Appendix E: Hand Auger Logs

HAND AUGER LOG

HOLE Id: **ENVR-HA03**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI		LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000)	5925787.00 mN 1744024.40 mE	DRILL TYPE: 50 mm HA	HOLE STARTED: 10/11/2020
		DRILL METHOD: HA	HOLE FINISHED: 10/11/2020
R.L.:	36.70m		DRILLED BY: Tonkin + Taylor Ltd
DATUM:	NZVD2016		LOGGED BY: RVDK CHECKED: CBM

GEOLOGICAL												ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Tauranga Group Box 1, 0.0-1.0m					ENVR-HA03 -0.0-0.1 @ 0.00m ENVR-HA03 -0.5 @ 0.50m ENVR-HA03 -1.0 @ 0.90m		36 35 34 33 32	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5					Clayey SILT; dark brown trace orange mottle. Very stiff, moist, non-plastic. 0.5m: PID=0.0PPM SILT; grey. Very stiff, dry. Silty CLAY; grey. Very stiff, moist, medium plasticity. 1.0m: PID=0.0PPM 1m: Target depth

COMMENTS:

Hole Depth 1m

Scale 1:25

Rev.: A

CORE PHOTOS

BOREHOLE No.: **ENVR-HA03**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925787.00 mN (NZTM2000) 1744024.40 mE R.L.: 36.70m DATUM: NZVD2016	DRILL TYPE: 50 mm HA DRILL METHOD: HA	HOLE STARTED: 10/11/2020 HOLE FINISHED: 10/11/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: RVDK CHECKED: CBM

0.00-1.00m

HAND AUGER LOG

HOLE Id: **ENVR-HA04**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925759.80 mN 1744104.70 mE	DRILL TYPE: 50 mm HA	HOLE STARTED: 10/11/2020
	DRILL METHOD: HA	HOLE FINISHED: 10/11/2020
R.L.: 39.50m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: RVDK CHECKED: CBM

GEOLOGICAL												ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Tauranga Group Box 1, 0.0-1.0m					ENVR-HA04 -0.0-0.1m @ 0.00m ENVR-HA04 -0.5 @ 0.50m ENVR-HA04 -1.0 @ 0.90m		39 38 37 36 35	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5					SILT, some organics; dark brown. Very stiff, moist, non-plastic; organics, rootlets. Clayey SILT, trace sand; greyish brown. Very stiff, moist, non-plastic. 0.5m: PID=0.0PPM Clayey SILT; dark brown minor black mottle. Very stiff, moist, non-plastic. 1.0m: PID=0.0PPM 1m: Target depth

COMMENTS:

Hole Depth 1m

Scale 1:25

Rev.: A

CORE PHOTOS

BOREHOLE No.: **ENVR-HA04**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925759.80 mN 1744104.70 mE R.L.: 39.50m DATUM: NZVD2016	DRILL TYPE: 50 mm HA DRILL METHOD: HA	HOLE STARTED: 10/11/2020 HOLE FINISHED: 10/11/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: RVDK CHECKED: CBM

0.00-1.00m

HAND AUGER LOG

HOLE Id: **ENVR-HA05**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925739.90 mN 1744151.80 mE	DRILL TYPE: 50 mm HA	HOLE STARTED: 10/11/2020
	DRILL METHOD: HA	HOLE FINISHED: 10/11/2020
R.L.: 41.00m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: RVDK CHECKED: CBM

GEOLOGICAL													ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Tauranga Group Box 1, 0.0-1.0m					ENVR-HA05 -0.0-0.1m @ 0.00m ENVR-HA05 -0.5 @ 0.50m ENVR-HA05 -1.0 @ 0.90m		40 39 38 37	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5					Clayey SILT; dark brown. Very stiff, moist, non-plastic. SILT, trace sand; light grey. Very stiff, moist, non-plastic. 0.5m: PID=0.0PPM Clayey SILT; dark brown minor black mottle. Very stiff, moist, non-plastic. 1.0m: PID=0.0PPM 1m: Target depth

COMMENTS:

Hole Depth 1m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:17:34 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **ENVR-HA05**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925739.90 mN (NZTM2000) 1744151.80 mE R.L.: 41.00m DATUM: NZVD2016	DRILL TYPE: 50 mm HA DRILL METHOD: HA	HOLE STARTED: 10/11/2020 HOLE FINISHED: 10/11/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: RVDK CHECKED: CBM

0.00-1.00m

HAND AUGER LOG

HOLE Id: **ENVR-HA101**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI		LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000)	5926989.60 mN 1743340.30 mE	DRILL TYPE: 50 mm HA	HOLE STARTED: 04/11/2020
		DRILL METHOD: HA	HOLE FINISHED: 04/11/2020
R.L.:	12.80m		DRILLED BY: Tonkin + Taylor Ltd
DATUM:	NZVD2016		LOGGED BY: RVDK CHECKED: CBM

GEOLOGICAL												ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Tauranga Group Box 1, 0.0-2.0m	04/11/2020				ENVR-HA 101-0.0-0.1m @ 0.00m ENVR-HA 101-0.5-0.6m @ 0.50m ENVR-HA 101-1.6-1.8m @ 1.60m		12 11 10 9 8	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5					Clayey SILT; greyish brown. Stiff, dry, non-plastic. Clayey SILT; brown, minor black streaking. Stiff, dry, low plasticity. 0.5m: PID= 0.0ppm Clayey SILT; brownish grey with orange mottle. Stiff, moist, medium plasticity. 1.0m: PID= 0.0ppm SILT, trace sand; light greyish brown with orange mottle. Stiff, moist, non-plastic. 2m: Target depth

COMMENTS:

Hole Depth 2m

Scale 1:25

Rev.: A

CORE PHOTOS

BOREHOLE No.: **ENVR-HA101**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926989.60 mN (NZTM2000) 1743340.30 mE R.L.: 12.80m DATUM: NZVD2016	DRILL TYPE: 50 mm HA DRILL METHOD: HA	HOLE STARTED: 04/11/2020 HOLE FINISHED: 04/11/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: RVDK CHECKED: CBM

0.00-2.00m

HAND AUGER LOG

HOLE Id: **HA03**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI		LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000)	5926343.50 mN 1743214.30 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 02/12/2020
		DRILL METHOD: HA+DCP	HOLE FINISHED: 02/12/2020
R.L.:	19.40m		DRILLED BY: GEOTECHNICS
DATUM:	NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL													ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					asb/gl/split @ 0.00m		19	0	TS	M			SILT; brown. Moist, non-plastic.
					● 186/56 kPa						VSt		SILT; friable. Very stiff, moist, non-plastic.
					asb/gl @ 0.40m PID, 0.0ppm			0.5					Silty CLAY; light greyish white mottled orange brown. Very stiff, moist, high plasticity.
					@ 0.50m ● 121/48 kPa								0.5m: mottled yellowish brown
					● 180/77 kPa			1.0					
					asb/gl @ 0.90m PID, 0.0ppm								
					@ 1.00m ● 121/48 kPa		18						
					● 104/54 kPa			1.5					
					att/psd @ 1.45m								
					● 114/60 kPa								
					asb/gl @ 1.90m			2.0					
					● 162/77 kPa								2.1m: light greyish white, low plasticity
					● 122/66 kPa		17	2.5					
Tauranga Group					● 119/72 kPa								
					asb/gl @ 2.80m								
					● 175/74 kPa			3.0					Sandy SILT; light whitish grey. Moist to wet, non-plastic.
					● 122/85 kPa						St-VSt		SILT; light greyish white mottled yellowish brown. Very stiff, moist, non-plastic.
					att/psd @ 3.45m		16						Clayey SILT; light whitish grey mottled yellowish brown and brown. Very stiff to stiff, moist, low plasticity.
					● 186/85 kPa			3.5					3.7m: Light brown with black mottles. Medium plasticity.
					● 122/82 kPa								
					asb/gl @ 3.80m			4.0					
					● 123/77 kPa								
					● 147/101 kPa		15	4.5					4.7m: Dark brown, organic stained.
					● 96/32 kPa								
					asb/gl @						St		Peaty clayey SILT; black. Stiff, moist, low

COMMENTS: Farmland end Spedding Rd

Hole Depth 6.45m

Scale 1:25

Rev.: A

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA03**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926343.50 mN 1743214.30 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 02/12/2020
		HOLE FINISHED: 02/12/2020
R.L.: 19.40m	DRILL METHOD: HA+DCP	DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Box 1, 0.0-5.2m Tauranga Group	trace water			1 2 1 2 2 2 2 2 3 3 6 7 9 10 6 7 6 7 9 9 10 10 10 11	4.80m ● 104/21 kPa		14 13 12 11 10	5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5		M	VSt		plasticity. Organic clayey SILT; dark brown. Very stiff, moist, medium plasticity; organics, amorphous. End of handauger 5.2m. Scala (blows per 100mm): 3,3,4,4,6,13,19,13 13,18,20,21 Organic clayey silt, dark brown, adhering to lowest rod on withdrawal 6.45m: Refusal

COMMENTS: Farmland end Spedding Rd

Hole Depth 6.45m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:19:06 AM - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA03**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926343.50 mN (NZTM2000) 1743214.30 mE R.L.: 19.40m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 02/12/2020 HOLE FINISHED: 02/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM

0.00-5.20m

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA04**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI		LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000)	5926082.10 mN 1743388.90 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 02/12/2020
		DRILL METHOD: HA+DCP	HOLE FINISHED: 02/12/2020
R.L.:	21.20m		DRILLED BY: GEOTECHNICS
DATUM:	NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm)	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	Description and Additional Observations
Topsoil					asb/gI/dupB @ 0.00m		21	0	TS	M	St		SILT; dark brown. Stiff, moist, non-plastic; inclusion of agricultural plastic sheet.
											VSt		Sandy SILT; light whitish brown. Very stiff, moist, non-plastic.
					● >186 kPa asb/gI @ 0.40m						St-VSt		Silty CLAY; light greyish white mottled yellowish brown. Very stiff to stiff, moist, high plasticity.
					PID, 0.0ppm @ 0.50m			0.5					
					● 179/50 kPa								
					● 159/61 kPa asb/gI @ 0.90m			1.0					1.0m: light grey mottled yellowish brown
					PID, 0.1ppm @ 1.00m		20						
					● 122/54 kPa								
					● 109/44 kPa			1.5					1.8m: some sand, light brownish white
					att/psd @ 1.45m								
					● 90/35 kPa asb/gI @ 1.90m								
					● 127/46 kPa			2.0					
	02/12/2020 W/L +2hrs						19				VSt		Clayey SILT; light brown. Very stiff, moist, low plasticity.
					att/psd @ 2.45m					M-W			Silty SAND; white. Moist to wet; sand, fine to medium; well packed.
Tauranga Group				6 7				2.5					2.5m: Scala (blows per 100mm): 13,22,22,20,18
	02/12/2020			11 11 11 11 10 10 9 9	asb/gI @ 2.80m								3.0m: light brown
				2 3 3 3 4 4			18	3.0		M	St		SILT; light brown. Stiff, moist, non-plastic; Scala (blows per 100mm): 5,6,8.
													Clayey SILT; grey. Stiff, moist, low plasticity.
					● 97/45 kPa			3.5					
					asb/gI @ 3.80m					W			Silty SAND; greyish brown. Wet; sand, fine to medium.
					● 90/32 kPa			4.0		M	VSt		SILT; brown and grey. Very stiff, moist, non-plastic.
					● 101/28 kPa		17						
					● 159/32 kPa			4.5					4.4m: abundant organics and inclusions of decomposed wood
					● 117/33 kPa								Clayey SILT; light grey. Very stiff, moist, low plasticity.
					asb/gI @								

COMMENTS: Farmland end Spedding Rd

Hole Depth 6.85m

Scale 1:25

Rev.: A

HAND AUGER LOG

HOLE Id: **HA04**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926082.10 mN 1743388.90 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 02/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 02/12/2020
R.L.: 21.20m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Box 1, 0.0-5.2m Tauranga Group				1 2 2 2 2 2 3 3 3 3 3 4 4 4 4 5 5 6 6 6 6 5 6 6 6 6 7 7 7 7 8 8 8 8 8 8 8 10 11 12 12	4.80m ● 117/42 kPa		16 15 14 13 12	5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5					[CONT] Clayey SILT; light grey. Very stiff, moist, low plasticity. 5.15m: brown with some organics End of handauger 5.2m. Scala (blows per 100mm): 3,4,5,6,7,8,11,12,11,12, 14,15,16,16,21,24 6.85m: Refusal

COMMENTS: Farmland end Spedding Rd

Hole Depth 6.85m

Scale 1:25

Rev.: A

HandAugerLog - 21/12/2020 10:22:18 AM - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **HA04**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926082.10 mN (NZTM2000) 1743388.90 mE R.L.: 21.20m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 02/12/2020 HOLE FINISHED: 02/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM

0.00-5.20m

HAND AUGER LOG

HOLE Id: **HA05**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925977.70 mN 1743549.70 mE	DRILL TYPE: 75 and 50mm Hand auger	HOLE STARTED: 01/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 01/12/2020
R.L.: 27.20m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL													ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill					asb/gl/split @ 0.00m		27	0	TS	M			SILT; dark brown. Moist, non-plastic; inclusions of gravel, black plastic twine.
					● 130/32 kPa asb/gl @ 0.40m PID, 0.1ppm @ 0.50m			0.5			St-VSt		Silty CLAY; light grey. Stiff to very stiff, moist, high plasticity.
					● 88/29 kPa								
	01/12/2020 W/L on completion				● 82/32 kPa asb/gl @ 0.90m PID, 0.1ppm @ 1.00m		26	1.0					
					● 108/35 kPa								
					● 80/33 kPa att/psd @ 1.45m			1.5					1.8m: light greyish brown. Low plasticity
	01/12/2020				● 96/41 kPa asb/gl @ 1.90m			2.0		W	St		Sandy SILT; light greyish brown. Stiff, wet, non-plastic.
							25			M	F-St		Clayey SILT, trace sand; light brown. Stiff to firm, moist, low plasticity.
Tauranga Group					● 56/19 kPa att/psd2 @ 2.45m			2.5					
					● 37/20 kPa asb/gl @ 2.70m								
					● 41/21 kPa			3.0			F		Silty CLAY; light grey. Firm, moist, high plasticity.
					● 40/24 kPa		24						
					● 35/16 kPa asb/gl @ 3.70m			3.5					
					● 35/13 kPa								4.0m: brown
					● 35/13 kPa		23	4.0					4.2m: blackish brown
					● 41/21 kPa			4.5					4.5m: brown
					● 45/21 kPa asb/gl @						St		

COMMENTS: Spedding Road

Hole Depth 7.25m

Scale 1:25

Rev.: A

HAND AUGER LOG

HOLE Id: **HA05**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925977.70 mN 1743549.70 mE	DRILL TYPE: 75 and 50mm Hand auger	HOLE STARTED: 01/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 01/12/2020
R.L.: 27.20m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL												ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Box 1, 0.0-5.2m Tauranga Group					4.70m ● 77/31 kPa		22	5.5		M	St		Clayey SILT, some organics; light brown. Stiff, moist, medium plasticity; amorphous.
													End of handauger 5.2m Scala only (blows per 100mm) 1,3,3,3,3,4,4,5 5,5,6,6,6,8,6,6,6,7 6,8
							21	6.0					
								6.5					
							20	7.0					
								7.5					7.25m: Target depth
							19	8.0					
								8.5					
							18	9.0					
								9.5					

COMMENTS: Spedding Road

Hole Depth 7.25m

Scale 1:25

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA05**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925977.70 mN (NZTM2000) 1743549.70 mE R.L.: 27.20m DATUM: NZVD2016	DRILL TYPE: 75 and 50mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 01/12/2020 HOLE FINISHED: 01/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM

0.00-5.20m

HAND AUGER LOG

HOLE Id: **HA06**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI		LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000)	5925924.30 mN 1743672.80 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 01/12/2020
		DRILL METHOD: HA+DCP	HOLE FINISHED: 01/12/2020
R.L.:	30.70m		DRILLED BY: GEOTECHNICS
DATUM:	NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
					asb/gI/dupA @ 0.00m				TS				SILT; dark brown. Moist, non-plastic; friable.
					157/66 kPa								SILT; light yellowish brown. Very stiff, moist, non-plastic.
					122/56 kPa asb/gI @ 0.40m PID, 0.2ppm @ 0.50m		30	0.5					Clayey SILT; yellowish brown. Stiff to very stiff, moist; low to medium plasticity.
	01/12/2020 W/L on completion				106/48 kPa asb/gI @ 0.90m PID, 0.3ppm @ 1.00m			1.0					
					98/44 kPa								
					119/42 kPa att/psd @ 1.45m		29	1.5					Silty CLAY; light brownish grey. Very stiff, moist, high plasticity.
					108/73 kPa asb/gI @ 1.90m			2.0					
					141/82 kPa								Clayey SILT; light brown. Stiff to very stiff, moist, medium plasticity.
Tauranga Group					129/84 kPa			2.5					
	01/12/2020				86/66 kPa asb/gI/att/psd @ 2.70m		28						
					58/37 kPa			3.0					
					69/37 kPa								
					61/31 kPa asb/gI @ 3.70m			3.5					
					66/29 kPa		27						Sandy SILT; grey. Stiff, moist, low plasticity; sand, fine.
					74/21 kPa			4.0					
					64/42 kPa			4.5					
					64/31 kPa asb/gI @		26						

COMMENTS: Spedding Road

Hole Depth 7.25m

Scale 1:25

Rev.: A

HAND AUGER LOG

HOLE Id: **HA06**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI		LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000)	5925924.30 mN 1743672.80 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 01/12/2020
		DRILL METHOD: HA+DCP	HOLE FINISHED: 01/12/2020
R.L.:	30.70m		DRILLED BY: GEOTECHNICS
DATUM:	NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm)	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	Description and Additional Observations
Box 1, 0.0-5.2m Tauranga Group				0 2 4 6 8 10 12 14 16 18	4.70m ● 96/32 kPa		25 24 23 22 21	5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5				10 25 50 100 200	[CONT] Sandy SILT; grey. Stiff, moist, low plasticity; sand, fine. End of hand auger 5.2m. Scala only (blows per 100mm) 3,4,4,5,6,8,9,9 10,13,11,11,13,14,15,16,16,16, 16,17 7.25m: Target depth

COMMENTS: Spedding Road

Hole Depth 7.25m

Scale 1:25

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA06**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925924.30 mN (NZTM2000) 1743672.80 mE R.L.: 30.70m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 01/12/2020 HOLE FINISHED: 01/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM

0.00-5.20m

HAND AUGER LOG

HOLE Id: **HA07**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925859.50 mN 1743823.00 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 01/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 01/12/2020
R.L.: 32.90m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					asb/gI @ 0.10m				TS	M	F		Sandy SILT; dark brown. Firm, moist, low plasticity; sand, fine.
Tauranga Group	01/12/2020	100	HA		85/22 kPa PID, 0.1ppm @ 0.50m asb/gI @ 0.50m att/psd @ 0.80m 82/47 kPa PID, 0.2ppm @ 1.00m asb/gI & att/psd @ 1.00m 69/37 kPa corrosivity @ 1.80m 63/33 kPa asb/gI @ 2.00m corrosivity @ 2.40m 90/47 kPa 87/31 kPa asb/gI @ 3.00m 131/31 kPa >218 kPa asb/gI @ 4.00m UTP UTP		32 31 30 29 28	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5			St D-VD		Sandy SILT, trace organics; brown, mottled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets. 0.5m: Light brown, mottled orange. PID test, 0.1ppm. Clayey SILT, minor sand, trace organics; light brown. Stiff, moist, medium plasticity; sand, fine; organics, rootlets. 1.0m: PID test, 0.2ppm SILT, some clay, minor sand; light brown, mottled orange. Stiff, moist, medium plasticity; sand, fine. SILT, some clay and sand; light brown, mottled orange and brown. Stiff, moist, medium plasticity; sand, fine. Sandy SILT, trace organics and clay; light brown, mottled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets. 2.5m: Grey and orange. Sandy SILT, trace organics; light brown, mottled orange. Stiff to very stiff, moist, low plasticity; sand, fine; organics, rootlets. 3.4m: Light brown, mottled orange. 3.5m: Grey. Silty SAND, trace organics; light brown mottled orange. Dense to very dense, moist, poorly graded; sand, fine to medium; organics, rootlets.

