REPORT ON AN EXISTING WASTEWATER SYSTEM FOR SERENDIP RETREAT LTD

Our Ref: 26783
Date: May 2019

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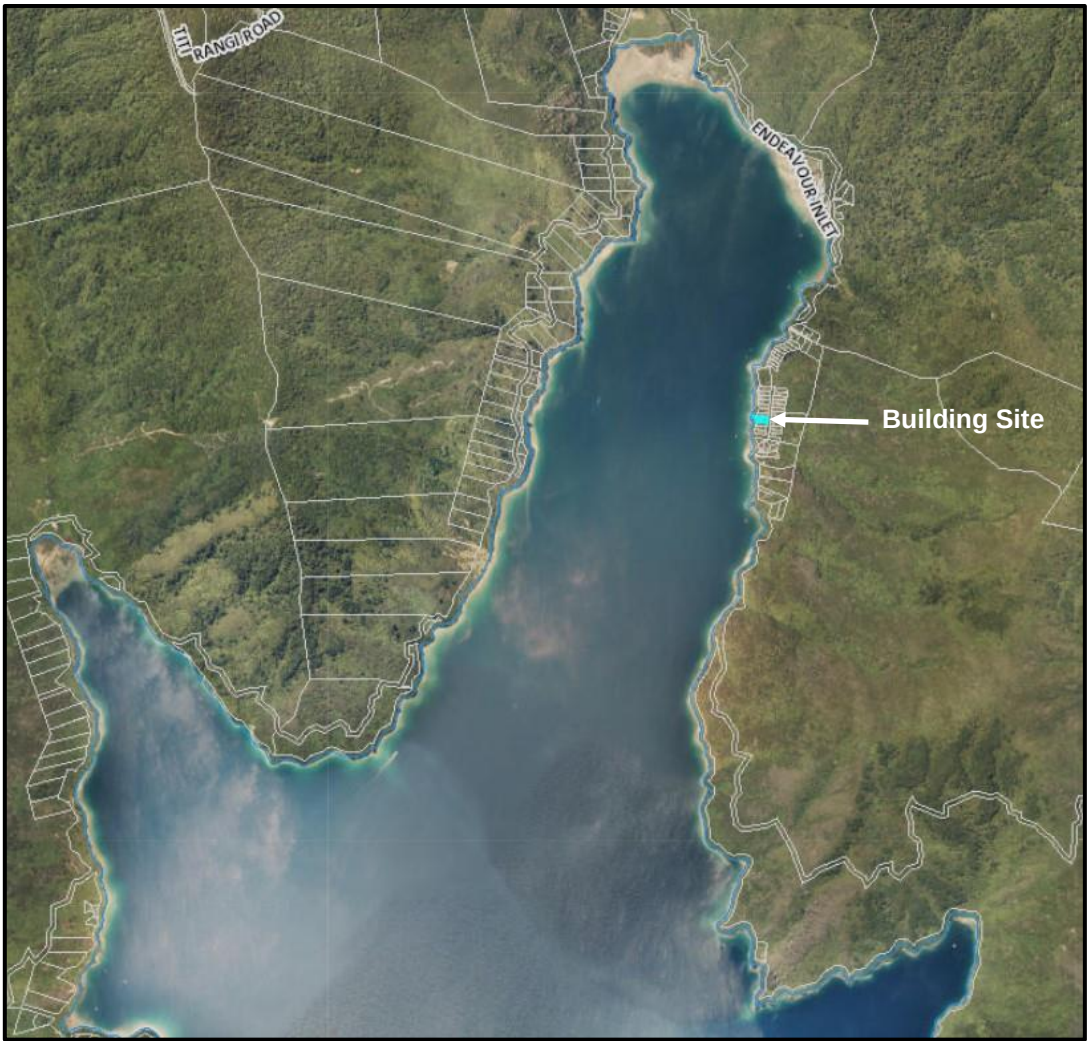
27 May 2019

REPORT ON AN EXISTING WASTEWATER SYSTEM FOR SERENDIP RETREAT LTD

1. BACKGROUND

The property is located at 'The Pines' at the north eastern end of Endeavour Inlet, legal description Lot 8 DP 2349. The three bedroomed house was built in 2004 and is serviced by an on-site wastewater system which was consented under Resource Consent U041112. This expires on 20 August 2019.

