GEOTON Pty Ltd
Geotechnical Consultants

Geoton Pty Ltd ABN 81 129 764 629
PO Box 522 Prospect TAS 7250
Unit 24, 16-18 Goodman Court
Invermay TAS 7248
Tel (+61) (3) 6326 5001
www.geoton.com.au

6 December 2022

Reference No. GL22468Ab

Prime Design Tasmania Pty Ltd
10 Goodman Court
INVERMAY TAS 7248

Attention: Mr Drew Den Hartog

Dear Sir

RE: Site Classification & On-site Wastewater Disposal Assessment and Design

14 Gunter Street, Lady Barron

We have pleasure in submitting herein our report detailing the results of the geotechnical investigation conducted at the above site.

Should you require clarification of any aspect of this report, please contact Brett Street or the undersigned on 03 6326 5001.

For and on behalf of

Geoton Pty Ltd

Tony Barriera

Director – Principal Geotechnical Engineer

1 INTRODUCTION

A limited scope investigation has been conducted for Prime Design Tasmania Pty Ltd at the site of a proposed residential development at 14 Gunter Street, Lady Barron.

The investigation has been conducted to assess the following:

- The general subsurface conditions at the site and consequently assign a Site Classification in accordance with AS 2870 – 2011 “Residential Slabs and Footings”;
- The surrounding topography and provide a Wind Classification in accordance with AS 4055 – 2021 “Wind Loads for Housing”; and
- The suitability of the site for disposal of domestic wastewater and the design of an on-site wastewater disposal system in accordance with AS/NZS 1547:2012 “On-site domestic wastewater management”.

Site plans prepared by Prime Design Tasmania Pty Ltd of the proposed development were provided, project number PD22250, dated 21.11.2022. We understand a 3 - bedroom dwelling is proposed.

2 FIELD INVESTIGATION

The field investigation was conducted on 1 September 2022 and involved the drilling of 4 boreholes by a bobcat with an auger attachment to depths of 2.0m.

Dynamic Cone Penetration (DCP) tests were conducted in the natural granular soils encountered in the investigation. The permeability of the site was also tested using a Constant Head Permeameter.

The results of the field tests are shown on the borehole logs.

The logs of the boreholes are included in Appendix A and their locations are shown on Figure 1 attached.

3 SITE CONDITIONS

The site is approximately 1000m^2 in size and is currently vacant, with the ground surface having a very gentle fall towards the south.

The Mineral Resources Tasmania (MRT) Digital Geological Atlas, 1:250,000 Series, shows the site to be located on Devonian Period dominantly syenogranite/ monzogranite (igneous rock).

Examination of the LIST Landslide Planning Map indicates that the site is not mapped within a known landslide hazard band.

The investigation indicated that the soil profile was generally uniform across the site. The boreholes generally encountered silty sand topsoil to depths of 0.1m to 0.25m, underlain by sand to the investigated depths of 2.0m.

All boreholes encountered a perched water table at the measured depths of BH1 (1.4m), BH2 (1.2m), BH3 (1.4m) and BH4 (1.1m).

Full details of soil conditions encountered are presented on the borehole logs.

4 SITE CLASSIFICATION

After allowing due consideration of the site geology, drainage and soil conditions, the site has been classified as follows:

CLASS S (AS 2870)

Foundation designs in accordance with this Classification are to be subject to the overriding conditions of Section 5 below.

This Classification is applicable only for ground conditions encountered at the time of this investigation. If cut or fill earthworks are carried out, then the Site Classification will need to be re-assessed, and possibly changed.

5 FOUNDATIONS

Particular attention should be paid to the design of footings as required by AS 2870 – 2011.

In addition to normal founding requirements arising from the above Classification, particular conditions at this site dictate that the founding medium for all footings would be as follows:

Silty SAND/SAND (SM/SP) – fine to medium grained, grey, medium dense encountered below 0.5m from the existing ground surface

An allowable bearing pressure of **100 kPa** is available for edge beams, strips and pads founded as above, provided the site is prepared as follows:

- Earthworks should be carried out in accordance with AS3798-2007, Earthworks for Residential and Commercial Development.
- All topsoil should be removed from the building footprint.
- The natural sand foundation should be proof rolled prior to slab on ground construction.
- All sands disturbed in the base of footing excavations should be compacted.

The Site Classification presented assumes that the current natural drainage and infiltration conditions at the site will not be markedly affected by the proposed site development work. Care should therefore be taken to ensure that surface water is not permitted to collect adjacent to the structure and that significant changes to seasonal soil moisture equilibria do not develop as a result of service trench construction or tree root action.

Attention is drawn to Appendix B of AS 2870 and CSIRO Building Technical File BTF18 “Foundation Maintenance and Footing Performance: A Homeowner’s Guide” as a guide to maintenance requirements for the proposed structure.

Although the borehole data provides an indication of subsurface conditions at the site, variations in soil conditions may occur in areas of the site not specifically covered by the field investigation. The base of all footing or beam excavations should therefore be

inspected to ensure that the founding medium meets the requirements referenced herein with respect to type and strength of founding material.

The boreholes were backfilled shortly after being drilled, not allowing time for groundwater seepage flows to develop. Groundwater seepages or higher groundwater levels can occur during and/or after a prolonged period of wet weather or a heavy rainfall event.

6 WIND CLASSIFICATION

After allowing due consideration of the region, terrain, shielding and topography, the site has been classified as follows:

WIND CLASSIFICATION N3 (AS 4055)

REGION	TERRAIN CATEGORY	SHIELDING	TOPOGRAPHY
A	TC1	NS	T1

7 EFFLUENT DISPOSAL

The AS/NZS 1547:2012 and the *Building Act 2016:* Director's Guidelines for On-site Wastewater Management Systems provide guidelines for typical wastewater flow allowances under a range of circumstances. The documents recommend a typical wastewater flow of 150 litres/person/day for households on town water supply. As the proposed dwelling is 3 bedrooms, a population equivalent of 5 persons is appropriate with the average daily flow being 750L/day.