Box 1, 0.0-3.0m

Box 2, 3.0-5.0m

COMMENTS:

Hole Depth 5.9m

Scale 1:25

Rev.: A

HandAugerLog - 22/12/2020 2:43:19 PM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA07**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925859.50 mN 1743823.00 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 01/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 01/12/2020
R.L.: 32.90m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm)	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	Description and Additional Observations
		0	DCP	0 2 4 6 8 10 12 14 16 18 2 3 5 6 5 5 6 6 9 9 9 9 11 12 13 13 12 13	asb/gl @ 5.00m		27 26 25 24 23	5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5		M	St	10 25 50 100 200	5.9m: END OF HAND AUGER. Scala only to 5.9 m (blows per 50 mm): 2,3,5,6,5,5,6,6,9,9,9,9,11,12,13,13,12,13 5.9m: END OF INVESTIGATION

COMMENTS:

Hole Depth 5.9m

Scale 1:25

Rev.: A

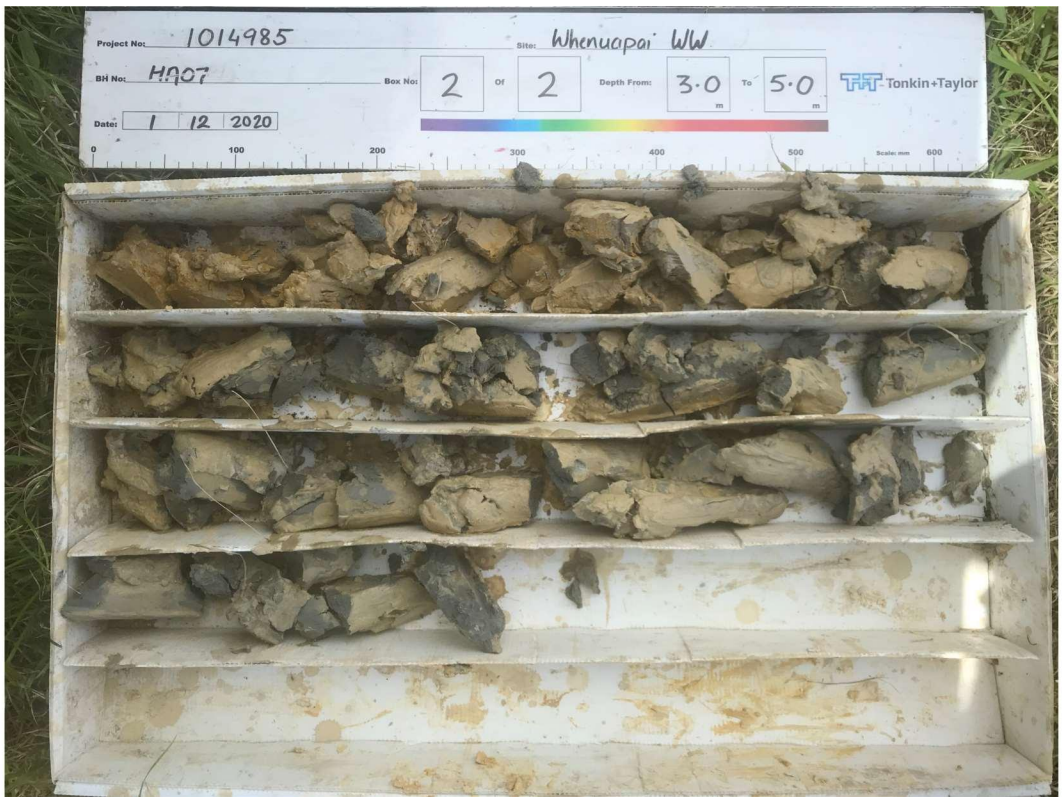
CORE PHOTOS

BOREHOLE No.: **HA07**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925859.50 mN (NZTM2000) 1743823.00 mE R.L.: 32.90m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 01/12/2020 HOLE FINISHED: 01/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM

0.00-3.00m



3.00-5.00m

HAND AUGER LOG

HOLE Id: **HA07a**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925813.70 mN 1743968.70 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 25/11/2020
		HOLE FINISHED: 25/11/2020
R.L.: 35.60m	DRILL METHOD: HA+DCP	DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					asb @ 0.10m				TS	M			Sandy SILT, trace organics; dark brown. Firm, moist, low plasticity; sand, fine; organics, rootlets.
Tauranga Group		100	HA+DCP		>218 kPa asb @ 0.50m PID, 0.0ppm @ 0.51m		35	0.5			VSt-H		SILT, some sand, minor clay, trace organics; orange, mottled brown-red and brown. Very stiff, moist, low plasticity. Organics, rootlets.
													Grades to: clayey SILT, minor sand, trace organics; grey and brown mottled orange. Very stiff to hard, moist, medium plasticity. Sand, fine; organics, rootlets.
					174/62 kPa asb @ 1.00m PID, 0.8ppm @ 1.01m corrosivity @ 1.20m			1.0					
					187/75 kPa		34	1.5			VSt		Sandy SILT, some clay, trace organics; grey mottled orange and brown. Very stiff, moist, low to medium plasticity. Organics, rootlets.
					159/87 kPa asb @ 2.00m			2.0					2.1m: trace clay; grey, mottled orange.
					geo @ 2.20m								
					geo @ 2.40m			2.5					Silty CLAY; grey, mottled orange and pink. Very stiff, moist, high plasticity.
					188/73 kPa		33						Sandy SILT, some clay, trace organics; grey mottled orange and brown. Very stiff, moist, low to medium plasticity. 2.8 - 2.9m: orange, mottled grey.
					199/84 kPa asb @ 3.00m			3.0					
					>218 kPa			3.5			VSt-H		Sandy SILT; grey, speckled white. Very stiff to hard, moist, low plasticity; sand, fine to coarse.
							32				VD		Grades to: Silty, fine to coarse SAND; grey, speckled white. Very dense, moist, well graded.
					UTP asb @ 4.00m			4.0			VSt-H		Sandy SILT; grey, speckled white. Very stiff to hard, moist, low plasticity; sand, fine to coarse.
					UTP			4.5					4.6m: minor fine, rounded gravel.
					UTP		31				H		

Box 1, 0.0-3.0m

Box 2, 3.0-5.0m

COMMENTS:

Hole Depth 5.85m

Scale 1:25

Rev.: A

HAND AUGER LOG

HOLE Id: **HA07a**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925813.70 mN 1743968.70 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 25/11/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 25/11/2020
R.L.: 35.60m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				5 5 6 7 8 5 7 8 11 10 11 10 11 10 10 11 11	asb @ 5.00m		30	5.5		M			Silty CLAY; grey. Hard, moist, high plasticity. 5.0 m: END OF HAND AUGER. Scala only to 5.85 m (blows per 50 mm): 5,5,6,7,8,5,7,8,11,10,11,10,11,10,10,11,11
							29	6.0 6.5					5.85m: END OF INVESTIGATION
							28	7.0 7.5					
							27	8.0 8.5					
							26	9.0 9.5					

COMMENTS:

Hole Depth 5.85m

Scale 1:25

Rev.: A

CORE PHOTOS

BOREHOLE No.: **HA07a**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925813.70 mN (NZTM2000) 1743968.70 mE R.L.: 35.60m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 25/11/2020 HOLE FINISHED: 25/11/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM

0.00-3.00m

3.00-5.00m

HAND AUGER LOG

HOLE Id: **HA08**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925683.60 mN (NZTM2000) 1744277.50 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 24/11/2020
		HOLE FINISHED: 24/11/2020
R.L.: 49.10m	DRILL METHOD: HA+DCP	DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					Env @ 0.10m		49	0	TS	M	F		Sandy SILT, trace organics; brown. Firm, moist, low plasticity; sand, fine. Organics, rootlets
Tauranga Group	24/11/2020	94	HA+DCP		● 48/16 kPa Env @ 0.50m PID, 1.8ppm @ 0.50m			0.5					Sandy SILT, minor organics; grey-brown, moittled orange. Firm, moist, low plasticity; sand, fine; organics, rootlets.
					● 57/11 kPa Env @ 1.00m PID, 2.5ppm @ 1.00m		48	1.0					1.2-1.5m: CORE LOSS
					● 82/6 kPa			1.5			St		SILT, some sand, mior clay, trace organics; grey-brown, speckled black. Stiff, moist, high plasticity; sand, fine; organics, rootlets.
					● >200 kPa Env @ 2.00m		47	2.0			VSt-H		Grades to: Silty CLAY, minor sand, trace organics; brown, mottled orange, speckled brown. Very stiff to hard, moist, high plasticity; sand, fine; organics, rootlets.
					● >200 kPa			2.5					2.4m: dark brown.
Box 1, 0.0-3.0m					● >200 kPa Env @ 3.00m		46	3.0					Sandy SILT, minor clay, trace organics; brown, spotted brown. Very stiff to hard, moist, low plasticity; sand, fine ; organics, rootlets.
													Sandy, clayey SILT, trace organics; brown, spotted brown. Very stiff to hard, moist, low plasticity; sand, fine; organics, rootlets.
					● 135/73 kPa			3.5			VSt		Sandy, silty CLAY, trace organics; brown, spotted dark brown. Very stiff, moist, medium plasticity; sand, fine; organics, rootlets.
											VSt-H		Grades to: Sandy, SILT, minor clay, trace organics; brown, spotted brown. Very stiff to hard, moist, low plasticity; sand, fine; organics, rootlets.
					● 149/72 kPa Env @ 4.00m		45	4.0			VSt		Grades to: Sandy SILT; brown, mottled orange, spotted black and dark brown. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
					● 129/56 kPa			4.5					4.2m: light grey-brown, spotted black.
Box 2, 3.0-5.0m					● >200 kPa						H		4.9m: hard.

COMMENTS:

Hole Depth 5.85m

Scale 1:25

Rev.: A

HAND AUGER LOG

HOLE Id: **HA08**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925683.60 mN 1744277.50 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 24/11/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 24/11/2020
R.L.: 49.10m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				4 5 5 6 6 7 9 8 14 8 8 9 10 10 11 11 12	Env @ 5.00m		44	5.5					5.0m: END OF HAND AUGER. Scala only to 5.85m(blows per 50mm): 4,5,5,6,6,7,9,8,14,8,8,9,10,10,11,11,12
							43	6.0					5.85m: END OF INVESTIGATION
								6.5					
							42	7.0					
								7.5					
							41	8.0					
								8.5					
							40	9.0					
								9.5					

COMMENTS:

Hole Depth 5.85m

Scale 1:25

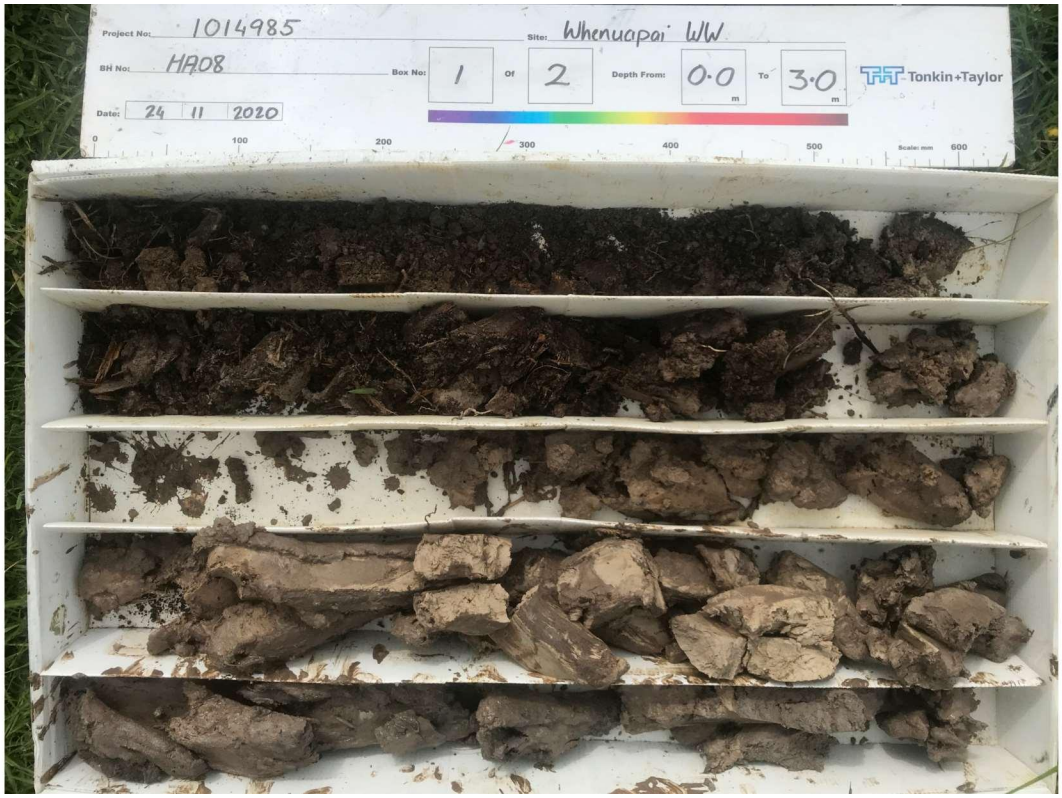
Rev.: A

CORE PHOTOS

BOREHOLE No.: **HA08**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925683.60 mN (NZTM2000) 1744277.50 mE R.L.: 49.10m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 24/11/2020 HOLE FINISHED: 24/11/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m

3.00-5.00m

HAND AUGER LOG

HOLE Id: **HA08a**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925734.60 mN 1744164.50 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 24/11/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 24/11/2020
R.L.: 41.80m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL													ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					asb/gl @ 0.10m 1 x Glass Jar 1x plastic Jar			0.0	TS	M	F		Sandy SILT, trace organics; dark brown. Firm, moist, low plasticity; sand, fine; organics, rootlets.
					● >218 kPa asb/gl @ 0.50m 1 x Glass Jar 1x plastic Jar			0.5					0.55m: Rootlet
					PID - 27.3ppm @ 0.51m		41				VSt		Silty CLAY, minor sand, trace organics; light brown mottled orange. Very stiff, moist, high plasticity; sand, fine; organics, rootlets.
					PID - 27.3ppm ● 130/44 kPa asb/gl @ 1.00m 1 x Glass Jar 1x plastic Jar			1.0					
					PID - 17.2ppm @ 1.01m								
					PID - 17.2ppm ● 184/93 kPa Corrosivity @ 1.20m 1 x plastic jar			1.5					Clayey SILT, some sand, trace organics; light brown & brown. Very stiff, moist, medium plasticity; sand, fine; organics, rootlets.
							40						Sandy SILT, some clay, trace organics; light brown & brown. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
Tauranga Group	24/11/2020				● 181/83 kPa asb/gl @ 2.00m 1 x Glass Jar 1x plastic Jar			2.0					
Box 1, 0.0-3.0m					● 171/78 kPa			2.5					
					att/psd @ 2.70m Atterberg/PSD		39						
					● 106/53 kPa asb/gl @ 3.00m 1 x Glass Jar 1x plastic Jar			3.0					
										W			Sandy SILT, trace organics; light brown. Very stiff, wet, low plasticity; sand, fine; organics, rootlets.
					● 131/59 kPa Corrosivity @ 3.50m 1 x plastic jar			3.5					
							38						
					● 149/62 kPa asb/gl @ 4.00m 1 x Glass Jar 1x plastic Jar			4.0					
					● 188/62 kPa			4.5					
Box 2, 3.0-5.0m				2 2 3 2 4 5 4	● 177/84 kPa		37						

COMMENTS:

Hole Depth 6.2m

Scale 1:25

Rev.: A

HAND AUGER LOG

HOLE Id: **HA08a**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5925734.60 mN 1744164.50 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 24/11/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 24/11/2020
R.L.: 41.80m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				5 4 4 4 7 5 5 7 7 7 7 8 9 8 7 9 10 10 10 12 12	asb/gl @ 5.00m 1 x Glass Jar 1x plastic Jar		36	5.5 6.0					5.0m: END OF HAND AUGER. Scala only to 6.2 m (blows per 50 mm): 2,2,3,2,4,5,4,5,4,4,4,7,5,5,7,7,7,7,8,9,8,7,9,10,10 ,9,10,10,10,12,12
							35	6.5 7.0 7.5					
							34	8.0 8.5					
							33	9.0 9.5					
							32						

COMMENTS:

Hole Depth 6.2m

Scale 1:25

Rev.: A

CORE PHOTOS

BOREHOLE No.: **HA08a**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5925734.60 mN (NZTM2000) 1744164.50 mE R.L.: 41.80m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 24/11/2020 HOLE FINISHED: 24/11/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM

0.00-3.00m

3.00-5.00m

HAND AUGER LOG

HOLE Id: **HA107a**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926927.60 mN 1743320.80 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 13.50m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL													ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					Env @ 0.10m				TS TS	M	L		Silty SAND, trace organics; brown. Loose, moist, poorly graded; sand, fine; organics, rootlets.
					● 202/47 kPa Env @ 0.50m PID - 0.0ppm @ 0.51m		13	0.5			VSt-H		Silty CLAY, minor sand, trace organics; brown mottled orange and dark brown, speckled white. Very stiff to hard, moist, high plasticity; sand, fine; organics, rootlets.
					● 137/31 kPa Env @ 1.00m PID 0.0ppm @ 1.01m			1.0					
					● 81/31 kPa		12	1.5			St		Clayey SILT, minor sand; grey and grey brown mottled orange speckled black. Stiff, moist, high plasticity; sand, fine.
					● 67/31 kPa Env @ 2.00m			2.0					Sandy SILT, minor clay, trace organics; brown mottled orange, speckled white. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
	03/12/2020				att/psd//corrosivity @ 2.20m								Sandy SILT, trace organics; grey & brown motled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
Tauranga Group		100	HA+DCP		● 38/16 kPa		11	2.5					
Box 1, 0.0-3.0m					● 31/22 kPa			3.0					
					● 68/28 kPa corrosivity @ 3.50m		10	3.5		W	L		Silty SAND, trace organics; grey. Loose, wet, poorly graded; sand, fine; organics, rootlets.
					● 87/34 kPa			4.0		M	St		Sandy SILT, trace organics; grey and brown speckled black. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
					● 72/30 kPa		9	4.5					SILT, some clay and sand, trace organics; brown speckled dark brown. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
Box 2, 3.0-5.0m				2 1 2 2 2 1	● 100/31 kPa								

COMMENTS:

Hole Depth 6.65m

Scale 1:25

Rev.: A

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA107a**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926927.60 mN 1743320.80 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 13.50m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				2 4 3 3 3 4 5 4 3 4 4 4 5 6 5 5 7 7 6 7 6 7 10 9 11 10 10 8 8 9 8 8			8 7 6 5 4	5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5					5.0 m: END OF HAND AUGER. Scala only to 6.65 m (blows per 50 mm): 1,2,2,2,1,2,4,3,3,3,4,5,4,3,4,4,4,5,6,5,5,7,7,6,7,6,7,10,9,11,10,10,8,8,9,8,8
													6.65m: END OF INVESTIGATION

COMMENTS:

