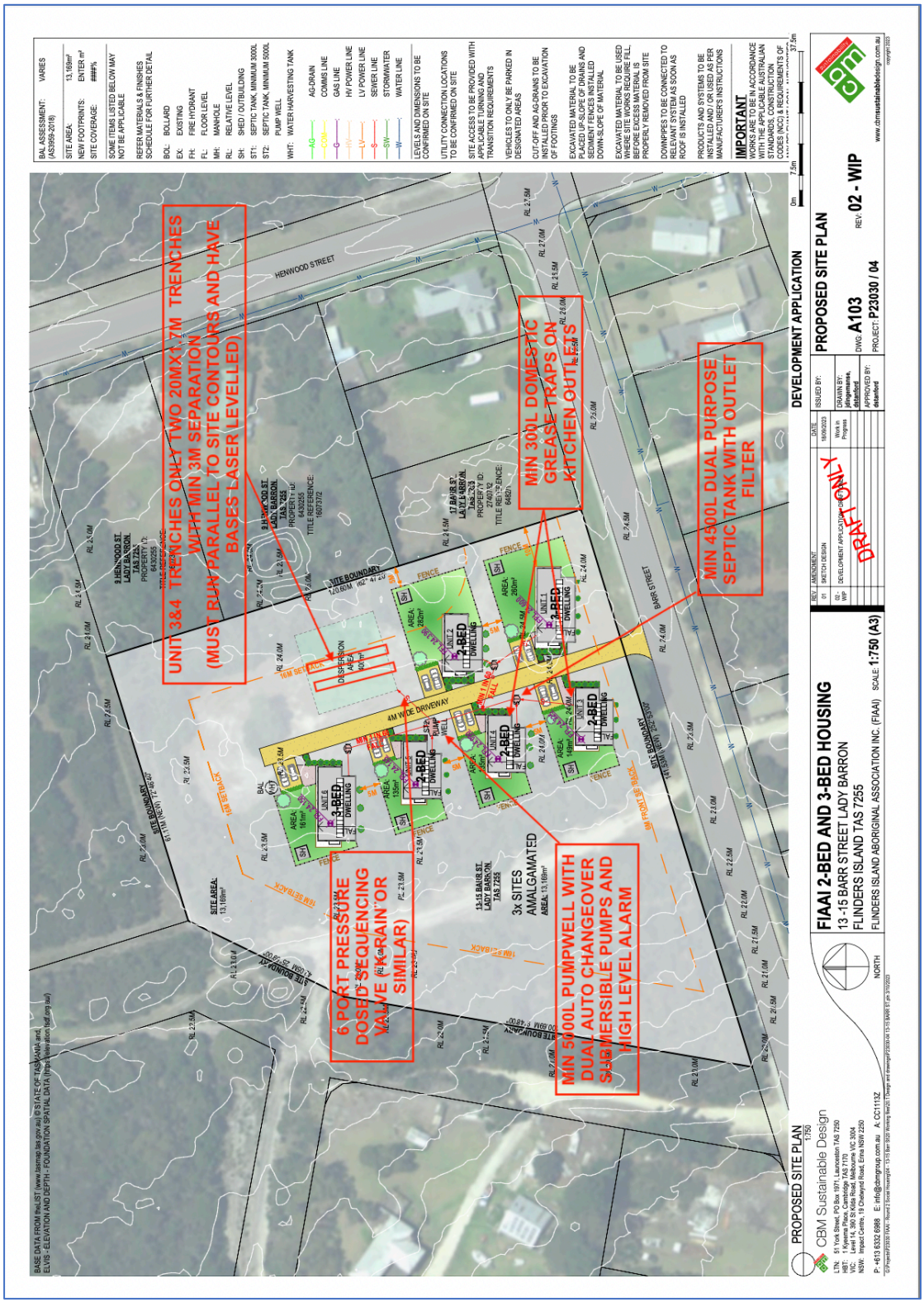
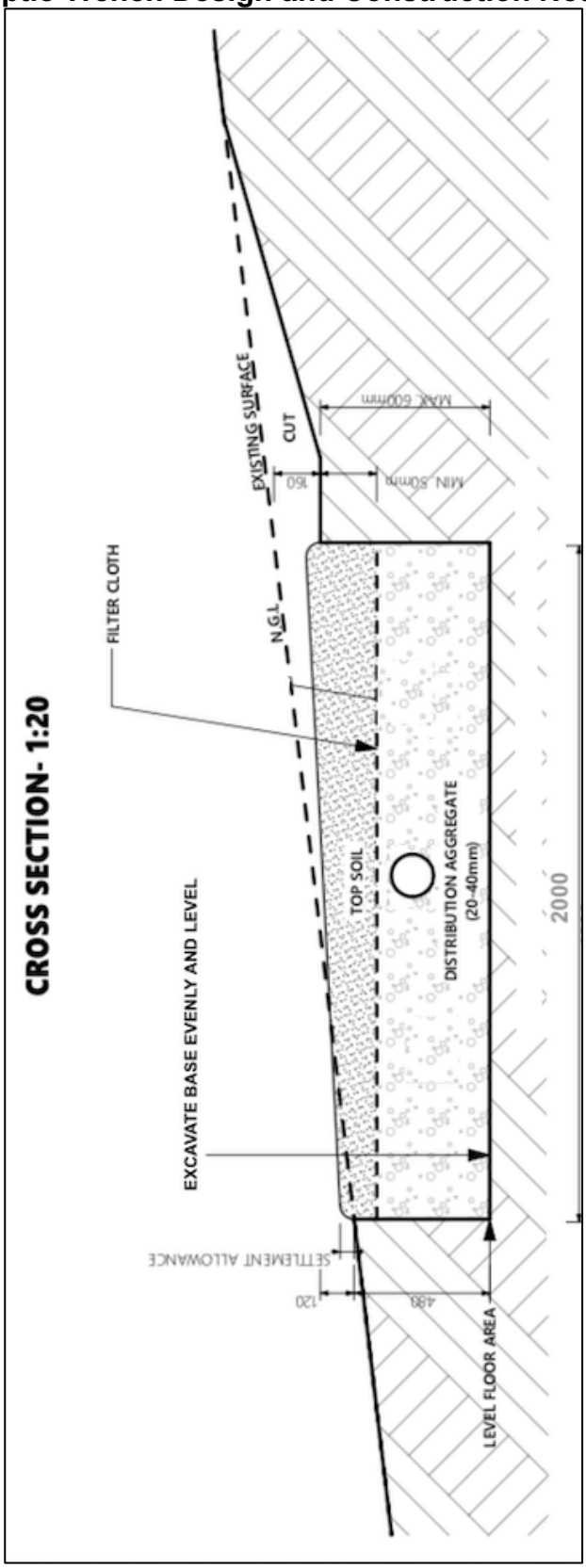
• Adopted Soil category	2
• Amended Adopted Soil Category	Not amended
• Adopted DLR/DIR (mm/d OR L/m^2/d)	20
• LAA Design	Trench
• Primary LAA Requirement	67.5m^2
• Reserve Area	Min 100% reserve LAA must be maintained in an undeveloped state near the primary system as identified on the site plan
Fixtures	Assumes std water saving fixtures inc 6/3L dual flush toilets, aerator forcets, Washing/dishwashing machines with min WELSS rating 6.5 star
Consequences of Variation in Effluent Flows	
• High Flows	The system should be capable of buffering against flows of up to 110% in a 24 hr period or 105%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 Section 5.7 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 7.6.2(d) of AS/NZS 1567.2012.