7.1 Permeability of Soil and Soil Category

The soil has been classified as follows:

- Texture – Sand (Table E1 from AS1547-2012);
- Structure – Massive (Table E4 from AS/NZS1547-2012); and
- Category – 1 (Table E1 from AS/NZS1547:2012).

For massive Category 1 soils the indicative K_{sat} from AS/NZS1547 Table 5.1 is >3.0m/day.

- Adopted Permeability – 3.0m/day.

7.2 Disposal and Treatment Method

As the site has a shallow ground water table, the site is not suitable for in-ground disposal of wastewater using absorption trenches or evapo-transpiration systems, in addition the location of the dwelling requires the wastewater disposal area to be located upslope due to appropriate setbacks from site boundaries and buildings.

As such, the site assessment indicates that the site is suitable for the disposal of domestic effluent by way of a septic tank, which is required to have a minimum capacity of 3000L and a raised conventional bed.

The conventional bed will need to be constructed above the natural surface and filled with sand-fill media.

Due to the conventional bed being raised above the natural surface, a pump and pump chamber is required. The pump is to be hard-wired to the dwelling and comes fitted with audible and visual high-water alarms. The alarms will notify you of a failing submersible pump or blocked line, which causes the liquid level to rise in your septic tank/pump pit.

7.3 Design Loading Rate

The adopted design loading rate for the conventional bed has been set at 20mm/day as outlined in AS/NZS 1547:2012 Table L1. The maximum allowable rate of 35mm/day has not been adopted due to site constraints.

7.4 Conventional Bed

Guidelines for the design of conventional bed systems are outlined in AS/NZS 1547:2012 Appendix L. The method of determining the dimensions for the bed is outlined in AS/NZS 1547:2012 Section L4 and is as follows:

$$L = \frac{Q}{DLR \times W}$$

Where L= Length in metres

Q= Design daily flow in L/day

DLR= Design Loading Rate in mm/day

W= Width in metres

As the DLR value has been set at 20mm/day and the design daily flow (Q) has been set at 750L/day, when the parameters are inserted in the above equation, the bed dimensions required are as follows:

- Beds required = 1
- Bed length = 12.5m
- Bed width = 3m
- Nominal Bed height = 0.4m

The disposal field for the above scenario would need to be a minimum of 16.5m long and 7m wide due to the following:

- A 2m buffer is required around the outside of the disposal field.

This would give a disposal area of approximately 115.5m^2.

There is an adequate secondary (back-up) area of 115.5m^2 if required.

The bed is to be located in the area shown on the site plan and constructed as per the cross sections shown on Figure 2 attached.

The sand-fill media needs to meet the criteria outlined in AS/NZS 1547:2012 Section N3.3.2, as follows:

a) Medium sand with a grain size of 0.25mm to 1.0mm, a uniformity coefficient less than 4, less than 3% fines passing a 200 sieve (0.075 mm), free of clay, limestone, and organic material;

b) Carefully placed onto the ploughed area and moved into place either manually or by using a lightweight tracked tractor with a blade; and

c) Built-up until its height reaches the height of the distribution bed.

The distribution bed shall be constructed in accordance with AS/NZS 1547:2012 Section N3.3.3, as follows:

a) Formed within the top of the sand-fill media, with a level base; and

b) Carefully filled with graded river run aggregate (20mm to 60mm, non-crushed, rounded), distribution pipes and levelled at a minimum depth of 150mm.

7.5 Risk Management

The risk management process is an inherent part of the on-site wastewater disposal design. The on-site wastewater disposal system has been designed by considering the site characteristics and with risk identification in accordance with AS1547:2012. The risk reduction measures are detailed in the report and form the basis of the system selection and design.

7.6 Setbacks

The minimum separation distance between the disposal area and downslope features is based on Appendix R from AS/NZS 1547:2012 “Recommended Setback Distances for Land Application Systems”. As per Table R1 from AS/NZS 1547:2012 the minimum setback requirements are as follows:

- 22.0m from downslope sensitive features such as watercourses;
- 2.0m from downslope property boundaries;
- 1.5m uphill and laterally from property boundaries;
- 5.0m from downslope buildings;
- 3.0m uphill and laterally from buildings; and
- 1.5m from groundwater.

7.7 Wastewater Recommendations

It is recommended that the following actions are undertaken in looking after your system:

- Septic tanks **must be** pumped out every 3 to 5 years or more frequently depending on usage;
- Minimise domestic water use;
- Minimise the use of non-biodegradable detergents;
- Minimise the use of detergents containing phosphorous (eg calgon and similar);
- Avoid discharging polluting chemicals into wastewater systems; and
- Monitor quality of groundwater.

References:

AS 2870 - 2011 Residential Slabs and Footings Construction

AS 4055 - 2021 Wind Loads for Housing

AS/NZS 1547- 2012 On-site domestic-wastewater management

Building Act 2016: Director's Guidelines for On-site Wastewater Management Systems

Attachments:

Limitations of report

Figure 1: Site Plan

Figure 2: Conventional Bed Section

Appendix A – Borehole Logs & Explanation Sheets

Appendix B – Certificate forms

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Geotechnical Consultants - Limitations of report

These notes have been prepared to assist in the interpretation and understanding of the limitations of this report.

Project specific criteria

The report has been developed on the basis of unique project specific requirements as understood by Geoton and applies only to the site investigated. Project criteria are typically identified in the Client brief and the associated proposal prepared by Geoton and may include risk factors arising from limitations on scope imposed by the Client. The report should not be used without further consultation if significant changes to the project occur. No responsibility for problems that might occur due to changed factors will be accepted without consultation.

Subsurface variations with time

Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. In the event of significant delays in the commencement of a project, further advice should be sought.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and at the time they are taken. All available data is interpreted by professionals to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, as it is virtually impossible to provide a definitive subsurface profile which includes all the possible variabilities inherent in soil and rock masses.

Report Recommendations

The report is based on 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 and therefore the report recommendations can only be regarded as preliminary. Where variations in conditions are encountered, further advice should be sought.

Specific purposes

This report should not be applied to any project other than that originally specified at the time the report was issued.

