GEO-ENVIRONMENTAL ASSESSMENT

85 Woodbridge Hill Road

Woodbridge

January 2026

GEO-ENVIRONMENTAL

SOLUTIONS

Investigation Details

Client:	Dunbabin Architects
Site Address:	85 Woodbridge Hill Road, Woodbridge
Date of Inspection:	03/12/2025
Proposed Works:	Demolition of existing dwelling Construction of new dwelling
Investigation Method:	70mm hand auger
Inspected by:	C. Cooper

Site Details

Certificate of Title (CT):	223482/1
Title Area:	4088m^2
Applicable Planning Overlays:	Bushfire-prone Areas Biodiversity Protection Area Landslide Hazard Area (Low)
Slope & Aspect:	Approx. 15% E facing slope
Vegetation:	Mixed flora

Background Information

Geology Map:	MRT 250 000
Geological Unit:	Permian mudstone
Climate:	Annual rainfall approx. 900mm
Water Connection:	Tank
Sewer Connection:	Unserviced-On-site required
Testing and Classification:	AS2870:2011, AS1726:2017, AS4055:2021 & AS1547:2012

Investigation

A number of auger holes were completed to identify the distribution of, and variation in soil materials on the site. Representative auger holes drilled at the approximate location indicated on the site plan were chosen for testing and classification according to AS2870-2011 & AS1547-2012 (see profile summary).

Soil Profile Summary

BH 1 Depth (m)	BH 2 Depth (m)	USCS	Description
0.00 – 0.30	0.00 – 0.30	SM	**Silty SAND**: grey-brown, slightly moist, medium dense, fine- to medium-grained
0.30 – 1.60	0.30 – 0.80	CI	**Silty CLAY**: light brown to grey, medium plasticity, slightly moist, stiff
1.60 – 1.70	0.80 – 1.00	CL	**Sandy CLAY**: yellow to grey, low plasticity, slightly moist, very stiff, end of hole.

Wastewater Profile Summary

BH 3 Depth (m)	USCS	Description
0.00 – 0.20	SM	**Silty SAND**: brown, slightly moist, dense
0.20 – 1.00	CI	**Silty CLAY**: light brown to grey, medium plasticity, slightly moist, stiff, end of hole.

Site Notes

Soils on site are developing from Permian mudstone and consist of a sandy topsoil overlying predominantly clay subsoils. The clay fraction is highly plastic and is likely to have low permeability for onsite wastewater disposal.

Site Classification

The site has been assessed and classified in accordance with AS2870:2011 *"Residential Slabs and Footings".*

The site has been classified as:

Class P

Y's range: **40-60mm**

Notes: due to demolition and removal of previous foundations in the construction area. These processes disturb the ground conditions and may cause differential movement and settlement across the building area. Design and construction should be made in accordance with this classification.

Wind Loading Classification

According to *"AS4055:2021 - Wind Loads for Housing"* the house site is classified below:

Wind Classification: N3

Region:	A
Terrain Category:	2.0
Shielding Classification:	PS
Topographic Classification:	T2
Wind Classification:	N3
Design Wind Gust Speed – m/s ($V_{h,u}$):	50

Wastewater Classification & Recommendations

According to AS1547-2012 (on-site waste-water management) the natural soil is classified as **Light CLAY (Category 5)**. The proposed development involves the demolition of an existing dwelling and the construction of a new two-bedroom dwelling. The existing dwelling on site is serviced by a primary treatment system with onsite absorption. Due to the expected age and condition of this system, it should be disconnected and decommissioned from use as per the recommendations overleaf. A new treatment system is required for the proposed dwelling.

The site is unsuited to the installation of a traditional septic tank and trenches due to soil conditions including low permeability and dispersion. Secondary treatment of effluent will be required, and it is proposed to install a package treatment system (e.g., AWTS) with treated effluent to be disposed of via subsurface irrigation.

A Design Irrigation Rate (DIR) of 2.4mm/day has been assigned for this site. This includes a 20% reduction to the typical DIR of 3mm/day to account for the slope of the site.

The occupancy of a two-bedroom dwelling results in a daily wastewater loading of 480L/day. This is based on a tank water supply and a maximum occupancy of 4 people (120L/day/person). With a daily wastewater loading of 480L/day and a DIR of 2.4mm/day, an irrigation area of at least 200m^2 is required. This is best installed as subsurface irrigation within a minimum of 200mm of imported loam material.

Samples were taken at the site for assessment of dispersion. An Emerson (1967) Dispersion test was conducted to determine if these samples were dispersive. The subsoil samples taken from site showed slight to moderate signs of dispersion and were found to be Class 2:2. It is therefore recommended that gypsum be incorporated into the base of the irrigation area at a rate of 1kg/5m^2 to mitigate potential soil dispersion.

A surface diversion drain is required upslope of the irrigation area to divert excess stormwater flows. The area must be excluded from traffic or any future building works. A 100% reserve area should be set aside for future wastewater requirements. Due to the large area available on site, no formal reserve area has been assigned. For all calculations, please refer to the Trench summary reports.

The existing treatment tank(s) and related absorption area(s) are to be disconnected and decommissioned from use. All parts of the redundant system should be emptied by a licensed liquid waste contractor. The tanks should be disinfected with ag lime or hydrated lime. Where possible, the old system should be removed from the site. Alternatively, the lid and base of the tanks are to be broken up to below ground level and the tanks filled with compacted clean fill and the surface relevelled. If settling occurs over time then additional fill may be required. The inlet and outlet pipes on the tanks must be permanently sealed or plugged.

The land application area must not encroach on any Tree Protection Zone or exceed the minimum setback distances outlined below. Given that the area designated for wastewater disposal is within an existing garden and no major clearing is required, it is deemed to have the lowest potential impact on biodiversity values. With secondary treatment and shallow subsurface application, it is considered that this disposal method will pose minimal environmental risk to the site overall.

Demonstration of the system being consistent with Building Act 2016 Guidelines for On-site Wastewater Management Systems is outlined in the attached table.

The following setback distances are required to comply with E23 of the Kingborough Interim Planning Scheme 2015 and the Building Act 2016:

Upslope or level buildings:	2m
Downslope buildings:	4.25m
Upslope or level boundaries:	1.5m
Downslope boundaries:	10.5m
Downslope surface water:	100m

To comply with E23.10.1 of the Kingborough Interim Planning Scheme 2015:

A1 *Horizontal separation distance from a building to a land application area must comply with one of the following:*

(a) be no less than 6m;	
(b) be no less than; (i) 2m from an upslope or level building; (ii) if primary treated effluent be no less than 4m plus 1m for every degree of average gradient from a downslope building; (iii) if secondary treated effluent and subsurface application, no less than 2m plus 0.25m for every degree of average gradient from a down slope building.	 Complies Complies 4.25m required

A2 *Horizontal separation distance from downslope surface water to a land application area must comply with any of the following:*

(a) be no less than 100m;	Complies
(b) if the site is within a high rainfall area or the site soil category is 4, 5 or 6, be no less than the following; (i) if primary treated effluent standard or surface application, 50m plus 7m for every degree of average gradient from downslope surface water; (ii) if secondary treated effluent standard and subsurface application, 50m plus 2m for every degree of average gradient from down slope surface water.	N/A
(c) if the site is not within a high rainfall area or the site soil category is not 4, 5 or 6, be no less than the following; (i) if primary treated effluent 15m plus 7m for every degree of average gradient from downslope surface water; (ii) if secondary treated effluent and subsurface application, 15m plus 2m for every degree of average gradient from down slope surface water.	N/A