We have been engaged to inspect the existing system and assess against current codes and practice.



Location Plan

2. CONSENTED SYSTEM

The consented system allowed for an aerated wastewater treatment plant to a 'bed' designed in accordance with AS/NZS 1547:2000 'On-Site Domestic Wastewater Management'.

The system was completed under Building Consent BC041130.

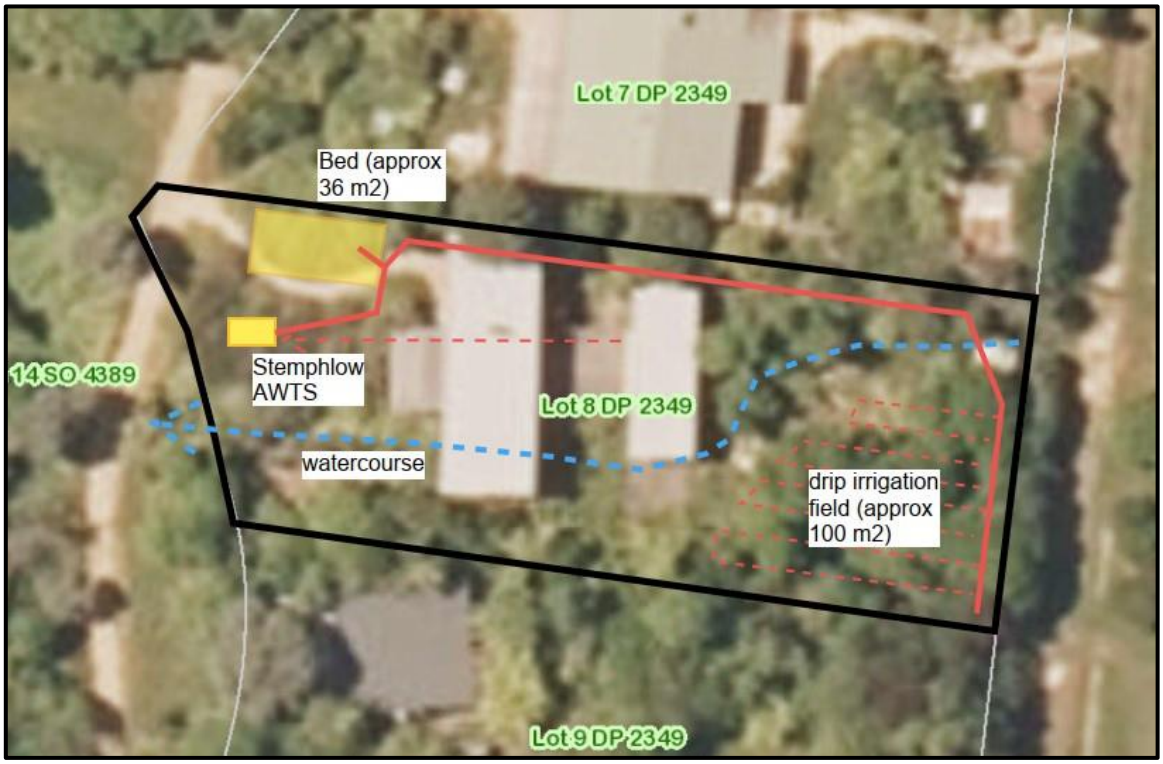
The design basis used was as follows:

-	Soil type	Weakly structured LOAM
-	Soil Category	3
-	Water supply	Community reticulated system
-	Number of bedrooms	3
-	Number of people	5
-	Wastewater allowances	180 litres/person/day (900 litres/day)
-	Treatment	Secondary (aerated)
-	Design Loading Rate (DLR)	30 mm/day
-	Bed	9 x 4 m (36 m^2 total) dose loaded

The wastewater system in place consists of a Stemphlow aerated secondary treatment plant discharging to a 9 m x 4 m bed (assumed based on design) in addition to approximately 100 m^2 of drip irrigation. The drip irrigation field is permanently fed, but the bed can be included by manually turning a valve.