Interpretation by others

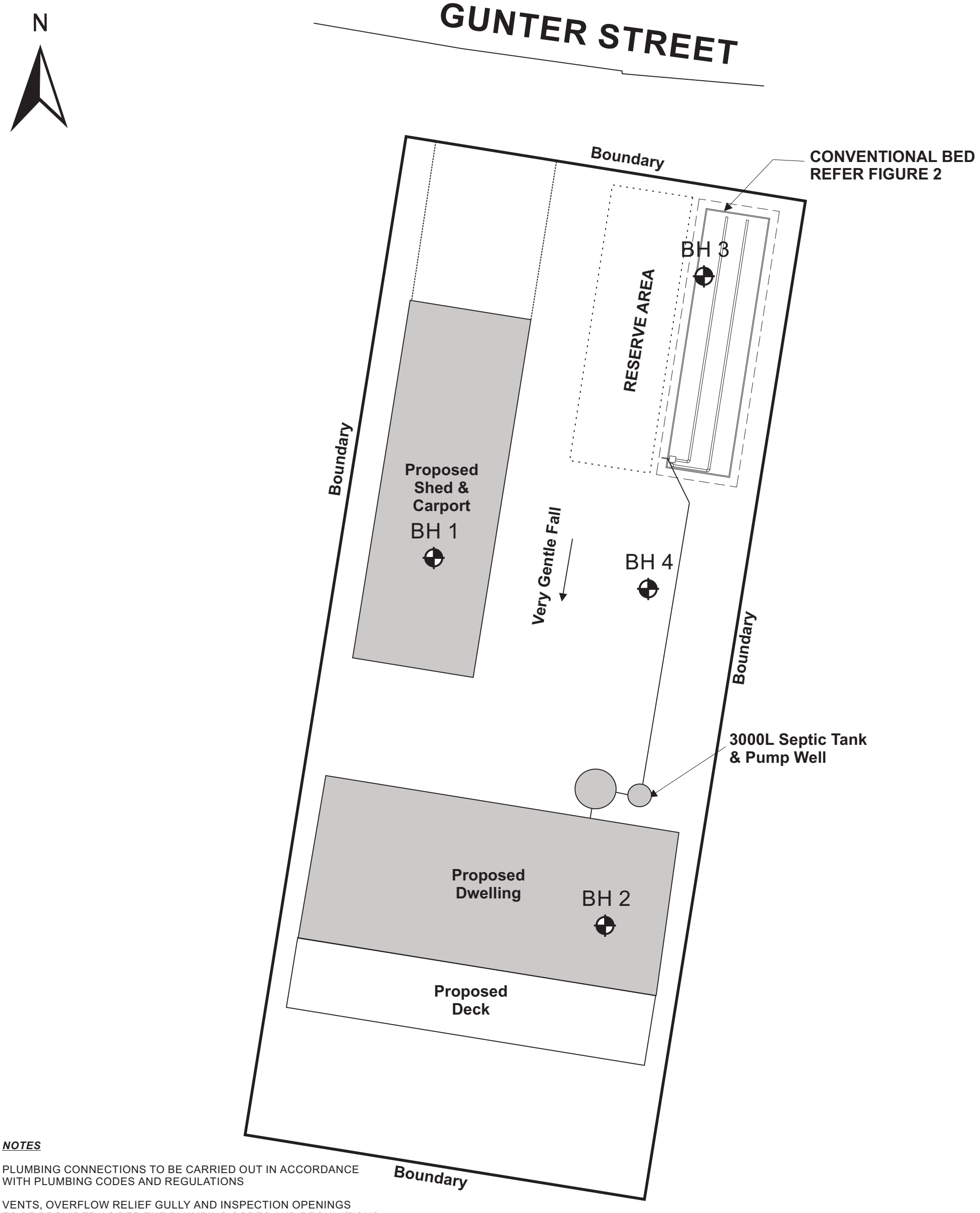
Geoton will not be responsible for interpretations of site data or the report findings by others involved in the design and construction process. Where any confusion exists, clarification should be sought from Geoton.

Report integrity

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Geoenvironmental issues

This report does not cover issues of site contamination unless specifically required to do so by the client. In the absence of such a request, Geoton take no responsibility for such issues.



NOTES

PLUMBING CONNECTIONS TO BE CARRIED OUT IN ACCORDANCE WITH PLUMBING CODES AND REGULATIONS

VENTS, OVERFLOW RELIEF GULLY AND INSPECTION OPENINGS TO BE PROVIDED AS PER THE PLUMBING CODES AND REGULATIONS

BED TO BE SET BACK:
- 22.0m FROM DOWNHILL SENSITIVE FEATURES SUCH AS WATER COURSES;
- 2.0m FROM DOWNSLOPE PROPERTY BOUNDARIES;
- 1.5m UPHILL AND LATERALLY FROM PROPERTY BOUNDARIES;
- 5.0m FROM DOWNSLOPE BUILDINGS;
- 3.0M UPHILL AND LATERALLY FROM BUILDINGS; AND
-1.5M FROM GROUNDWATER.

Approximate Scale (m)

0 5 10 15 20

Legend

BH 1
Approximate Borehole Location

GEOTON Pty Ltd				client:	PRIME DESIGN TASMANIA PTY LTD
				project:	14 GUNTER STREET LADY BARRON
date	06/12/2022	drawn	BS		
scale	AS SHOWN	approved	TB	title:	SITE PLAN
original size	A3	rev		project no: GL22468A	figure no. 1

