ON-SITE WASTEWATER ASSESSMENT

328 Lune River Road

Lune River

June 2022

GEO-ENVIRONMENTAL SOLUTIONS

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Geo-Environmental Solutions P/L 29 Kirksway Place, Battery Point 7004. Ph 6223 1839

Introduction

Client: Dark Lab
Date of inspection: 24/08/20 & 13/12/21
Location*:* 328 Lune River Road Lune River.
Land description: Approx. 5ha lot
Building type: Proposed new visitor facilities
Investigation: Geo-Probe540UD and hand auger
Inspected by*:* JP Cumming & M Campbell

Background information

Map: Mineral Resources Tasmania 1:25 0000 South East Tasmania Sheet
Rock type: Triassic sandstone/Quaternary alluvium
Soil depth: Approx. 2.40m
Planning overlay: Biodiversity Protection Area
Scenic Landscape Corridor
Local meteorology: Annual rainfall approx. 800 mm
Local services: Tank water with on site wastewater disposal required

Site conditions

Slope and aspect: 3% Southeast facing slope
Site drainage: Imperfect subsoil drainage
Vegetation: Native flora
Weather conditions: Cloudy, approx. 20mm rainfall received in preceding 7 days.
Ground surface: Moist surface conditions

Investigation

A number of excavations were completed to identify the distribution of, and variation in soil materials on the site. Representative excavation from each proposed lot indicated on the site plan were chosen for testing and classification according to AS1547-2012 (see profile summaries).

Profile Summaries – Typical soils

Hole 1 Depth (m)	Hole 2 Depth (m)	Horizon	Description
0 – 0.10	0 – 0.30	A1	Grey **Silty SAND (SM)**, single grain, moist dense consistency, few fine roots, gradual boundary to
0.10 – 0.50	0.30 – 0.60	A2	Light Grey **Silty SAND (SM)**, single grain, moist dense consistency, gradual boundary to
0.50 – 1.10	0.60 – 1.20	B2	Olive Grey **CLAY (CH)**, massive structure, very moist firm consistency – perched groundwater at approx 1.1m, high plasticity, gradual boundary to
1.10 – 2.0+	1.20 – 2.0+	B21	Light Greenish Grey **SANDY CLAY (CH)**, massive structure, slightly moist stiff consistency, high plasticity, lower boundary undefined

Soil Profile Notes

The soils on site consist of sands overlying clayey subsoils which have developed from Triassic sandstone and Quaternary alluvium. The clay fraction is likely to show moderate to significant ground surface movement with moisture fluctuations and may lose bearing capacity when wet.

The soils are moderately structured, have a low permeability and high CEC for retention of nutrients. The soils across the site area classified according to AS/NZS1547-2012 as **Category 3 – Loam.** The irrigation is also to be constructed with additional sandy loam scraped from site as part of preparations for the parking areas. It is anticipated that the irrigation area will be constructed with at least 300mm of additional loam and mulch with landscaped gardens.

Site Summary

The proposal is for the construction of new visitor facilities associated with the existing Ida Bay Railway site and new proposed art installation. As part of the development a new wastewater system is proposed to be installed to cater for wastewater requirements on the site. The existing wastewater system on site will remain to service the existing caretakers and visitor accommodation buildings elsewhere on the site.

Proposed wastewater loading

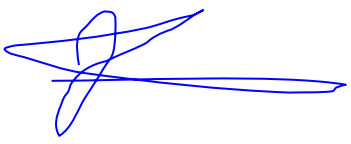
The capability of the system to support the proposed new site facilities and projected visitor numbers and on-site wastewater disposal has been evaluated to ensure environmental values are maintained. Based upon peak of approximately 300 visitors per day with tank water supply, the expected loading from visitors according to AS/NZS1547-2012 and the Directors Guidelines for on-site wastewater management is 3000L/day. This was taken at an estimated average loading of 10L/person/day, from a mix of visitors using toilet facilities only at 6L/person/day and a mix of other patrons dinging in the visitor centre at 15L/person/day (note - the visitor centre is only serving packaged food/drinks and the food service does not involve any on site cooking).