A3 *Horizontal separation distance from a property boundary to a land application area must comply with either of the following:*

(a) be no less than 40m from a property boundary;	
(b) be no less than: (i) 1.5m from an upslope or level property boundary; and (ii) if primary treated effluent 2m for every degree of average gradient from a downslope property boundary; or (iii) if secondary treated effluent and subsurface application, 1.5m plus 1m for every degree of average gradient from a downslope property boundary.	Complies Complies 10.5m required

A4

Horizontal separation distance from a downslope bore, well or similar water supply to a land application area must be no less than 50m.	No bore or well identified within 50m

A5

Vertical separation distance between groundwater and a land application area must be no less than 1.5m.	No groundwater encountered

A6

Vertical separation distance between a limiting layer and a land application area must be no less than 1.5m.	No limiting layer identified

A7 *The arrangement of a land application area must comply with both of the following:*

(a) not include areas beneath buildings, driveways or other hard stand areas;	Complies
(b) have a minimum horizontal dimension of 3m.	Complies

Construction Notes & Recommendations

According to "*AS2870-2011 Residential slabs & footings"* the site has been classified as **Class P** – see 'Site Classification' above. Demolition and removal of previous foundations are proposed to occur in the building area; these processes may have implications for the preparation of foundations. Specific care must be taken to ensure any remnant foundation/building materials or loose soil are adequately removed prior to construction.

All earthworks on site must comply with AS3798:2012, and I further recommend that consideration be given to drainage and sediment control on site during and after construction. Care should also be taken to ensure there is adequate drainage in the construction area to avoid the potential for weak bearing and foundation settlement associated with excessive soil moisture.

I also recommend that during construction that I and/or the design engineer be notified of any major variation to the soil conditions or wastewater loading as outlined in this report.

Dr John Paul Cumming B.Agr.Sc (hons) PhD CPSS GAICD

Director

GES

Land suitability and system sizing for on-site wastewater management

Trench 3.0 (Australian Institute of Environmental Health)

Assessment Report

Site assessment for on-site waste water disposal

Assessment for	Dunbabin Architects	Assess. Date	9-Jan-26
		Ref. No.	
Assessed site(s)	85 Woodbridge Hill Road, Woodbridge	Site(s) inspected	3-Dec-25
Local authority	Kingborough	Assessed by	John Paul Cumming

This report summarises wastewater volumes, climatic inputs for the site, soil characteristics and sustem sizing and design issues. Site Capability and Environmental sensitivity issues are reported separately, where 'Alert' columns flag factors with high (A) or very high (AA) limitations which probably require special consideration for system design(s). Blank spaces on this page indicate data have not been entered into TRENCH.

Wastewater Characteristics

Wastewater volume (L/day) used for this assessment = 480 (using the 'No. of bedrooms in a dwelling' method)

Septic tank wastewater volume (L/day) = 160

Sullage volume (L/day) = 320

Total nitrogen (kg/year) generated by wastewater = 1.5

Total phosphorus (kg/year) generated by wastewater = 1.2

Climatic assumptions for site (Evapotranspiration calculated using the crop factor method)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm)	56	56	69	71	72	84	85	93	85	85	78	75
Adopted rainfall (R, mm)	56	56	69	71	72	84	85	93	85	85	78	75
Retained rain (Rr, mm)	44	45	56	57	58	67	68	74	68	68	62	60
Max. daily temp. (deg. C)												
Evapotrans (ET, mm)	130	110	91	63	42	29	32	42	63	84	105	126
Evapotr. less rain (mm)	**86**	**65**	**35**	**6**	**-16**	**-38**	**-37**	**-32**	**-5**	**16**	**43**	**66**

Annual evapotranspiration less retained rain (mm) = 191

Soil characterisitics

Texture = Light CLAY Category = 5 Thick. (m) = 1

Adopted permeability (m/day) = 0.12 Adopted LTAR (L/sq m/day) = 2 Min depth (m) to water = 3

Proposed disposal and treatment methods

Proportion of wastewater to be retained on site:	All wastewater will be disposed of on the site
The preferred method of on-site primary treatment:	In a package treatment plant
The preferred method of on-site secondary treatment:	In-ground
The preferred type of in-ground secondary treatment:	None
The preferred type of above-ground secondary treatment:	None
Site modifications or specific designs:	Not needed

Suggested dimensions for on-site secondary treatment system

Total length (m) =	25
Width (m) =	8
Depth (m) =	0.4
Total disposal area (sq m) required =	200
comprising a Primary Area (sq m) of:	200
and a Secondary (backup) Area (sq m) of:	

Sufficient area is available on site

Comments

Using the DIR of 2.4mm/day and a daily wastewater loading of 480L/day, an irrigation area of at least 200m^2 will be required. Therefore the system should have the capacity to cope with predicted climatic and loading events.

GES

Land suitability and system sizing for on-site wastewater management

Trench 3.0 (Australian Institute of Environmental Health)

Site Capability Report

Site assessment for on-site waste water disposal

Assessment for	Dunbabin Architects	Assess. Date	9-Jan-26
		Ref. No.	
Assessed site(s)	85 Woodbridge Hill Road, Woodbridge	Site(s) inspected	3-Dec-25
Local authority	Kingborough	Assessed by	John Paul Cumming

This report summarises data relating to the physical capability of the assessed site(s) to accept wastewater. Environmental sensitivity and system design issues are reported separately. The 'Alert' column flags factors with high (A) or very high (AA) site limitations which probably require special consideration in site acceptability or for system design(s). Blank spaces indicate data have not been entered into TRENCH.

Alert	Factor	Units	Value	Confid level	Limitation Trench	Limitation Amended	Remarks
A	Expected design area	sq m	500	V. high	High		
	Density of disposal systems	/sq km	10	Mod.	Very low		
	Slope angle	degrees	9	High	Moderate		
	Slope form	Straight simple		High	Low		
	Surface drainage	Imperfect		High	Moderate		
	Flood potential	Site floods <1:100 yrs		High	Very low		
	Heavy rain events	Rare		High	Low		
	Aspect (Southern hemi.)	Faces E or W		V. high	Moderate		
	Frequency of strong winds	Common		High	Low		
	Wastewater volume	L/day	480	High	Low		
	SAR of septic tank effluent		1.7	High	Low		
	SAR of sullage		2.6	High	Moderate		
	Soil thickness	m	1.0	V. high	Low		
	Depth to bedrock	m	1.5	V. high	Moderate		
	Surface rock outcrop	%	0	V. high	Very low		
	Cobbles in soil	%	0	V. high	Very low		
	Soil pH		5.5	High	Low		
	Soil bulk density	gm/cub. cm	1.2	High	Very low		
AA	Soil dispersion	Emerson No.	2	V. high	Very high		
	Adopted permeability	m/day	0.12	Mod.	Very low		
A	Long Term Accept. Rate	L/day/sq m	2	High	High		

Comments

The site has the capability to accept onsite wastewater. Secondary treatment of effluent and disposal via irrigation is recommended.