Appendix 2 Land Application Design and Construction Notes


UNIT 3&4 TRENCHES ONLY TWO 20MX1.7M TRENCHES WITH MIN 3M SEPARATION (MUST RUN PARALLEL TO SITE CONTOURS AND HAVE BASES LASER LEVELLED)
MIN 300L DOMESTIC GREASE TRAPS ON KITCHEN OUTLETS
MIN 4300L DUAL PURPOSE SEPTIC TANK WITH OUTLET FILTER
6 PORT PRESSURE DOSED SEQUENCING VALVE (RIVULIS RAIN"OR SIMILAR)
MIN 5000L PUMPWELL WITH DUAL AUTO CHANGEOVER SUBMERSIBLE PUMPS AND HIGH LEVEL ALARM
DRAFT ONLY
DEVELOPMENT APPLICATION
PROPOSED SITE PLAN
FIAAI 2-BED AND 3-BED HOUSING
13 -15 BARR STREET LADY BARRON
FLINDERS ISLAND TAS 7255
FLINDERS ISLAND ABORIGINAL ASSOCIATION INC. (FIAAI)
SCALE: 1:750 (A3)
DWG: A103
REV: 02 - WIP
PROJECT: P23030 / 04
CBM Sustainable Design
4WD ACCESS ONLY
4M WIDE DRIVEWAY
HENWOOD STREET
BARR STREET
SITE BOUNDARY
SITE AREA: 13,168m²
NORTH