Hole Depth 6.65m

Scale 1:25

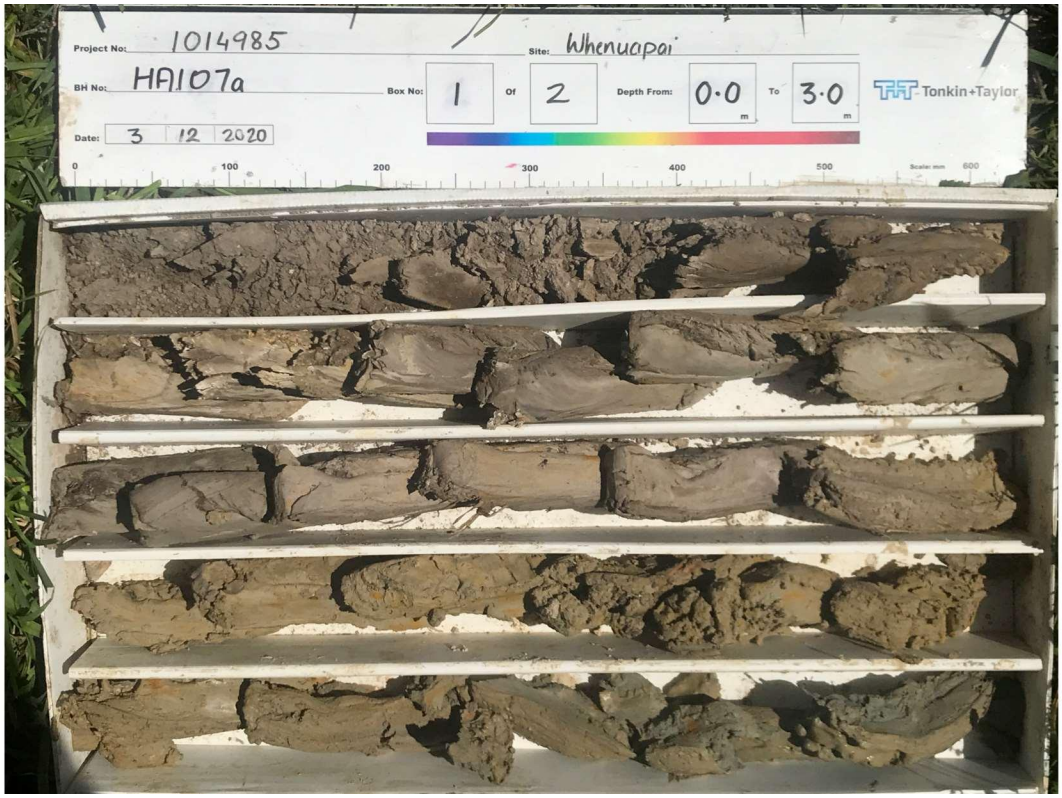
Rev.: A

CORE PHOTOS

BOREHOLE No.: **HA107a**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926927.60 mN (NZTM2000) 1743320.80 mE R.L.: 13.50m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 03/12/2020 HOLE FINISHED: 03/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m

3.00-5.00m

HAND AUGER LOG

HOLE Id: **HA107b**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926922.30 mN 1743265.20 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 04/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 04/12/2020
R.L.: 12.30m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					Env @ 0.10m		12	0.0	TS	D-M	F		Sandy SILT, trace organics; brown. Firm, dry to moist, low plasticity; sand, fine; organics, rootlets.
Fill					● 124/31 kPa Env @ 0.50m PID 0.5ppm @ 0.51m			0.5		D	VSt		Sandy SILT, trace organics; light brown and orange brown. Very stiff, dry to moist, low plasticity; sand, fine; organics, rootlets.
					● 152/34 kPa Env @ 1.00m PID 0.1ppm @ 1.01m corrosivity @ 1.20m		11	1.0		M	St		Sandy SILT, trace organics and clay; grey-brown mottled orange speckled white and black. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
					● 93/53 kPa			1.5					
					● 35/16 kPa Env @ 2.00m			2.0			F		SILT, some sand, trace organics; dark brown speckled black. Firm, moist, low plasticity; sand, fine; organics, rootlets.
							10				VSt		Sandy SILT, trace organics; grey mottled orange speckled white. Very stiff, low plasticity; sand, fine; organics, rootlets.
					● 82/22 kPa			2.5					Silty SAND; grey mottled orange speckled white. Very stiff, moist, poorly graded; sand, fine.
					corrosivity @ 2.70m								
Box 1, 0.0-3.0m Tauranga Group		100	HA+DCP		● 51/19 kPa			3.0		M-W	F		Sandy SILT, trace organics; grey mottled orange. Firm, moist to wet, low plasticity; sand, fine; organics, rootlets.
					● 75/20 kPa		9	3.5		M			SILT, some sand, minor clay, trace organics; grey mottled brown. Firm, moist, low plasticity; organics, rootlets.
										M-W	L-MD		Silty SAND, trace organics; grey mottled brown. Loose to medium dense, moist to wet, poorly graded; sand, fine; organics, rootlets.
					● 45/28 kPa			4.0					
					● 59/34 kPa		8	4.5					4.3 - 4.45m: SILT, some sand, minor clay, trace rootlets; grey. Stiff, moist, high plasticity; sand, fine.
Box 2, 3.0-5.0m					● 62/32 kPa								

COMMENTS:

Hole Depth 6.85m

Scale 1:25

Rev.: A

HAND AUGER LOG

HOLE Id: **HA107b**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926922.30 mN 1743265.20 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 04/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 04/12/2020
R.L.: 12.30m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				1 1 1 2 2 2 2 2 4 4 3 4 4 4 5 4 7 6 6 7 6 9 8 6 8 8 11 10 10 9 10 9 8 9 9 9			7 6 5 4 3	5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5					5.0 m: END OF HAND AUGER. Scala only to 6.85 m (blows per 50 mm): 1,1,1,2,2,2,2,4,4,3,4,4,4,5,4,7,6,6,7,6,9,8,6,8,8,1 1,10,10,9,10,11,10,9,8,9,9,9 6.85m: END OF INVESTIGATION

COMMENTS:

Hole Depth 6.85m

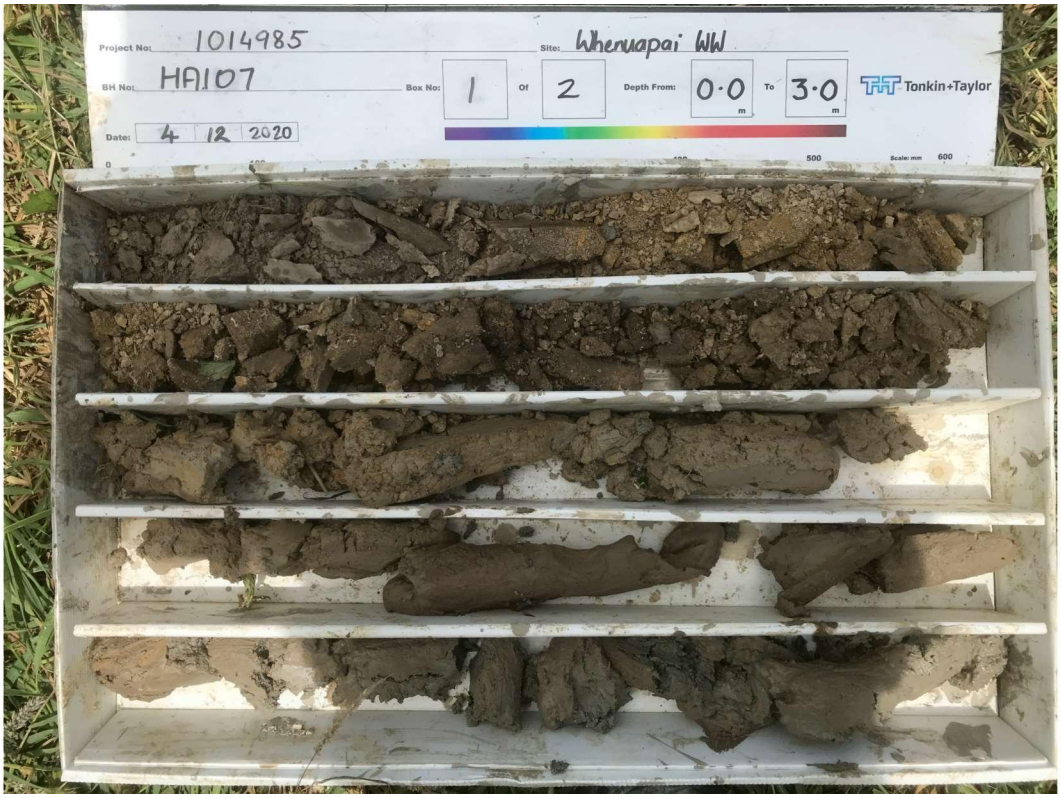
Scale 1:25

Rev.: A

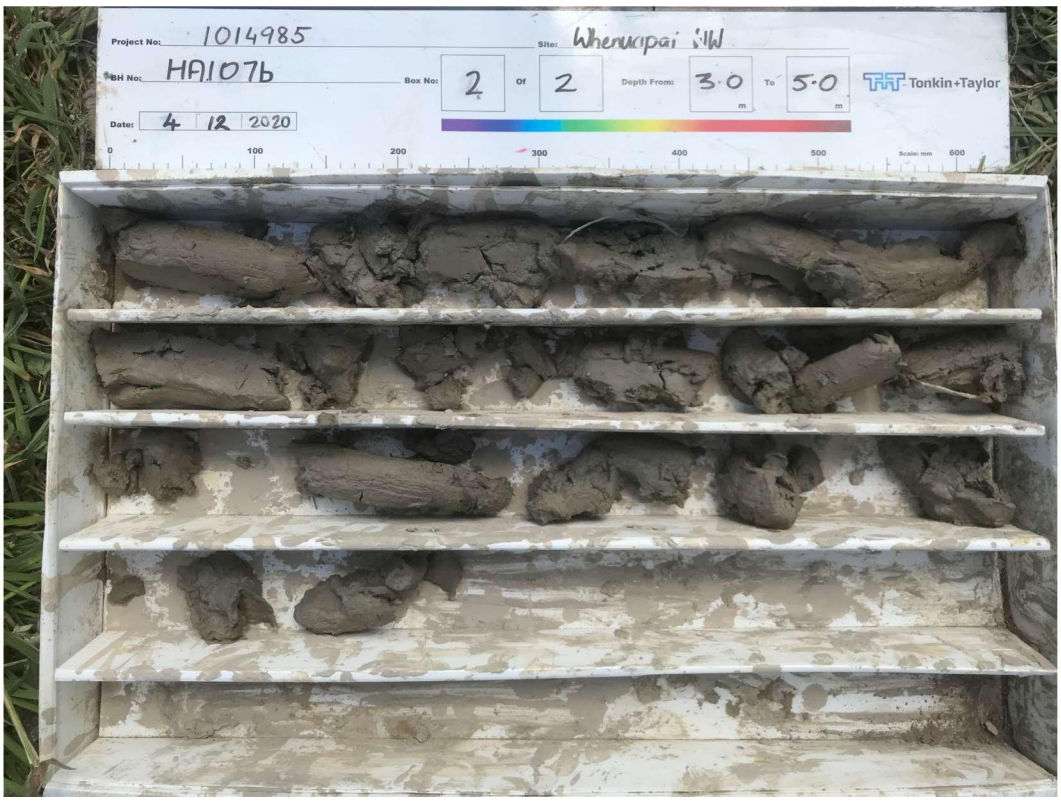
CORE PHOTOS

BOREHOLE No.: **HA107b**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926922.30 mN (NZTM2000) 1743265.20 mE R.L.: 12.30m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 04/12/2020 HOLE FINISHED: 04/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m



3.00-5.00m

HAND AUGER LOG

HOLE Id: **HA108**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926898.60 mN 1743173.50 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 11.50m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					Env @ 0.10m				TS	M	F		Sandy SILT, trace organics; brown. Firm, moist, low plasticity; sand, fine; organics, rootlets.
					131/25 kPa PID, 0.0ppm @ 0.50m Env @ 0.50m		11	0.5			VSt		Sandy SILT, trace organics; brown, mottled orange. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
											St		Sandy SILT, minor clay, trace organics; brown, mottled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
					73/28 kPa PID, 0.0ppm @ 1.00m Env @ 1.00m			1.0					SILT, minor sand and clay, trace organics; light brown, mottled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
	03/12/2020				54/21 kPa		10	1.5		W	F-St		Sandy SILT, trace organics; greyish brown, mottled orange, spotted blue. Firm to stiff, wet, low plasticity; sand, fine; organics, rootlets.
					26/9 kPa Env @ 2.00m			2.0					
					Att/psd @ 2.40m					S	F		SILT, minor sand, trace organics; brown. Firm, saturated, low plasticity; sand, fine; organics, rootlets.
					37/28 kPa		9	2.5					
Tauranga Group		100	HA+DCP		32/17 kPa			3.0					
Box 1, 0.0-3.0m					51/17 kPa		8	3.5					
					22/9 kPa			4.0					3.95m: grades to soft
					31/16 kPa		7	4.5					4.45m: grades to firm
Box 2, 3.0-5.0m					40/18 kPa								

COMMENTS:

Hole Depth 6.7m

Scale 1:25

Rev.: A

HandAugerLog - 1/03/2021 9:34:45 AM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA108**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926898.60 mN 1743173.50 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 11.50m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				1 1 1 1 2 2 2 2 1 2 3 2 2 2 2 1 3 4 4 3 4 3 4 3 3 3 3 3 3 4 4 3 4 5			6 5	5.5 6.0 6.5					5.0 m: END OF HAND AUGER. Scala only to 6.7 m (blows per 50 mm): 1,1,1,1,2,2,2,1,2,3,2,2,2,2,1,3,4,4,3,4,3,4,3,3,3,3,3,3,3,4,4,3,4,5
							4 3 2	7.0 7.5 8.0 8.5 9.0 9.5					6.7m: END OF INVESTIGATION

COMMENTS:

Hole Depth 6.7m

Scale 1:25

Rev.: A

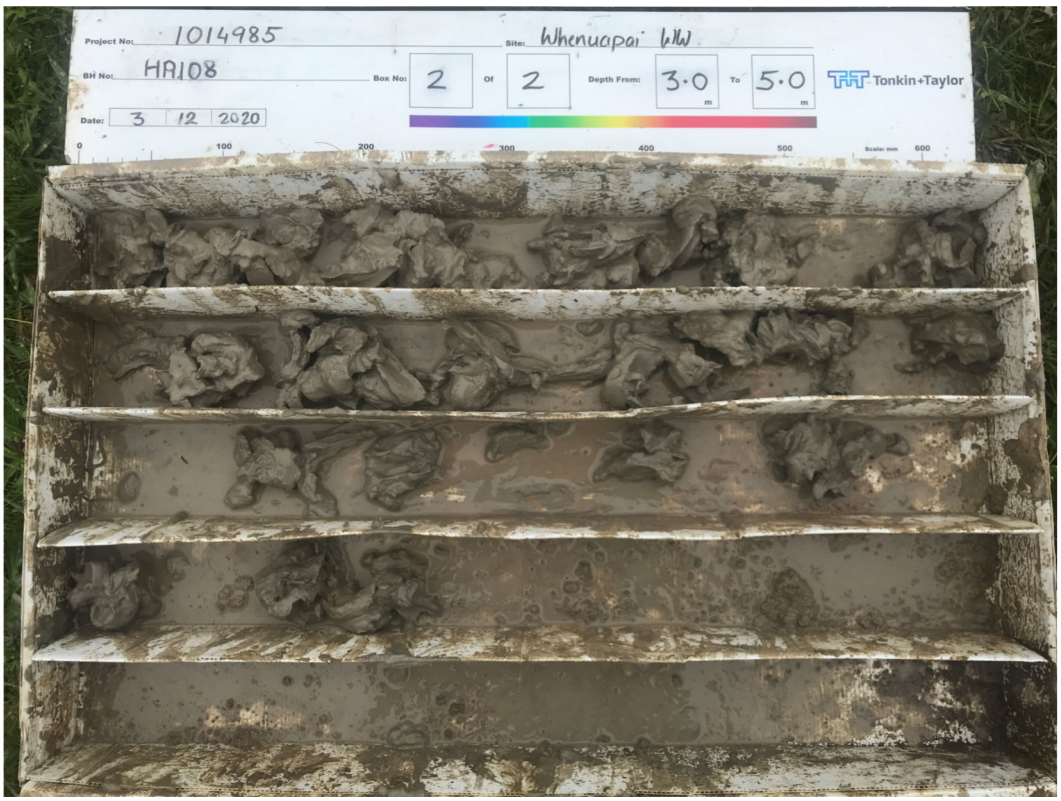
CORE PHOTOS

BOREHOLE No.: **HA108**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926898.60 mN (NZTM2000) 1743173.50 mE R.L.: 11.50m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 03/12/2020 HOLE FINISHED: 03/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM

0.00-3.00m



3.00-5.00m

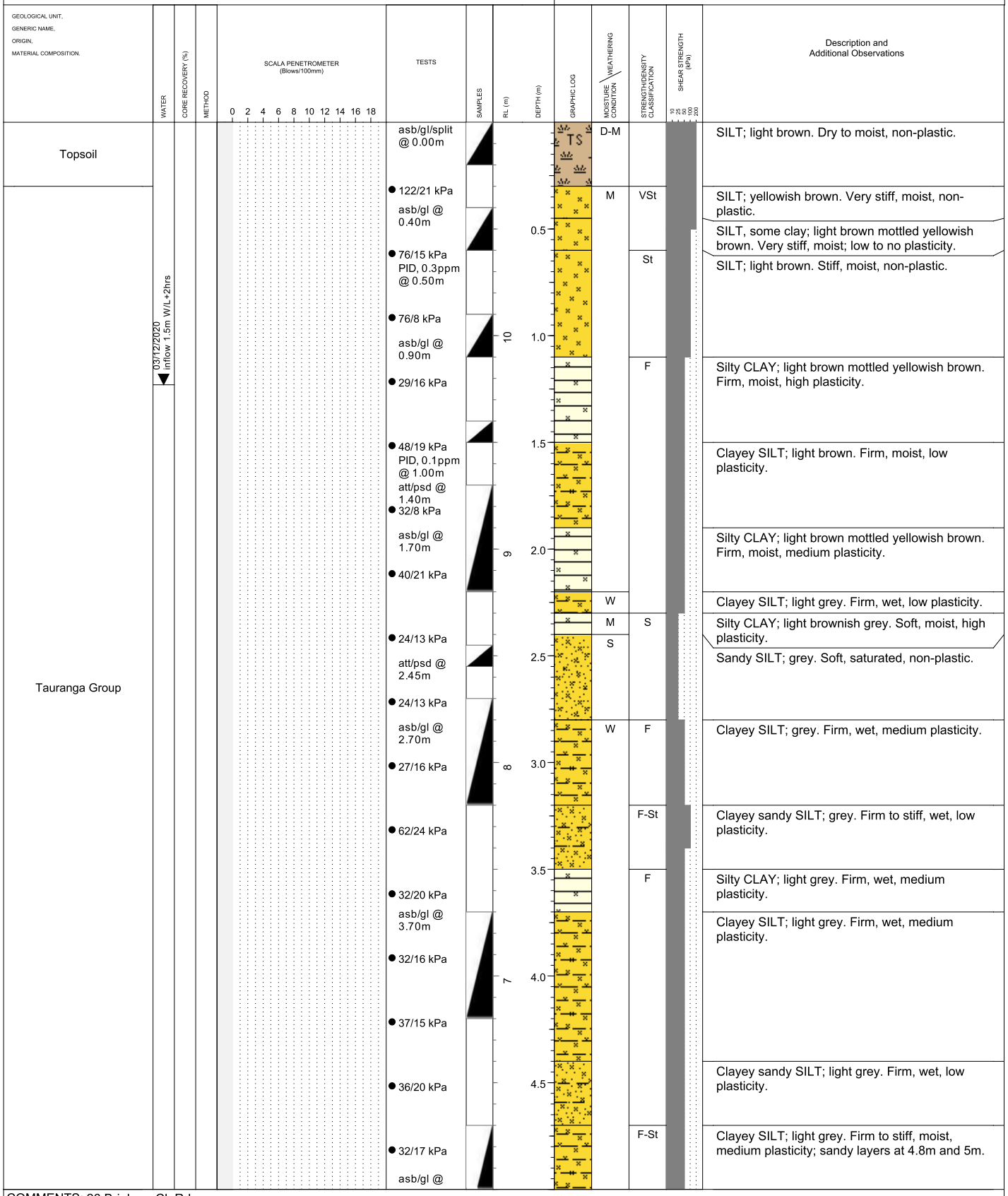
HAND AUGER LOG

HOLE Id: **HA109**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926901.80 mN 1743136.40 mE	DRILL TYPE: 75 and 50mm handauger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 11.00m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION



COMMENTS: 26 Brigham Ck Rd

Hole Depth 7.25m

Scale 1:25

Rev.: A

HAND AUGER LOG

HOLE Id: **HA109**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926901.80 mN 1743136.40 mE	DRILL TYPE: 75 and 50mm handauger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 11.00m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm)	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa)	Description and Additional Observations
Box 1, 0.0-5.2m Tauranga Group				0 2 4 6 8 10 12 14 16 18	4.70m ● 60/24 kPa		5	5.5 6.0				10 25 50 100 200	[CONT] Clayey SILT; light grey. Firm to stiff, moist, medium plasticity; sandy layers at 4.8m and 5m. End of handauger at 5.2 m Scala (blows per 50 mm) 1,2,2,3,3,3,5,5,4,4 5,6,6,5,5,4,5,7,7,10
							4	6.5 7.0					7.25m: Target depth
							3	7.5 8.0					
							2	8.5 9.0					
								9.5					

COMMENTS: 26 Brigham Ck Rd

Hole Depth 7.25m

Scale 1:25

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA109**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926901.80 mN (NZTM2000) 1743136.40 mE R.L.: 11.00m DATUM: NZVD2016	DRILL TYPE: 75 and 50mm handauger DRILL METHOD: HA+DCP	HOLE STARTED: 03/12/2020 HOLE FINISHED: 03/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM

0.00-5.20m

HAND AUGER LOG

HOLE Id: **HA110a**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI		LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000)	5926999.30 mN 1743387.70 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 08/12/2020
		DRILL METHOD: HA+DCP	HOLE FINISHED: 08/12/2020
R.L.:	14.60m		DRILLED BY: Tonkin + Taylor Ltd
DATUM:	NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill		100	HA		Env/asb @ 0.10m		14	0.5		M	MD		Silty, fine SAND, minor gravel, trace organics; brown. Medium dense, moist, poorly graded; organics, rootlets.
					>218 kPa Env/asb @ 0.50m PID,0.0ppm @ 0.51m					D-M	H		Silty CLAY, some sand, trace organics; grey, mottled orange and dark brown. Hard, dry to moist, high plasticity; sand, fine; organics, rootlets.
					>218 kPa PID, 0.0ppm @ 1.00m Env/asb @ 1.00m		13	1.0		M	VSt		Sandy, silty CLAY, trace organics; grey, mottled orange and dark brown. Hard, moist, medium plasticity; sand, fine; organics, rootlets.
					163/31 kPa			1.5					Sandy, clayey SILT, trace organics; light grey, mottled orange and brown. Hard, moist, medium plasticity; sand, fine; organics, rootlets.
					141/81 kPa Env/asb @ 2.00m		12	2.0			H		Silty CLAY, minor sand, trace organics; light grey, mottled orange. Hard, moist, high plasticity; sand, fine; organics, rootlets.
					84/34 kPa			2.5			St		SILT, minor sand and clay, trace organics; brown, grey, red. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
					121/68 kPa Env/asb @ 3.00m		11	3.0					Sandy SILT, trace organics; dark brown. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
					109/75 kPa			3.5					SILT, some sand, trace organics; brown, grey, red. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
					112/34 kPa		10	4.0		W	VSt St		Silty CLAY, minor sand, trace organics; light grey, mottled orange. Hard, moist, high plasticity; sand, fine; organics, rootlets.
Tauranga Group	08/12/2020				82/38 kPa			4.5		M	L		Grades to: SILT, some sand, minor clay, trace organics; light grey, mottled orange and dark brown. Stiff, moist, low to medium plasticity; sand, fine; organics, rootlets.
											St		Sandy SILT, trace organics; light grey, mottled orange and dark brown. Stiff, moist low plasticity; sand, fine; organics, rootlets.
											VSt St		Organic SILT, some sand; dark brown. Stiff, moist, low plasticity; sand, fine.
													SILT, minor sand, minor clay, trace organics; grey, streaked brown. Very stiff, moist, low plasticity; sand, fine; organics, rootlets.
													Sandy SILT, trace organics; grey, streaked brown. Stiff, wet, low plasticity; sand, fine; organics, rootlets.
													Fine SAND, some silt, trace organics; grey. Loose, moist, poorly graded; organics, rootlets.
													Sandy SILT, some gravel, trace organicsl; grey

Box 1, 0.0-3.0m

Box 2, 3.0-5.0m

COMMENTS:

Hole Depth 6.85m

Scale 1:25

Rev.: A

HandAugerLog - 22/12/2020 3:49:16 PM - Produced with Core-GS by GeRoc

HAND AUGER LOG

HOLE Id: **HA110a**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926999.30 mN (NZTM2000) 1743387.70 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 08/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 08/12/2020
R.L.: 14.60m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Tauranga Group				1 1 1 2 1 2 1 2 2 2 2 3 1 2 2 3 2 3 2 3 4 3 4 3 4 4, 4 4 3 4 4 5 5 4 4 5 4	UTP		9 8	5.5 6.0 6.5					and brown, speckled black. Stiff, moist, low plasticity; sand, fine; organics, rootlets. 5.0 m: END OF HAND AUGER. Scala only to 6.85 m (blows per 50 mm): 1,1,1,2,1,2,1,2,2,2,2,3,1,2,2,3,2,3,2,3,4,3,4,3,4,4, 4,4,3,4,4,5,5,4,4,5,4
							7 6 5	7.0 7.5 8.0 8.5 9.0 9.5					6.85m: END OF INVESTIGATION

COMMENTS:

Hole Depth 6.85m

Scale 1:25

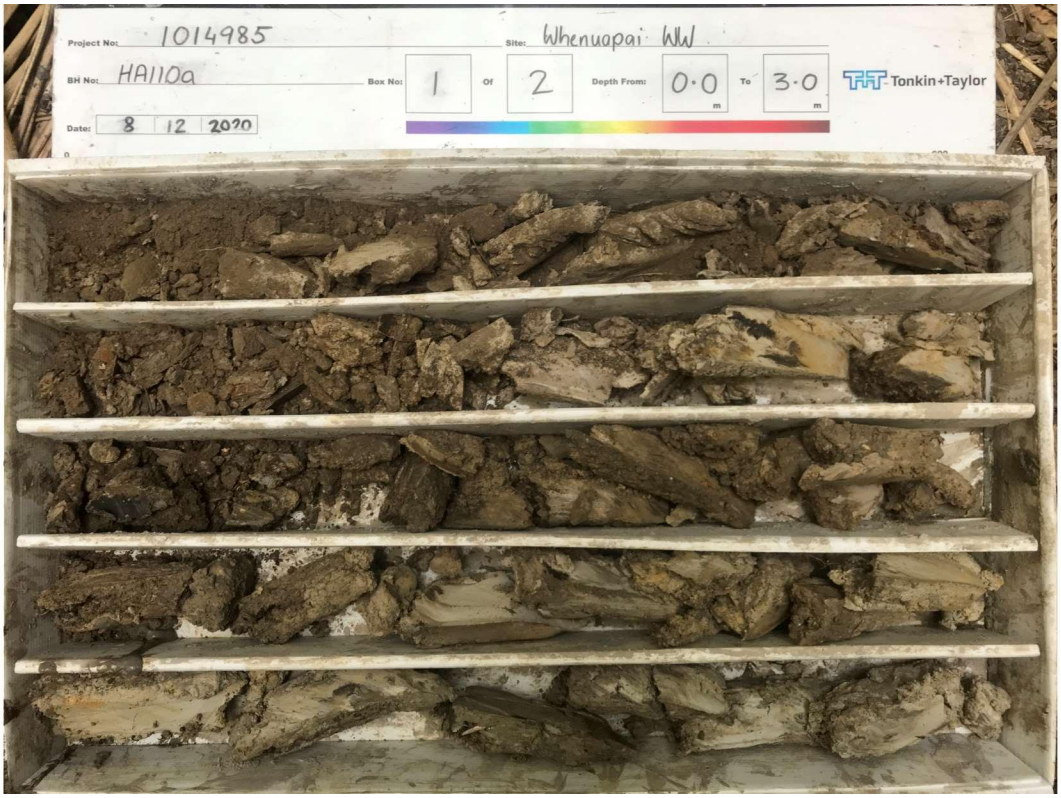
Rev.: A

CORE PHOTOS

BOREHOLE No.: **HA110a**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926999.30 mN (NZTM2000) 1743387.70 mE R.L.: 14.60m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 08/12/2020 HOLE FINISHED: 08/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM



0.00-3.00m

3.00-5.00m

HAND AUGER LOG

HOLE Id: **HA110b**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI		LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000)	5926965.40 mN 1743376.70 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 08/12/2020
		DRILL METHOD: HA+DCP	HOLE FINISHED: 08/12/2020
R.L.:	14.70m		DRILLED BY: Tonkin + Taylor Ltd
DATUM:	NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill					Env/asb @ 0.10m					M	MD		Silty, fine SAND, minor gravel, trace organics; brown. Tightly packed, moist, poorly graded; organics, rootlets.
					● UTP Env/asb @ 0.50m PID, 0.0ppm @ 0.51m Corrosivity @ 0.60m		14	0.5			St		Sandy SILT, minor gravel, trace organics; light grey-brown. Stiff, moist, low plasticity; organics, rootlets.
					● UTP Env/asb @ 1.00m PID, 0.0ppm @ 1.01m			1.0			VSt		Silty CLAY, minor sand and gravel, trace organics; brown, mottled orange and dark brown. Very stiff, moist, high plasticity; sand, fine; gravel, fine to medium, sub-angular, sandstone; organics, rootlets.
					● 79/25 kPa			1.5					
							13				St		Grades to: SILT, some sand, minor clay, trace organics; brown and grey. Stiff, moist, medium plasticity; sand, fine; organics, rootlets.
					● 65/34 kPa Env/asb @ 2.00m			2.0					
					● 93/37 kPa			2.5					
Box 1, 0.0-3.0m	08/12/2020 ▼	100	HA+DCP		Corrosivity @ 2.90m		12	3.0					Sandy SILT, minor organics; brown, speckled black and white, mottled orange. Stiff, moist, low plasticity; sand, fine to medium; organics, rootlets.
Tauranga Group				3 2 3 3 2 1 2 1 1 2 2 2 2 3 3 3 3 3 4 3	att/psd @ 3.35m		11	3.5		W	L-MD		Silty, fine to coarse SAND, trace gravel and organics; grey, speckled white.Loosely packed, wet, poorly graded; gravel, fine, sub-angular, mudstone; organics, rootlets.
								4.0					
								4.5		M	St		Sandy SILT, minor organics; brown, speckled black and white, mottled orange. Stiff, moist, low plasticity; sand, fine to medium; organics, rootlets.
Box 2, 3.0-5.0m							10				F		Organic SILT; brown. Firm, moist, low plasticity.

COMMENTS:

Hole Depth 6.95m

Scale 1:25

Rev.: A

Tonkin+Taylor

HAND AUGER LOG

HOLE Id: **HA110b**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926965.40 mN 1743376.70 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 08/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 08/12/2020
R.L.: 14.70m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				1,1,1,2,1,2,2,2,3,2,3,3,3,4,4,3,5,4,5,5,6,6,5,5,6,6,8,7,7,8,7,8,6,8,9,9,8,9			9	5.5					5.0 m: END OF HAND AUGER. Scala only to 6.95 m (blows per 50 mm): 1,1,1,2,1,2,2,2,3,2,3,3,3,4,4,3,5,4,5,5,6,6,5,5,6,6, 6,8,7,7,8,7,8,6,8,9,9,8,9
							8	6.0					
								6.5					
								7.0					6.95m: END OF INVESTIGATION
							7	7.5					
								8.0					
								8.5					
							6	9.0					
								9.5					
							5						

COMMENTS:

Hole Depth 6.95m

Scale 1:25

Rev.: A

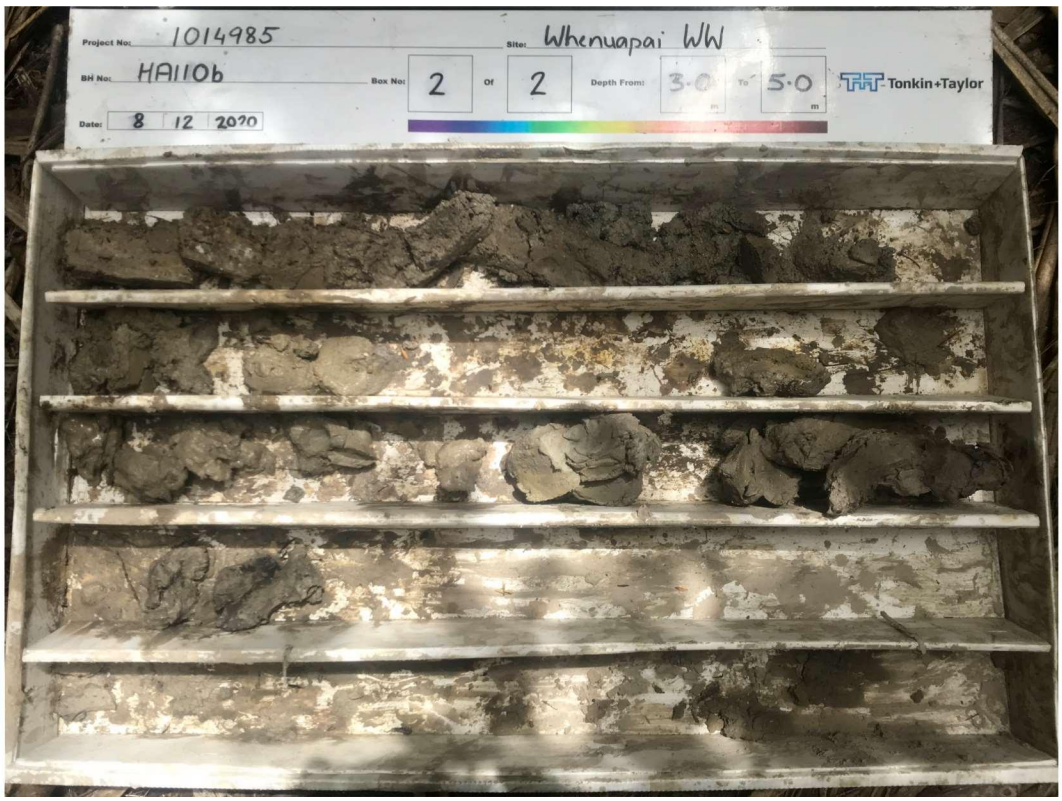
CORE PHOTOS

BOREHOLE No.: **HA110b**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926965.40 mN (NZTM2000) 1743376.70 mE R.L.: 14.70m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 08/12/2020 HOLE FINISHED: 08/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM

0.00-3.00m



3.00-5.00m

HAND AUGER LOG

HOLE Id: **HA111**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5927039.30 mN (NZTM2000) 1743395.90 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 07/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 07/12/2020
R.L.: 14.40m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill	07/12/2020	88	HA+DCP		Env/asb @ 0.10m		14	0.5		D	F		Sandy SILT, trace organics; dark brown. Firm, dry, low plasticity; sand, fine; organics, rootlets.
					● 65/34 kPa PID, 1.2ppm @ 0.50m Env/asb @ 0.50m								SILT, some sand, minor clay, trace gravel, and organics; light brown, mottled orange, dark grey and grey. Sand, fine; gravel, fine to medium, sub-angular, sandstone; organics, rootlets.
					● 31/16 kPa PID, 0.3ppm @ 1.00m Env/asb @ 1.00m Corrosivity @ 1.20m		13	1.0		M			Sandy SILT, some gravel; dark brown. Firm, moist, low plasticity; sand, fine; gravel, fine, angular, sandstone.
					● 16/9 kPa			1.5		W			1.6m: wet.
					● 31/20 kPa Env/asb @ 2.00m		12	2.0					
					Corrosivity @ 2.40m ● 7/2			2.5			St		SILT, some sand, minor clay and gravel, trace organics; dark brown and black. Stiff, moist, low plasticity; sand, fine; gravel, fine, sub-angular, sandstone; organics, rootlets.
Box 1, 0.0-3.1m					Env/asb @ 3.00m		11	3.0			L		Gravelly, fine SAND, some silt; dark brown. Loosely packed, wet, poorly graded; gravel, fine to medium, sub-angular, sandstone.
								3.5					3.1 - 3.5m: NO RECOVERY
Tauranga Group				1 0 1 1 0 2 2 2 2 1 2 1 1 2 2 3 4 3 4 3 3 3 3 3 3 4 3 4 3 4 3 4 5 4 4 5 6 5 5 6 6 7 7 6 7 6 9 8 7 8 9 7 8 8 7 9 9 9			10	4.0					3.5 m: END OF HAND AUGER. Scala only to 6.5 m (blows per 50 mm): 1,0,1,1,0,2,2,2,2,1,2,1,1,2,2,3,4,3,4,3,3,3,3,3,3,4, 3,4,3,4,3,4,3,4,5,4,4,5,6,5,5,6,6,7,7,6,7,6,9,8,7,8, 9,7,8,8,7,9,9,9
								4.5					

COMMENTS:

Hole Depth 6.45m

Scale 1:25

Rev.: A

HAND AUGER LOG

HOLE Id: **HA111**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5927039.30 mN 1743395.90 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 07/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 07/12/2020
R.L.: 14.40m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Tauranga Group				4 3 4 5 4 4 5 6 5 5 6 6 7 7 6 7 6 9 8 7 8 9 7 8 9 9 9			9 8	5.5 6.0					[CONT] 3.5 m: END OF HAND AUGER. Scala only to 6.5 m (blows per 50 mm): 1,0,1,1,0,2,2,2,2,1,2,1,1,2,2,3,4,3,4,3,3,3,3,3,3,4, 3,4,3,4,3,4,3,4,5,4,4,5,6,5,5,6,6,7,7,6,7,6,9,8,7,8, 9,7,8,8,7,9,9,9
							7 6 5	6.5 7.0 7.5 8.0 8.5 9.0 9.5					6.45m: END OF INVESTIGATION

COMMENTS:

Hole Depth 6.45m

Scale 1:25

Rev.: A

CORE PHOTOS

BOREHOLE No.: **HA111**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5927039.30 mN (NZTM2000) 1743395.90 mE R.L.: 14.40m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 07/12/2020 HOLE FINISHED: 07/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM

0.00-3.10m

HAND AUGER LOG

HOLE Id: **HA112**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926554.90 mN 1743164.20 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 02/12/2020
		HOLE FINISHED: 02/12/2020
R.L.: 9.60m	DRILL METHOD: HA+DCP	DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill					Env/asb @ 0.10m ● 72/16 kPa Env/asb @ 0.50m PID 0.9ppm @ 0.51m ● 116/22 kPa Env/asb @ 1.00m PID 1.8ppm @ 1.01m ● UTP Env @ 1.80m Env/corrosivity @ 2.00m		9 8 7 6 5	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5		M	St VSt		Sandy SILT, trace organics; brown and grey mottled orange, spotted black and white. Stiff, moist, low plasticity; sand, fine; organics, rootlets & carbonaceous material. Sandy SILT, trace organics; dark grey brown, spotted black. Stiff, moist, low plasticity; sand, fine; organics, rootlets. Silty CLAY, some sand, trace organics; grey, some orange spots. Very stiff, moist, medium plasticity; sand, fine; organics, rootlets. 1.8m: Strong chemical odour 2.0m: roots, white/cream coloured powder. 2m: Refusal

Box 1, 0.0-2.0m

COMMENTS:

Hole Depth 2m

Scale 1:25

Rev.: A

CORE PHOTOS

BOREHOLE No.: **HA112**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926554.90 mN (NZTM2000) 1743164.20 mE R.L.: 9.60m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 02/12/2020 HOLE FINISHED: 02/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM

0.00-2.00m

HAND AUGER LOG

HOLE Id: **HA113**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI		LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000)	5926630.20 mN 1743032.10 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 02/12/2020 HOLE FINISHED: 02/12/2020
R.L.:	7.90m	DRILL METHOD: HA+DCP	DRILLED BY: GEOTECHNICS
DATUM:	NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil					asb/gI/dupC @ 0.00m				TS	M			SILT; brown with yellowish brown inclusions. Very stiff, moist, non-plastic.
					● 161/21 kPa asb/gI @ 0.40m				TS		VSt		SILT; dark brown. Very stiff, moist, non-plastic.
Tauranga Group					PID, 0.0ppm @ 0.50m			0.5					SILT, some clay; light brown. Very stiff, moist; low to no plasticity.
					● 150/37 kPa						St-VSt		Clayey SILT; light brown. Stiff to very stiff, moist; low to medium plasticity.
					● 96/32 kPa asb/gI @ 0.90m		7	1.0					1.1m: medium plasticity
					PID, 0.4ppm @ 1.00m								
					● 66/21 kPa								
					● 54/16 kPa			1.5					
	02/12/2020 Water inflow/level on completion				att/psd @ 1.45m						St		Sandy SILT; light brown mottled orange brown. Stiff, moist, non-plastic; sand, fine.
					● 88/24 kPa asb/gI @ 1.90m		6	2.0		S			Silty SAND; brown, grey from 2.2m. Saturated, non-plastic.
East Coast Bays Formation					● 114/13 kPa								
Box 1, 0.0-2.6m				4,5,12,26 >>	att/psd @ 2.45m			2.5					2.4m: Scala (blows per 50mm): 4.5, 4.5,12,26, bouncinig Over augered, solid refusal at 2.6m
							5	3.0					2.6m: Refusal
								3.5					
							4	4.0					
								4.5					
							3						

COMMENTS: Brigham Creek Road. ECBF outcrop in nearby creek bed.

Hole Depth 2.6m

Scale 1:25

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA113**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926630.20 mN (NZTM2000) 1743032.10 mE R.L.: 7.90m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 02/12/2020 HOLE FINISHED: 02/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM

0.00-2.60m

HAND AUGER LOG

HOLE Id: **HA114**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926872.80 mN 1743108.40 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 11.00m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	Description and Additional Observations
Fill	Gravelly SILT; brown. Dry, non-plastic; (farm track).
Topsoil	SILT; greyish brown. Very stiff, moist, non-plastic.
	SILT; light brown. Very stiff, moist, non-plastic.
	Clayey SILT; light grey mottled yellowish brown. Stiff to very stiff, moist, low plasticity. 1.0m: medium plasticity 1.2m: low plasticity
	Silty CLAY; light greyish brown. Firm, moist, high plasticity.
	SILT; light brown. Firm, wet, non-plastic.
	Clayey SILT; light brown mottled orange brown. Firm, moist, medium plasticity.
Tauranga Group	Sandy SILT; light brown. Stiff to firm, moist, non-plastic. 3.0m: grey
	Silty CLAY; light greyish brown. Firm, moist to wet, high plasticity; difficult to recover.
	Clayey SILT; greyish brown. Firm to stiff, moist, low plasticity.

WATER: 03/12/2020 inflow 2.6m, w/l after 4hrs

CORE RECOVERY (%) | METHOD | SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18

TESTS | SAMPLES | RL (m) | DEPTH (m) | GRAPHIC LOG | MOISTURE CONDITION / WEATHERING | STRENGTH/DENSITY CLASSIFICATION | SHEAR STRENGTH (kPa) 10 25 50 100 200

TESTS	SAMPLES	RL (m)	DEPTH (m)	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION
Dup D, Asb/gl @ 0.00m				D	
TS				M	VSt
● 184/32 kPa asb/gl @ 0.40m			0.5		
● 186/29 kPa PID, 0.0ppm @ 0.50m					
● 109/33 kPa asb/gl @ 0.90m		10	1.0		St-VSt
● 104/42 kPa PID, 0.0ppm @ 1.00m					
● 56/27 kPa att/psd @ 1.45m			1.5		F
● 40/24 kPa asb/gl @ 1.90m		9	2.0	W	
● 41/27 kPa				M	
● 42/21 kPa			2.5		
● 61/16 kPa asb/gl @ 2.70m					F-St
● 56/15 kPa		8	3.0		
● 37/16 kPa att/psd @ 3.45m			3.5	M-W	F
● 40/9 kPa asb/gl @ 3.70m					
● 27/11 kPa		7	4.0		
● 27/11 kPa					
● 49/24 kPa			4.5		
● 37/20 kPa asb/gl @				M	F-St

COMMENTS: 26 Brigham Ck Rd

Hole Depth 7.25m

Scale 1:25

Rev.: A

HAND AUGER LOG

HOLE Id: **HA114**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926872.80 mN 1743108.40 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 03/12/2020
R.L.: 11.00m	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
DATUM: NZVD2016		DRILLED BY: GEOTECHNICS
		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Box 1, 0.0-5.2m Tauranga Group					4.70m ● 50/11 kPa		5	5.5					[CONT] Clayey SILT; greyish brown. Firm to stiff, moist, low plasticity.
								6.0					End of hand auger 5.2 m Scala (blows per 50 mm) 0,0,0,0,1,0,1,1,1,1,2,2,2,2,2,2 3,3,3,4,3,3,2,3,2,3,2,3,2,2,2,3 3,3,4,4,4,4,
							4	6.5					
								7.0					7.25m: Target depth
								7.5					
							3	8.0					
								8.5					
								9.0					
							2	9.5					

COMMENTS: 26 Brigham Ck Rd

Hole Depth 7.25m

Scale 1:25

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA114**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926872.80 mN (NZTM2000) 1743108.40 mE R.L.: 11.00m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 03/12/2020 HOLE FINISHED: 03/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM

0.00-5.20m

HAND AUGER LOG

HOLE Id: **HA115**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926794.20 mN 1743054.00 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 9.90m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL													ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill					env @ 0.10m					M	L		Silty SAND, trace organics; brown. Moist, poorly graded; sand, fine, loosely packed; organics, rootlets.
											VSt		Silty CLAY, minor sand; orange-brown mottled orange. Very stiff, moist; sand, fine.
					168/40 kPa			0.5					Sandy SILT, trace organics; brown. Stiff, moist, low plasticity; sand, fine; organics, rootlets.. 0.4m: Brown & light brown
					env @ 0.50m PID, 0.5ppm @ 0.50m						St-VSt		Sandy SILT, minor clay, trace organics; brown and light brown mottled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets.
					171/51 kPa PID, 0.3ppm @ 1.00m env @ 1.00m split/dup @ 1.01m		9	1.0					
					82/19 kPa			1.5			St		SILT, minor clay and sand, trace organics; light grey-brown mottled orange. Stiff, moist, low plasticity; sand, fine; organics, rootlets. 1.9m: Brown mottled orange
					81/25 kPa env @ 2.00m		8	2.0					
					56/22 kPa			2.5					2.6 - 2.65m: organics, decomposed wood
Tauranga Group					geo @ 2.60m								
Box 1, 0.0-3.0m	24/11/2020	100	HA+DCP		56/25 kPa		7	3.0		W	F		Sandy SILT, trace organics; grey speckled black. Firm, wet, low plasticity; sand, fine; organics, rootlets.
					34/16 kPa			3.5					3.55m: Organics, wood
													SILT, minor sand, trace organics; brown speckled black. Firm, wet, low plasticity; sand, fine; organics, rootlets.
					40/19 kPa		6	4.0		W-S			Sandy SILT, trace organics; grey speckled black. Firm, saturated to wet, low plasticity; sand, fine; organics, rootlets.
					37/28 kPa			4.5		W	St		SILT, some sand, trace organics; brown speckled black. Firm, wet, low plasticity; sand, fine; organics, rootlets.
Box 2, 3.0-5.0m					88/54 kPa		5						

COMMENTS:

Hole Depth 6m

Scale 1:25

Rev.: A

HAND AUGER LOG

HOLE Id: **HA115**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926794.20 mN 1743054.00 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 9.90m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				2 2 3 2 4 4 4 6 5 7 7 8 9 9 9 9 9 10 10 12 20			4	5.5					5.0m: END OF HAND AUGER. Scala only to 6.0m(blows per 50mm): 2,2,3,2,4,4,4,6,5,7,7,8,9,7,9,9,10,10,12,20
							3	6.0					6m: Refusal
							2	6.5					
							1	7.0					
							0	7.5					
								8.0					
								8.5					
								9.0					
								9.5					

COMMENTS:

Hole Depth 6m

Scale 1:25

Rev.: A

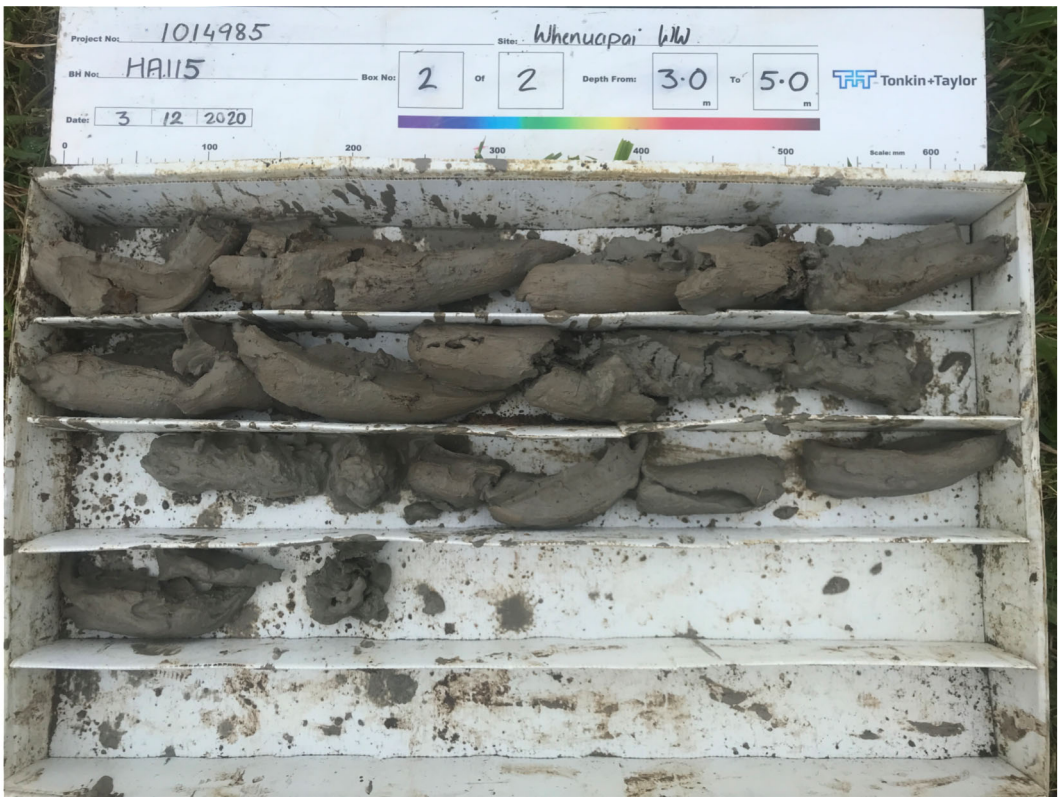
CORE PHOTOS

BOREHOLE No.: **HA115**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926794.20 mN 1743054.00 mE R.L.: 9.90m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 03/12/2020 HOLE FINISHED: 03/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM

0.00-3.00m



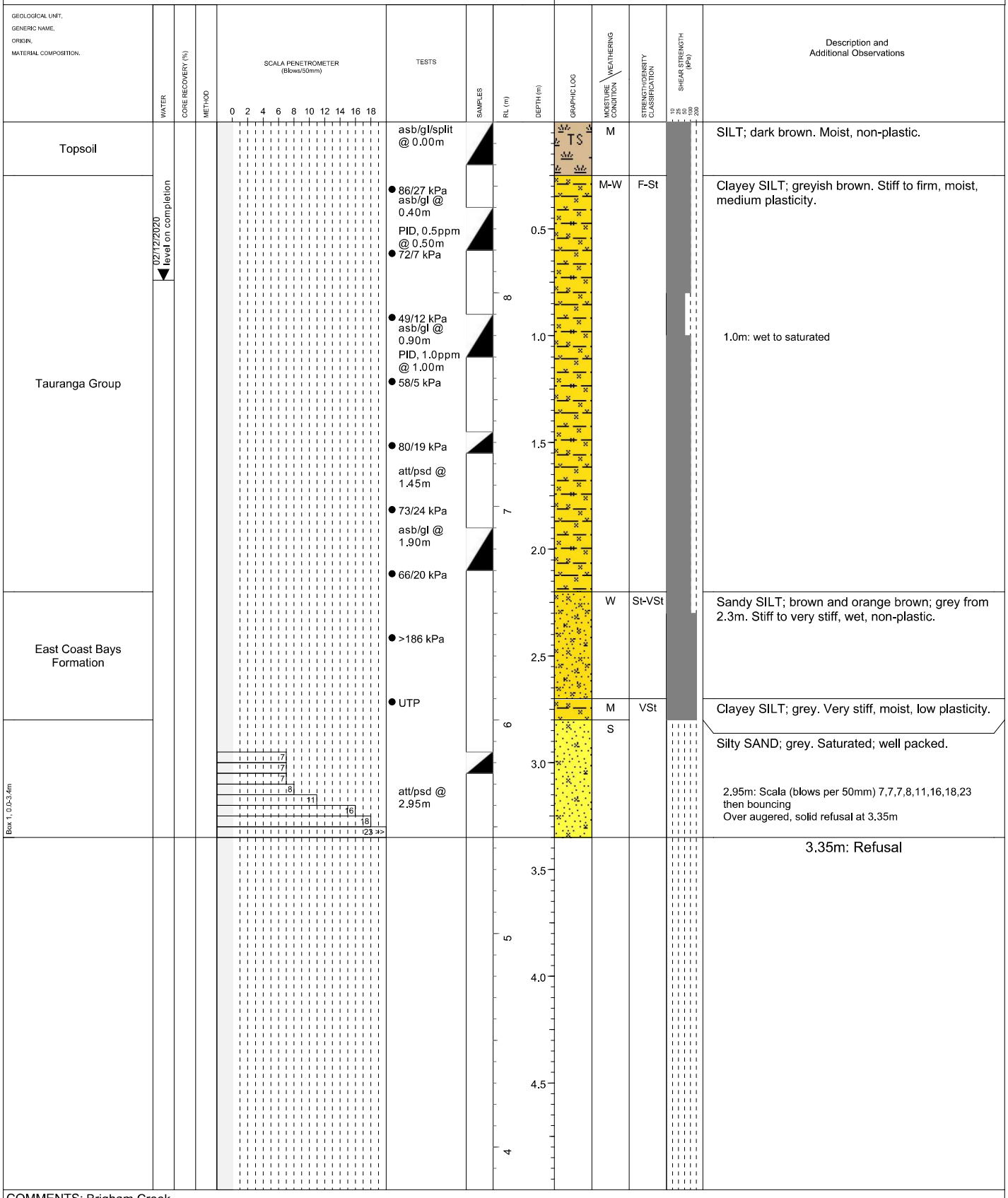
3.00-5.00m

HAND AUGER LOG

HOLE Id: **HA116**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926675.90 mN 1743047.90 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 02/12/2020
		HOLE FINISHED: 02/12/2020
R.L.: 8.80m	DRILL METHOD: HA+DCP	DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM



COMMENTS: Brigham Creek

Hole Depth 3.35m

Scale 1:25

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA116**

SHEET: 1 OF 1

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926675.90 mN (NZTM2000) 1743047.90 mE R.L.: 8.80m DATUM: NZVD2016	DRILL TYPE: 75 and 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 02/12/2020 HOLE FINISHED: 02/12/2020 DRILLED BY: GEOTECHNICS LOGGED BY: RBE CHECKED: CBM

0.00-3.35m

HAND AUGER LOG

HOLE Id: **HA117**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926564.40 mN 1743138.40 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 02/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 02/12/2020
R.L.: 10.00m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL													ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill		100	HA+DCP		Env/asb @ 0.10m		9	0.0		D	St		Sandy SILT, trace organics; light brown mottled orange and brown. Stiff, dry, low plasticity; sand, fine; organics, rootlets..
					● 152/19 kPa Env/asb @ 0.50m PID 0.8ppm @ 0.51m			0.5		M	VSt		Silty CLAY, minor sand, trace organics & insulation fibres; light brown mottled orange. Very stiff, moist, high plasticity; sand, fine; organics, rootlets.
					● 137/16 kPa Env/asb @ 1.00m PID 6.0ppm @ 1.01m			1.0		D-M			Sandy SILT, trace organics; dark brown and light brown mottled orange. Very stiff, dry to moist, low plasticity; sand, fine; organics, rootlets.
					● 112/25 kPa		8	1.5		M			Silty CLAY, trace organics; light brown mottled orange. Very stiff, moist, high plasticity; organics, rootlets.
					● 186/76 kPa Env/corrosivity @ 2.00m			2.0					
Tauranga Group					● 218/81 kPa			2.5			VSt-H		Silty CLAY, some sand, minor organics; brown spotted black, speckled white and orange. Very stiff, moist, high plasticity; sand, fine; organics, carbonaceous.
Box 1, 0.0-3.0m					att/psd @ 2.70m		7	3.0					Sandy SILT; grey and brown speckled orange. Very stiff to hard, moist, low plasticity; sand, fine.
					● 171/48 kPa						VSt		SILT, some clay and sand, trace peat (spongy); brown mottled orange, streaked black. Very stiff, moist, low plasticity; sand, fine.
					● 156/75 kPa			3.5					3.6m: Grey mottled orange
					● 199/75 kPa		6	4.0					Sandy SILT, trace organics; light brown mottled orange, streaked black. Very stiff, moist, low plasticity; sand, fine; carbonaceous & decomposed wood.
					● 209/72 kPa			4.5			D		Silty SAND, trace organics; grey streaked black and brown. Moist, poorly graded; sand, fine, tightly packed; carbonaceous & decomposed wood.
Box 2, 3.0-5.0m					● 184/73 kPa								

COMMENTS:

