

13 December 2023

Reference No. GL23488Ab

Mr Stephen & Ms Charlotte White
2 Thunder and Lightning Road
CAPE BARREN ISLAND TAS 7257

Dear Sir and Madam

RE: Site Classification & On-site Wastewater Disposal Assessment and Design
3 Chalky Lane, Whitemark

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 Anne Foster 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 Mr Stephen & Ms Charlotte White at the site of a proposed residential development at 3 Chalky Lane, Whitemark.

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 the disposal of domestic wastewater and the design of an on-site wastewater system in accordance with AS/NZS 1547:2012 “On-site Domestic Wastewater Management”.

The following plans of the proposed development were provided:

- Site plan, provided by Andrew Thomson, dated August 2023;
- Architectural drawings of the proposed future dwelling, prepared by Imagine by Design, Drawing Nos. 002, 100, 200 and 300, Issue C, dated 10 July 2023; and
- Quote with drawings and details of shed/secondary dwelling, prepared by Sheds n Homes, dated 11 August 2023.

We understand that the development will comprise a two-bedroom shed/dwelling, with a future dwelling to be constructed at a later date. The future dwelling will have three bedrooms and a media room.

2 FIELD INVESTIGATION

The field investigation was conducted on 23 October 2023 and involved the drilling of 5 boreholes by bobcat with an auger attachment to the investigated depths of 1.0m to 2.0m.

Dynamic Cone Penetration (DCP) tests were conducted in the granular soils encountered in the investigation.

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 6,053m² and is currently undeveloped. The ground surface across the site is generally near level and vegetated with a low grass cover, with scrub located within the southern portion of the site.

The proposed wastewater disposal area is located on near-level ground to the north of the proposed driveway and buildings.

Site Classification & On-site Wastewater Disposal Assessment and Design

A photograph of the site is attached as Plate 1.

The Mineral Resources Tasmania (MRT) Digital Geological Atlas, 1:250,000 Series, shows the site to be located on Quaternary period undifferentiated sediments, with this being generally confirmed by the field data.

Examination of the Land Information System Tasmania (LIST) Landslide Planning Map – Hazard Bands Overlay indicates that the site is not within a mapped landslide hazard band.

Examination of the LIST Coastal Inundation Hazard Bands Overlay indicates that the south-eastern portion of the site is within an investigation hazard band.

The investigation indicated that the soil profile varied slightly across the site. Boreholes BH1 and BH5 encountered silty sand topsoil to depths of 0.05m, underlain by sand to the investigated depths of 2.0m. Boreholes BH2 to BH4 generally encountered silty sand topsoil to depths of 0.05m to 0.1m, overlying sand to depths of 0.55m to 0.6m, underlain by sandy to silty clay to a depth of 0.85m (BH2) or the investigated depths of 1.0m (BH3 and BH4). Borehole BH2 encountered clayey sand from a depth of 0.85m to the investigated depth of 2.0m.

The boreholes did not encounter any signs of groundwater seepage over the investigated depths.

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 the Foundations section 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 due to the site having an area of loose soil above a depth of 0.5m, the founding medium for all footings would be as follows:

SAND (SW) – medium to coarse grained, grey

encountered below 0.1m from the existing ground surface

Due to the underlying loose sand an allowable bearing pressure of only **50 kPa** is available for edge beams, slab panels and support thickenings for slab construction founded as above, provided the site is prepared as follows:

- Earthworks should be carried out in accordance with AS 3798-2007, 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; and
- All sands disturbed in the base of footing excavations should be compacted.

Alternatively, an allowable bearing pressure of **100kPa** is available in medium dense or better sand, or stiff or better sandy clay encountered below a depth of 0.5m from the existing ground surface.

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 N2 (AS 4055)

REGION	TERRAIN CATEGORY	SHIELDING	TOPOGRAPHY
A	TC2	NS	T0

7 EFFLUENT DISPOSAL

7.1 Permeability of Soil and Soil Category

Based on the findings of the borehole investigation, the soil has been classified as follows:

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

For single grained Category 1 soils the indicative permeability (K_{sat}) from AS/NZS 1547 Table 5.1 is >3.0m/day.