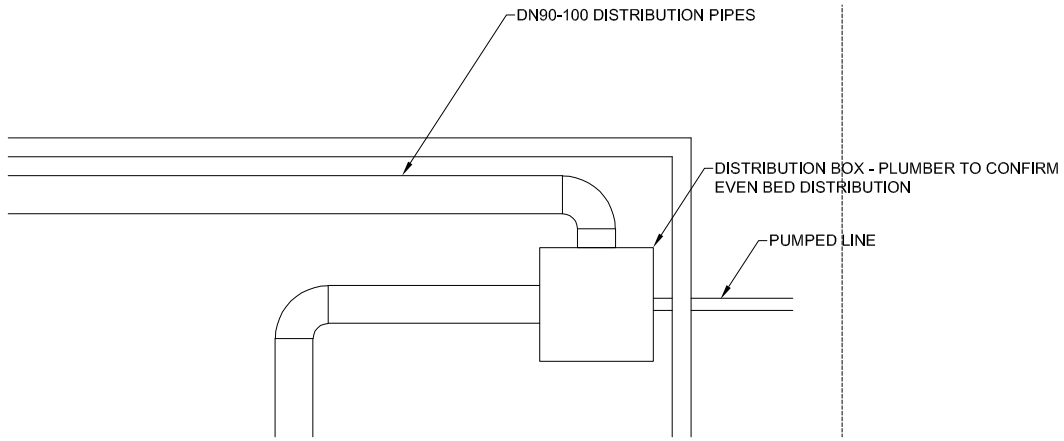
12.1.2 - February 2023

FILTER SAND

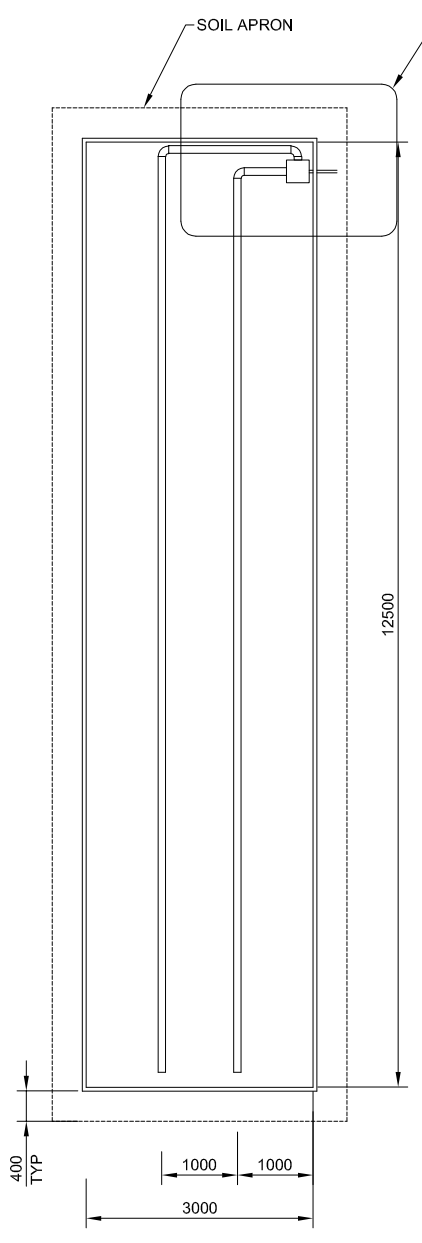
The sand-fill media needs to meet the criteria outlined in AS/NZS 1547:2012 Section N3.3.2, as follows:

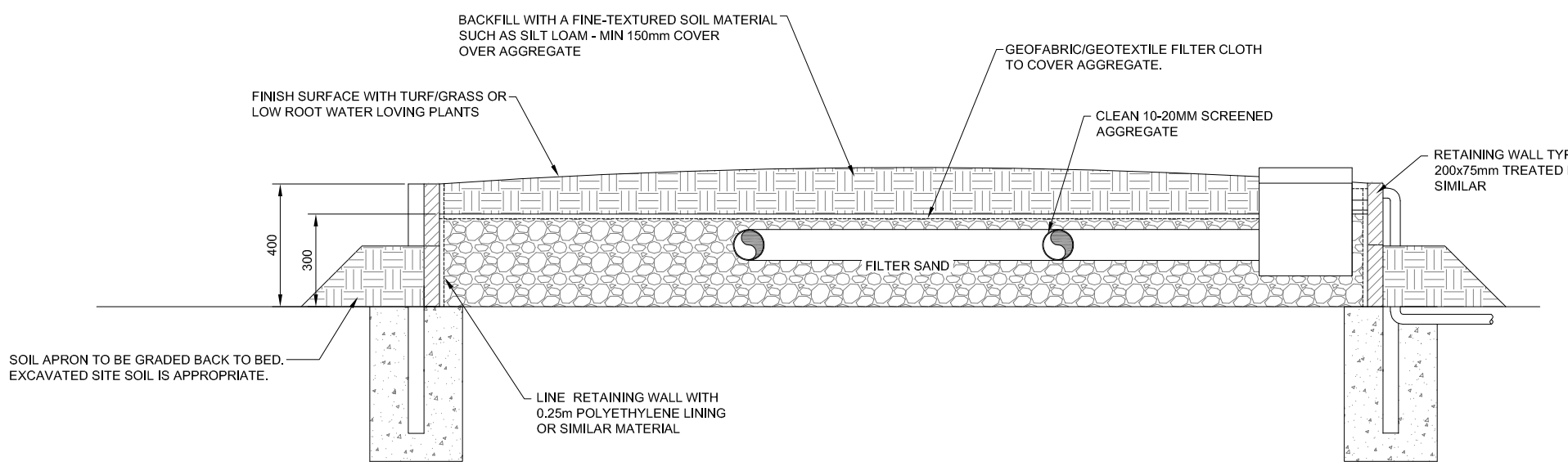
a) Medium sand with a grain size of 0.25mm to 1.0mm, a uniformity coefficient less than 4, less than 3% fines passing a 200 sieve (0.075 mm), free of clay, limestone, and organic material;

BED CONSTRUCTION TO BE UNDERTAKEN BY SUITABLE QUALIFIED PERSONS HAVING EXPERIENCE WITH RETAINING WALLS



DETAIL 1
SCALE 1:20 @A3





CONSTRUCTION NOTES:

a) Pine sleepers to be a minimum 75mm and a minimum rating of H4

b) Posts to be anchored at a minimum depth 600mm cemented into natural ground.

c) Maximum height of timber retaining wall should not exceed 1m.

d) Posts are recommended to be of steel construction or 75mm treated pine sleeper.

e) Posts are to be installed on the outside of bed.

f) Post spacing is recommended to be spaced at either end of sleeper including a middle support.

g) Polyethylene Lining LDPE 200um.

h) Polyethylene liner to be extended into natural ground by a minimum 200mm prior to backfilling.