Septic Trench Design and Construction Notes

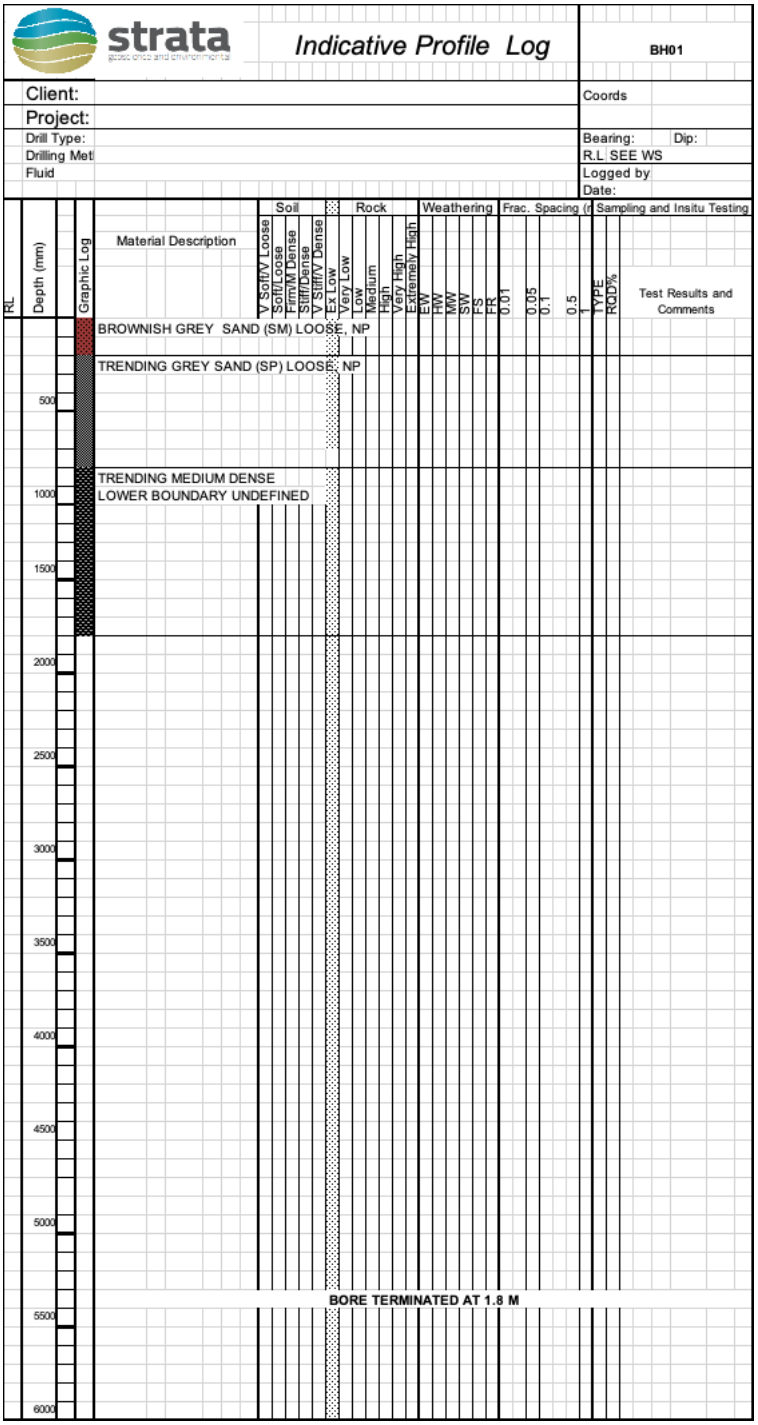


Septic Trench Design and Construction Notes

1. Each Trench has the dimensions of 20.0 m X 1.7 m X 0.5 m.
2. There are two trenches in total as located on site plan giving a total basal area of 68m^2 (See Appendix 1)
3. Trench must be positioned parallel with the contours of the land and the base of the trench **MUST** be excavated evenly and level. In clay soils smearing of walls and floors of trench **MUST** be avoided and should be scoured to a depth of 5-10 mm to reduce base and sidewall sealing after applying Gypsum at a rate of 0.5Kg/m^2.
4. The lower 250mm is to be filled with 20-40mm aggregate.
5. 100mm PVC pipe slotted in the 8'o'clock and 4'o'clock positions to be placed on top of aggregate as shown. The distribution pipe **MUST** be level to ensure flow of effluent to all areas of the trench. Failure to ensure this may cause preferential overloading of the trench and the potential for trench overflow.
6. A further 75mm of aggregate can be added around/over the distribution pipe before overlaying with geo-textile to prevent soil from clogging gravels/lateral slots. For sandy soils the sides of the trench should also be lined.
7. Backfilling of the bed to 150mm above original ground surface level with endemic topsoil (if a sand/loam) or imported loam should proceed. This layer should be mounded. Do not mechanically compact this layer.
8. An inspection outlet should be placed on each distribution pipe.
9. Vehicles and livestock **MUST** be excluded from the bed area.

Appendix 3 Site and Soil Evaluation

Table 3 Site Features	
Climate	The nearest weather station with long term data is Whitemark Station with a mean annual rainfall of 769 mm (BOM 2023) and no evaporation data. The region has a near Mediterranean climate with maximum temperatures and minimum rainfall in the summer.
Exposure	The site is relatively unshielded with exposure to winds which predominate from the NW/SW directions
Vegetation	Grass
Landform	Plain
Slope	Slight slopes
Fill	No fill evident
Rocks and Rock Outcrops	None evident
Erosion Potential	None known
Surface Water	100m+
Flood Potential	<1:100 AEP
Stormwater Run-on and Upslope Seepage	The dwelling and land application areas are expected to receive on minor amounts of stormwater run-on or groundwater recharge.
Groundwater	No groundwater was encountered throughout site reconnaissance however perched water tables likely to exist in wetter periods- upslope interceptor drainage required.
Site Drainage and Subsurface Drainage	Good
Available Land Application Area	There is surplus space to land application area requirements (including reserves).