GES

Land suitability and system sizing for on-site wastewater management

Trench 3.0 (Australian Institute of Environmental Health)

Environmental Sensitivity Report

Site assessment for on-site waste water disposal

Assessment for	Dunbabin Architects	Assess. Date	9-Jan-26
		Ref. No.	
Assessed site(s)	85 Woodbridge Hill Road, Woodbridge	Site(s) inspected	3-Dec-25
Local authority	Kingborough	Assessed by	John Paul Cumming

This report summarises data relating to the environmental sensitivity of the assessed site(s) in relation to applied wastewater. Physical capability and system design issues are reported separately. The 'Alert' column flags factors with high (A) or very high (AA) limitations which probably require special consideration in site acceptability or for system design(s). Blank spaces indicate data have not been entered into TRENCH.

Alert	Factor	Units	Value	Confid level	Limitation Trench	Limitation Amended	Remarks
	Cation exchange capacity	mmol/100g	100	High	Low		
	Phos. adsorp. capacity	kg/cub m	0.7	High	Moderate		
	Annual rainfall excess	mm	-191	High	Very low		
	Min. depth to water table	m	3	High	Very low		
	Annual nutrient load	kg	2.6	High	Very low		
	G'water environ. value	Agric non-sensit		V. high	Low		
	Min. separation dist. required	m	2	High	Very low		
	Risk to adjacent bores		Very low	V. high	Very low		
	Surf. water env. value	Agric non-sensit		V. high	Low		
A	Dist. to nearest surface water	m	120	V. high	High		
A	Dist. to nearest other feature	m	20	V. high	High		
	Risk of slope instability		Low	V. high	Low		
AA	Distance to landslip	m	0	V. high	Very high		

Comments

There is low risk of environmental harm associated with onsite wastewater at this site.

Appendix 1 - DCP Results Table

Dynamic Cone Penetration (DCP) Conversion to Californian Bearing Ratio
(ref: Australian Standard AS 1289.6.3.2 - 1997)

DCP Location BH1

Depth (mm)	DCP (Blows/100mm)	DCP (mm/Blow)	DCP Resistance (mPa)	Allowable Bearing Capacity (kPa)	CBR (Rounded Up)
0-100	1	100.0	0.3	35	2
100-200	2	50.0	0.6	69	4
200-300	2	50.0	0.6	69	4
300-400	2	50.0	0.6	69	4
400-500	2	50.0	0.6	69	4
500-600	3	33.3	0.9	104	6
600-700	3	33.3	0.9	104	6
700-800	2	50.0	0.6	69	4
800-900	3	33.3	0.9	104	6
900-1000	3	33.3	0.9	104	6
1000-1100	3	33.3	0.9	104	6
1100-1200	2	50.0	0.6	69	4
1200-1300	3	33.3	0.9	104	6
1300-1400	3	33.3	0.9	104	6
1400-1500	4	25.0	1.3	139	8
1500-1600	5	20.0	1.6	174	10
1600-1700	11	9.1	3.4	382	25
1700-1800	15	6.7	4.7	521	35
1800-1900	20	5.0	6.3	694	48

Explanatory Notes

1 Scope of Works

The methods of description and classification of soils used in this report are based largely on Australian Standard 1726 – Geotechnical Site Investigations (AS1726:2017), with reference to Australian Standard 1289 – Methods for testing soils for engineering purposes (AS1289), for eventual Site Classification according to Australian Standard 2870 (AS2870:2011) – Residential Slabs and Footings and Australian Standard 1547 (AS1547:2012) On-site domestic wastewater management.

1.1 Site Classification AS2870:2011

Site classification with reference to the above Australian Standards are based on site reactivity.

Class	Foundation Conditions	Characteristic Surface Movement
A	Most sand and rock sites with little or no ground movement from moisture changes.	**0mm**
S	Slightly reactive clay sites, which may experience only slight ground movement from moisture changes.	**0 – 20mm**
M	Moderately reactive clay or silt sites, which may experience moderate ground movement from moisture changes.	**20 – 40mm**
H-1	Highly reactive clay sites, which may experience high ground movement from moisture changes.	**40 – 60mm**
H-2	Highly reactive clay sites, which may experience very high ground movement from moisture changes.	**60 – 75mm**
E	Extremely reactive sites, which may experience extreme ground movement from moisture changes.	**>75mm**

*Note: Soils where foundation performance may be significantly affected by factors other than reactive soil movement are classified as **Class P**.*

A site is classified as **Class P** when:

- The bearing capacity of the soil profile in the foundation zone is generally less than 100kpa
- If excessive foundation settlement may occur due to loading on the foundation.
- The site contains uncontrolled fill greater than 0.8m in depth for sandy sites and 0.4m in depth for other soil materials.
- The site is subject to mine subsistence, landslip, collapse activity or coastal erosion.
- The site is underlain by highly dispersive soils with significant potential for erosion
- If the site is subject to abnormal moisture conditions which can affect foundation performance

1.2 Soil Characterisation

This information explains the terms of phrase used within the soil description area of the report.

It includes terminology for cohesive and non-cohesive soils and includes information on how the Unified Soil Classification Scheme (USCS) codes are determined.

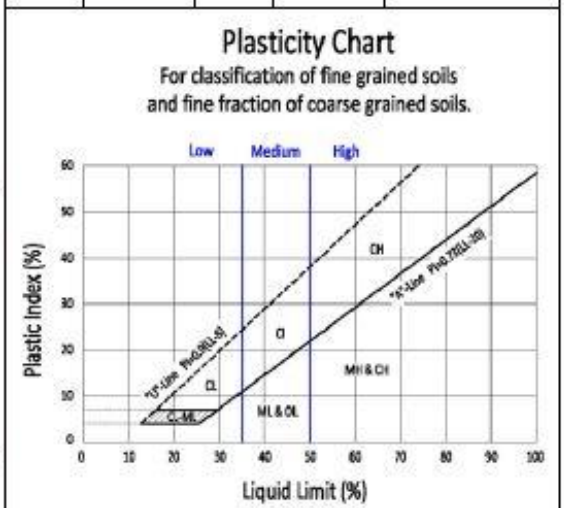
NON COHESIVE – SAND & GRAVEL		
Consistency Description	**Field Test**	**Dynamic Cone Penetrometer blows/100 mm**
Very loose (VL)	Easily penetrated with 13 mm reinforcing rod pushed by hand.	0 - 1
Loose (L)	Easily penetrated with 13 mm reinforcing rod pushed by hand. Can be excavated with a spade; 50 mm wooden peg can be easily driven.	1 - 3
Medium dense (MD)	Penetrated 300 mm with 13 mm reinforcing rod driven with 2 kg hammer, - hard shovelling.	3 - 8
Dense (D)	Penetrated 300 mm with 13 mm reinforcing rod driven with 2 kg hammer, requires pick for excavation: 50 mm wooden peg hard to drive.	8 - 15
Very dense (VD)	Penetrated only 25 - 50 mm with 13 mm reinforcing rod driven with 2 kg hammer.	>15

COHESIVE - SILT & CLAY		
Consistency Description	**Field Test**	**Indicative undrained shear strength kPa**
Very soft	Easily penetrated >40 mm by thumb. Exudes between thumb and fingers when squeezed in hand.	<12
Soft	Easily penetrated 10 mm by thumb. Moulded by light finger pressure	>12 and <25
Firm	Impression by thumb with moderate effort. Moulded by strong finger pressure	>25 and <50
Stiff	Slight impression by thumb cannot be moulded with finger.	>50 and <100
Very Stiff	Very tough. Readily indented by thumbnail.	>100 and <200
Hard	Brittle. Indented with difficulty by thumbnail.	>200

1.3 USCS Material Descriptions

Soils for engineering purposes are the unconsolidated materials above bedrock, they can be residual, alluvial, colluvial or aeolian in origin.