I) Timber Sleepers to be treated with a bitumen waterproofing on the exterior if backfilled around.

j) Bed distribution lines MUST enter the beds from the top (pipe work to be attached to the exterior of the bed).

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GEOTECHNICAL CONSULTANTS

- GEOTECHNICAL INVESTIGATIONS
- SITE CLASSIFICATION
- WASTEWATER ASSESSMENT
- ROADWORKS
- LANDSLIDE RISK ASSESSMENT
- DAMS
- ENVIRONMENTAL ASSESSMENT
- FOUNDATION INVESTIGATION

PO Box 522 Prospect Vale TAS 7250
Unit 24, 16-18 Goodman Court
Invermay, TAS
T- (03) 6326 5001
www.geoton.com.au

10

CLIENT:	PRIME DESIGN TASMANIA PTY LTD
PROJECT:	SITE CLASSIFICATION & ONSITE WASTEWATER DISPOSAL DESIGN
PROJECT NO:	GL22468Ab
DRAWING NO:	FIGURE 2
DATE:	06/12/2022
REVISION:	-
SCALE:	-
DRAWN:	B.STREET
DESIGNED:	T.BARRIERA
APPROVED:	T.BARRIERA

No.	REVISION	DATE

PLATE 1 - View of the proposed development location looking to the north

GEOTON Pty Ltd				client: PRIME DESIGN TASMANIA PTY LTD	
title: PHOTOGRAPH				project: 14 GUNTER STREET LADY BARRON	
date:	01/09/2022	original size	A4	project no: GL22468A	figure no. PLATE 1

Appendix A

Borehole Logs

GEOTON Pty Ltd
Geotechnical Consultants
PO Box 522 Prospect TAS 7250
Unit 24, 16-18 Goodman Court, Invermay TAS
Tel (03) 6326 5001

ENGINEERING BOREHOLE LOG

Borehole no. BH1
Sheet no. 1 of 1
Job no. GL22468A

Client : Prime Design Tasmania Pty Ltd — Date : 01/09/2022
Project : Site Classification and On-Site Wastewater Assessment & Design — Logged By : BS
Location : 14 Gunter Street, Lady Barron

Drill model : Bobcat — Easting: — Slope: 90° — RL Surface :
Hole diameter : 150mm — Northing: — Bearing: - — Datum :

Method	Support	Penetration	Water	Notes Samples Tests (DCP)	Depth (m)	Graphic log	Classification Symbol	Material Description	Moisture condition	Consistency density, index	Structure, additional observations
ADV	N				0.25			TOPSOIL - Silty Sand, fine grained, black, trace organics	M	L	
					0.50		SP	SAND - fine to medium grained, light brown	M	MD	
					0.75						
					1.00						
					1.25			SAND - fine grained, black	M/W	MD	
			▽		1.50			SAND - coarse grained, white	W	MD	Groundwater measured at 1.4m, borehole collapse
					1.75			SAND - fine grained, light brown	W	MD	
					2.00						
					2.25			Borehole BH1 terminated @ 2.0m			

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Unit 24, 16-18 Goodman Court, Invermay TAS
Tel (03) 6326 5001

ENGINEERING BOREHOLE LOG

Borehole no. BH2
Sheet no. 1 of 1
Job no. GL22468A

Client : Prime Design Tasmania Pty Ltd — Date : 01/09/2022
Project : Site Classification and On-Site Wastewater Assessment & Design — Logged By : BS
Location : 14 Gunter Street, Lady Barron

Drill model : Bobcat — Easting: — Slope: 90° — RL Surface :
Hole diameter : 150mm — Northing: — Bearing: - — Datum :

Method	Support	Penetration	Water	Notes Samples Tests (DCP)	Depth (m)	Graphic log	Classification Symbol	Material Description	Moisture condition	Consistency density, index	Structure, additional observations
ADV	N			1				TOPSOIL - Silty Sand, fine grained, black, trace organics	M	L	
				2							
				1	0.25		SM	Silty SAND - fine grained, black/ brown	M	L/ MD	
				2							
				1	0.50		SP	SAND - fine to medium grained, grey	M	MD	
				2							
				3							
				3	0.75						
					1.00						
			▽		1.25			SAND - coarse grained, white	W	MD	water table measured at 1.2m borehole collapse
					1.50			SAND - fine grained, black	W	MD	
					1.75						
					2.00						
					2.25			Borehole BH2 terminated @ 2.0m			

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Unit 24, 16-18 Goodman Court, Invermay TAS
Tel (03) 6326 5001

ENGINEERING BOREHOLE LOG

Borehole no. BH3
Sheet no. 1 of 1
Job no. GL22468A

Client : Prime Design Tasmania Pty Ltd — Date : 01/09/2022
Project : Site Classification and On-Site Wastewater Assessment & Design — Logged By : BS
Location : 14 Gunter Street, Lady Barron

Drill model : Bobcat — Easting: — Slope: 90° — RL Surface :
Hole diameter : 150mm — Northing: — Bearing: - — Datum :

Method	Support	Penetration	Water	Notes Samples Tests (DCP)	Depth (m)	Graphic log	Classification Symbol	Material Description	Moisture condition	Consistency density, index	Structure, additional observations
ADV	N							TOPSOIL - Silty Sand, fine grained, black, trace organics	M	L	
					0.25		SP	SAND - fine to medium grained, light brown	M	MD	
					0.50			SAND - coarse grained, white	M/W	MD	
					0.75			SAND - fine to medium grained, brown/black	M/W	MD	
					1.00			with some fine gravel			
			▽		1.25						
					1.50			SAND - fine grained, brown	W	MD	water table measured at 1.4m, borehole collapse
					1.75						
					2.00						
					2.25			Borehole BH3 terminated @ 2.0m			

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Geotechnical Consultants
PO Box 522 Prospect TAS 7250
Unit 24, 16-18 Goodman Court, Invermay TAS
Tel (03) 6326 5001

ENGINEERING BOREHOLE LOG

Borehole no. BH4
Sheet no. 1 of 1
Job no. GL22468A

Client : Prime Design Tasmania Pty Ltd — Date : 01/09/2022
Project : Site Classification and On-Site Wastewater Assessment & Design — Logged By : BS
Location : 14 Gunter Street, Lady Barron