The background and need for the drip irrigation is not documented on Council's files, apart from a comment on a service record sheet (2006) that the system will cope better with peak loads with the dripper lines in place.

A site plan showing the approximate 'As Built' layout is shown below.



Site Plan

3. SITE INSPECTION

We visited the site on 23 April 2019 and report as follows:

3.1 FLOWS AND FIXTURES

The house has a reticulated community water supply (spring or catchment).

The flows to the taps were recorded as follows:

- Laundry 4 litres/min
- Kitchen 5 litres/min
- Basin 6 litres/min
- Shower 5 litres/min

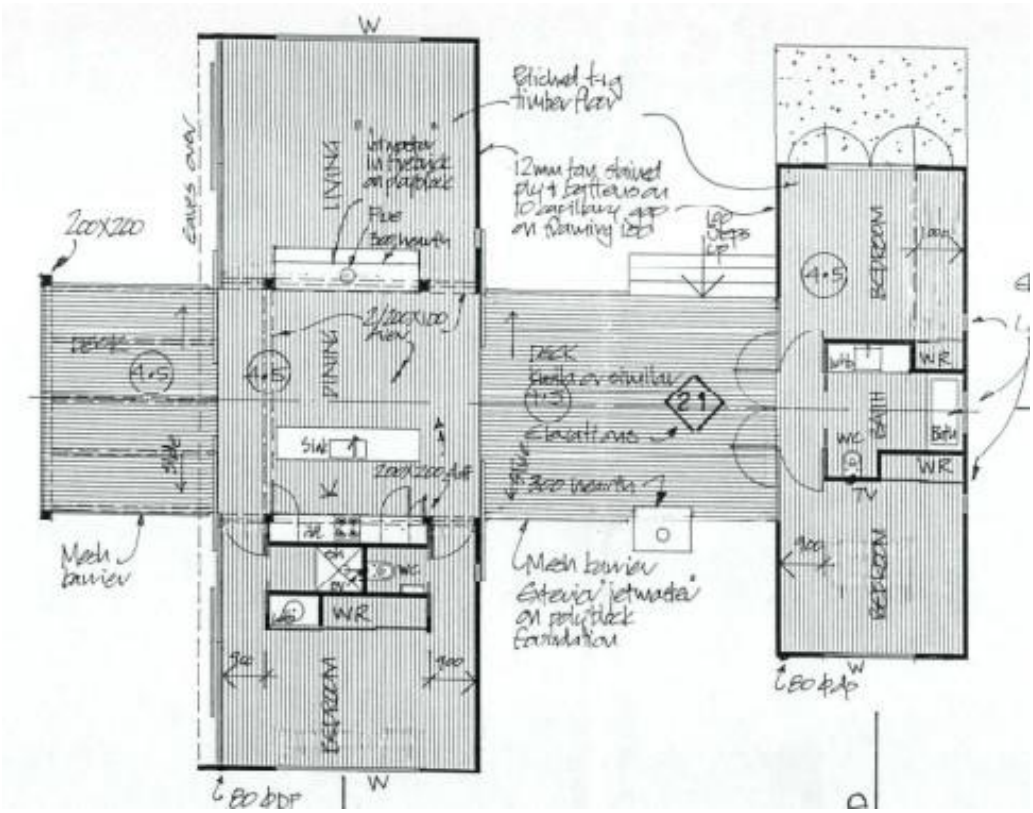
These equate to low flows (<9 litres/min).

Fixtures in the house include:

- Toilet cisterns - Dual flush (6/3)
- Washing machine - Whirlpool < 90 litres/load

There is also a bath.

The house has 3 bedrooms and there are no other office or rumpus rooms which could be considered as potential bedrooms.



Floor Plan

3.2 TREATMENT

The treatment system consists of a Stemphlow BM2 aerated treatment plant. This was last serviced in January 2018. The service records confirm that the system was working well, including the drip field.

3.3 LAND APPLICATION AREA (LAA)

The bed is located in a well vegetated garden and partly under a path. An attempt to excavate a pit to inspect the pipes was abandoned due to the difficulty and time it would have taken, but in our experience where they are holiday baches, as is this one, there has never been an issue due to;

- the low annual loading
- the fact that they get long periods of non-use to rejuvenate the aerobic bacteria, and
- the effluent is pumped (dose loaded) to evenly distribute the load.