Major Divisions		Particle size mm	USCS Group Symbol	Typical Names	Laboratory Classification				
					% < 0.075 mm (2)	Plasticity of fine fraction	$C_u = \frac{D_{60}}{D_{10}}$	$C_c = \frac{(D_{30})^2}{(D_{10})(D_{60})}$	NOTES
COARSE GRAINED SOILS (more than half of material less than 63 mm is larger than 0.075 mm)	BOULDERS	200			Use the gradation curve of material passing 63 mm for classification of fractions according to the criteria given in 'Major Divisions'				
	COBBLES	63							
	GRAVELS (more than half of coarse fraction is larger than 2.36 mm)	coarse 20 / medium 6 / fine 2.36	GW	Well graded gravels and gravel-sand mixtures, little or no fines	0-5	—	>4	Between 1 and 3	(1) Identify fines by the method given for fine-grained soils.
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels	0-5	—	Fails to comply with above		
			GM	Silty gravels, gravel-sand-silt mixtures (1)	12-50	Below 'A' line or PI<4	—	—	
			GC	Clayey gravels, gravel-sand-clay mixtures (1)	12-50	Above 'A' line and PI>7	—	—	
	SANDS (more than half of coarse fraction is smaller than 2.36 mm)	coarse 0.6 / medium 0.2 / fine 0.075	SW	Well graded sands and gravelly sands, little or no fines	0-5	—	>6	Between 1 and 3	(2) Borderline classifications occur when the percentage of fines (fraction smaller than 0.075 mm size) is greater than 5% and less than 12%. Borderline classifications require the use of SP-SM, GW-GC.
			SP	Poorly graded sands and gravelly sands, little or no fines	0-5	—	Fails to comply with above		
			SM	Silty sands, sand silt mixtures (1)	12-50	Below 'A' line or PI<4	—	—	
			SC	Clayey sands, sand-clay mixtures (1)	12-50	Above 'A' line and PI>7	—	—	
FINE GRAINED SOILS (more than half of material less than 63 mm is smaller than 0.075 mm	SILTS & CLAYS (Liquid Limit ≤50%)		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity					
			CL CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays					
			OL	Organic silts and clays of low plasticity					
	SILTS & CLAYS (Liquid Limit >50%)		MH	Inorganic silts, mic- aceous or diato-maceous fine sands or silts, elastic silts					
			CH	Inorganic clays of high plasticity, fat clays					
			OH	Organic silts and clays of high plasticity					
	HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils					



Grain size analysis is performed by two processes depending on particle size. Sand silt and clay particles are assessed using a standardised hydrometer test, and coarse sand and larger is assessed through sieving by USCS certified sieves. For more detail see the following section.

Soil Classification	Particle Size
Clay	Less than 0.002mm
Silt	0.002 – 0.06mm
Fine/Medium Sand	0.06 – 2.0mm
Coarse Sand	2.0mm – 4.75mm
Gravel	4.75mm – 60.00mm

1.4 Bearing Capacities and DCP testing.

DCP and PSP weighted penetrometer tests – Dynamic Cone Penetrometer (DCP) and Perth Sand Penetrometer (PSP) tests are carried out by driving a rod into the ground with a falling weight hammer and measuring the blows for successive 100mm increments of penetration. Normally, there is a depth limitation of 1.2m but this may be extended in certain conditions by the use of extension rods. The methods for the two tests are quite similar.

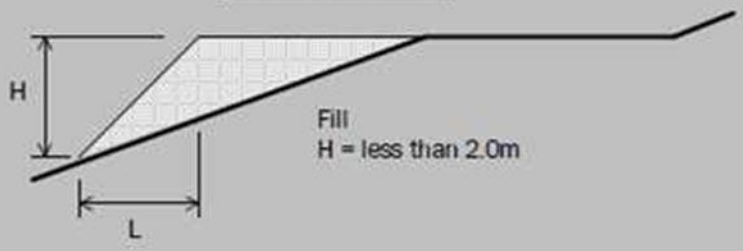
- Dynamic Cone Penetrometer – a 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS 1289, Test 6.3.2).
- Perth Sand Penetrometer – a 16mm diameter flat-ended rod is driven with a 9kg hammer, dropping 600mm (AS 1289 Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.

Site Anomalies – During construction GES will need to be notified of any major variation to the foundation conditions as predicted in this report.

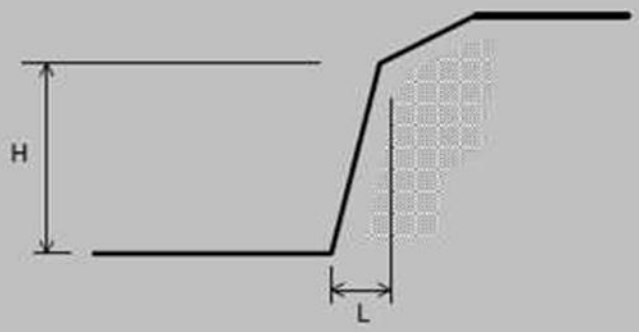
1.5 Batter Angles for Embankments *(Guide Only)*

Note : Retaining walls or other form of soil retaining methods must be adopted where the slope ratio is greater than that indicated in the table below :-

FILL EMBANKMENTS



CUT EMBANKMENTS



MATERIAL TYPE (refer soils report)		EMBANKMENT SLOPES (Height : Length)	
		Compacted Fill	Cutting
Stable Rock (A*)		2 : 3	6 : 1
Sand (A*)		1 : 2	2 : 3
Silt (P*)		1 : 4	1 : 4
Clay	Firm Clay	1 : 2	1 : 1
	Soft Clay	Not Suitable	2 : 3
Soft Soils (P*)		Not Suitable	Not Suitable

Glossary of Terms

Bearing Capacity – Maximum bearing pressure that can be sustained by the foundation from the proposed footing system under service loads which should avoid failure or excessive settlement.

Clay – (Mineral particles less than 0.002mm in diameter). Fine grained cohesive soil with plastic properties when wet. Also includes sandy clays, silty clays, and gravelly clays.

Dynamic Cone Penetrometer (DCP) – Field equipment used to determine underlying soil strength and therefore bearing capacity (kPa) by measuring the penetration of the device into the soil after each hammer blow.

Dispersive soil – A soil that has the ability to pass rapidly into suspension in water.

Footing – Construction which transfers the load from the building to the foundation.

Foundation – Ground which supports the building

Landslip – Foundation condition on a sloping site where downhill foundation movement or failure is a design consideration.

Qualified Engineer – A professional engineer with academic qualifications in geotechnical or structural engineering who also has extensive experience in the design of the footing systems for houses or similar structures.

Reactive Site – Site consisting of clay soil which swells on wetting and shrinks on drying by an amount that can damage buildings on light strip footings or unstiffened slabs. Includes sites classified as S, M, H-1, H-2 & E in accordance with AS2870-2011.

Sand – (Mineral particles greater than 0.02mm in diameter). Granular non-cohesive, non-plastic soil that may contain fines including silt or clay up to 15%.

Services – Means all underground services to the site including but not limited to power, telephone, sewerage, water & storm water.