Site wastewater budget – proposed loadings

- Visitor centre – 300 visitors per day @10L/day - peak loading = 3000L/day
- Average loading @63% occupancy = 1890L/day

The proposed redeveloped site has an estimated total peak loading of approximately 3000L/day and based upon ABS occupancy figures for accommodation and attractions in Tasmania of approximately 63% an average wastewater loading of 1890L/day would be applicable. It is recommended that the treatment system be designed with a daily treatment capacity capable of processing the peak hydraulic loading of 3000L/day and with an organic treatment capacity of up to 1.5Kg of BOD/day. The irrigation area should be designed based upon a DIR of 3.5mm/day and the average wastewater flows on the system to yield a minimum area of 500m^2. It is also recommended that a small commercial grease trap be installed for the limited kitchen facilities on site (i.e. 500L min). For further details please refer to the attached trench files, irrigation specification compliance tables and site plans.

I should be notified of any variation to the loading on the system or variation to the soil conditions as predicted in this report.



Dr John Paul Cumming B.Agr.Sc (hons) PhD CPSS GAICD
Environmental and Engineering Soil Scientist

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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	Dark Lab	Assess. Date	14-Jun-22
		Ref. No.	
Assessed site(s)	328 Lune River Road, Lune River	Site(s) inspected	13-Dec-21
Local authority	Huon Valley Council	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 = 1,890 (using a method independent of the no. of bedrooms)
Septic tank wastewater volume (L/day) = 1,000
Sullage volume (L/day) = 890
Total nitrogen (kg/year) generated by wastewater = 8.9
Total phosphorus (kg/year) generated by wastewater = 3.4

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)	65	60	60	85	90	95	104	120	102	99	84	68
Adopted rainfall (R, mm)	65	60	60	85	90	95	104	120	102	99	84	68
Retained rain (Rr, mm)	59	54	54	77	81	86	94	108	92	89	76	61
Max. daily temp. (deg. C)												
Evapotrans (ET, mm)	149	126	104	72	48	34	36	48	72	96	120	144
Evapotr. less rain (mm)	**90**	**72**	**50**	**-5**	**-33**	**-52**	**-58**	**-60**	**-20**	**7**	**44**	**83**

Annual evapotranspiration less retained rain (mm) = 119

Soil characterisitics

Texture = loam Category = 3 Thick. (m) = 2.4
Adopted permeability (m/day) = 0.76 Adopted LTAR (L/sq m/day) = 4 Min depth (m) to water = 10

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:	Above-ground
The preferred type of in-ground secondary treatment:	None
The preferred type of above-ground secondary treatment:	Trickle irrigation
Site modifications or specific designs:	Not needed

Suggested dimensions for on-site secondary treatment system

Total length (m) =	94
Width (m) =	5
Depth (m) =	0.3
Total disposal area (sq m) required =	500
comprising a Primary Area (sq m) of:	500
and a Secondary (backup) Area (sq m) of:	

Sufficient area is available on site

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Comment

Using the DIR of 3.5L/sq m/day anirrigation area of at least 500m2 is required for the predicted average loadings.

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Land suitability and system sizing for on-site wastewater management

Trench 3.0 (Australian Institute of Environmental Health)

Site Capability Report

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		Ref. No.	
Assessed site(s)	328 Lune River Road, Lune River	Site(s) inspected	13-Dec-21
Local authority	Huon Valley Council	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	3,000	V. high	Very low	High	
	Density of disposal systems	/sq km	3	Mod.	Very low		
	Slope angle	degrees	1	High	Very low		
	Slope form	Straight simple		High	Low		
	Surface drainage	Imperfect		High	Moderate		
	Flood potential	Site floods <1:100 yrs		High	Very low		
	Heavy rain events	Infrequent		High	Moderate		
	Aspect (Southern hemi.)	Faces E or W		V. high	Moderate		
	Frequency of strong winds	Common		High	Low		
AA	Wastewater volume	L/day	1,890	High	Very high		
	SAR of septic tank effluent		1.2	High	Low		
	SAR of sullage		2.1	High	Moderate		
	Soil thickness	m	2.4	V. high	Very low		
	Depth to bedrock	m	2.4	Mod.	Very low		
	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	1.3	High	Very low		
	Soil dispersion	Emerson No.	8	V. high	Very low		
	Adopted permeability	m/day	0.76	Mod.	Very low		
	Long Term Accept. Rate	L/day/sq m	4	High	Moderate		

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Comments

The site has the capability to accept onsite wastewater

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Trench 3.0 (Australian Institute of Environmental Health)