- Adopted Permeability – 4.0m/day.

8 EFFLUENT DISPOSAL – HABITABLE SHED

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 reticulated water. As the habitable shed will have 2 bedrooms, a population equivalent of 4 persons with a wastewater design flow rate of 600L/day has been adopted.

8.1 Disposal and Treatment Method

This site assessment indicates that the site is suitable for the disposal of domestic effluent by way of a septic tank and absorption trench. The septic tank is required to have a minimum capacity of **3,000L**.

8.2 Design Loading Rate

The adopted design loading rate for the absorption trench and conventional bed has been set at 30mm/day as outlined in AS/NZS 1547:2012 Table L1.

8.3 Absorption Trench System

Guidelines for the design of the trench systems are outlined in AS/NZS 1547:2012 Appendix L. The method of determining the dimensions for the trenches 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 = Trench width in metres (set at 1.0m)

As the DLR value has been set at 30mm/day and the design daily flow (Q) has been set at 600L/day, when the parameters are inserted in the above equation the trench dimensions required are as follows:

- Trench length = **20m**
- Trench width = 1.0m
- Trench depth = 0.45m

9 EFFLUENT DISPOSAL – FUTURE DWELLING

As the future dwelling will have 3 bedrooms and a media room (habitable room), a population equivalent of 6 persons with a wastewater design flow rate of 900L/day has been adopted.

9.1 Disposal and Treatment Method

This site assessment indicates that the site is suitable for the disposal of domestic effluent by way of a septic tank and conventional bed. The septic is required to have a minimum capacity of **3,500L**.

9.2 Design Loading Rate

The adopted design loading rate for the absorption trench and conventional bed has been set at 30mm/day as outlined in AS/NZS 1547:2012 Table L1.

9.3 Conventional Bed System

Guidelines for the design of the conventional beds are outlined in AS/NZS 1547:2012 Appendix L. The method of determining the dimensions for the beds 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

Site Classification & On-site Wastewater Disposal Assessment and Design

DLR = Design Loading Rate in mm/day

W = Width in metres

As the DLR value has been set at 30mm/day and the design daily flow (Q) has been set at 900L/day, when the parameters are inserted in the above equation the bed dimensions required are as follows:

- Beds required = 1
- Bed length = 15.0m
- Bed width = 2.0m
- Bed depth = 0.5m

10 GENERAL

A downslope separation of 2m (minimum) must be left between trenches and beds.

This would give a disposal area of approximately 100m². These dimensions may be modified to suit the client's needs provided that the total length remains and the spacing between and around the trenches and bed is adhered to.

There is adequate secondary (back-up) area of 100m² if required.

The trench and bed are to be located in the area shown on the site plan.

The bed is to be constructed as per the cross section located on Figure 2, attached. The trench is to be constructed as per the cross sections located on Figure WW-02 attached. The slotted trench is the preferred trench type.

Vehicles shall be excluded from the land application area.

10.1 Pump-Out Chamber

As the site is near level, pumps may be required to pump the effluent from the septic tanks to the disposal area if sufficient fall cannot be achieved.

The pump is to be hard wired to the dwelling or shed 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.

The pump pit for the habitable shed should have a minimum capacity of 900L with the float switch installed such that it discharges when the volume of wastewater reaches approximately 300L. If the pump fails to activate, the pit will provide an additional 24-hour holding capacity of 600L.

The pump pit for the future dwelling should have a minimum capacity of 1350L with the float switch installed such that it discharges when the volume of wastewater reaches approximately 450L. If the pump fails to activate, the pit will provide an additional 24-hour holding capacity of 900L.