Hole Depth 6.3m

Scale 1:25

Rev.: A

HAND AUGER LOG

HOLE Id: **HA117**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926564.40 mN 1743138.40 mE	DRILL TYPE: 50 mm Hand auger	HOLE STARTED: 02/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 02/12/2020
R.L.: 10.00m		DRILLED BY: Tonkin + Taylor Ltd
DATUM: NZVD2016		LOGGED BY: ROM CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
				3 4 4 4 7 7 6 7 7 7 6 8 8 8 10 11 10 11 11			4	5.5 6.0					5.0 m: END OF HAND AUGER. Scala only to 6.3 m (blows per 50 mm): 3,4,4,4,7,7,6,7,7,9,7,7,7,8,7,7,7,6,8,8,8,10,11,10, 11,11
							3 2 1	6.5 7.0 7.5 8.0 8.5 9.0 9.5					6.3m: END OF INVESTIGATION

COMMENTS:

Hole Depth 6.3m

Scale 1:25

Rev.: A

CORE PHOTOS

BOREHOLE No.: **HA117**

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: 5926564.40 mN (NZTM2000) 1743138.40 mE R.L.: 10.00m DATUM: NZVD2016	DRILL TYPE: 50 mm Hand auger DRILL METHOD: HA+DCP	HOLE STARTED: 02/12/2020 HOLE FINISHED: 02/12/2020 DRILLED BY: Tonkin + Taylor Ltd LOGGED BY: ROM CHECKED: CBM

0.00-3.00m

3.00-5.00m

HAND AUGER LOG

HOLE Id: **HA119**

SHEET: 1 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926938.00 mN 1743195.90 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 11.40m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

Geological unit, generic name, origin, material composition	Water	Core recovery (%)	Method	Scala penetrometer (Blows/50mm)	Tests	Samples	RL (m)	Depth (m)	Graphic log	Moisture condition / Weathering	Strength/density classification	Shear strength (kPa)	Description and Additional Observations
Topsoil					Dup E/asb/gl @ 0.00m				TS	D			SILT; light brown. Dry, non-plastic.
					● 125/4 kPa asb/gl @ 0.40m		11	0.5		M	VSt		Clayey SILT; light brown. Very stiff, moist, low plasticity.
					● 81/32 kPa PID, 0.0ppm @ 0.50m						St		Silty CLAY; light brown mottled yellowish brown. Stiff, moist, medium plasticity.
					● 74/21 kPa asb/gl @ 0.90m			1.0					1.1m: sandy layer
	03/12/2020 inflow 1.6m, W/L after 45mins				● 56/19 kPa PID, 0.0ppm @ 1.00m		10						Clayey SILT; light brown mottled yellowish brown. Stiff, moist, low plasticity.
					● 58/19 kPa att/psd @ 1.45m			1.5		S	F-St		Sandy SILT; brown mottled yellowish brown. Firm to stiff, saturated, non-plastic.
					● 60/11 kPa asb/gl @ 1.90m			2.0					
					● 42/19 kPa					W	S-F		Clayey SILT; grey. Soft to firm, wet, medium plasticity.
Tauranga Group					● 66/16 kPa att/psd @ 2.45m		9	2.5					
					● 23/8 kPa asb/gl @ 2.70m								
					● 29/11 kPa			3.0					
					● 48/20 kPa		8				F		Clayey sandy SILT; grey. Firm, wet, low plasticity.
					● 50/20 kPa asb/gl @ 3.70m			3.5		M	St		Clayey SILT; grey. Stiff, moist, medium plasticity.
					● 56/19 kPa			4.0					Clayey sandy SILT; light grey. Stiff, moist, low plasticity.
					● 61/32 kPa		7			W			Sandy SILT; grey. Stiff, wet, non-plastic.
					● 25/11 kPa			4.5		M	F-St		Clayey SILT; grey. Firm to stiff, moist, medium plasticity.
					● 32/19 kPa asb/gl @								

COMMENTS: 26 Brigham Ck Rd. No core photograph, the soil is very similar to HA109

Hole Depth 7.25m

Scale 1:25

Rev.: A

HAND AUGER LOG

HOLE Id: **HA119**

SHEET: 2 OF 2

PROJECT: Watercare Whenuapai-Redhill GI	LOCATION: Whenuapai	JOB No.: 1014985.0000
CO-ORDINATES: (NZTM2000) 5926938.00 mN 1743195.90 mE	DRILL TYPE: 75 and 50 mm Hand auger	HOLE STARTED: 03/12/2020
	DRILL METHOD: HA+DCP	HOLE FINISHED: 03/12/2020
R.L.: 11.40m		DRILLED BY: GEOTECHNICS
DATUM: NZVD2016		LOGGED BY: RBE CHECKED: CBM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	Description and Additional Observations
Box 1, 1.0-5.2m Tauranga Group	[CONT] Clayey SILT; grey. Firm to stiff, moist, medium plasticity. 5.1m: some sand, minor organics
	end of handauger 5.2m Scala (blows per 100mm) 0,0,2,2,2,6,5,7,5,5, 5,6,6,6,8,12,13,12,10,13
	7.25m: Target depth

WATER | CORE RECOVERY (%) | METHOD | SCALA PENETROMETER (Blows/50mm) 0 2 4 6 8 10 12 14 16 18 | TESTS | SAMPLES | RL (m) | DEPTH (m) | GRAPHIC LOG | MOISTURE CONDITION / WEATHERING | STRENGTH/DENSITY CLASSIFICATION | SHEAR STRENGTH (kPa) 10 25 50 100 200

TESTS: 4.70m ● 54/13 kPa

RL (m): 6, 5, 4, 3, 2

DEPTH (m): 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5

COMMENTS: 26 Brigham Ck Rd. No core photograph, the soil is very similar to HA109

Hole Depth 7.25m

Scale 1:25

Rev.: A

Appendix C – Soil and Groundwater Analytical Results – Summary Tables

	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	NES SCS Health Rural Residential 10% produce [1]	NEPM Residential HIL A [2]	NES Commercial / Industrial Outdoor Worker (unpaved) [3]	NEPM Commercial / Industrial HIL D [4]	AUP (OP) Permitted Activity Soil Acceptance Criteria [5]	TP153 Volcanic Auckland Background Concentrations [6]	TP153 Non-Volcanic Auckland Background Concentrations [7]	WasteMINZ Soil Disposal Managed Fill Criteria[8]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [9]
Location	HA04	HA04	HA04	HA08	HA08	HA08	ENVR-SS03									
Sample	HA04 0m 02-Dec-2020 7:10 am	HA04 0.5m 02-Dec-2020 7:25 am	HA04 1m 02-Dec-2020 7:33 am	HA08-0.1m 24-Nov-2020	HA08-0.5m 24-Nov-2020	HA08-1.0m 24-Nov-2020	ENVR-SS03-0.1-0.2m 10-Nov-2020									
Date	2/12/2020	2/12/2020	2/12/2020	24/11/2020	24/11/2020	24/11/2020	10/11/2020									
Lab number	2486806.8	2486806.9	2486806.1	2481819.8	2481819.9	2481819.1	2470910.4									
Soil suite	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2									
Heavy Metals - Screen Level (mg/kg)																
Total Recoverable Arsenic	< 2	< 2	< 2	4	< 2	2	< 2	20	-	70	-	100	12		*17*	N/L
Total Recoverable Cadmium	0.34	< 0.10	< 0.10	0.18	< 0.10	< 0.10	< 0.10	3	-	1300	-	7.5	0.65		*0.8*	N/L
Total Recoverable Chromium	6	4	7	9	< 2	4	2	460	-	6,300	-	400	125	55	*290*	N/L
Total Recoverable Copper	9	2	5	21	4	5	20	>10,000	-	>10,000	-	325	90	45	*44*[A]	N/L
Total Recoverable Lead	7.3	6	9.3	11.3	3.7	5.9	7.5	210	-	3300	-	250	65		*60*[B]	N/L
Total Recoverable Mercury	< 0.10	< 0.10	0.11	< 0.10	< 0.10	0.22	< 0.10	310				0.75	0.45		*0.7*	N/L
Total Recoverable Nickel	< 2	< 2	4	8	< 2	2	< 2		400	-	6000	105	320	35	*310*	N/L
Total Recoverable Zinc	13	< 4	5	38	5	10	20		7400	-	400000	400	1160	180	*400*	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)
(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)
(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part
(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018
(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site									
Location	ENVR-SS04	ENVR-SS05	ENVR-HA101	ENVR-HA101	ENVR-HA101	HA107a	HA107a	HA107a	HA108									
Sample	ENVR-SS04-0.1-0.2m 10-Nov-2020	ENVR-SS05-0.1-0.2m 10-Nov-2020	ENVR - HA101 - 0.0-0.1m 04-Nov-2020	ENVR - HA101 - 0.5-0.6m 04-Nov-2020	ENVR - HA101 - 1.6-1.8m 04-Nov-2020	HA107a - 0.1m 04-Nov-2020	HA107a - 0.5m 04-Nov-2020	HA107a - 1.0m 04-Nov-2020	HA108 - 0.1m 03-Dec-2020									
Date	10/11/2020	10/11/2020	4/12/2020	4/12/2020	4/12/2020	4/11/2020	4/11/2020	4/11/2020	3/12/2020									
Lab number	2470910.8	2470910.12	2467662.5	2467662.6	2467662.8	2470943.1	2470943.2	2470943.3	2488783.9									
Soil suite	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2									
Heavy Metals - Screen Level (mg/kg)										**NES SCS Health Rural Residential 10% produce** [1]	**NEPM Residential HIL A** [2]	**NES Commercial / Industrial Outdoor Worker (unpaved)** [3]	**NEPM Commercial / Industrial HIL D** [4]	**AUP (OP) Permitted Activity Soil Acceptance Criteria** [5]	**TP153 Volcanic Auckland Background Concentrations** [6]	**TP153 Non-Volcanic Auckland Background Concentrations** [7]	**WasteMINZ Soil Disposal Managed Fill Criteria**[8]	**Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration** [9]
Total Recoverable Arsenic	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	20	-	70	-	100	12		*17*	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	0.16	< 0.10	< 0.10	0.15	< 0.10	< 0.10	0.16	3	-	1300	-	7.5	0.65		*0.8*	N/L
Total Recoverable Chromium	3	4	7	7	5	6	6	8	5	460	-	6,300	-	400	125	55	*290*	N/L
Total Recoverable Copper	35	42	10	9	6	19	5	11	10	>10,000	-	>10,000	-	325	90	45	*44*[A]	N/L
Total Recoverable Lead	7.8	10	5.3	10.7	8.5	4.9	5.7	12.5	3.7	210	-	3300	-	250	65		*60*[B]	N/L
Total Recoverable Mercury	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.13	< 0.10	310				0.75	0.45		*0.7*	N/L
Total Recoverable Nickel	4	6	< 2	< 2	2	< 2	< 2	< 2	< 2		400	-	6000	105	320	35	*310*	N/L
Total Recoverable Zinc	22	42	12	5	5	10	< 4	9	7		7400	-	400000	400	1160	180	*400*	N/L

Notes:

- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceedance of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adopted AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)
(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)
(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part
(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018
(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site	HAIL Site							
Location	HA108	HA108	HA109	HA109	HA109	HA114	HA114	HA114	HA115							
Sample	HA108 - 0.5m 03-Dec-2020	HA108 - 1.0m 03-Dec-2020	HA109 - 0.0m 03-Dec-2020 10:18 am	HA109 - 0.5m 03-Dec-2020 10:47 am	HA109 - 1.0m 03-Dec-2020 10:55 am	HA114 - 0.0m 03-Dec-2020 8:12 am	HA114 - 0.5m 03-Dec-2020 8:25 am	HA114 - 1.0m 03-Dec-2020 8:32 am	HA115 - 0.1m 03-Dec-2020							
Date	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020	3/12/2020							
Lab number	2488783.1	2488783.11	2488783.13	2488783.14	2488783.15	2488783.2	2488783.21	2488783.22	2488783.27							
Soil suite	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2	Soil suite 2							
Heavy Metals - Screen Level (mg/kg)										**NES SCS Health Rural Residential 10% produce** [1]	**NEPM Residential HIL A** [2]	**NES Commercial / Industrial Outdoor Worker (unpaved)** [3]	**NEPM Commercial / Industrial HIL D** [4]	**AUP (OP) Permitted Activity Soil Acceptance Criteria** [5]	**TP153 Volcanic Auckland Background Concentrations** [6]	**TP153 Non-Volcanic Auckland Background Concentrations** [7]	**WasteMINZ Soil Disposal Managed Fill Criteria**[8]	**Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration** [9]
Total Recoverable Arsenic	2	3	< 2	< 2	8	4	< 2	< 2	3	20	-	70	-	100	12		*17*	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	0.11	< 0.10	< 0.10	0.15	< 0.10	< 0.10	0.15	3	-	1300	-	7.5	0.65		*0.8*	N/L
Total Recoverable Chromium	8	8	6	8	11	11	8	10	15	460	-	6,300	-	400	125	55	*290*	N/L
Total Recoverable Copper	6	8	9	6	12	78	4	7	34	>10,000	-	>10,000	-	325	90	45	*44*[A]	N/L
Total Recoverable Lead	8.4	11.3	4.3	9.1	22	14.9	4.8	9.6	22	210	-	3300	-	250	65		*60*[B]	N/L
Total Recoverable Mercury	< 0.10	< 0.10	< 0.10	< 0.10	0.18	< 0.10	< 0.10	< 0.10	< 0.10	310				0.75	0.45		*0.7*	N/L
Total Recoverable Nickel	2	2	< 2	2	6	22	< 2	2	11		400	-	6000	105	320	35	*310*	N/L
Total Recoverable Zinc	5	6	8	6	10	53	4	7	57		7400	-	400000	400	1160	180	*400*	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:
(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)
(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)
(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part
(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018
(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

Soil Analytical Results
Summary of Reported Concentrations of Heavy Metals from HAIL Sites

	HAIL Site	HAIL Site	HAIL Site	HAIL Site									
Location	HA115	HA115	HA117	HA117									
Sample	HA115 - 0.5m 03-Dec-2020	HA115 - 1.0m 03-Dec-2020	HA117 0.1m 02-Dec-2020	HA117 0.5m 02-Dec-2020									
Date	3/12/2020	3/12/2020	2/12/2020	2/12/2020									
Lab number	2488783.28	2488783.29	2486806.28/ 2487331.36	2486806.29/ 2487331.37									
Soil suite	Soil suite 2	Soil suite 2	Heavy metals, VOCS, SVOCS, ONOPS, asbestos	Heavy metals, VOCS, SVOCS, ONOPS, asbestos									
Heavy Metals - Screen Level (mg/kg)					**NES SCS Health Rural Residential 10% produce** [1]	**NEPM Residential HIL A** [2]	**NES Commercial / Industrial Outdoor Worker (unpaved)** [5]	**NEPM Commercial / Industrial HIL D** [4]	**AUP (OP) Permitted Activity Soil Acceptance Criteria** [5]	**TP153 Volcanic Auckland Background Concentrations** [6]		**TP153 Non-Volcanic Auckland Background Concentrations** [7]	**WasteMINZ Soil Disposal Managed Fill Criteria**[8]	**Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration** [9]
Total Recoverable Arsenic	< 2	2	< 2	< 2	20	-	70	-	100		12		*17*	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	3	-	1300	-	7.5		0.65		*0.8*	N/L
Total Recoverable Chromium	7	10	7	7	460	-	6,300	-	400	125		55	*290*	N/L
Total Recoverable Copper	4	6	7	4	>10,000	-	>10,000	-	325	90		45	*44^*	N/L
Total Recoverable Lead	5.8	9.8	8.8	9.4	210	-	3300	-	250		65		*60[B]*	N/L
Total Recoverable Mercury	< 0.10	0.11	< 0.10	< 0.10	310				0.75		0.45		*0.7*	N/L
Total Recoverable Nickel	< 2	2	4	3		400	-	6000	105	320		35	*310*	N/L
Total Recoverable Zinc	7	8	11	7		7400	-	400000	400	1160		180	*400*	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mongedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:
(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)
(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)
(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part
(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018
(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	HAIL Site	HAIL Site	HAIL Site	HAIL Site									
Location	HA117	HA119	HA119	HA119									
Sample	HA117 2.0m 02-Dec-2020	HA119 - 0.0m 03-Dec-2020 12:30 pm	HA119 - 0.5m 03-Dec-2020 12:43 pm	HA119 - 1.0m 03-Dec-2020 12:50 pm									
Date	2/12/2020	3/12/2020	3/12/2020	3/12/2020									
Lab number	2486806.31	2488783.31	2488783.32	2488783.33									
Soil suite	Heavy metals, VOCS, SVOCS, ONOPS	Soil suite 2	Soil suite 2	Soil suite 2									
Heavy Metals - Screen Level (mg/kg)					**NES SCS Health Rural Residential 10% produce** [1]	**NEPM Residential HIL A** [2]	**NES Commercial / Industrial Outdoor Worker (unpaved)** [3]	**NEPM Commercial / Industrial HIL D** [4]	**AUP (OP) Permitted Activity Soil Acceptance Criteria** [5]	**TP153 Volcanic Auckland Background Concentrations** [6]	**TP153 Non-Volcanic Auckland Background Concentrations** [7]	**WasteMINZ Soil Disposal Managed Fill Criteria**[8]	**Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration** [9]
Total Recoverable Arsenic	< 2	< 2	< 2	< 2	20	-	70	-	100	12		*17*	N/L
Total Recoverable Cadmium	< 0.10	0.23	< 0.10	< 0.10	3	-	1300	-	7.5	0.65		*0.8*	N/L
Total Recoverable Chromium	6	6	9	6	460	-	6,300	-	400	125	55	*290*	N/L
Total Recoverable Copper	5	9	6	4	>10,000	-	>10,000	-	325	90	45	*44*[A]	N/L
Total Recoverable Lead	12.5	4.2	8.7	7.1	210	-	3300	-	250	65		*60*[B]	N/L
Total Recoverable Mercury	< 0.10	< 0.10	< 0.10	< 0.10	310				0.75	0.45		*0.7*	N/L
Total Recoverable Nickel	< 2	< 2	< 2	< 2		400	-	6000	105	320	35	*310*	N/L
Total Recoverable Zinc	5	8	5	< 4		7400	-	400000	400	1160	180	*400*	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceednace of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:
(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)
(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)
(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part
(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018
(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce (1)	NEPM Residential HIL A (2)	NES Commercial / Industrial Outdoor Worker (unpaved) (1)	NEPM Commercial / Industrial HIL D (2)	AUP (OP) Permitted Activity Soil Acceptance Criteria (4)	TP153 Volcanic Auckland Background Concentrations (5)	TP153 Non-Volcanic Auckland Background Concentrations (5)	WasteMINZ Soil Disposal Managed Fill Criteria (6)	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration (9)
Location	BH05A	BH05A	BH05A	BH06	BH06	BH06	HA03	HA03	HA03	HA03	BH07	BH07									
Sample	BH05a - 0.1m 17-Nov-2020	BH05a - 1.0m 17-Nov-2020	BH05a - 2.0m 17-Nov-2020	BH06 - 0.1-0.3m 19-Nov-2020	BH06 - 0.35-0.6m 19-Nov-2020	BH06 - 1.0-1.2m 19-Nov-2020	HA03 0m 02-Dec-2020 9:25 am	HA03 0.5m 02-Dec-2020 9:32 am	HA03 1m 02-Dec-2020 9:41 am	BH07 - 0.1-0.4m 20-Nov-2020	BH07 - 0.5-0.65m 20-Nov-2020	BH07 - 1.0-1.35m 20-Nov-2020									
Date	17/11/2020	17/11/2020	17/11/2020	19/11/2020	19/11/2020	19/11/2020	2/12/2020	2/12/2020	2/12/2020	20/11/2020	20/11/2020	20/11/2020									
Lab number	2478987.2/ 2479565.1	2478987.3/ 2479565.2	2478987.4/ 2479563.3	2478987.9/ 2479563.7	2478987.10/ 2479563.8	2478987.11/ 2479563.9	2488906.1/ 2487331.1	2488906.2/ 2487331.2	2488906.3/ 2487331.3	2478987.11/ 2479565.15	2478987.18/ 2479563.16	2478987.19/ 2479563.17									
Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3									
Heavy Metals - Screen Level (mg/kg)																					
Total Recoverable Arsenic	< 2	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	20	-	70	-	100	12		17	NIL
Total Recoverable Cadmium	< 0.10	< 0.10	< 0.10	0.33	< 0.10	< 0.10	0.49	< 0.10	< 0.10	0.21	< 0.10	< 0.10	3	-	1300	-	7.5	0.65		0.8	NIL
Total Recoverable Chromium	8	7	7	5	3	4	6	5	4	3	3	8	460	-	6,300	-	400	125	55	280	NIL
Total Recoverable Copper	22	5	6	9	4	7	8	< 2	< 2	3	3	3	>10,000	-	>10,000	-	325	90	45	44[4]	NIL
Total Recoverable Lead	6.1	9.5	9	7.7	11.5	11.6	7.1	6.7	5.9	4.1	6.4	7.1	210	-	3300	-	250	65		68[4]	NIL
Total Recoverable Mercury	< 0.10	< 0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10	0.14	< 0.10	< 0.10	< 0.10	< 0.10	310	-			0.75	0.45		0.7	NIL
Total Recoverable Nickel	16	< 2	< 2	3	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2		400	-	6000	105	320	35	310	NIL
Total Recoverable Zinc	23	6	4	6	< 4	< 4	13	< 4	< 4	< 4	< 4	< 4		7400	-	400000	400	1160	180	400	NIL