Bed (partly under and to right of path)

The drip irrigation area is well vegetated. However, the lines are running up and down the slope rather than across the slope as is standard practise. There are also no flush or air valves.

Drip Irrigation Area

There were no signs of adverse environmental effects in either field.

3.4 SOIL CATEGORY

The original soil investigation determined that the soil was a Loam with a Soil Category of 3, based on a visual assessment.

Our test on one sample indicated that the soil is a sandy clay Loam which ribboned 35-40 mm, indicating a Category 4 soil.

4. CURRENT STANDARDS (AS/NZS 1547:2012)

4.1 DESIGN

4.1.1 Loading

The current wastewater allowance for a good water supply and the fixtures currently in place, including a bath, in accordance with AS/NZS 1547:2012, is 150 litres/person/day (refer to detailed calculations attached).

For 3 bedrooms, or 6 people, this equates to a daily load of 900 litres, which is equivalent to the original design flows.

4.1.2 Treatment

The most recent inspection record confirms that the treatment system is performing well.

However, this was carried out in January 2018 and a more recent inspection should be carried out.

4.1.3 Land Application Area (LAA)

The current codes require a DLR of 30 mm/day for a Category 4 soil for a bed and for a daily flow of 900 litres, a bed size of 30 m^2 is required. This compares to the original 'design' size of 36 m^2, assumed to be in place.

Based on this, the drip irrigation area of approximately 100 m^2 is in addition to what is actually required. Using a Drip Irrigation Rate (DIR) of 2.8 mm/day, allowing for a 20% reduction for the slope, this area can take another 250 litres/day.

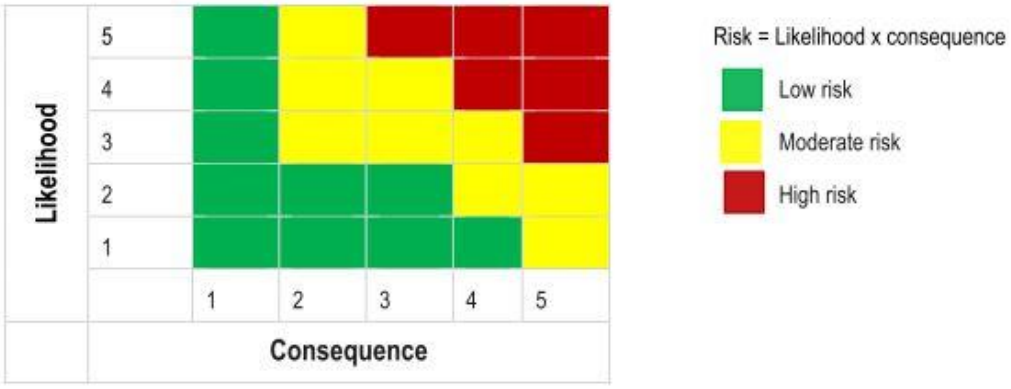
If both fields were used concurrently or alternatively by way of an automatic sequencing valve, the effective DLR for the bed would be 24 mm/day and the DIR 2.2 mm/day.

4.1.4 Design Summary

	Original Design	Current Codes
Number of bedrooms	3	3
Number of people	5	6
Water Supply Source	Community	Community
Loading (litres) - Per person/day	180	150 (with current fixtures in place)
- Total/day	900	900
Treatment	Secondary	Secondary
Design Loading Rate (DLR) (mm/day) BED ONLY	30	30
Bed Area (m^2)	36 (assumed)	30

4.2 RISK ASSESSMENT

The following risk assessment follows the guidelines and recommendations in AS/NZS 1547:2012 and makes reference to the Risk Matrix below.



Risk Matrix (*ex-Auckland Council GD06***)**

- Risk Reduction Measures (Table A1)

Hydraulic Failure

The risk of hydraulic failure has been reduced using water conservation fixtures and dose loading by pump for an even distribution and has been assessed as LOW.