10.2 Setbacks

The minimum separation distance between the disposal area and horizontal and vertical features is based on Appendix R from AS/NZS 1547:2012 “Recommended Setback Distances for Land Application Systems” and Section 3.1 from the *Building Act 2016*: Director’s Guidelines for On-site Wastewater Management Systems. The following minimum setbacks are required:

- 15.0m from downslope watercourses and sensitive features;
- 1.5m from property boundaries; and
- 3.0m from buildings.

10.3 Wastewater Recommendations

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

- Septic tanks **must be** pumped out at least 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:

AS1726 - 2017 Geotechnical Site Investigations

AS 2870 - 2011 Residential Slabs and Footings Construction

AS 3798 - 2007 Guidelines on Earthworks for Commercial and Residential Developments

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

Site Classification & On-site Wastewater Disposal Assessment and Design

Attachments:

Limitations of report

Figure 1 – Site Plan

Figure 2 – Typical Conventional Bed Section

Figure WW-02 – Typical Trench Section

Site Photograph

Appendix A – Borehole Logs & Explanation Sheets

Appendix B – Certificate Forms

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

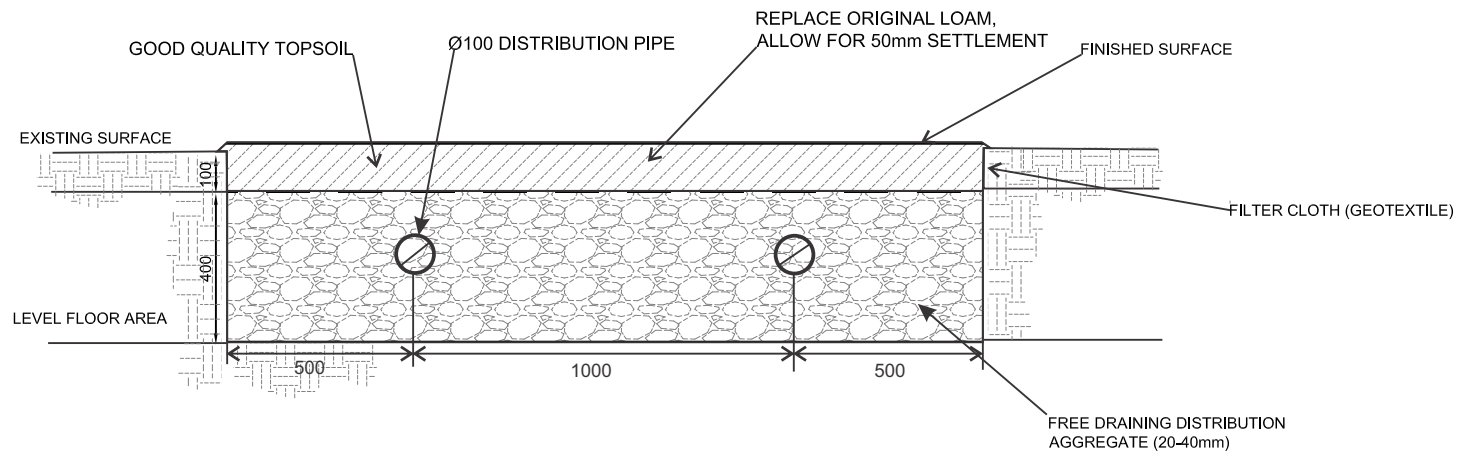
Geoton will not be responsible for interpretations of site data or the report findings by others involved in the design and construction process. Where any confusion exists, clarification should be sought from Geoton.

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.