Silt – (Mineral particles 0.002 – 0.02mm in diameter). Fine grained non-cohesive soil, non-plastic when wet. Often confers a silky smoothness of field texture, regularly includes clay and sand to form clayey silts, sandy silts and gravelly silts.

Site – The site title, as denoted by address, lot number, or Certificate of Title (CT) number, or Property Identification Number (PID).

Surface Movement (Ys) – Design movement (mm) at the surface of a reactive site caused by moisture changes.

Disclaimer

This Report has been prepared in accordance with the scope of services between Geo-Environmental Solutions Pty. Ltd. (GES) and the Client. To the best of GES's knowledge, the information presented herein represents the client's requirements at the time of printing of the Report. However, the passage of time, manifestation of latent conditions or impacts of future events may result in findings differing from that discussed in this Report. In preparing this Report, GES has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations referenced herein. Except as otherwise stated in this Report, GES has not verified the accuracy or completeness of such data, surveys, analyses, designs, plans and other information.

The scope of this study does not allow for the review of every possible geotechnical parameter or the soil conditions over the whole area of the site. Soil and rock samples collected from the investigation area are assumed to be representative of the areas from where they were collected and not indicative of the entire site. The conclusions discussed within this report are based on observations and/or testing at these investigation points.

This report does not purport to provide legal advice. Readers of the report should engage professional legal practitioners for this purpose as required.

No responsibility is accepted for use of any part of this report in any other context or for any other purpose by third a party.

Demonstration of wastewater system being consistent with *Building Act 2016 Guidelines for On-site Wastewater*

Acceptable Solutions	**Performance Criteria**	**Compliance**
A1 Horizontal separation distance from a building to a land application area must comply with one of the following: a) be no less than 6m; or b) be no less than: (i) 3m from an upslope building or level building; (ii) If primary treated effluent to be no less than 4m plus 1m for every degree of average gradient from a downslope building; (iii) If secondary treated effluent and subsurface application, no less than 2m plus 0.25m for every degree of average gradient from a downslope building.	P1 a) The land application area is located so that (i) the risk of wastewater reducing the bearing capacity of a building's foundations is acceptably low.; and (ii) is setback a sufficient distance from a downslope excavation around or under a building to prevent inadequately treated wastewater seeping out of that excavation	Complies with E23 Land application area will be located with a minimum separation distance of 2m from an upslope or level building and 4.25m from a downslope building.
A2 Horizontal separation distance from downslope surface water to a land application area must comply with (a) or (b) (a) be no less than 100m; or (b) be no less than the following: (i) if primary treated effluent 15m plus 7m for every degree of average gradient to downslope surface water; or (ii) if secondary treated effluent and subsurface application, 15m plus 2m for every degree of average gradient to down slope surface water.	P2 Horizontal separation distance from downslope surface water to a land application area must comply with all of the following: a) Setbacks must be consistent with AS/NZS 1547 Appendix R; b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable.	Complies with E23 Land application area will be located with a minimum separation distance of 100m of downslope surface water.

A3 Horizontal separation distance from a property boundary to a land application area must comply with either of the following: (a) be no less than 40m from a property boundary; or (b) be no less than: (i) 1.5m from an upslope or level property boundary; and (ii) If primary treated effluent 2m for every degree of average gradient from a downslope property boundary; or (iii) If secondary treated effluent and subsurface application, 1.5m plus 1m for every degree of average gradient from a downslope property boundary.	P3 Horizontal separation distance from a property boundary to a land application area must comply with all of the following: (a) Setback must be consistent with AS/NZS 1547 Appendix R; and (b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable.	Complies with E23 Land application area will be located with a minimum separation distance of 1.5m from an upslope or level property boundary and 10.5m from a downslope property boundary.
A4 Horizontal separation distance from a downslope bore, well or similar water supply to a land application area must be no less than 50m and not be within the zone of influence of the bore whether up or down gradient.	P4 Horizontal separation distance from a downslope bore, well or similar water supply to a land application area must comply with all of the following: (a) Setback must be consistent with AS/NZS 1547 Appendix R; and (b) A risk assessment completed in accordance with Appendix A of AS/NZS 1547 demonstrates that the risk is acceptable	No bore or well identified within 50m

A5 Vertical separation distance between groundwater and a land application area must be no less than: (a) 1.5m if primary treated effluent; or (b) 0.6m if secondary treated effluent	P5 Vertical separation distance between groundwater and a land application area must comply with the following: (a) Setback must be consistent with AS/NZS 1547 Appendix R; and (b) A risk assessment completed in accordance with Appendix A of AS/NZS 1547 that demonstrates that the risk is acceptable	No groundwater encountered.
A6 Vertical separation distance between a limiting layer and a land application area must be no less than: (a) 1.5m if primary treated effluent; or (b) 0.5m if secondary treated effluent	P6 Vertical setback must be consistent with AS/NZS1547 Appendix R.	Complies with E23
A7 nil	P7 A wastewater treatment unit must be located a sufficient distance from buildings or neighbouring properties so that emissions (odour, noise or aerosols) from the unit do not create an environmental nuisance to the residents of those properties	Consistent with P7.

AS1547:2012 – Loading Certificate – AWTS Design

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

Site Address: 85 Woodbridge Hill Road, Woodbridge

System Capacity: 4 persons @ 120L/person/day

Summary of Design Criteria

DIR: 2.4mm/day.

Irrigation area: 200m^2

Reserve area location /use: Not assigned – more than 100% available

Water saving features fitted: Standard fixtures

Allowable variation from design flows: 1 event @ 200% daily loading per quarter

Typical loading change consequences: Expected to be minimal due to use of AWTS and large land area

Overloading consequences: Continued overloading may cause hydraulic failure of the irrigation area and require upgrading/extension of the area. Risk considered acceptable due to monitoring through quarterly maintenance reports.

Underloading consequences: Lower than expected flows will have minimal consequences on system operation unless the house has long periods of non occupation. Under such circumstances additional maintenance of the system may be required. Long term under loading of the system may also result in vegetation die off in the irrigation areas and additional watering may be required. Risk considered acceptable due to monitoring through quarterly maintenance reports.

Lack of maintenance / monitoring consequences: Issues of underloading/overloading and condition of the irrigation area require monitoring and maintenance, if not completed system failure may result in unacceptable health and environmental risks. Monitoring and regulation by the permit authority required to ensure compliance.

Other considerations: Owners/occupiers must be made aware of the operational requirements and limitations of the system by the installer/maintenance contractor.

CERTIFICATE OF THE RESPONSIBLE DESIGNER

Section 94
Section 106
Section 129
Section 155

Form **35**

To: Dunbabin Architects *Owner name*
2/129 Bathurst Street *Address*
Hobart 7000 *Suburb/postcode*

Designer details:

Name: John-Paul Cumming
Category: Bld. Srvcs. Dsgnr. - Hydraulic
Business name: Geo-Environmental Solutions
Phone No: 03 6223 1839
Business address: 29 Kirksway Place
Battery Point 7004
Fax No: N/A
Licence No: CC774A
Email address: office@geosolutions.net.au

Details of the proposed work:

Owner/Applicant Dunbabin Architects
Designer's project reference No. J12467
Address: 85 Woodbridge Hill Road
Lot No: 223482/1
Woodbridge 7162

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

Description of work:
On-site wastewater management 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:

AWTS with subsurface irrigation.