Power Failure

These systems are multi-chambered and typically have an emergency storage capacity in excess of 24 hours. LOW Risk of adverse environmental issues.

Bacteria Washout

The risk of bacteria washout will be mitigated by the low water usage and even distribution. LOW Risk.

Dispersive Soils

The soils are not dispersive. NO Risk

Marginal Soil Conditions

The soils are silty clays and not marginal. LOW Risk.

Site Constraints

The proximity of the boundary to the bed and the watercourse to the drip field present site restraints. These are further assessed below under Setback Distances.

Rainfall

The annual rainfall is over 1,600 mm and there are high intensity rainfall events on occasion. However, the site is well drained and the road above the rear boundary assists in collecting and managing the runoff from further upslope. LOW Risk.

Salinisation

No bare ground, salt crystals or salt tolerant plants were found to indicate evidence of salinity. NO Risk.

Highly permeable Soils

The soils are not free draining.

No specific measures are therefore required to reduce the risk of water table contamination. LOW Risk.

- Slope (Table M2)

No reductions for slope are required for bed applications.

A 20% reduction in the DIR has been applied to the drip irrigation area.

- Setback Distances (Table R1)

The setback distances have been assessed by way of a weighting analysis (see Appendix) and can be summarised as follows:

Feature	Setback			Comment (Refer to Risk Matrix)
	Table R1	Actual		
		Bed	Drip	
Property Boundary	18 m	<2 m across		Mod Risk[1]
			>2 m up slope	Low Risk[2]
Building/House	3.3 m	5 m	5 m	No Risk
Surface Water	58 m	10 m across slope		Mod/High Risk[3]
			4 m downslope	
Bore/Well	26 m	No bore/well		No Risk
Recreational Areas	8.0 m	5 m to SFR		Low Risk[4]
			30 m to SFR	No Risk
In-ground water tank	8.6 m	No in-ground tank		No Risk
Retaining wall cut within 3 m or 45º	3 m	No retaining walls		No Risk
Ground Water	0.9 m	Water table > 900 mm, given depth of watercourse adjacent		No Risk
Hardpan/Bedrock	0.8 m	>> 0.8 m given this area is old landslide debris		No Risk

1 The MDC Guidelines allow proximity to boundaries of 2 m when neighbouring property is upslope. Some risk reduction work is required.
2 The MDC Guidelines allow proximity to boundaries of 2 m when neighbouring property is upslope. No risk reduction work is required.
3 Some risk reduction work is required.
4 The bed has subsurface discharge and is not surface irrigated. It is also greater than 2 m from the boundary. No risk reduction work is considered necessary.

4.3 DISCUSSION

The bed complies to the current codes design requirements, except for its proximity to the boundary to the north and the watercourse to the south.

The drip irrigation area is in addition to code requirements but is not laid out correctly.

While no adverse environmental effects were noted, some risk reduction work is considered necessary to address potential effects to neighbours and surface water quality due to non-compliance with current set back standards.

This work should include annual checks by a certified service person (currently overdue), the installation of an automatic 3-way sequencing valve to switch from the bed (2 ports) to the drip area (1 port) and the relaying of the drip lines across the contours, 1 m apart, including air and flush valves.

This work will better make use and take advantage of the currently available excess capacity in the combined LAA's and reduce the loading rates of both areas.

It is also current good practice to have a 'Loading Certificate' on display somewhere prominent in the house. This summarises the wastewater system for the house and reminds occupants, particularly visitors, about the limitations of it.