Environmental Sensitivity Report

Site assessment for on-site waste water disposal

Assessment for	Dark Lab	Assess. Date	14-Jun-22
		Ref. No.	
Assessed site(s)	328 Lune River Road, Lune River	Site(s) inspected	13-Dec-21
Local authority	Huon Valley Council	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	-119	High	Very low		
	Min. depth to water table	m	10	High	Very low		
	Annual nutrient load	kg	12.4	High	Moderate		
	G'water environ. value	Agric non-sensit		V. high	Low		
	Min. separation dist. required	m	5	High	Very low		
	Risk to adjacent bores	Very low		V. high	Very low		
A	Surf. water env. value	Recreational		V. high	High		
	Dist. to nearest surface water	m	200	V. high	Moderate	No change	
	Dist. to nearest other feature	m	50	V. high	Moderate		
	Risk of slope instability	Low		V. high	Low		
	Distance to landslip	m	870	V. high	Very low		

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Comments

The soil onsite has a good CEC for the retention of nutrients. this and the low slope angle impart a low environemtnal risk associated with onsite wastewater disposal.

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: 328 Ida Bay Road

System Capacity: Peak loading 3000L/day & average loading 1890L/day

Summary of Design Criteria

DIR: 3.5mm/day

Irrigation area: 500m^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.

Demonstration of wastewater system compliance to *Building Act 2016 Guidelines for On-site Wastewater Disposal*

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 A1 (b) (i) Land application area will be located with a minimum separation distance of 3m from an upslope or level building. Complies with A1 (b) (iii) Land application area will be located with a minimum separation distance of 2.5m of 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 A2 (b) (ii) Land application area will be located with a minimum separation distance of 19m 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 A3 (b) (i) Land application area will be located with a minimum separation distance of 1.5m from an upslope or level property boundary Complies with A3 (b) (iii) Land application area will be located with a minimum separation distance of 3.5m of 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	Complies with A4 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	Complies with A5 (b) 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 A6 (b)
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	Complies

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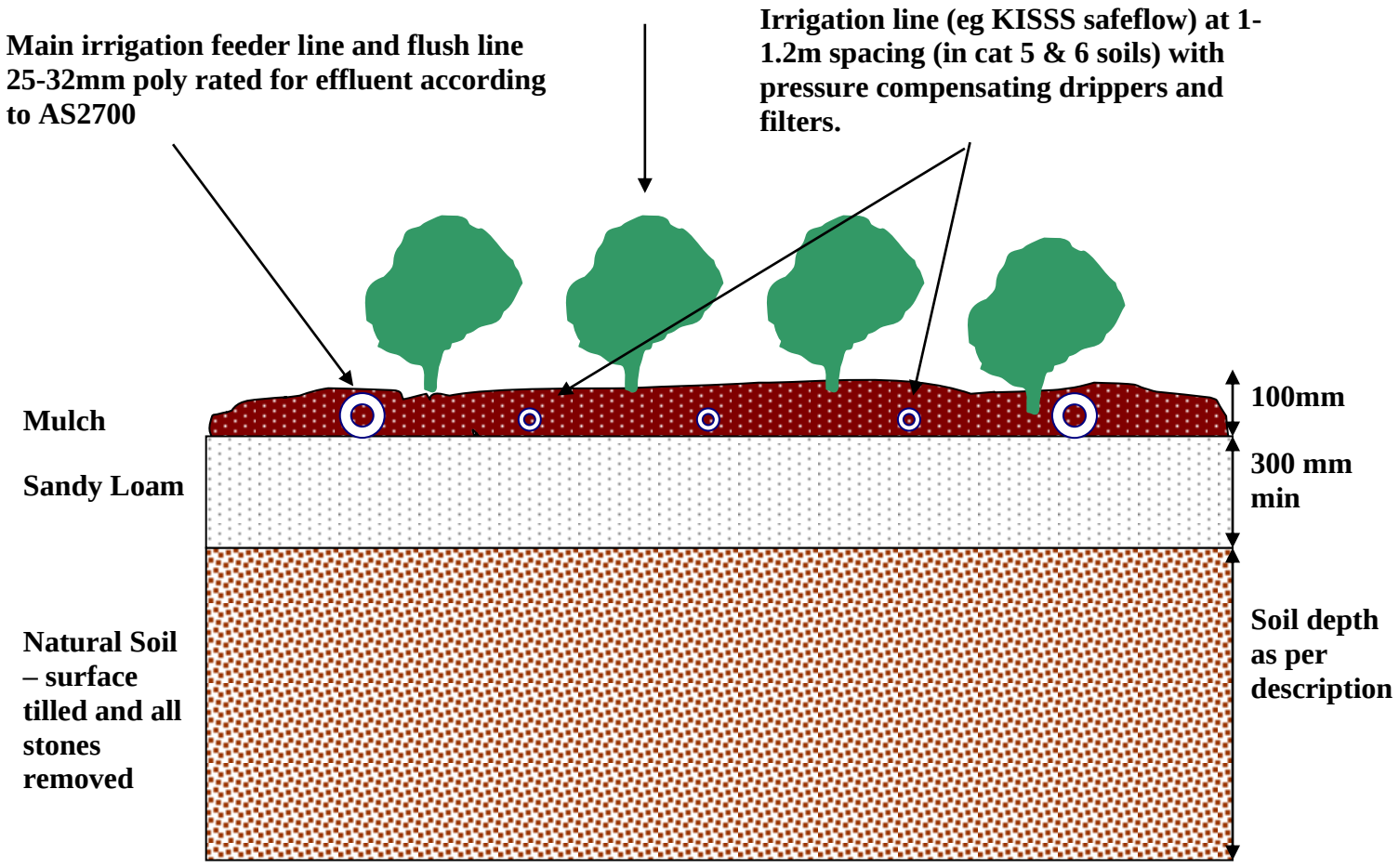
Figure 1 - AWTS