CONVENTIONAL BED SECTION

SCALE 1:20

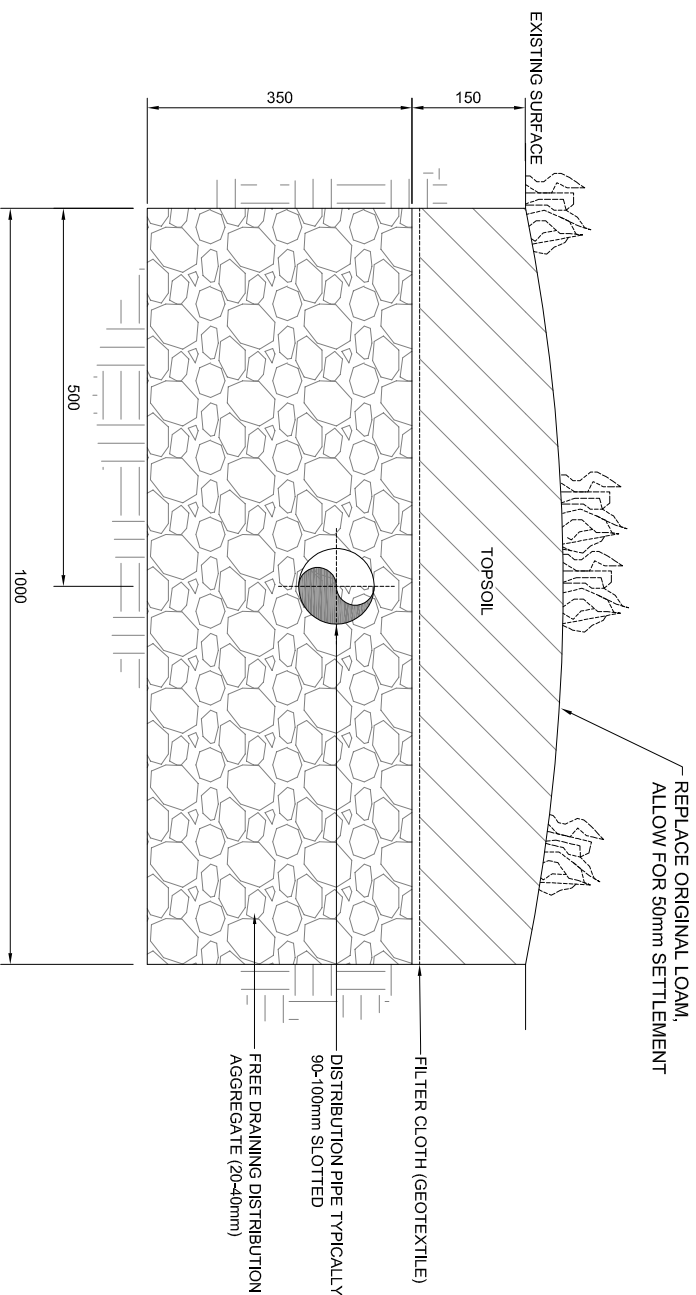
GEOTON Pty Ltd				Client: MR STEPHEN & MS CHARLOTTE WHITE	
				Project: 3 CHALKY LANE WHITEMARK	
Date	22/11/2023	Drawn	AF	Title: TYPICAL CONVENTIONAL BED SECTION	
Scale	As Shown	Approved	TB		
Original size	A4	Rev		Project no: GL23488A	Figure no. 2

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GEOTECHNICAL CONSULTANTS

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

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FIGURE:	WW-02
DATE:	27/10/2020
REVISION:	A
SCALE:	@ A4
DRAWN:	B.STREET
DESIGNED:	T.BARRIERA
APPROVED:	T.BARRIERA



TYPICAL ARCH SECTION

SCALE 1:10

SCALE





PLATE 1 - View of the site looking to the east

GEOTON Pty Ltd				Client: MR STEPHEN & MS CHARLOTTE WHITE	
				Project: 3 CHALKY LANE WHITEMARK	
Title: PHOTOGRAPH					
Date:	23/10/2023	Original Size	A4	Project no: GL23488A	Figure no. PLATE 1