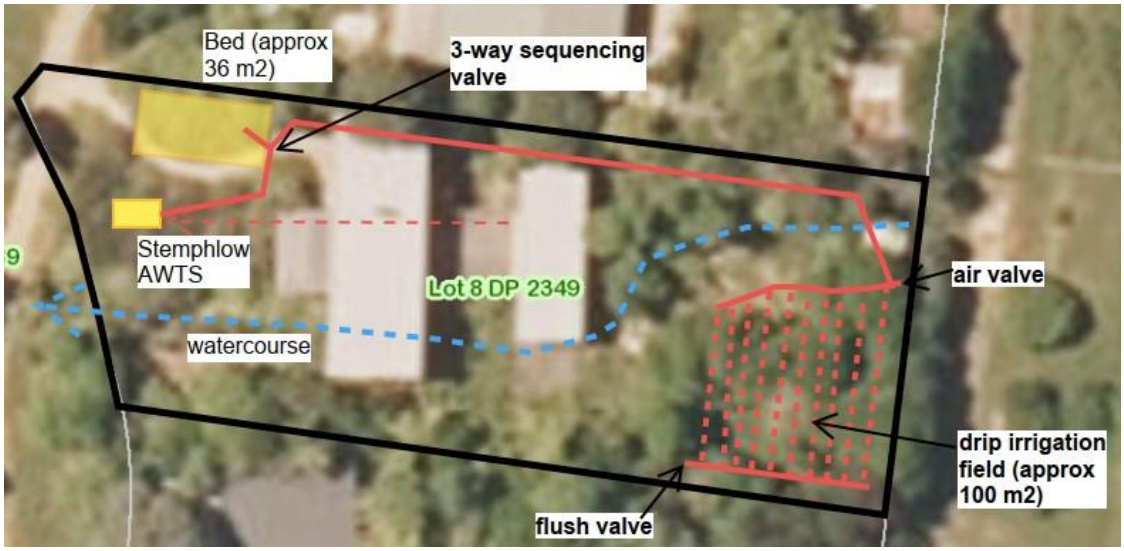
5. RECOMMENDATIONS

a) Engage a serviceman to inspect the treatment system as soon as possible and arrange for annual inspections thereafter, including the drip field and sequencing valve.

b) Install an automatic 3-way sequencing valve, with 2 ports feeding the bed and 1 port feeding the drip field.

c) Remove the current drip lines and install 100 m of drip line across the contour, feeding from and to inlet/outlet manifolds. Install air and flush valves.

d) Prepare and display a 'Loading Certificate'.
(A Loading Certificate has been prepared and is attached to this report).



Recommended Remedial Works

6. REFERENCES

- Crites, R and Tchobanoglous, A (1998). 'Small and Decentralized Wastewater Management Systems'.
- Auckland Council, July 2018 ‘Guideline Document: On-Site Wastewater Management in the Auckland Region’.
- AS/NZS 1547:2000 'On-Site Domestic Wastewater Management'.
- AS/NZS 1547:2012 'On-Site Domestic Wastewater Management'.
- Marlborough District Council (11 July 2005) ‘Guidelines for New On-Site Wastewater Management Systems’.
- Marlborough Sounds Resource Management Plan.
- Marlborough Environment Plan.
- Hadley Consultants, 18 March 2004, ‘Engineering Report for Mrs Anne Duncan, Lot 8 DP 2349, The Pines, Endeavour Inlet, Queen Charlotte Sound’.
- Resource Consent U041112.
- Building Consent BC041130.

DAVIDSON GROUP LTD

W L McGlynn

WLM: LW

APPENDICES

- Field Check List
- Setback Risk Assessment
- Design Flow Assessment and Bed Design Check
- Wastewater Loading Certificate

davidson group	Wastewater Revalidations	Job No.	26783
	for Serendip retreat Ltd	Date	23-Apr-19
	The Pines	Name	LM
	Field Check List		

1	Previously approved system	
	RC # ?	U041112
	year	2004
	type	secondary to bed
	soil Cat	3
	# bedrooms	3
	design flow	900 l/day
2	Water supply	
	roof/creek/spring	community
3	Number of bedrooms	3
4	Tap flows	
	Kitchen	
	laundry tub	
	bathroom	
	shower	
	out side tap	
5	Toilet cistern type	dual
6	Bath ?	yes
7	Washing machine Type	Whirlpool front loader
8	Recheck soil Cat	
	topsoil depth	100
	soil type	sandy clay LOAM
	ribbon length	35-40 mm
	Soil Category	4
9	Treatment	
	Type	Stemphlow BM 2 (AWTS)
	Size	no speccs found
	Check filter	by serviceman
	Check sludge/scum	by serviceman
	Last serviced?	Jan-18
	Maint. Contractor?	Safe Water Systems
10	Land Application	
	type	bed plus drip
	length/area?	bed approx 36 m2, drip approx 100 m2
	signs of distress?	no
	check splitter valve	na
	flush valves?	none
	air valves?	none
11	Set backs	
	boundaries	1-2 m?
	water courses	5-10 m
	sea	> 20 m
	house	5 m
12	Water table depth?	> 2 m
13	Other	