AWTS - Raised irrigation bed design

To be used in conjunction with site evaluation report for construction of irrigation areas for use with aerated wastewater treatment systems (AWTS) on shallow, duplex, or clay soils**.** On dispersive soils gypsum should be added to tilled natural soil at 1Kg/5m^2. For irrigation areas larger than 500m^2 the irrigation area should be split into multiples of at least 100m^2 with flow automatically switched between each area by a kraine valve.

Irrigation Area Cross Section

Native plants @ 1 per 4m^2



- The existing surface of the site should be tilled to a depth of 100mm with a conventional plough, discs or spring tines to break down the turf matt and any large soil clods
- A minimum of 300mm of loam should be added to the site to aid installation– the loam should be mixed into the exiting subsoil with another pass of the cultivating tines or similar

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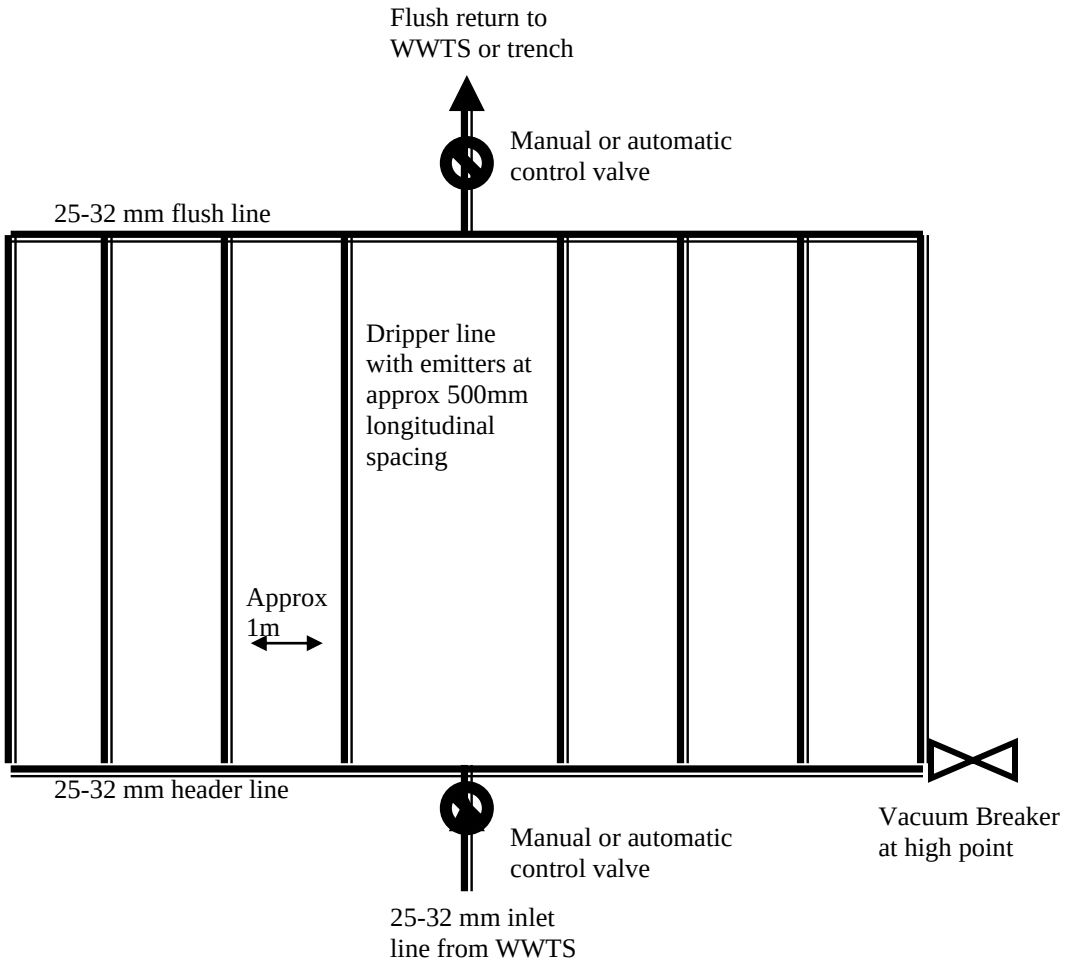
Irrigation Area Plan View