Appendix A

Borehole Logs

Geotechnical Consultants

PO Box 522 Prospect TAS 7250

Unit 24, 16-18 Goodman Court, Invermay TAS

Tel (03) 6326 5001

Borehole no. BH1

Sheet no. 1 of 1

Job no. GL23488A

Client :		Mr Stephen & Ms Charlotte White				Date : 23/10/2023	
Project :		Site Classification and On-site Wastewater Assessment & Design				Logged By : BS	
Location :		3 Chalky Lane, Whitemark					
Drill model :		Bobcat		Easting:		Slope: 90°	
Hole diameter :		150mm		Northing:		Bearing: -	
						RL Surface :	
						Datum :	

Method	Support	Penetration	Water	DCP (Blows/ 100mm)	Depth (m)	Graphic log	Classification Symbol	Material Description	Moisture condition	Consistency density, index	Structure, additional observations
AD	Z			2		SM	SW	TOPSOIL - Silty SAND, medium to coarse grained, grey	M	L	
				1				SAND - medium to coarse grained, grey	M	L	
				2	0.25						
				2							
				2	0.50						
				3				MD			
				3		SP	SAND - coarse grained, orange	M	MD		
				3	0.75						
								1.00			
				1.25			Becoming white				
				1.50			Becoming orange, trace clay				
				1.75							
				2.00			Borehole BH1 terminated @ 2.0m				
				2.25							

Client :		Mr Stephen & Ms Charlotte White				Date : 23/10/2023									
Project :		Site Classification and On-site Wastewater Assessment & Design				Logged By : BS									
Location :		3 Chalky Lane, Whitemark													
Drill model :		Bobcat		Easting:		Slope: 90°									
Hole diameter :		150mm		Northing:		Bearing: -									
						RL Surface :									
						Datum :									
Method	Support	Penetration	Water	Notes Samples Tests	Depth (m)	Graphic log	Classification Symbol	Material Description	Moisture condition	Consistency density, index	Structure, additional observations				
AD	N				0.25		SM	TOPSOIL - Silty SAND, medium to coarse grained, grey	M	L					
							SW	SAND - medium to coarse grained, grey	M	MD					
					0.50										
					0.75		CH	Sandy CLAY - high plasticity, orange, coarse grained sand, trace fine gravel	M	St					
					1.00										
					1.25										
					1.50										
					1.75										
					2.00			SC	Clayey SAND - coarse grained, orange/grey, with fine gravel	M		MD			
2.25			Borehole BH2 terminated @ 2.0m												

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Unit 24, 16-18 Goodman Court, Invermay TAS

Tel (03) 6326 5001

Borehole no. BH3

Sheet no. 1 of 1

Job no. GL23488A

Client :		Mr Stephen & Ms Charlotte White						Date : 23/10/2023	
Project :		Site Classification and On-site Wastewater Assessment & Design						Logged By : BS	
Location :		3 Chalky Lane, Whitemark							
Drill model :		Bobcat		Easting:		Slope: 90°		RL Surface :	
Hole diameter :		150mm		Northing:		Bearing: -		Datum :	

Method	Support	Penetration	Water	Notes Samples Tests	Depth (m)	Graphic log Classification Symbol	Material Description	Moisture condition	Consistency density, index	Structure, additional observations
AD	N					SM	TOPSOIL - Silty SAND, medium to coarse grained, grey	M	MD	
					0.25	SW	SAND - fine to medium grained, cream	M	MD	
					0.50					
					0.75	CH	Sandy CLAY - high plasticity, orange, coarse grained sand	M	St	
					1.00		Borehole BH3 terminated @ 1.0m			
					1.25					
					1.50					
					1.75					
					2.00					
					2.25					

Client :		Mr Stephen & Ms Charlotte White						Date : 23/10/2023			
Project :		Site Classification and On-site Wastewater Assessment & Design						Logged By : BS			
Location :		3 Chalky Lane, Whitemark									
Drill model :		Bobcat		Easting:		Slope: 90°		RL Surface :			
Hole diameter :		150mm		Northing:		Bearing: -		Datum :			
Method	Support	Penetration	Water	Notes Samples Tests	Depth (m)	Graphic log	Classification symbol	Material Description	Moisture condition	Consistency density, index	Structure, additional observations
AD							SM	TOPSOIL - Silty SAND, medium to coarse grained, grey	M	L	
						SW	SAND - medium to coarse grained, white	M	MD		
					0.25						
					0.50						
					0.75		CH	Silty CLAY - high plasticity, orange	M	St	
					1.00						
					1.25			Borehole BH4 terminated @ 1.0m			
					1.50						
					1.75						
					2.00						
					2.25						