Notes:

- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceedance of the adopted Class 4 WasteMINZ Managed Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)
(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)
(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part
(6 & 7) - Volcanic and non-volcanic adground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce [1]	NEPM Residential HIL A [2]	NES Commercial / Industrial Outdoor Worker (unpaved) [3]	NEPM Commercial / Industrial HIL D [4]	AUP (OP) Permitted Activity Soil Acceptance Criteria [5]	TP153 Volcanic Auckland Background Concentrations [6]	TP153 Non-Volcanic Auckland Background Concentrations [7]	WasteMINZ Soil Disposal Managed Fill Criteria [8]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [9]
Location	BH08	BH08	BH08	HA05	HA05	HA05	HA06	HA06	HA06	HA07	HA07	HA07									
Sample	0.1	0.5	1	HA05 - 0m 01-Dec-2020 1:15 pm	HA05 - 0.5m 01-Dec-2020 1:30 pm	HA05 - 1.0m 01-Dec-2020 1:36 pm	HA06 - 0m 01-Dec-2020 10:45 am	HA06 - 0.4-0.6m 01-Dec-2020 11:00 am	HA06 - 1.0m 01-Dec-2020 11:12 am	HA07 - 0.1m 01-Dec-2020	HA07 - 0.5m 01-Dec-2020	HA07 - 1.0m 01-Dec-2020									
Date	BH08-0.1m	BH08-0.5m	BH08-1.0m	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020									
Lab number	2481161.1/ 2480946.1	2481161.2/ 2480946.2	2481161.3/ 2480946.3	2486812.2/ 2487331.11	2486812.3	2486812.4/ 2487331.12	2486812.9/ 2487331.16	2486812.10	2486812.11/ 2487331.17	2486812.19/ 2487331.21	2486812.17/ 2487331.22	2486812.18/ 2487331.23									
Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3									
Heavy Metals - Screen Level (mg/kg)																					
Total Recoverable Arsenic	7	< 2	< 2	2	< 2	< 2	8	5	2	4	2	< 2	20	-	70	-	100		12	17	NIL
Total Recoverable Cadmium	< 0.10	< 0.10	< 0.10	0.1	< 0.10	< 0.10	0.29	< 0.10	< 0.10	0.17	< 0.10	< 0.10	3	-	1300	-	7.5		0.65	0.8	NIL
Total Recoverable Chromium	101	5	3	6	8	7	13	21	11	9	7	15	460	-	6,300	-	400	125	55	280	NIL
Total Recoverable Copper	66	6	3	43	3	2	26	10	16	31	6	5	>10,000	-	>10,000	-	325	90	45	44[A]	NIL
Total Recoverable Lead	11.3	11.9	6.3	20	9.2	5.5	21	26	24	15.7	13.8	8.5	210	-	3300	-	250		65	60[A]	NIL
Total Recoverable Mercury	0.1	0.11	< 0.10	< 0.10	0.16	< 0.10	0.13	0.19	0.3	< 0.10	0.1	0.16	310	-			0.75		0.45	0.7	NIL
Total Recoverable Nickel	51	< 2	< 2	8	3	< 2	7	11	9	6	2	3		400	-	6000	105	320	35	210	NIL
Total Recoverable Zinc	18	4	< 4	40	< 4	< 4	42	12	5	49	5	5		7400	-	400000	400	1160	180	400	NIL

Notes:

- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceedance of the adopted Class 4 WasteMINZ Managed Fill Criteria*
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 2) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)
(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)
(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part
(6 & 7) - Volcanic and non-volcanic adground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce [1]	NEPM Residential HIL A [2]	NES Commercial / Industrial Outdoor Worker (unpaved) [2]	NEPM Commercial / Industrial HIL D [2]	AUP (OP) Permitted Activity Soil Acceptance Criteria [4]	TP153 Volcanic Auckland Background Concentrations [4]	TP153 Non-Volcanic Auckland Background Concentrations [7]	WasteMINZ Soil Disposal Managed Fill Criteria [8]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [9]
Location	ENVR-HA03	ENVR-HA03	ENVR-HA03	ENVR-HA04	ENVR-HA04	ENVR-HA04	ENVR-HA05	ENVR-HA05	ENVR-HA05	ENVR-HA05	BH110	BH110	BH110	BH111								
Sample	ENVR-HA03-0.0-0.1m 10-Nov-2020	ENVR-HA03-0.5m 10-Nov-2020	ENVR-HA03-1.0m 10-Nov-2020	ENVR-HA04-0.0-0.1m 10-Nov-2020	ENVR-HA04-0.5m 10-Nov-2020	ENVR-HA04-1.0m 10-Nov-2020	ENVR-HA05-0.0-0.1m 10-Nov-2020	ENVR-HA05-0.5m 10-Nov-2020	ENVR-HA05-1.0m 10-Nov-2020	BH110.0.1-0.35m 13-Nov-2020	BH110.0.5-0.75m 13-Nov-2020	BH110.0.9-1.15m 13-Nov-2020	BH111-0.05-0.2m 10-Nov-2020									
Date	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	13/11/2020	13/11/2020	13/11/2020	10/11/2020									
Lab number	2470910.1/ 2471363.1	2470910.2/ 2471363.2	2470910.3/ 2471363.3	2470910.5/ 2471363.5	2470910.6/ 2471363.6	2470910.7/ 2471363.7	2470910.9/ 2471363.9	2470910.10/ 2471363.10	2470910.11/ 2471363.11	2474527.1/ 2474175.1	2474527.2/ 2474175.2	2474527.3/ 2474175.3	2472606.1/ 2473434.1									
Soil suite	Soil suite 3 + OCPs	Soil suite 3	Soil suite 3	Soil suite 3 + OCPs	Soil suite 3	Soil suite 3	Soil suite 3 + OCP	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3									
Heavy Metals - Screen Level (mg/kg)																						
Total Recoverable Arsenic	< 2	< 2	< 2	< 5	2	< 2	< 2	< 2	< 2	< 2	5	< 2	< 2	20	-	70	-	100	12		17	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.15	< 0.10	< 0.10	0.31	3	-	1300	-	7.5	0.65		0.8	N/L
Total Recoverable Chromium	3	3	7	< 5	7	5	5	5	6	5	8	6	7	460	-	6,300	-	400	125	55	290	N/L
Total Recoverable Copper	24	< 2	2	12	2	2	16	5	4	2	5	4	4	>10,000	-	>10,000	-	325	90	45	44[A]	N/L
Total Recoverable Lead	7.6	3.3	6.6	31	10.6	8.9	7.1	5.6	8.2	6.1	11.2	6.4	7	210	-	3300	-	250		65	60[A]	N/L
Total Recoverable Mercury	< 0.10	0.24	0.25	< 0.3	0.2	0.17	< 0.10	0.18	0.21	< 0.10	< 0.10	< 0.10	< 0.10	310	-		-	0.75		0.45	0.7	N/L
Total Recoverable Nickel	3	< 2	< 2	< 5	< 2	3	2	< 2	4	< 2	3	< 2	< 2		400		6000	105	320	35	210	N/L
Total Recoverable Zinc	18	< 4	5	17	< 4	< 4	30	5	11	6	5	< 4	11		7400	-	400000	400	1160	180	400	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- *Italic values represent an exceedance of the adopted Class 4 WasteMINZ Managed Fill Criteria*
- * values represent concentrations reported above both the adopted AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)

(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part

(6 & 7) - Volcanic and non-volcanic adground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site							
Location	BH11A	BH11A	BH113/ ENVR-HA102	BH113/ ENVR-HA102	BH113/ ENVR-HA102	HA110a	HA110a	HA110a	HA110a	HA111	HA111	HA113	HA112						
Sample	BH11A-0.4-0.7m 13-Nov-2020	BH11A-1.0-1.3m 13-Nov-2020	BH113 - 0.1m 09-Nov-2020	BH113 - 0.5m 09-Nov-2020	BH113 - 2.0m 09-Nov-2020	HA110a - 0.1m 08-Dec-2020	HA110a - 0.5m 08-Dec-2020	HA110a - 2.0m 08-Dec-2020	HA110a - 2.0m 07-Dec-2020	HA111-0.1m 07-Dec-2020	HA111-1.0m 07-Dec-2020	HA111-2.0m 07-Dec-2020	HA112 0.1m 02-Dec-2020						
Date	13/11/2020	13/11/2020	9/11/2020	9/11/2020	9/11/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	7/12/2020	7/12/2020	7/12/2020	2/12/2020						
Lab number	2474175.9/ 2474527.8	2474175.9/ 2474527.9	2470943.5	2470943.6	2470943.7	2497172.1/ 2492195.1	2497172.2/ 2492195.2	2497172.4/ 2492195.4	2490377.1/ 2486833.1	2490377.3/ 2486833.3	2490377.4/ 2486833.4	2490377.5/ 2486833.5	2486806.15						
Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3						
Heavy Metals - Screen Level (mg/kg)														**AES SCS Health Rural Residential 10% produce** [1]	**NEPM Residential HIL A** [2]	**NES Commercial / Industrial Outdoor Worker (unpaved)** [3]	**NEPM Commercial / Industrial HIL D** [4]	**AUP (OP) Permitted Activity Soil Acceptance Criteria** [5]	**TP153 Volcanic Auckland Background Concentrations** [6]	**TP153 Non-Volcanic Auckland Background Concentrations** [7]	**WasteMINZ Soil Disposal Managed Fill Criteria**[8]	**Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration** [9]
Total Recoverable Arsenic	< 2	< 2	< 2	< 2	< 2	< 2	< 2	2	7	3	4	5		20	-	70	-	100	12		17	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.24	< 0.10	< 0.10	< 0.10		3	-	1000	-	7.5	0.65		0.8	N/L
Total Recoverable Chromium	5	4	6	7	5	7	10	10	14	10	12	9		460	-	6,300	-	400	125	55	290	N/L
Total Recoverable Copper	5	5	11	6	8	4	8	10	16	10	13	3		>10,000	-	>10,000	-	325	90	45	44 [A]	N/L
Total Recoverable Lead	8.1	11.2	4.2	6.7	9.8	7.8	13.2	10.9	19.3	12.1	13.1	7.1		210	-	3300	-	200	65		60[B]	N/L
Total Recoverable Mercury	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.13	0.21	0.15	0.42	0.13	0.14	< 0.10		310				0.75	0.45		0.7	N/L
Total Recoverable Nickel	< 2	< 2	< 2	< 2	< 2	2	4	4	5	3	4	< 2			400		6000	105	320	35	210	N/L
Total Recoverable Zinc	5	< 4	8	5	5	6	12	8	18	14	18	7			7400	-	400000	400	1160	180	400	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.
- Italic values represent an exceedance of the adopted Class 4 WasteMINZ Managed Fill Criteria
- * values represent concentrations reported above both the adoped AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil -National Environment Protection Measure 1999 (revised 2013)

(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part

(6 & 7) - Volcanic and non-volcanic adground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site							
Location	HA112	HA112	HA113	HA113	HA113	BH116	BH116	BH116	BH117	BH117	BH117	BH117	HA116	HA116	HA116							
Sample	HA112 1.8m 02-Dec-2020	HA112 2.0m 02-Dec-2020	HA113 0m 02-Dec-2020 11:45 am	HA113 0.5m 02-Dec-2020 12:00 pm	HA113 1.0m 02-Dec-2020 12:07 pm	BH116 - 0.1m 02-Nov-2020	BH116 - 0.5m 02-Nov-2020	BH116 - 2.0m 02-Nov-2020	BH117 - 0.1m 09-Nov-2020	BH117 - 0.5m 09-Nov-2020	BH117 - 2.0m 09-Nov-2020	HA116 0m 02-Dec-2020 1:10 pm	HA116 0.5m 02-Dec-2020 1:17 pm	HA116 1.0m 02-Dec-2020 1:23 pm								
Date	2/12/2020	2/12/2020	2/12/2020	2/12/2020	2/12/2020	2/11/2020	2/11/2020	2/11/2020	9/11/2020	9/11/2020	9/11/2020	2/12/2020	2/12/2020	2/12/2020								
Lab number	2486806.18	2486806.19	2486806.2/ 2467331.3	2486806.21/ 2467331.31	2486806.22/ 2467331.32	2467662.1/ 2471441.8	2467662.2/ 2471441.9	2467662.4/ 2471441.10	2470943.9/ 2471441.14	2470943.9/ 2471441.15	2470943.10/ 2471441.16	2486806.24/ 2467331.33	2486806.25/ 2467331.34	2486806.26/ 2467331.35								
Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3								
Heavy Metals - Screen Level (mg/kg)																**NES SCS Health Rural Residential 10% produce** [1]	**NEPM Residential HIL A** [2]	**NES Commercial / Industrial Outdoor Worker (unpaved)** [1]	**NEPM Commercial / Industrial HIL D** [2]	**AUP (OP) Permitted Activity Soil Acceptance Criteria** [5]	**TP153 Volcanic Auckland Background Concentrations** [3]	**TP153 Non-Volcanic Auckland Background Concentrations** [3]	**WasteMINZ Soil Disposal Managed Fill Criteria**[4]	**Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration** [9]
Total Recoverable Arsenic	< 2	< 2	< 2	< 2	< 2	3	4	< 2	< 2	< 2	< 2	< 2	2	< 2	< 2	20	-	70	-	100	12	*17*	N/L
Total Recoverable Cadmium	< 0.10	< 0.10	0.29	< 0.10	< 0.10	0.1	< 0.10	< 0.10	0.26	< 0.10	< 0.10	0.28	< 0.10	< 0.10	*0.65*	1	-	1300	-	7.5	0.65	*0.8*	N/L
Total Recoverable Chromium	6	6	8	5	7	10	12	6	5	4	2	8	4	4	*260*	460	-	6,300	-	400	125	55	*290*	N/L
Total Recoverable Copper	4	3	5	< 2	4	14	22	7	5	< 2	2	9	2	5	*45*	>10,000	-	>10,000	-	325	90	45	*44*[8]	N/L
Total Recoverable Lead	6.7	5.9	11	4.4	7.7	11.9	11.3	7.7	10.8	5.3	3.9	16.3	4.4	8.4	*210*	210	-	3300	-	250	65	*210*	*80*[8]	N/L
Total Recoverable Mercury	0.13	0.11	< 0.10	< 0.10	< 0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	*0.30*	310	-	-	-	0.75	0.45	*0.7*	N/L
Total Recoverable Nickel	< 2	< 2	< 2	< 2	< 2	5	10	< 2	2	< 2	2	5	< 2	< 2	*35*	-	400	-	6000	105	320	*35*	*210*	N/L
Total Recoverable Zinc	5	5	13	< 4	4	20	30	6	11	< 4	24	19	< 4	< 4	*180*	-	7400	-	400000	400	1160	*180*	*400*	N/L

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Underlined values indicate an exceedance of non-volcanic background concentrations in alluvial soils sampled.*
- *Italic values represent an exceedance of the adopted Class 4 WasteMINZ Managed fill Criteria*
- * values represent concentrations reported above both the adopted AUP (OP) environmental criteria and background concentrations.
- Note A: concentrations greater of 44 mg/kg and soil background. In this case the regional background concentration will apply.
- Note B: concentrations greater of 60 mg/kg and soil background. In this case the regional background concentration will apply.
- N/L: no limit set

Guidelines References:

(1 & 3) - values taken from Table B2 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(2 & 4) - values taken from Schedule B1 Table 1A of Guideline on Investigation Levels for Soil - National Environment Protection Measure 1999 (revised 2013)

(5) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan - Operative in Part

(6 & 7) - Volcanic and non-volcanic ackground values taken from Table E30.6.1.4.2 of Auckland Unitary Plan (Operative in Part) and Table 3 of Technical Publication 153. The adopted values for Arsenic, Cadmium, Lead and Mercury concentrations apply to both volcanic and non-volcanic soils. The adopted values for Chromium, Copper, Nickel and Zinc concentrations are based on samples collected from residual Puketoka Formation. However, non-volcanic concentrations have been considered for samples collected from shallow alluvium along the alignment.