quantity (l)	time (secs)	l/min
5	60	5.0
5	80	3.8
5	50	6.0
5	57	5.3

davidson group	**SETBACK RISK ASSESSMENT** re : AS/NZS 1547:2012, TABLE R1 (Weighted Assessment) **Serendip Retreat Ltd** **The Pines, Endeavour Inlet**	**Job No** **Name** **Date**	26783 LM 23.05.19	

SITE FEATURE	SETBACK(m) min	SETBACK(m) max	SITE CONSTRT ITEM	SCORE (0 - 4) low-best high-worst	WEIGHTED SETBACK (m)	COMMENTS	MDC\GD06 (m)
Property	1.5	50.0	**A**	1		The effluent is secondary treated	2 -4 /1.5
Boundary			**D**	2		Gentle slope at bed, moderate/steep slope at drip	
			J	1		subsurface & drip irrigation	
			TOTAL	4	**17.7**		
Building/	2.0	6.0	**A**	1		The effluent is secondary treated	-/1.5-3.0
houses			**D**	2		Gentle slope at bed, moderate/steep slope at drip	
			J	1		subsurface & drip irrigation	
			TOTAL	4	**3.3**		
Surface	15.0	100.0	**A**	1		The effluent is secondary treated	-/15-20
water			**B**	3		Cat 4 soil. The nearest surface water is a creek 10 m away, across gradient (bed) & 5 m (drip)	
			D	2		Gentle slope at bed, moderate/steep slope at drip	
			E	3		Across and up gradient from watercourse	
			F	2		Cat 4 soil	
			G	0		No flooding risk	
			J	1		subsurface & drip irrigation	
			TOTAL	12	**57.9**		
Bore,	15.0	50.0	**A**	1		The effluent is secondary treated	-/20
well			**C**	2		Cat 4 soil	
			H	1		Cat 4 soils, low porous soils, no aquifers, no rock	
			J	1		subsurface & drip irrigation	
			TOTAL	5	**25.9**		
Recreatnl	3	15	**A**	1		The effluent is secondary treated	
areas			**E**	3		Across and up gradient from watercourse	
			J	1		subsurface & drip irrigation	
			TOTAL	5	**8.0**		
In-ground	4	15	**A**	1		The effluent is secondary treated	
water tank			**E**	3		Across and up gradient from watercourse	
			J	1		subsurface & drip irrigation	
			TOTAL	5	**8.6**		
Ret. wall,	3 or > 45°		**D**			Gentle slope at bed, moderate/steep slope at drip	-/3
embankm,			**G**			No flooding risk	
escarpmt,			**H**			Cat 4 soils, low porous soils, no aquifers, no rock	
cuttings						**nothing within 3 m**	
Ground	0.6	1.5	**A**	1		The effluent is secondary treated	-\0.6-1.5
water			**C**	2		Cat 4 soil	
			F	2		Cat 4 soil	
			H	1		Cat 4 soils, low porous soils, no aquifers, no rock	
			I	1		no drainage plains or channels	
			J	1		subsurface & drip irrigation	
			TOTAL	8	**0.9**		
Hardpan,	0.5	1.5	**A**	1		The effluent is secondary treated	
bedrock			**C**	2		Cat 4 soil	
			J	1		subsurface & drip irrigation	
			TOTAL	4	**0.8**		

davidson group		**On Site Wastewater Design**			**Job No**	26783
	Client	Serendip retreat			**Sheet No**	1
	Location	The Pines			**Name**	lm
					Date	23.04.19
		FLOW ALLOWANCES				

REFERENCES : ARC TP # 58 Third Edition
2 AS/NZS 1547:2012 "On Site Domestic Wastewater Management"
3 ON-SITE NewZ Special Report - 97/1
4 MDC,11 July 2005,"Guidelines for New On -Site Wastewater Systems"