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Unit 24, 16-18 Goodman Court, Invermay TAS

Tel (03) 6326 5001

Borehole no. BH5

Sheet no. 1 of 1

Job no. GL23488A

Client :		Mr Stephen & Ms Charlotte White				Date : 23/10/2023	
Project :		Site Classification and On-site Wastewater Assessment & Design				Logged By : BS	
Location :		3 Chalky Lane, Whitemark					
Drill model :		Bobcat		Easting:		Slope: 90°	
Hole diameter :		150mm		Northing:		Bearing: -	
						RL Surface :	
						Datum :	

Method	Support	Penetration	Water	Notes Samples Tests	Depth (m)	Graphic log Classification Symbol	Material Description	Moisture condition	Consistency density, index	Structure, additional observations
AD	Z				0.25	SM	TOPSOIL - Silty SAND, medium to coarse grained, grey	M	L	
						SW	SAND - medium to coarse grained, grey	M	MD	
					0.50					
					0.75					
					1.00	SP	SAND - coarse grained, orange	M	MD	
					1.25		Trace clay			
					1.50		Becoming white			
					1.75					
					2.00					
					2.25					
Borehole BH5 terminated @ 2.0m										

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

Soil Description Explanation Sheet (1 of 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 Limit – $w < PL$

Hard and friable or powdery.

Moist, near Plastic Limit – $w \approx PL$

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 - $w \approx LL$

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.

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.						

• LL – Liquid Limit.

COMMON DEFECTS IN SOILS

TERM	DEFINITION	DIAGRAM	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.		SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
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.		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.	
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.		TUBE CAST	An infilled tube. The infill may be uncemented or weakly cemented soil or have rock properties.	
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.		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

To: Owner /Agent
 Address
 Suburb/postcode

Form **55**

Qualified person details:

Qualified person:
Address: Phone No:
 Fax No:
Licence No: Email address:

Qualifications and Insurance details: (description from Column 3 of the Director's Determination - Certificates by Qualified Persons for Assessable Items)

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

Details of work:

Address: Lot No:
 Certificate of title No:
The assessable item related to this certificate: (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: (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: ☒

In issuing this certificate the following matters are relevant –

Documents:	Geoton Pty Ltd, Report Reference No. GL23488Ab, dated 13/12/2023
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 with AS2870 - 2011
Wind Loading in accordance with 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.

	<i>Signed:</i>	<i>Certificate No:</i>	<i>Date:</i>
Qualified person:		GL23488Ab	13/12/2023

CERTIFICATE OF THE RESPONSIBLE DESIGNER

Section 94
Section 106
Section 129
Section 155

To: Mr Stephen & Ms Charlotte White
2 Thunder and Lightning Road
Cape Barren Island Tas 7257

Owner name
Address
Suburb/postcode

Form **35**

Designer details:

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

Details of the proposed work:

Owner/Applicant: Mr Stephen & Ms Charlotte White
Address: 3 Chalky Lane
Whitemark Tas 7255
Designer's project reference No: GL23488Ab
Lot No: 181010/2
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
	<input type="checkbox"/> Building design	Architect or Building Designer
	<input type="checkbox"/> Structural design	Engineer or Civil Designer
	<input type="checkbox"/> Fire Safety design	Fire Engineer
	<input checked="" type="checkbox"/> Civil design	Civil Engineer or Civil Designer
	<input type="checkbox"/> Hydraulic design	Building Services Designer
	<input type="checkbox"/> Fire service design	Building Services Designer
	<input type="checkbox"/> Electrical design	Building Services Designer
	<input type="checkbox"/> Mechanical design	Building Service Designer
	<input type="checkbox"/> Plumbing design	Plumber-Certifier; Architect, Building Designer or Engineer
	<input type="checkbox"/> Other (specify)	

Deemed-to-Satisfy: ☒

Performance Solution: ☐ (X the appropriate box)

Other details:

All design documents provided in Report GL23488Ab, dated 13/12/2023

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.