Design specifications:

1. Manufacturer's recommendations for spacing of lateral irrigation lines should be followed (either Techline brand, Geoflow or KISSS) with commonly used with spacing of 0.3m (0.6m KISSS) in highly permeable soils and 0.6m (1.0-1.2m KISSS) in less permeably loams and clays.
2. Dependent upon treatment system a 200µm filter may be installed at the pumping chamber outlet, but a 100-120 µm inline disc filter **should** be installed prior to discharge into the irrigation area.
3. A vacuum breaker valve must be installed at the highest point of each irrigation zone in a marked and protected valve control box.
4. A flush line must be installed at the lowest point/bottom of the irrigation area with a return valve for flushing back into the treatment chamber of the system (not into the primary chamber as it may affect the performance of the microbial community) or to a dedicated absorption trench.
5. The minimum irrigation pumping capacity should be equivalent to 120kpa (i.e. 12m of head) at the furthest point of the irrigation area (a gauge should be placed at the vacuum breaker) – therefore pump size can be matched on site to the irrigation pipe size and design.

SAFETY IN DESIGN REPORT
In accordance with the Workplace Health & Safety Acts and Regulations JMG have considered the potential hazards and risks that are specific to this design.

The following risks which are unique to this design have been identified: Nil.

This report does not relieve contractors from their responsibilities under the Act to identify, report, mitigate and manage all aspects of risk and safety.

TREATED WASTE WATER SUB-SURFACE IRRIGATION AREA= 504m²

Wastewater system:

Commercial AWTS unit

Min 500L grease trap on kitchen outlet

Subsurface Irrigation area 500m²

Refer to GES report

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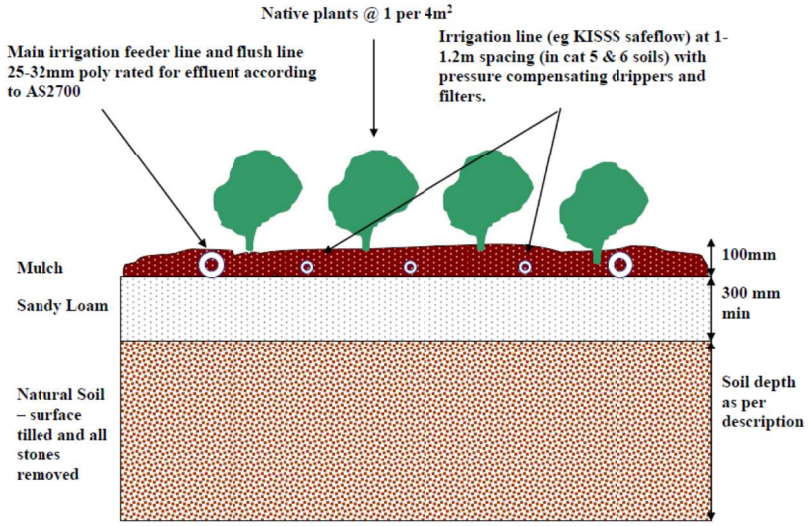
Dr John Paul Cumming
Building Services Designer-Hydraulic
CC2294A