		Appliance / Fixture per Capita Daily Flow Allowance				Total per Capita Flow (l/p/d)
		Toilet	Washing Machine	Shower	Basin (kitchen, bathroom, laundry)	
1	**Households with standard fixtures**	11 litre cistern	>120 litres/load	*flows > 14 litres/min*		
		60	25	85	30	
		60	*25*	*70*	*25*	
	Blackwater only	60				
		60				
	Greywater only		25	85	10	
			20	*65*	*5*	
2	**Households with standard water reduction fixtures**	*11/5.5 dual flush*	*<120 litres/load*	*flows < 14 litres/min (may need shower flow restrictors or aerator taps)*		
		40	20	80	25	
		40	*20*	*65*	*20*	
	Blackwater only	40				
		40				
	Greywater only		20	80	10	
			15	*60*	*5*	
3	**Households with full water reduction facilities**	*6/3 dual flush*	*<90 l/load*	*flows < 9 litres/min (may need aerator taps and flow/pressure control valves on all outlets)*		
		35	15	75	20	145
		35	*15*	*55*	*15*	
	Blackwater only	35				
		35				
	Greywater only		15	75	10	
			10	*55*	*5*	
4	**Bath**	*add 5 l/p/d if there is a bath*				*5*
	Design wastewater flow per person per day					**150**
	Number of Bedrooms					**3**
	Equivalent Occupancy					**6**
	Design Daily Wastewater Allowance					**900**

NOTE Figures in *italics* are for roof water supply. Other values are for creek, community and/or bore water supply (see also Note 6, Table H3, 1547).

davidson group	**On Site Wastewater Design** **Client** Serendip retreat **Location** The Pines Bed	**Job No** 26783 **Sheet No** 3 **Name** lm **Date** 23.04.19

1 DLR (Design Loading Rate)

Soil Category 4 Therefore DLR is 30 mm/day

2 Minimum Area = Daily Flow / DLR = 30 m^2

davidson group	**On Site Wastewater Design**	**Job No**	26783
	Client Serendip retreat	**Sheet No**	2
	Location The Pines	**Name**	lm
		Date	23.04.19
	IRRIGATION DESIGN		

1 DIR (Design Irrigation Rate)

Soil Category 4

DIR 3.5 | 20% reduction, DIR_{design}= 2.8 mm/day

2 Field Area Irrigation field area = Daily Flow / (DIR) = 321 m^2

If area = 100 m2, this can take flow = 280 l/day

davidson group
PROJECT PLANNERS
RESOURCE MANAGERS
CIVIL & STRUCTURAL ENGINEERS
BUILDING DESIGNERS
ENVIRONMENTAL ENGINEERS

Our Ref: 26783

May 2019

WASTEWATER LOADING CERTIFICATE

- **Location**	The Pines (Lot 8 DP 2349)
- **Owner**	Serendip Retreat Ltd
- **Number of Bedrooms**	3
- **Equivalent Number of People**	6
- **Water Supply**	Community Supply
- **Maximum Daily Wastewater Output**	900 litres (150 litres/person for 6 people)
- **Standard Water Reduction Facilities**	- Standard dual flush water closets - Low water use washing machine (less than 90 l/load) - Low water pressure (less than 9 litres/min)
- **Treatment System**	Secondary treatment (Stemphlow BM 2 AWTS)
- **Land Application System**	Pump to a bed and drip irrigation Field
- **Land Application Areas**	Bed 36 m^2, drip field 100 m^2
- **Maintenance**	Annual Inspection by authorised service contractor
- **Overloading the System**	Overloading the system may result in: - Inadequate treatment and/or odour - Saturation of the soil in some areas of the land application area (LAA) - Seepage from the LAA - Odour from the LAA - Spread of infectious diseases - Breeding of mosquitoes and attraction of flies and rodents
- **Good Practice**	To keep the bacteria working in the treatment system and LAA: - Use biodegradable soaps - Use low-phosphorus detergent - Use detergents in recommended quantities - Don't use powerful bleaches, whiteners, nappy soakers, spot removers and disinfectants, and - Don't put oil, chemicals or paints down the drain

Site Plan

1:500 5/23/2019

MARLBOROUGH DISTRICT COUNCIL SMART MAPS