Design documents provided:

The following documents are provided with this Certificate –
Document description:

Drawing numbers:	Prepared by: Geo-Environmental Solutions	Date: Jan-26
Schedules:	Prepared by:	Date:
Specifications:	Prepared by: Geo-Environmental Solutions	Date: Jan-26
Computations:	Prepared by:	Date:
Performance solution proposals:	Prepared by:	Date:
Test reports:	Prepared by: Geo-Environmental Solutions	Date: Jan-26

Standards, codes or guidelines relied on in design process:

AS1547:2012 On-site domestic wastewater management.

AS3500 (Parts 0-5)-2013 Plumbing and drainage set.

Any other relevant documentation:

Geo-Environmental Assessment - 85 Woodbridge Hill Road Woodbridge - Jan-26

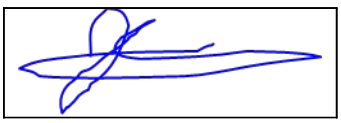
Geo-Environmental Assessment - 85 Woodbridge Hill Road Woodbridge - Jan-26

Attribution as designer:

I John-Paul Cumming, 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:	John-Paul Cumming		09/01/2026
Licence No:	CC774A		

Assessment of Certifiable Works: (TasWater)

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

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

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

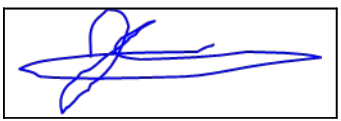
I confirm that the proposed works are not Certifiable Works, in accordance with the Guidelines for TasWater CCW Assessments, by virtue that all of the following are satisfied:

- [x] The works will not increase the demand for water supplied by TasWater
- [x] The works will not increase or decrease the amount of sewage or toxins that is to be removed by, or discharged into, TasWater's sewerage infrastructure
- [x] The works will not require a new connection, or a modification to an existing connection, to be made to TasWater's infrastructure
- [x] The works will not damage or interfere with TasWater's works
- [x] The works will not adversely affect TasWater's operations
- [x] The work are not within 2m of TasWater's infrastructure and are outside any TasWater easement
- [x] I have checked the LISTMap to confirm the location of TasWater infrastructure
- [x] If the property is connected to TasWater's water system, a water meter is in place, or has been applied for to TasWater.

Certification:

I ..... John-Paul Cumming..... 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:	John-Paul Cumming		09/01/2026

CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

Form 55

To: Dunbabin Architects *Owner /Agent*
2/129 Bathurst Street *Address*
Hobart 7000 *Suburb/postcode*

Qualified person details:

Qualified person: John-Paul Cumming
Address: 29 Kirksway Place
Battery Point 7004
Phone No: 03 6223 1839
Fax No:
Licence No: AO999
Email address: jcumming@geosolutions.net.au

Qualifications and Insurance details: Certified Professional Soil Scientist (CPSS stage 2)
(description from Column 3 of the Director's Determination - Certificates by Qualified Persons for Assessable Items

Speciality area of expertise: AS2870-2011 Foundation Classification
(description from Column 4 of the Director's Determination - Certificates by Qualified Persons for Assessable Items)

Details of work:

Address: 85 Woodbridge Hill Road
Woodbridge 7162
Lot No:
Certificate of title No: 223482/1

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 Classification
(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:	The attached soil report for the address detailed above in 'details of work'
Relevant calculations:	Reference the above report.
References:	AS2870:2011 residential slabs and footings AS1726:2017 Geotechnical site investigations CSIRO Building technology file – 18.

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

Site Classification consistent with AS2870-2011.

Scope and/or Limitations

The classification applies to the site as inspected and does not account for future alteration to foundation conditions as a result of earth works, drainage condition changes or variations in site maintenance.

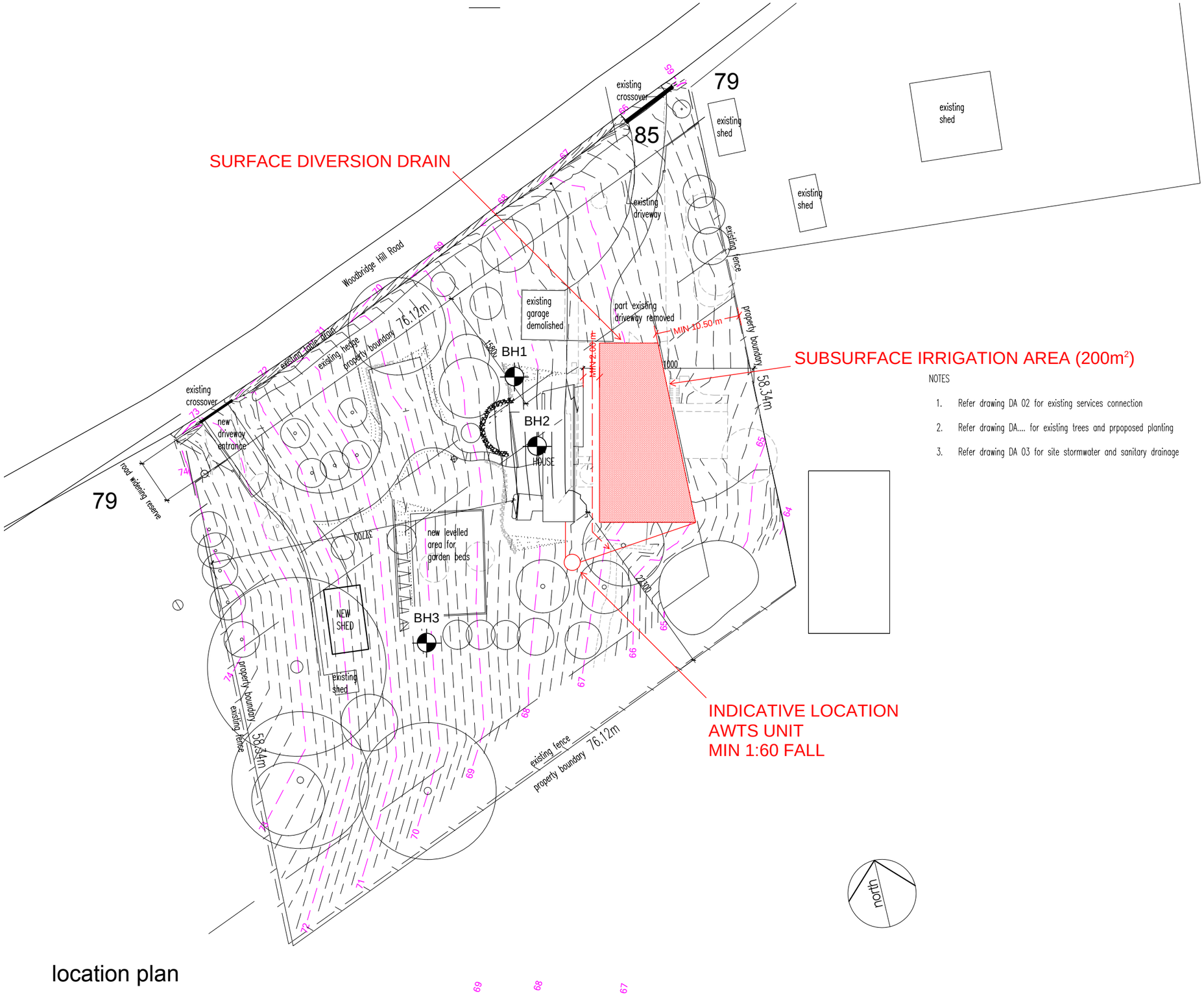
I, John-Paul Cumming certify the matters described in this certificate.