Drill model : Bobcat — Easting: — Slope: 90° — RL Surface :
Hole diameter : 150mm — Northing: — Bearing: - — Datum :

Method	Support	Penetration	Water	Notes Samples Tests (DCP)	Depth (m)	Graphic log	Classification Symbol	Material Description	Moisture condition	Consistency density, index	Structure, additional observations
ADV	N							TOPSOIL - Silty Sand, fine grained, black, trace organics	M	L	
					0.25		SP	SAND - fine to medium grained, light brown/grey	M	MD	
					0.50						
					0.75						
					1.00						
			▽					SAND - coarse grained, white	W	MD	water table measured at 1.1m, borehole collapse
					1.25						
					1.50						
					1.75						
					2.00						
					2.25			Borehole BH4 terminated @ 2.0m			

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Investigation Log Explanation Sheet

METHOD – BOREHOLE

TERM	Description
AS	Auger Screwing*
AD	Auger Drilling*
RR	Roller / Tricone
W	Washbore
CT	Cable Tool
HA	Hand Auger
DT	Diatube
B	Blank Bit
V	V Bit
T	TC Bit

* Bit shown by suffix e.g. ADT

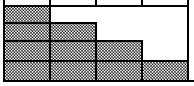
METHOD – EXCAVATION

TERM	Description
N	Natural exposure
X	Existing excavation
H	Backhoe bucket
B	Bulldozer blade
R	Ripper
E	Excavator

SUPPORT

TERM	Description
M	Mud
N	Nil
C	Casing
S	Shoring

PENETRATION

1	2	3	4	
				No resistance ranging to Refusal

WATER

Symbol	Description
	Water inflow
	Water outflow
	17/3/08 water on date shown

NOTES, SAMPLES, TESTS

TERM	Description
U_{50}	Undisturbed sample 50 mm diameter
U_{63}	Undisturbed sample 63 mm diameter
D	Disturbed sample
N	Standard Penetration Test (SPT)
N*	SPT – sample recovered
N_C	SPT with solid cone
V	Vane Shear
PP	Pocket Penetrometer
P	Pressumeter
B_S	Bulk sample
E	Environmental Sample
R	Refusal
DCP	Dynamic Cone Penetrometer (blows/100mm)
PL	Plastic Limit
LL	Liquid Limit
LS	Linear Shrinkage

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION

Based on AS 1726:2017

MOISTURE

TERM	Description
D	Dry
M	Moist
W	Wet

CONSISTENCY/DENSITY INDEX

TERM	Description
VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fr	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	Very dense

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Soil Description Explanation Sheet (1of 2)

DEFINITION

In engineering terms, soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL AND SOIL NAME

Soils are described in accordance with the AS 1726: 2017 as shown in the table on Sheet 2.

PARTICLE SIZE DEFINITIONS

NAME	SUBDIVISION	SIZE (mm)
BOULDERS		>200
COBBLES		63 to 200
GRAVEL	Coarse	19 to 63
	Medium	6.7 to 19
	Fine	2.36 to 6.7
SAND	Coarse	0.6 to 2.36
	Medium	0.21 to 0.6
	Fine	0.075 to 0.21
SILT		0.002 to 0.075
CLAY		<0.002

MOISTURE CONDITION

Coarse Grained Soils

Dry Non-cohesive and free running.

Moist Soil feels cool, darkened in colour. Soil tends to stick together.

Wet As for moist but with free water forming when handling.

Fine Grained Soils

Moist, dry of Plastic Limited – w < PL
Hard and friable or powdery.

Moist, near Plastic Limit – w ≈ PL
Soils can be moulded at a moisture content approximately equal to the plastic limit.

Moist, wet of Plastic Limit – w > PL
Soils usually weakened and free water forms on hands when handling.

Wet, near Liquid Limit - w ≈ LL

Wet, wet of Liquid Limit - w > LL

CONSISTENCY TERMS FOR COHESIVE SOILS

TERM	UNDRAINED STRENGTH s_u (kPa)	FIELD GUIDE
Very Soft	≤12	Exudes between the fingers when squeezed in hand
Soft	12 to 25	Can be moulded by light finger pressure
Firm	25 to 50	Can be moulded by strong finger pressure
Stiff	50 to 100	Cannot be moulded by fingers
Very Stiff	100 to 200	Can be indented by thumb nail
Hard	>200	Can be indented with difficulty by thumb nail
Friable	–	Can be easily crumbled or broken into small pieces by hand

RELATIVE DENSITY OF NON-COHESIVE SOILS

TERM	DENSITY INDEX (%)
Very Loose	≤15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	> 85

DESCRIPTIVE TERMS FOR ACCESSORY SOIL COMPONENTS

DESIGNATION OF COMPONENT	IN COARSE GRAINED SOILS		IN FINE GRAINED SOILS	TERM
	% Fines	% Accessory coarse fraction	% Sand/ gravel	
Minor	≤5	≤15	≤15	Trace
	>5, ≤12	>15, ≤30	>15, ≤30	With
Secondary	>12	>30	>30	Prefix

SOIL STRUCTURE

ZONING		CEMENTING	
Layer	Continuous across the exposure or sample.	Weakly cemented	Easily disaggregated by hand in air or water.
Lens	Discontinuous layer of different material, with lenticular shape.	Moderately cemented	Effort is required to disaggregate the soil by hand in air or water.
Pocket	An irregular inclusion of different material.		

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

Extremely Weathered material	Material is weathered to such an extent that it has soil properties. Structure and/or fabric of parent rock material retained and visible.
Residual soil	Structure and/or fabric of parent rock material not retained and visible.

TRANSPORTED SOILS

Aeolian soil	Carried and deposited by wind.
Alluvial soil	Deposited by streams and rivers.
Colluvial soil	Soil and rock debris transported downslope by gravity.
Estuarine soil	Deposited in coastal estuaries, and including sediments carried by inflowing rivers and streams, and tidal currents.
Fill	Man-made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.
Lacustrine soil	Deposited in freshwater lakes.
Marine soil	Deposited in a marine environment.

