Borehole No. BH1 (MDC 10814)

Project:	Havelock Sewage Treatment Plant	*Coordinates:*	1665114 E 5428819 N
Client:	Marlborough District Council	*Ref. Grid:*	NZTM
Project No.:	3-39123.00	*R.L.:*	Not established
Location:	South of ponds	*Datum:*	Mean Sea Level

Depth: 19.45 m
Inclination: Vertical

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m)	DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	CORE: CORE TYPE	CORE: TOTAL CORE RECOVERY (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	NOTES / OTHER TESTS	INSTALLATION DETAILS
Kaituna Formation	CLAY, moderate greyish brown, soft, moist, moderate plasticity [TOPSOIL]; 1 cm coarse sand lens on sharp basal contact.						PD		Down Hole Hammer			0.00-0.69m - Top soil with abundant root material.	65 mm uPVC tubing, with cement grout to surface
	SAND with minor gravel, medium greenish grey, loose, wet.				1	0/0// 0/0/0/1	SPT	100				0.69-2.71m - Sand fine to coarse grained, gravel fine-grained, well graded.	
	At 1.0-1.4 m, 2-3 cm interbeds of sandy SILT, dark greyish brown, very soft, moist - wet, slightly clayey in part.		1				PD						
	1.4 m: thin bed of brownish black sandy PEAT.				8	0/1// 1/2/3/2	SPT	78					
							PD						
					10	2/2// 2/2/3/3	SPT	78					
			2				PD						
					10	3/2// 3/3/2/2	SPT	100					
	Sandy SILT, greenish grey, soft, moist, low plasticity.						PD						
					2	0/0// 1/0/0/1	SPT	89				2.71-3.50m - Common bivalve shells.	
			3				PD						
					4	0/0// 0/1/1/2	SPT	100					
	Silty SAND, medium brownish grey, loose, moist, nil plasticity.						PD						
	From 3.80 m, SILT with irregular bioturbated greenish grey sand lenses.				5	1/1// 1/2/1/1	SPT	100				3.50-4.50m - Sand fine grained.	
			4				PD						
					5	1/1// 1/2/1/1	SPT	89					
	Sandy SILT, brownish grey, soft, moist, low plasticity. Gradational contact at base over 5 cm.						PD						
					2	0/1// 0/0/1/1	SPT	100				4.50-4.85m - Sand fine grained, locally wih disseminated coarse sand.	
	Clayey SILT, pale green, firm, moist, high plasticity.		5				PD						
Havelock/Pelorus Gravels	Sandy GRAVEL, dark brown to brownish yellow, medium dense, wet.				29	1/3// 7/9/7/6	SPT	84				5.19-6.50m - Gravel fine to medium grained, up to 20 mm, angular to subangular greenish grey schist (UW - rarely MW), and yellow quartz. well graded; sand coarse grained.	
							PD						
					17	2/2// 4/4/5/4	SPT	71					
			6				PD				SWL 0.00m 11/04		
					13	2/3// 4/3/3/3	SPT	22					
	Gravelly CLAY, brownish yellow, soft, wet, moderate plasticity.						PD						
					5	2/2// 2/1/1/1	SPT	44				6.50-7.00m - Gravel fine to medium grained up to 10 mm, comprising weak CW schist.	
	Silty sandy GRAVEL, light brown and greenish grey, medium dense, wet.		7				PD						
	From 7.2 m becomes clayey to silty GRAVEL, medium dense, moist.				22	2/3// 4/5/6/7	SPT	76				7.00-7.45m - Gravel fine to medium, UW - MW schist subangular tabular clasts. Possibly redeposited colluvium rather than alluvium.	
							PD						
			8										
	Gravelly CLAY, brownish yellow, stiff, moist, low to moderate plasticity.				25	2/3// 6/6/5/8	SPT	71				8.50-8.95m - Gravel fine to medium grained up to 20 mm.	
			9				PD						

Notes:

Drilled with a Robit casing advance system, so there is a minimal length of uncased hole when the SPT sampler is run to bottom; nevertheless common loose GRAVEL at the top of each SPT run is considered uphole material and not in situ.

PVC casing run to bottom of hole and grouted to surface, for shear wave logging.

Started: 10/04/2017 *Finished:* 11/04/2017
Drilling Co.: CW Drilling *Drilling Rig:* Marooka MST-800
Logged by: W Leask *Checked by:* E Boam

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

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Project No.:	3-39123.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	South of ponds	*Datum:*	Mean Sea Level		

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m)	DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	CORE: CORE TYPE	CORE: TOTAL CORE RECOVERY (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	NOTES / OTHER TESTS	INSTALLATION DETAILS
Havelock/Pelorus Gravels	Gravelly SILT brownish yellow, firm, moist to wet, low plasticity.				24	2/5// 6/6/6/6	SPT	40	Down Hole Hammer	HW casing		10.00-10.45m - Gravel fine to medium grained, variously orange, pale green, grey, but mainly brown, tabular schist clasts.	65 mm uPVC tubing, with cement grout to surface
	.		11				PD						
	Clayey GRAVEL, brownish yellow, dense, moist; clay matrix moderate plasticity. Steady upwelling of water from this depth before next joint of casing fitted and drilled down.				32	4/7// 8/8/8/8	SPT	76				11.50-11.95m - Gravel fine to coarse grained, probably up to cobble size, well graded, subangular to well rounded quartz and brown MW schist up to 30 mm.	
	.		12				PD						
	Clayey GRAVEL, brownish yellow, dense, moist.		13		40	3/7// 10/11/10/9	SPT	89				13.00-13.45m - Gravel fine to medium grained up to 30 mm, fragmented SW - MW schist	
	.		14				PD						
	Clayey - silty GRAVEL, yellowish to orange brown, medium dense (firm, locally stiff, locally soft), moist.				23	3/4// 4/5/6/8	SPT	100				14.50-14.95m - Gravel fine to medium grained, variously orange, pale green, grey, but mainly brown, tabular MW - HW schist clasts.	
	.		15				PD						
	Gravelly SILT-CLAY, brownish yellow, very stiff, moist, nil plasticity.		16		31	4/6// 6/7/9/9	SPT	38				16.00-16.45m - Gravel medium grained, orange brown HW schist, variably clast- to matrix-supported.	
	Sample recovered on drill bit: Gravelly SILT with minor clay, brownish yellow, soft, wet, low to moderate plasticity.		17				PD						
	Gravelly SILT, brownish yellow, stiff, moist, nil plasticity.				29	3/5// 7/7/7/8	SPT	100				17.50-17.95m - Gravel fine to medium grained, well rounded weak HW schist	
	.		18				PD						
	Gravelly clayey SILT, brownish yellow, very stiff, moist, moderate plasticity		19		34	3/4// 7/6/9/12	SPT	100				19.00-19.45m - Gravel fine to medium grained, well rounded MW-CW schist.	
	END OF BOREHOLE AT 19.45m - Target Depth Reached												

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