Qualified person:

Signed:

Certificate No: J12467

Date: 09/01/2026



location plan

NOTES

1. Refer drawing DA 02 for existing services connection
2. Refer drawing DA.... for existing trees and prpoposed planting
3. Refer drawing DA 03 for site stormwater and sanitary drainage

Wastewater system:

Existing wastewater system to be disconnected and decommissioned from use

Proposed:
New AWTS Unit with venting according to NCC Vol 3 Tas C2D6

Surface diversion drain

Subsurface irrigation area (200m²)
with gypsum @ 1kg/5m²
+ 200mm sandy loam

Min 2m from upslope or level buildings
Min 4.25m from downslope buildings
Min 1.5m from upslope or level boundaries
Min 10.5m from downslope boundary
Min 100m from downslope surface water

Refer to GES report

Dr. John Paul Cumming
Building Services Designer-Hydraulic
CCC774A

09/01/2025

GES
GEO-ENVIRONMENTAL SOLUTIONS
29 Kirksway Place Battery Point
T| 62231839 E| office@geosolutions.net.au

Approximate Test Hole Location

DUNBABIN ARCHITECTS
30 Flinders Esplanade
Hobart Tasmania 7000
t 6234 5602 m 0419 575 519
mark@dunbabinarchitects.com.au

No.	Date	Revision:
A	29.5.25	SW drainage added

Project: **NEW HOUSE**
85 WOODBRIDGE HILL RD
WOODBRIDGE

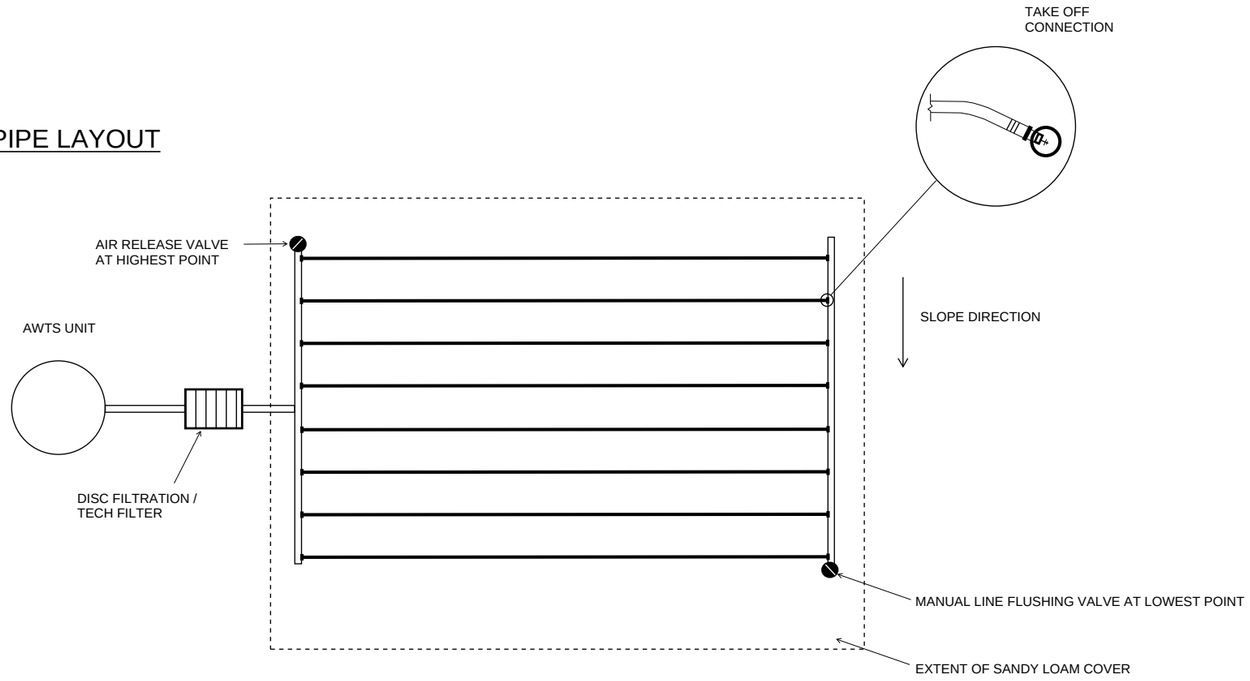
Project No: **2501**

Date: **.... 2025** Scale: **1:500@A3**
Drawn: **MD**
Checked:
Issue: **PLANNING APPLICATION**

Drawing: **LOCATION PLAN**
Drawing No: **DA-01** Rev: ..

GEO-ENVIRONMENTAL SOLUTIONS
29 Kirksway Place, Battery Point
T| 62231839 E| office@geosolutions.net.au

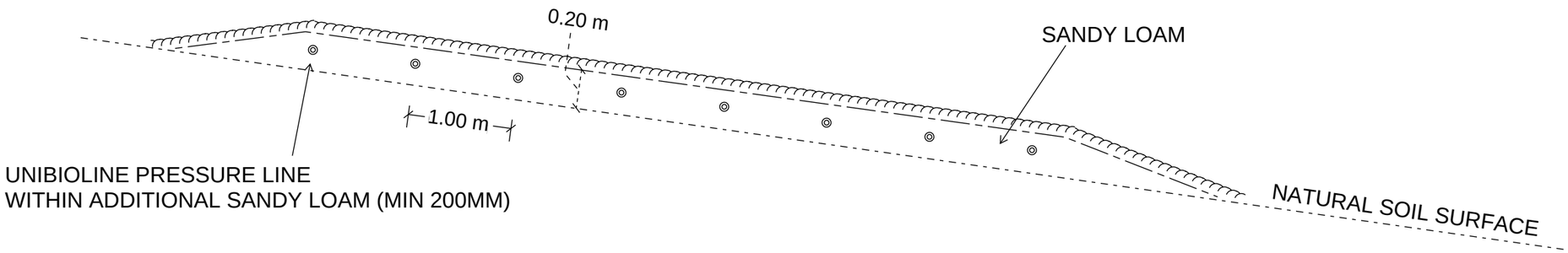
BED PLAN PIPE LAYOUT



APPLICATION AREA NOTES

1. APPLICABLE FOR SLOPE ANGLES OF 10-20%
2. BASE OF APPLICATION AREA TO BE SCARIFIED TO BREAK SURFACE LAYER. ALTERNATIVELY LINES CAN BE RIPPED INTO TOPSOIL WITH SUITABLE TRACTOR AND PIPE LAYER. SMEARING AND COMPACTION TO BE AVOIDED
3. IRRIGATION LINES TO BE INSTALLED INTO MIN 200mm ADDITIONAL SANDY LOAM
4. DEPENDANT ON TREATMENT SYSTEM A 200µm FILTER MAY BE INSTALLED AT THE PUMPING CHAMBER OUTLET, BUT A 100-120µm INLINE DISC FILTER SHOULD BE INSTALLED PRIOR TO DISCHARGE INTO THE IRRIGATION AREA.
5. A VACUUM BREAKER VALVE MUST BE INSTALLED AT THE HIGHEST POINT OF THE IRRIGATION AREA IN A MARKED AND PROTECTED VALVE CONTROL BOX.
6. A FLUSH LINE MUST BE INSTALLED AT THE LOWEST POINT OF THE IRRIGATION AREA
7. THE MINIMUM IRRIGATION PUMPING CAPACITY SHOULD BE EQUIVALENT TO 120 kpa (i.e. 12m OF HEAD) AT THE HIGHEST POINT OF THE IRRIGATION AREA.
8. CUT-OFF DIVERSION DRAIN UPSLOPE AS REQUIRED
9. ALL WORKS TO COMPLY WITH AS3500 AND TASMANIAN PLUMBING CODE