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Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 63 mm and basing fractions on estimated mass)						**GROUP SYMBOL**	**PRIMARY NAME**
COARSE GRAINED SOIL More than 65% of soil excluding oversize fraction is larger than 0.075 mm	(A 0.075 mm particle is about the smallest particle visible to naked eyes)	GRAVEL More than half of coarse fraction is larger than 2.36 mm	CLEAN GRAVEL (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes		GW	GRAVEL
				Predominantly one size or a range of sizes with some intermediate sizes missing		GP	GRAVEL
			GRAVEL WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML and MH below)		GM	Silty GRAVEL
				Plastic fines (for identification procedures see CL, CI and CH below)		GC	Clayey GRAVEL
		SAND More than half of coarse fraction is smaller than 2.36 mm	CLEAN SAND (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate sizes		SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing		SP	SAND
			SAND WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML and MH below)		SM	Silty SAND
				Plastic fines (for identification procedures see CL, CI and CH below)		SC	Clayey SAND
FINE GRAINED SOIL More than 35% of soil excluding oversize fraction is smaller than 0.075 mm		IDENTIFICATION PROCEDURES ON FRACTIONS <0.075 mm					
			DRY STRENGTH	**DILATANCY**	**TOUGHNESS**		
		SILT & CLAY (low to medium plasticity, LL ≤ 50)	None to Low	Slow to Rapid	Low	ML	SILT
			Medium to High	None to Slow	Medium	CL, CI	CLAY
			Low to Medium	Slow	Low	OL	ORGANIC SILT
		SILT & CLAY (high plasticity, LL > 50)	Low to Medium	None to Slow	Low to Medium	MH	SILT
			High to Very High	None	High	CH	CLAY
			Medium to High	None to Very Slow	Low to Medium	OH	ORGANIC CLAY
		Highly Organic Soil	Readily identified by colour, odour, spongy feel and frequently by fibrous texture.			Pt	PEAT

● LL – Liquid Limit.

COMMON DEFECTS IN SOILS

TERM	**DEFINITION**	**DIAGRAM**
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (e.g. bedding). May be open or closed.	
FISSURE	A surface or crack across which the soil has little or no tensile strength, but which is not parallel or sub parallel to layering. May be open or closed. May include desiccation cracks.	
SHEARED SEAM	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting fissures which divide the mass into lenticular or wedge-shaped blocks.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.	

TERM	**DEFINITION**	**DIAGRAM**
SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter.	
TUBE CAST	An infilled tube. The infill may be uncemented or weakly cemented soil or have rock properties.	
INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open defects.	

Appendix B

Certificate Forms

CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

Form 55

To: Prime Design *Owner /Agent*
10 Goodman Court *Address*
Invermay Tas 7248 *Suburb/postcode*

Qualified person details:

Qualified person: Tony Barriera - Geoton Pty. Ltd.
Address: PO Box 522 Phone No: 03 6326 5001
Prospect Tas 7250 Fax No:
Licence No: CC6220 P Email address: tbarriera@geoton.com.au

Qualifications and Insurance details: Tony Barriera – BEng, MSc CPEng, NER – IEAust 471929 Civil, Geotechnical Certain Underwriters at Lloyd's- ENG 21 000330
(description from Column 3 of the Director's Determination - Certificates by Qualified Persons for Assessable Items

Speciality area of expertise: Geotechnical Engineering
(description from Column 4 of the Director's Determination - Certificates by Qualified Persons for Assessable Items)

Details of work:

Address: 14 Gunter Street Lot No: 17
Lady Barron Tas 7255 Certificate of title No: 213391/17

The assessable item related to this certificate: Classification of foundation conditions according to AS2870 - 2011

(description of the assessable item being certified)
Assessable item includes –
- *a material;*
- *a design*
- *a form of construction*
- *a document*
- *testing of a component, building system or plumbing system*
- *an inspection, or assessment, performed*

Certificate details:

Certificate type: Foundation Site Classification – AS2870
(description from Column 1 of Schedule 1 of the Director's Determination - Certificates by Qualified Persons for Assessable Items n)

This certificate is in relation to the above assessable item, at any stage, as part of - *(tick one)*

building work, plumbing work or plumbing installation or demolition work: ☐

or

a building, temporary structure or plumbing installation: X

In issuing this certificate the following matters are relevant –

Documents:	Geoton Pty Ltd, Report Reference No. GL22468Ab, dated 06/12/2022
Relevant calculations:	Refer to report
References:	AS 2870 – 2011 Residential Slabs and Footings Construction AS 4055 – 2021 Wind Loads for Housing CSIRO Building Technical File 18

Substance of Certificate: (what it is that is being certified)

Site Classification in accordance to AS2870 - 2011
Wind Loading in accordance to AS 4055 - 2021
Findings and recommendations of report

Scope and/or Limitations

The classification applies to the site as investigated at the time and does not account for any future alteration to foundation conditions resulting from earthworks, drainage condition changes or site maintenance variations.

I certify the matters described in this certificate.

	Signed:	*Certificate No:*	*Date:*
Qualified person:		GL22468Ab	06/12/2022

CERTIFICATE OF THE RESPONSIBLE DESIGNER

Section 94
Section 106
Section 129
Section 155

Form **35**

To: Prime Design *Owner name*
10 Goodman Court *Address*
Invermay Tas 7248 *Suburb/postcode*

Designer details:

Name: Tony Barriera
Category: Civil Engineer – Hydraulic - Domestic
Business name: Geoton Pty Ltd
Phone No: 03 6326 5001
Business address: P O Box 522
Prospect TAS 7250
Fax No:
Licence No: IEAust 471929, CC6220 P
Email address: tbarriera@geoton.com.au

Details of the proposed work:

Owner/Applicant Prime Design
Designer's project reference No. GL22468Ab
Address: 14 Gunter Street
Lot No: 213391/17
Lady Barron Tas 7255

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

Description of work:
New building
on-site wastewater management system

(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:
All design documents provided in Report GL22468Ab, dated 06/12/2022