Irrigation Area Cross Section



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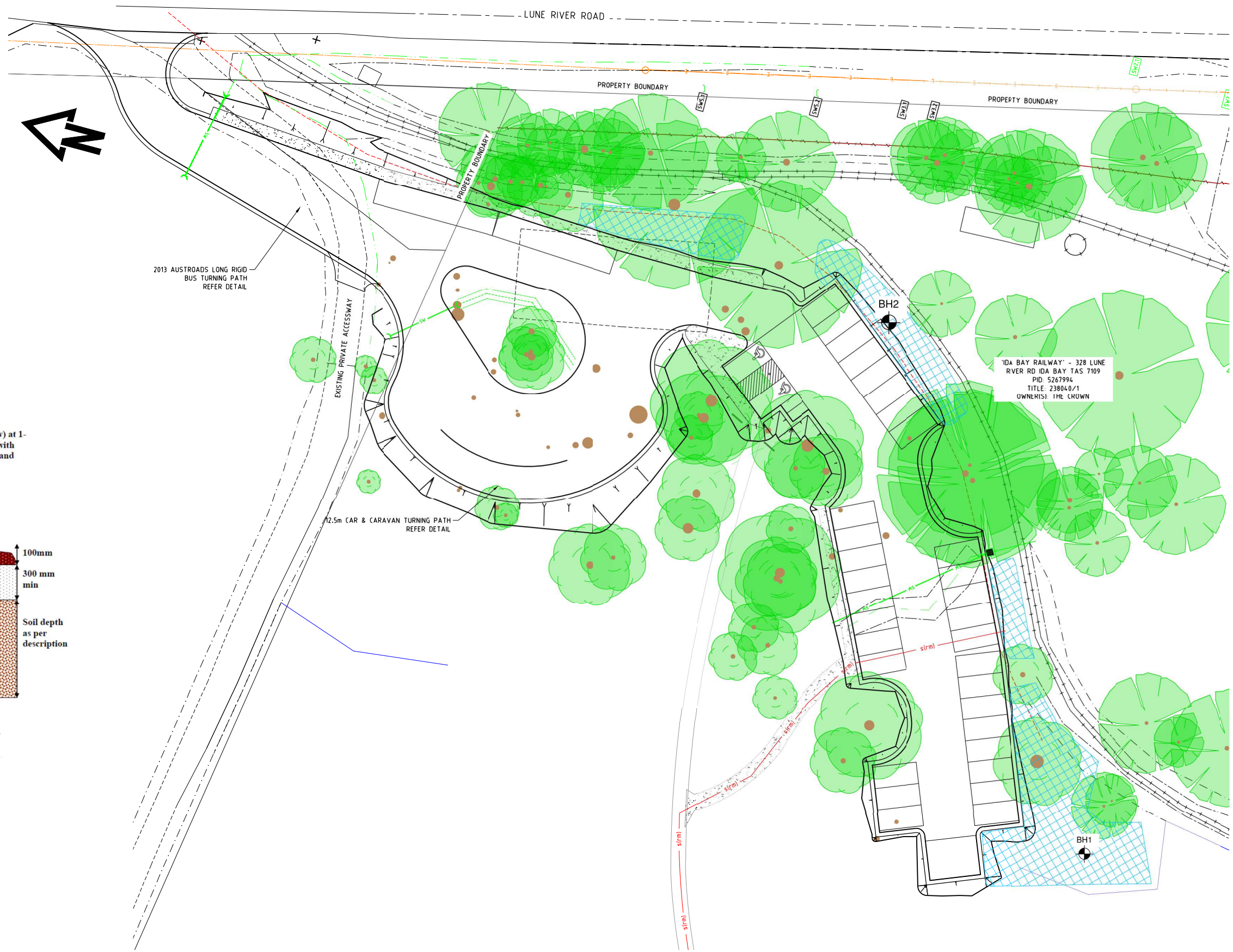

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Accepted	Grant Atherton (Discipline Head)	Date
Accepted	Chris Males (Team Leader)	Date
Approved	Matt Clark (Group Manager)	Date

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1:250	PLOT DATE	19/05/2022

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PROJECT
328 LUNE RIVER ROAD
DARK LAB TRANSFORMER

TITLE
EFFLUENT DISPOSAL AND REVEGETATION PLAN

PROJECT NO.	J203120PH	
DWG NO.	C05	REVISION P1
PLOT DETAILS	DARKLAB V2 - GA.DWG	