APPLICATION AREA CROSS-SECTION



Do not scale from these drawings. Dimensions to take precedence over scale.				CROSS-SECTION SUBSURFACE APPLICATION SLOPES 10-20%		Sheet 1 of 1 Drawn by: SR

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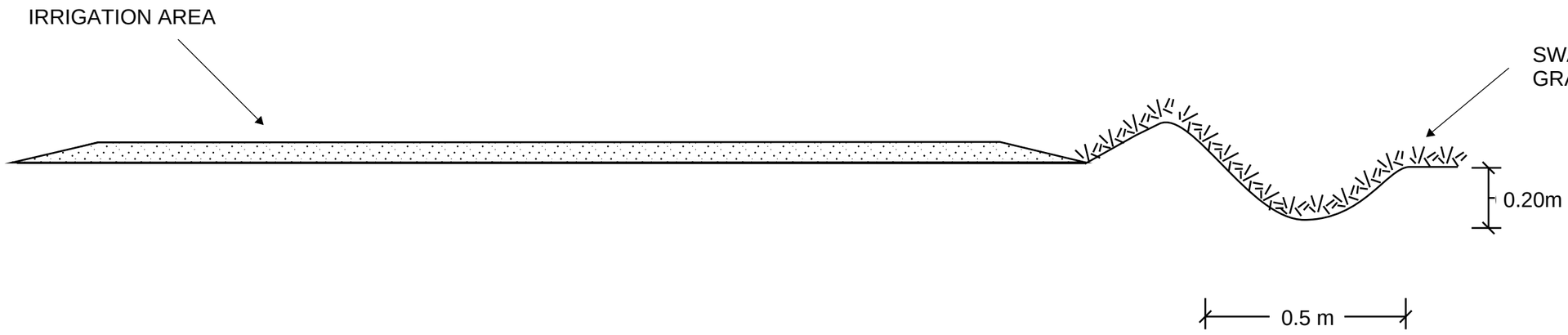
TYPICAL GRASSED SWALE DRAIN CROSS-SECTION

SWALE DRAIN TO BE MIN 0.5M WIDE BY MIN 0.20M DEEP

GRASS COVER TO BE MAINTAINED TO SLOW WATER FLOW AND MINIMSE EROSION



Do not scale from these drawings. Dimensions to take precedence over scale.	Geo-Environmental Solutions		Date: Nov 2021	Grassed swale drain typical cross-section	Sheet 1 of 1 Drawn by SR

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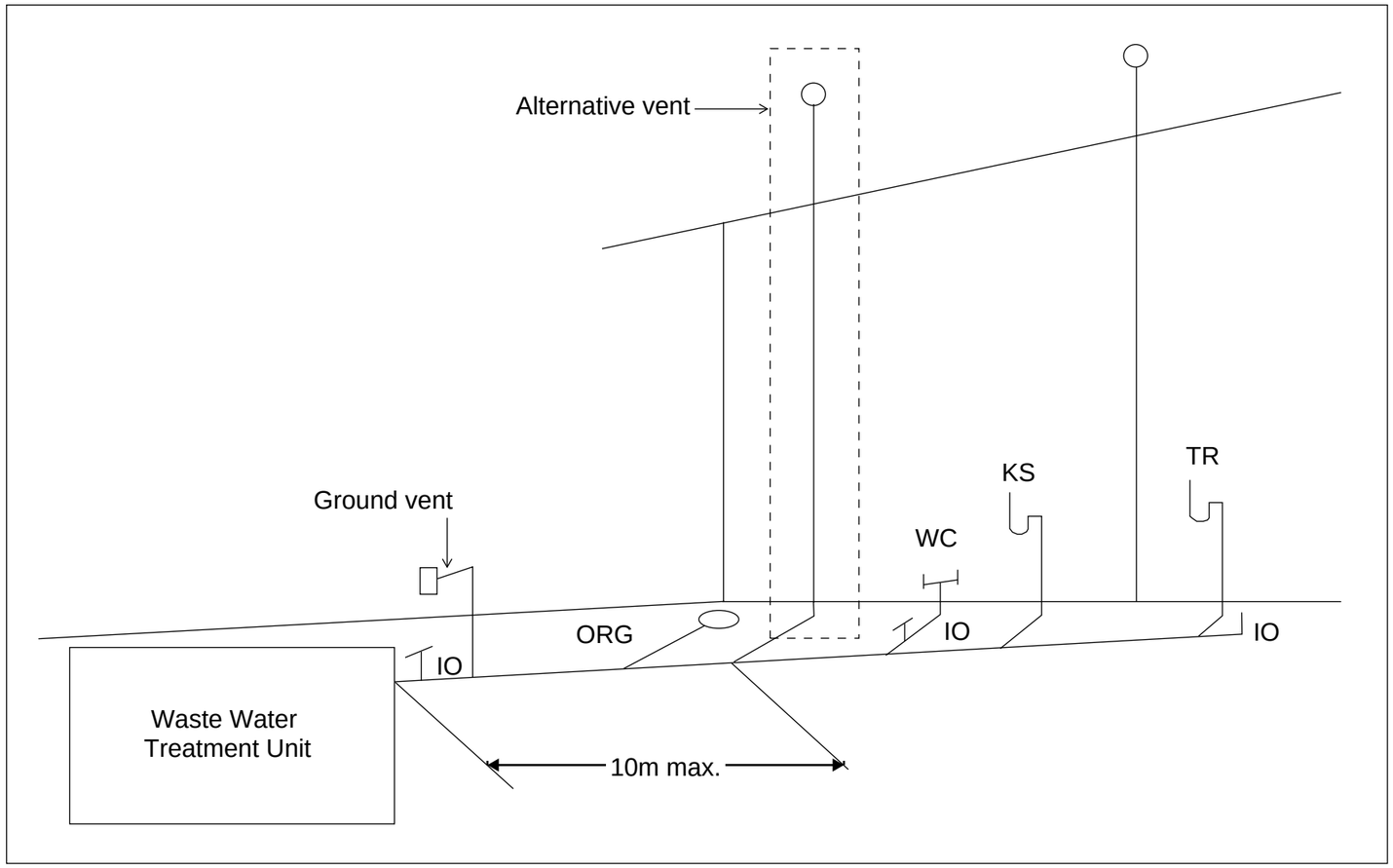

Tas Figure C2D6 Alternative Venting Arrangements

Vents must terminate in accordance with AS/NZS 3500.2

Alternative venting to be used by extending a vent to terminate as if an upstream vent, with the vent connection between the last sanitary fixture or sanitary appliance and the on-site wastewater management system. Use of a ground vent in not recommended

Inspection openings must be located at the inlet to an on-site wastewater management system treatment unit and the point of connection to the land application system and must terminate as close as practicable to the underside of an approved inspection opening cover installed at the finished surface level

Access openings providing access for desludging or maintenance of on-site wastewater management system treatment unites must terminate at or above finished surface level

Do not scale from these drawings. Dimensions to take precedence over scale.				Tas Figure C2D6 Alternative Venting Arrangements		Sheet 1 of 1