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

Standards, codes or guidelines relied on in design process:

All design documents are contained within report

AS/NZS1547:2012 On-site domestic-wastewater management

Any other relevant documentation:

Attribution as designer:

I Tony Barriera of Geoton Pty Ltd 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 in 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)	*Signed*	*Date*
Designer:	Tony Barriera		06/12/2022
Licence No:	CC6220P		

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:

- ☐ The works will not increase the demand for water supplied by TasWater
- ☐ 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
- ☐ The works will not require a new connection, or a modification to an existing connection, to be made to TasWater's infrastructure
- ☐ The works will not damage or interfere with TasWater's works
- ☐ The works will not adversely affect TasWater's operations
- ☐ The work are not within 2m of TasWater's infrastructure and are outside any TasWater easement
- ☐ I have checked the LISTMap to confirm the location of TasWater infrastructure
- ☐ 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 Tony Barriera of Geoton Pty Ltd 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:	Tony Barriera		06/12/2022

GEOTON Pty Ltd
Geotechnical Consultants

LOADING CERTIFICATE

To:	**Prime Design Tasmania Pty Ltd**	*Owner /Agent*	Certificate Ref: AS/NZS 1547:2012 Section 7.4.2
	10 Goodman Court	*Address*	
	Invermay Tas **7248**	*Suburb/postcode*	

Details of work:

Address:	**14 Gunter Street**	Lot No:	17
	Lady Barron Tas **7255**	Certificate of title No:	213391/17
The work related to this certificate:	On-site domestic-wastewater management	*(description of the work or part work being certified)*	

Certificate details:

In issuing this certificate the following matters are relevant –

Documents:	Report GL22468Ab dated 06/12/2022 Figure 1 – Site Plan Figure 2 – Conventional Bed Section
Relevant calculations:	Contained in the above
References:	AS/NZS1547:2012 On-site domestic-wastewater management

Substance of Certificate:

This certificate sets out the design criteria and the limitations associated with use of the system.

Wastewater Characteristics

Population equivalent used for this assessment = 5 (3 bedroom)
Wastewater volume (L/day) used for this assessment = 750 (150 Litres per person)
Approximate blackwater volume (L/day) = 300
Approximate greywater volume (L/day) = 450

Soil Characteristics/Design Criteria

Texture (Table E4 from AS/NZS 1547) = Sand
Soil category (Table E1 from AS/NZS 1547) = 1
Soil structure (Table E4 from AS/NZS 1547) = Massive
Indicative permeability (Table 5.1 from AS/NZS 1547) =>3.0m/day
Adopted permeability = 3.0m/day
Adopted Design Loading Rate = 20mm/day
Soil thickness for disposal = >2.0m
Minimum depth (m) to water = <1.4m

Dimensions for On-Site Treatment System

Disposal and treatment methods = Raised Conventional Bed
Site modification and specific design = N/A
Primary disposal area required = 115.5m^2
Reserve disposal area requred = 115.5m^2
Location and use of Reserve area = Reserve area located to the west of the proposed wastewater disposal area.
Is there sufficient area available on site for disposal (including reserve) = Yes

Notes

The purpose of the reserve area is to allow for future extension of the land application system to allow a factor of safety against unforseen malfunction or failure, perhaps following increased household occupancy or inadvertent misuse of the system.

The land application area may be reduced to account for flow reductions by water-saving devices, provided the organic loading rate is not higher than it would have been without the flow reduction.

Allowable Variation from Design Flow

Based on a septic tank capacity of 3000L and wastewater design volume of 750L/day the allowable variation from design flow (peak loading events) would be an additional 250L/day (Total flow of 1000L/day as per table J1 of AS/NZS 1547:2012).

System Limitations

Consequences of overloading the system:
Overloading the system can result in failure of the septic tank and land application system. This is a serious health and environmental hazard and can lead to any one or more of the following:

- Spread of infectious disease;
- Breeding of mosquitoes and attraction of flies and rodents;
- Nuisance and unpleasantness;
- Pollution of waterways;
- Contamination of bores, wells and groundwater; and
- Alteration to local ecology.

Consequences of under loading the system and or lack of operation:
Under loading the system or lack of operation may result in the bacteria to stop working and system failure.

Consequences of changes in loading due to varying wastewater characteristics:
The system has been designed for domestic onsite wastewater disposal, and as such effluent will be domestic and is not expected to change significantly. Significant changes in loading of the system can result in system failure.

Consequences of lack of operation maintenance, and monitoring attention of the system:
Lack of operation maintenance and monitoring attention of the system can result in failure of the septic tank and land application system. The operational and maintenance requirements are detailed below.

Operation Requirements

Refer to Section T5.2.1 of AS/NZS 1547:2012 for additional requirements.
For on-site system to work well the following is required:

- Reduce sludge building up through scraping all dishes to remove fats/grease; don't use a food waste disposal unit; and don't put sanitary napkins into the system.
- To keep bacteria working in the septic tank use biodegradable soaps; use a low phosphorous detergent; don't use powerful bleaches and disinfectants; and don't put chemicals or paint down the drain.
- Conservation of water will reduce the volume of effluent requiring disposal to the land application area, make it last longer and improve its performance.

Maintenance Requirements

Refer to Section T5.2.2 of AS/NZS 1547:2012 for additional requirements.
Maintenance of the system should include the following:

- Septic tanks must be inspected at least annually and pumped out regularly once the scum and sludge occupy two thirds of the tank volume. Typically a septic tank must be pumped out every 3 to 5 years or more frequently depending on usage.
- Grease traps must be inspected at least quarterly and cleaned out regularly.
- Deep rooting trees or shrubs should not be grown over absorption trenches/beds or pipes.
- Surface water diversion drains should be maintained upslope of and around the land application area and kept clean to reduce seepage of rainwater into the trenches.
- Maintain disposal area by maintaining plants and mowing grass to ensure that plants/grasses take up nutrients with maximum efficiency.
- Check disposal area for blockages such as wet spots and uneven grass colour.

I certify the matters described in this certificate.

	Signed:	*Date:*	*Certificate No.*
Certifier:		06/12/2022	GL22468Ab