strata
geoscience and environmental
Indicative Profile Log
BH01
Client:
Project:
Drill Type:
Drilling Met
Fluid
Coords
Bearing:
Dip:
R.L SEE WS
Logged by
Date:
RL
Depth (mm)
Graphic Log
Material Description
Soil
V Soft/V Loose
Soft/Loose
Firm/M Dense
Stiff/Dense
V Stiff/V Dense
Rock
Ex Low
Very Low
Low
Medium
High
Very High
Extremely High
Weathering
EW
HW
MW
SW
FS
FR
Frac. Spacing (
0.01
0.05
0.1
0.5
1
Sampling and Insitu Testing
TYPE
RQD%
Test Results and Comments
BROWNISH GREY SAND (SM) LOOSE, NP
TRENDING GREY SAND (SP) LOOSE, NP
TRENDING MEDIUM DENSE
LOWER BOUNDARY UNDEFINED
BORE TERMINATED AT 1.8 M
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000

Appendix 4 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 AS2870-2016
It must be emphasised that the site classification to AS2870-2016 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 - 2016. Other abnormal moisture conditions as defined in AS2870 – 2016 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 - 2016, 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 septic trench and bed 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.

CERTIFICATE OF THE RESPONSIBLE DESIGNER

Section 94
Section 106
Section 129
Section 155

Form **35**

To: CBM SUSTAINABLE DESIGN *Owner name*

Address

Suburb/postcode

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 AS ABOVE

Designer's project reference No. SR05399

Address: UNITS 5-6 13-15 BARR STREET

Lot No:

LADY BARRON

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

Description of work:

WASTEWATER OVERFLOW SYSTEM DESIGN

(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
	☒ 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: ☒ 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:	Date:
Schedules:	Prepared by:	Date
Specifications:	Prepared by: SN	Date 3/10/23
Computations	Prepared by: SN	Date 3/10/23
Performance solution proposals:	Prepared by:	Date
Test reports:	Prepared by:	Date

Standards, codes or guidelines relied on in design process:

AS1547-2012

Any other relevant documentation:

SEE TERMS AND CONDITIONS IN REPORT

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		3/10/23
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 infrastructur5
- [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: 3/10/23

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Section 94
Section 106
Section 129
Section 155

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To: CBM SUSTAINABLE DESIGN *Owner name*

Address

Suburb/postcode

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 AS ABOVE

Designer's project reference No. SR05398

Address: UNITS 1-2 13-15 BARR STREET

Lot No:

LADY BARRON

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

Description of work:

WASTEWATER OVERFLOW SYSTEM DESIGN

(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
	☒ 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: ☒ Performance Solution: ☐ *(X the appropriate box)*

Other details:

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Performance solution proposals:	Prepared by:	Date
Test reports:	Prepared by:	Date

Standards, codes or guidelines relied on in design process:

AS1547-2012

Any other relevant documentation:

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Attribution as designer:

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	Name: (print)SVEN NIELSEN	*SN*	
Designer:	SVEN NIELSEN		3/10/23
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
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- [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 infrastructur5
- [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.

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	Name: (print)	*Signed*	*Date*
Designer:	SVEN NIELSEN		Date: 3/10/23

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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 AS ABOVE

Designer's project reference No. SR05411

Address: UNITS 3-4 13-15 BARR STREET

Lot No:

LADY BARRON

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

Description of work:

WASTEWATER OVERFLOW SYSTEM DESIGN

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

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	☐ Electrical design	Building Services Designer
	☐ Mechanical design	Building Service Designer
	☐ Plumbing design	Plumber-Certifier; Architect, Building Designer or Engineer
	☐ Other (specify)	

Deemed-to-Satisfy: ☒ Performance Solution: ☐ *(X the appropriate box)*

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AS1547-2012

Any other relevant documentation:

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	Name: (print)SVEN NIELSEN	*SN*	
Designer:	SVEN NIELSEN		3/10/23
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.

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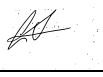
- [X] The work are not within 2m of TasWater's infrastructure and are outside any TasWater easement
- [X] I have checked the LISTMap to confirm the location of TasWater infrastructur5
- [X] If the property is connected to TasWater's water system, a water meter is in place, or has been applied for to 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: 3/10/23