	<i>Name: (print)</i>	<i>Signed</i>	<i>Date</i>
Designer:	Tony Barriera		13/12/2023
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		13/12/2023

LOADING CERTIFICATE

To: **Mr Stephen & Ms Charlotte White**

Owner /Agent

2 Thunder and Lightning Road

Address

**CAPE BARREN ISLAND
TAS**

7257

Suburb/postcode

**Certificate Ref:
AS/NZS 1547:2012
Section 7.4.2**

Details of work:

Address:

3 Chalky Lane

Lot No: **2**

WHITEMARK TAS

7255

Certificate of title No: **181010/2**

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 GL23488Ab dated 13/12/2023
Figure 1 - Site Plan
Figure 2 – Typical Conventional Bed Section
Figure WW-02 – Typical Trench 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 – Habitable Shed

<i>Population equivalent used for this assessment</i>	= 4 (2 bedrooms)
<i>Wastewater volume (L/day) used for this assessment</i>	= 600 (150 Litres per person)
<i>Approximate blackwater volume (L/day)</i>	= 240
<i>Approximate greywater volume (L/day)</i>	= 360

Wastewater Characteristics – Future Dwelling

<i>Population equivalent used for this assessment</i>	= 6 (3 bedrooms + media room)
<i>Wastewater volume (L/day) used for this assessment</i>	= 900 (150 Litres per person)
<i>Approximate blackwater volume (L/day)</i>	= 360
<i>Approximate greywater volume (L/day)</i>	= 540

Soil Characteristics/Design Criteria

<i>Texture (Table E1 from AS/NZS 1547)</i>	= Sands and Gravels
<i>Soil category (Table E1 from AS/NZS 1547)</i>	= 1
<i>Soil structure (Table E4 from AS/NZS 1547)</i>	= Single grained (massive)
<i>Indicative permeability (Table 5.1 from AS/NZS 1547)</i>	= >3.0m/day
<i>Adopted permeability</i>	= 4.0m/day
<i>Adopted Design Loading Rate</i>	= 30mm/day
<i>Soil thickness for disposal</i>	= >2.0m
<i>Minimum depth (m) to water</i>	= >2.0m

Dimensions for On-Site Treatment System

<i>Disposal and treatment methods</i>	= 2 Septic tanks, one absorption trench and one conventional bed
<i>Site modification and specific design</i>	= N/A
<i>Primary disposal area required</i>	= 100m ²
<i>Reserve disposal area required</i>	= 100m ²
<i>Location and use of Reserve area</i>	= Reserve area located to the east of the proposed future dwelling. Currently vacant and vegetated with a low grass cover.
<i>Is there sufficient area available on site for disposal (including reserve)</i>	= 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 unforeseen 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 – Habitable Shed

Based on a septic tank capacity of 3000L and wastewater design volume of 600L/day the allowable variation from design flow (peak loading events) would be an additional 400L/day (Total flow of 1000L/day as per table J1 of AS/NZS 1547:2012).

Allowable Variation from Design Flow – Future Dwelling

Based on a septic tank capacity of 3500L and wastewater design volume of 900L/day the allowable variation from design flow (peak loading events) would be an additional 500L/day (Total flow of 1400L/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:

Under loading the system may result in the bacteria to stop working and system failure.

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 at least 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 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.

	<i>Signed:</i>	<i>Date:</i>	<i>Certificate No.</i>
Certifier:		13/12/2023	GL23488Ab