(8) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(9) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

			Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce [1]	NES Commercial / Industrial Outdoor Worker (unpaved) [2]	AUP Permitted Activity Soil Acceptance Criteria [3]	MfE OIG Residential - Silty Clay - <1m - All Pathways [4]	MfE OIG Maintenance / Excavation - Silty Clay - surface soil - All Pathways [5]	MfE OIG Protection of Groundwater - Quality Silty Clay GW 4m [6]	WasteMINZ Soil Disposal Managed Fill Criteria[7]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [8]
		Location	BH05A	BH05A	BH05A	BH06	BH06	BH06	HA03	HA03	HA03	HA03	BH07	BH07	BH07							
		Sample	BH05a - 0.1m 17-Nov-2020	BH05a - 1.0m 17-Nov-2020	BH05a - 2.0m 17-Nov-2020	BH06 - 0.1-0.3m 19-Nov-2020	BH06 - 0.35-0.6m 19-Nov-2020	BH06 - 1.0-1.2m 19-Nov-2020	HA03 0m 02-Dec-2020 9:25 am	HA03 0.5m 02-Dec-2020 9:32 am	HA03 1m 02-Dec-2020 9:41 am	HA03 2m 02-Dec-2020	BH07 - 0.1-0.4m 20-Nov-2020	BH07 - 0.5-0.65m 20-Nov-2020	BH07 - 1.0-1.35m 20-Nov-2020							
		Date	17/11/2020	17/11/2020	17/11/2020	19/11/2020	19/11/2020	19/11/2020	2/12/2020	2/12/2020	2/12/2020	2/12/2020	20/11/2020	20/11/2020	20/11/2020							
		Lab number	2478987.2/ 2479563.1	2478987.3/ 2479563.2	2478987.4/ 2479563.3	2478987.9/ 2479563.7	2478987.10/ 2479563.8	2478987.11/ 2479563.9	2486606.1/ 2487331.1	2486606.2/ 2487331.2	2486606.3/ 2487331.3	2486606.4/ 2487331.4	2478987.17/ 2479563.15	2478987.18/ 2479563.16	2478987.19/ 2479563.17							
		Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3							
Hydrocarbons		Maximum Reported Concentrations (mg/kg)																				
Total Petroleum Hydrocarbons in Soil (mg/kg)	C_7 - C_9	**0**	< 9	< 9	< 10	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 9				2,700[2,v]	20,000	NA[2,2]	*220*	500
	C_{10} - C_{14}	**69**	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20				(560)[1,v]	NA[2,1]	NA[2,2]	*58*	510
	C_{15} - C_{36}	**2300**	< 40	< 40	< 40	< 40	< 40	< 40	57	< 40	< 40	< 40	< 40	< 40	< 40				NA[2,2]	NA[2,1]	NA[2,2]		20,000
	Total hydrocarbons (C_7 - C_{36})	**2300**	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70								
Polycyclic Aromatic Hydrocarbons Screening in Soil (mg/kg)	Total of Reported PAHs in Soil	**9.5**	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4	< 0.3	< 0.4	< 0.4	< 0.3	< 0.3	< 0.3	< 0.3	< 0.4								200
	1-Methylnaphthalene	**0**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	2-Methylnaphthalene	**0**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Acenaphthylene	**0.065**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Acenaphthene	**0.02**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Anthracene	**0.123**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Benzo[a]anthracene	**0.74**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Benzo[a]pyrene (BAP)	**0.94**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	**1.37**	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04	< 0.04	< 0.04	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	10	35	20	0.27[5]	25	NA[2,2]	2	
	Benzo[a]pyrene Toxic Equivalence (TEF)	**1.36**	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04	< 0.03	< 0.04	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04								
	Benzo[b]fluoranthene + Benzo[j]fluoranthene	**1.01**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Benzo[e]pyrene	**0.65**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Benzo[g,h,i]perylene	**0.72**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Benzo[k]fluoranthene	**0.38**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Chrysene	**0.7**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Dibenzo(a,h)anthracene	**0.132**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Fluoranthene	**1.19**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Fluorene	**0.016**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Indeno(1,2,3-c,d)pyrene	**0.68**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Naphthalene	**0**	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.06	< 0.06	< 0.07				69[5]	NA[2,1]	NA[2,2]		
	Perylene	**0.24**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Phenanthrene	**0.38**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014								
	Pyrene	**1.48**	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.014	< 0.013	< 0.013	< 0.012	< 0.012	< 0.014				(1,600)[4,p]	NA[2,1]	NA[2,2]		

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Italic values represent an exceedance of the adopted Class 4 WasteMINZ Managedfill Criteria*
- **Bold values represent concentrations report above the laboratory detection limit.**
- [1,4] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- [4,4] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- (2.1) NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site. For protection of groundwater quality i.e. 20,000 mg/kg for TPH, 10,000 mg/kg for other contaminants).
- (2.2) NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.
- v: volatilisation
- p: produce
- x: PAH surrogate
- m: maintenance/excavation
- PQL: Practical Quantitation Limit - laboratory detction limit.

Guidelines References:
(1 & 2) - values taken from Table B3 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)
(3) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan Operative in Part
(4) - values taken from Tables 4.10 and 4.13 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)
(5) - values taken from Table 4.19 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)
(6) - values taken from Table 4.20 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)
(7) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(8) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

			Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce [1]	NES Commercial / Industrial Outdoor Worker (unpaved) [2]	AUP Permitted Activity Soil Acceptance Criteria [3]	MfE OIG Residential - Silty Clay - <1m - All Pathways [4]	MfE OIG Maintenance / Excavation - Silty Clay - surface soil - All Pathways [5]	MfE OIG Protection of Groundwater Quality Silty Clay GW 4m [6]	WasteMINZ Soil Disposal Managed Fill Criteria[7]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [8]
		Location	BH08	BH08	BH08	HA05	HA05	HA05	HA06	HA06	HA06	HA06	HA07	HA07	HA07	ENVR-HA02	ENVR-HA03								
		Sample	0.1	0.5	1	HA05 - 0m 01-Dec-2020 1.15 pm	HA05 - 0.5m 01-Dec-2020 1.30 pm	HA05 - 1.0m 01-Dec-2020 1.36 pm	HA06 - 0m 01-Dec-2020 10.45 am	HA06 - 0.4-0.6m 01-Dec-2020 11.00 am	HA06 - 1.0m 01-Dec-2020 11.12 am	HA07 - 0.1m 01-Dec-2020	HA07 - 0.1m 01-Dec-2020	HA07 - 0.5m 01-Dec-2020	HA07 - 1.0m 01-Dec-2020	ENVR-HA02-0.0-0.1m 10-Nov-2020	ENVR-HA03-0.5m 10-Nov-2020								
		Date	BH08-0.1m	BH08-0.5m	BH08-1.0m	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	1/12/2020	10/11/2020	10/11/2020								
		Lab number	2481161.1/ 2480946.1	2481161.2/ 2480946.2	2481161.3/ 2480946.3	2486812.2/ 2487331.11	2486812.3	2486812.4/ 2487331.12	2486812.9/ 2487331.16	2486812.10	2486812.11/ 2487331.17	2486812.16/ 2487331.21	2486812.17/ 2487331.22	2486812.18/ 2487331.23	2470910.1/ 2471363.1	2470910.2/ 2471363.2								
		Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3 + OCPs	Soil suite 3								
Hydrocarbons		Maximum Reported Concentrations (mg/kg)																						
Total Petroleum Hydrocarbons in Soil (mg/kg)	C_7 - C_9	0	< 9	< 8	< 8	< 8	< 8	< 9	< 10	< 9	< 9	< 8	< 8	< 10	< 8	< 8				2,700[2,4]	20,000	NA[2.2]	120	500
	C_{10} - C_{14}	69	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20				(560)[2v]	NA[2.1]	NA[2.2]	58	510
	C_{15} - C_{36}	2300	< 40	< 40	< 40	123	< 40	< 40	55	< 40	< 40	< 40	< 40	< 40	< 40	< 40				NA[2.2]	NA[2.1]	NA[2.2]		20,000
	Total hydrocarbons (C_7 - C_{36})	2300	< 70	< 70	< 70	126	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70								
Polycyclic Aromatic Hydrocarbons Screening in Soil (mg/kg)	Total of Reported PAHs in Soil	9.5	< 0.4	< 0.4	< 0.4	9.5	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.3								200
	1-Methylnaphthalene	0	< 0.014	< 0.014	< 0.013	< 0.012	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	2-Methylnaphthalene	0	< 0.014	< 0.014	< 0.013	< 0.012	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Acenaphthylene	0.065	< 0.014	< 0.014	< 0.013	0.065	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Acenaphthene	0.02	< 0.014	< 0.014	< 0.013	0.02	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Anthracene	0.123	< 0.014	< 0.014	< 0.013	0.123	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Benzo[a]anthracene	0.74	< 0.014	< 0.014	< 0.013	0.74	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Benzo[a]pyrene (BAP)	0.94	< 0.014	< 0.014	< 0.013	0.94	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	< 0.04	< 0.04	< 0.04	1.37	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.03								
	Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	< 0.04	< 0.04	< 0.04	1.36	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.03								
	Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	< 0.014	< 0.014	< 0.013	1.01	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Benzo[e]pyrene	0.65	< 0.014	< 0.014	< 0.013	0.65	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Benzo[g,h,i]perylene	0.72	< 0.014	< 0.014	< 0.013	0.72	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Benzo[k]fluoranthene	0.38	< 0.014	< 0.014	< 0.013	0.38	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Chrysene	0.7	< 0.014	< 0.014	< 0.013	0.7	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Dibenz(a,h)anthracene	0.132	< 0.014	< 0.014	< 0.013	0.132	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Fluoranthene	1.19	< 0.014	< 0.014	< 0.013	1.19	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Fluorene	0.016	< 0.014	< 0.014	< 0.013	0.016	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Indeno(1,2,3-c,d)pyrene	0.68	< 0.014	< 0.014	< 0.013	0.68	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Naphthalene	0	< 0.07	< 0.07	< 0.07	< 0.06	< 0.07	< 0.08	< 0.08	< 0.07	< 0.08	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07				69[4]	NA[2.1]	NA[2.2]		
	Perylene	0.24	< 0.014	< 0.014	< 0.013	0.24	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Phenanthrene	0.38	< 0.014	< 0.014	< 0.013	0.38	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
	Pyrene	1.48	< 0.014	< 0.014	< 0.013	1.48	< 0.014	< 0.015	< 0.016	< 0.014	< 0.015	< 0.014	< 0.014	< 0.016	< 0.013	< 0.013								
																	10	35	20	0.27[4v]	25	NA[2.2]	2	
																				(1,600)[4v]	NA[2.1]	NA[2.2]		

Notes:

- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Italic values represent an exceedance of the adopted Class 4 WasteMINZ Managed fill Criteria*
- **Bold values represent concentrations report above the laboratory detection limit.**
- [2,4] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- [4v] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- (2.1) NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site. For protection of groundwater quality i.e. 20,000 mg/kg for TPH, 10,000 mg/kg for other contaminants).
- (2.2) NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.
- v: volatisation
- p: produce
- x: PAH surrogate
- m: maintenance/excavation
- PQL: Practical Quantitation Limit - laboratory detction limit.

Guidelines References:

(1 & 2) - values taken from Table B3 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(3) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan Operative in Part

(4) - values taken from Tables 4.10 and 4.13 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(5) - values taken from Table 4.19 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(6) - values taken from Table 4.20 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(7) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(8) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

			Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce [1]	NES Commercial / Industrial Outdoor Worker (unpaved) [2]	AUP Permitted Activity Soil Acceptance Criteria [3]	MfE OIG Residential - Silty Clay - <1m - All Pathways [4]	MfE OIG Maintenance / Excavation - Silty Clay - surface soil - All Pathways [5]	MfE OIG Protection of Groundwater - Quality Silty Clay GW 4m [6]	WasteMINZ Soil Disposal Managed Fill Criteria[7]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [8]
		Location	ENVR-HA03	ENVR-HA04	ENVR-HA04	ENVR-HA04	ENVR-HA05	ENVR-HA05	ENVR-HA05	BH110	BH110	BH110	BH111	BH111A								
		Sample	ENVR-HA03-1.0m 10-Nov-2020	ENVR-HA04-0.0-0.1m 10-Nov-2020	ENVR-HA04-0.5m 10-Nov-2020	ENVR-HA04-1.0m 10-Nov-2020	ENVR-HA05-0.0-0.1m 10-Nov-2020	ENVR-HA05-0.5m 10-Nov-2020	ENVR-HA05-1.0m 10-Nov-2020	BH110-0.1-0.35m 13-Nov-2020	BH110-0.5-0.75m 13-Nov-2020	BH110-0.9-1.15m 13-Nov-2020	BH111-0.05-0.2m 10-Nov-2020	BH111A-0.4-0.7m 13-Nov-2020								
		Date	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	10/11/2020	13/11/2020	13/11/2020	13/11/2020	10/11/2020	13/11/2020								
		Lab number	2470910.3/ 2471363.3	2470910.5/ 2471363.5	2470910.6/ 2471363.6	2470910.7/ 2471363.7	2470910.9/ 2471363.9	2470910.10/ 2471363.10	2470910.11/ 2471363.11	2474527.1/ 2474175.1	2474527.2/ 2474175.2	2474527.3/ 2474175.3	2472606.1/ 2473434.1	2474175.8/ 2474527.8								
		Soil suite	Soil suite 3	Soil suite 3 + OCPs	Soil suite 3	Soil suite 3	Soil suite 3 + OCP	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3								
Hydrocarbons		Maximum Reported Concentrations (mg/kg)																				
Total Petroleum Hydrocarbons in Soil (mg/kg)	$C_7 - C_9$	**0**	< 9	< 11	< 10	< 9	< 8	< 8	< 8	< 8	< 9	< 8	< 9	< 8				2,700[2,v]	20,000	NA[2,2]	*120*	500
	$C_{10} - C_{14}$	**69**	< 20	**69**	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20				(560)[2,v]	NA[2,1]	NA[2,2]	*58*	510
	$C_{15} - C_{36}$	**2300**	< 40	2,300	< 40	46	< 40	108	< 40	< 40	< 40	< 40	53	< 40				NA[2,2]	NA[2,1]	NA[2,2]		20,000
	Total hydrocarbons ($C_7 - C_{36}$)	**2300**	< 70	2,300	< 70	< 70	< 70	110	< 70	< 70	< 70	< 70	< 70	< 70								
Polycyclic Aromatic Hydrocarbons Screening in Soil (mg/kg)	Total of Reported PAHs in Soil	**9.5**	< 0.4	< 0.5	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4	< 0.3	< 0.4	< 0.4	< 0.4	< 0.4								200
	1-Methylnaphthalene	**0**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	2-Methylnaphthalene	**0**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Acenaphthylene	**0.065**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Acenaphthene	**0.02**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Anthracene	**0.123**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Benzo[a]anthracene	**0.74**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Benzo[a]pyrene (BAP)	**0.94**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	**1.37**	< 0.04	< 0.05	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	10	35	20	0.27[5]	25	NA[2,2]	2	
	Benzo[a]pyrene Toxic Equivalence (TEF)	**1.36**	< 0.04	< 0.05	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04								
	Benzo[b]fluoranthene + Benzo[j]fluoranthene	**1.01**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Benzo[e]pyrene	**0.65**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Benzo[g,h,i]perylene	**0.72**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Benzo[k]fluoranthene	**0.38**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Chrysene	**0.7**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Dibenzo(a,h)anthracene	**0.132**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Fluoranthene	**1.19**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Fluorene	**0.016**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Indeno(1,2,3-c,d)pyrene	**0.68**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Naphthalene	**0**	< 0.06	< 0.09	< 0.08	< 0.08	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.08	< 0.07				69[5]	NA[2,1]	NA[2,2]		
	Perylene	**0.24**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Phenanthrene	**0.38**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014								
	Pyrene	**1.48**	< 0.015	< 0.017	< 0.016	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014	< 0.014	< 0.015	< 0.014				(1,600)[4,d]	NA[2,1]	NA[2,2]		

Notes:
- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Italic values represent an exceedance of the adopted Class 4 WasteMINZ Managedfill Criteria*
- **Bold values represent concentrations report above the laboratory detection limit.**
- [2,d] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- [4,d] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- [2.1] NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site. For protection of groundwater quality i.e. 20,000 mg/kg for TPH, 10,000 mg/kg for other contaminants).
- [2.2] NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.
- -v: volatisation
- -p: produce
- -x: PAH surrogate
- -m: maintenance/excavation
- PQL: Practical Quantitation Limit - laboratory detction limit.

Guidelines References:
(1 & 2) - values taken from Table B3 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)
(3) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan Operative in Part
(4) - values taken from Tables 4.10 and 4.13 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)
(5) - values taken from Table 4.19 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)
(6) - values taken from Table 4.20 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)
(7) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018
(8) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

			Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce [1]	NES Commercial / Industrial Outdoor Worker (unpaved) [2]	AUP Permitted Activity Soil Acceptance Criteria [3]	MfE OIG Residential - Silty Clay - <1m - All Pathways [4]	MfE OIG Maintenance / Excavation - Silty Clay - surface soil - All Pathways [5]	MfE OIG Protection of Groundwater Quality Silty Clay GW 4m [4]	WasteMINZ Soil Disposal Managed Fill Criteria[7]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [8]
		Location	BH111A	HA110a	HA110a	HA110a	HA110a	HA111	HA111	HA111	HA113	HA113								
		Sample	BH111A-1.0-1.3m 13-Nov-2020	HA110a - 0.1m 08-Dec-2020	HA110a - 0.5m 08-Dec-2020	HA110a - 0.5m 08-Dec-2020	HA110a - 2.0m 08-Dec-2020	HA111-0.1m 07-Dec-2020	HA111-1.0m 07-Dec-2020	HA111-2.0m 07-Dec-2020	HA113 0.5m 02-Dec-2020 11:45 am	HA113 0.5m 02-Dec-2020 12:00 pm	HA113 0.5m 02-Dec-2020 12:07 pm	HA113-1.0m 02-Dec-2020 12:07 pm						
		Date	13/11/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	7/12/2020	7/12/2020	7/12/2020	7/12/2020	2/12/2020	2/12/2020	2/12/2020						
		Lab number	2474175, & 2474527.9	2491712.1/ 2492155.1	2491712.2/ 2492155.2	2491712.4/ 2492105.4	2492105.4	2493017.1/ 2489833.1	2493017.3/ 2489833.3	2493017.4/ 2489833.4	2489806.2/ 2487331.3	2489806.21/ 2487331.31	2489806.22/ 2487331.32							
		Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3						
Hydrocarbons		Maximum Reported Concentrations (mg/kg)																		
Total Petroleum Hydrocarbons in Soil (mg/kg)	C_6 - C_9	0	< 8	< 8	< 8	< 9	< 9	< 9	< 9	< 8	< 8	< 9	10	35	20	2,700[7,v]	20,000	NA[2.2]	120	500
	C_{10} - C_{14}	69	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20				(560)[7v]	NA[2.1]	NA[2.2]	58	510
	C_{15} - C_{36}	2300	101	< 40	< 40	< 40	47	< 40	< 40	< 40	< 40	< 40				NA[2.2]	NA[2.1]	NA[2.2]		20,000
	Total hydrocarbons (C_7 - C_{36})	2300	102	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70								
Polycyclic Aromatic Hydrocarbons Screening in Soil (mg/kg)	Total of Reported PAHs in Soil	9.5	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4							200
	1-Methylnaphthalene	0	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	2-Methylnaphthalene	0	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Acenaphthylene	0.065	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Acenaphthene	0.02	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Anthracene	0.123	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Benzo(a)anthracene	0.74	< 0.014	< 0.013	< 0.013	< 0.015	0.02	< 0.014	< 0.015	0.016	< 0.013	< 0.015								
	Benzo(a)pyrene (BAP)	0.84	< 0.014	< 0.013	< 0.013	< 0.015	0.027	< 0.014	< 0.015	0.018	< 0.013	< 0.015								
	Benzo(a)pyrene Potency Equivalency Factor (PEF) NES	1.37	< 0.04	< 0.04	< 0.04	< 0.04	0.03	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04								
	Benzo(a)pyrene Toxic Equivalence (TEF)	1.36	< 0.04	< 0.04	< 0.04	< 0.04	0.03	< 0.04	< 0.04	< 0.04	< 0.03	< 0.04								
	Benzo(b)fluoranthene + Benzo(j)fluoranthene	1.01	< 0.014	< 0.013	< 0.013	< 0.015	0.025	< 0.014	< 0.015	0.02	< 0.013	< 0.015								
	Benzo(e)pyrene	0.65	< 0.014	< 0.013	< 0.013	< 0.015	0.017	< 0.014	< 0.015	0.014	< 0.013	< 0.015								
	Benzo(g,h,i)perylene	0.72	< 0.014	< 0.013	< 0.013	< 0.015	0.019	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Benzo(k)fluoranthene	0.38	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Chrysene	0.7	< 0.014	< 0.013	< 0.013	< 0.015	0.016	< 0.014	< 0.015	0.014	< 0.013	< 0.015								
	Dibenzo(a,h)anthracene	0.132	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Fluoranthene	1.19	< 0.014	0.014	< 0.013	< 0.015	0.035	< 0.014	< 0.015	0.041	< 0.013	< 0.015								
	Fluorene	0.016	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Indeno(1,2,3-c,d)pyrene	0.88	< 0.014	< 0.013	< 0.013	< 0.015	0.017	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Naphthalene	0	< 0.07	< 0.07	< 0.07	< 0.08	< 0.08	< 0.07	< 0.08	< 0.07	< 0.07	< 0.08				69[4]	NA[2.1]	NA[2.2]		
	Perylene	0.24	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014	< 0.013	< 0.015								
	Phenanthrene	0.38	< 0.014	< 0.013	< 0.013	< 0.015	< 0.015	< 0.014	< 0.015	0.023	< 0.013	< 0.015								
	Pyrene	1.48	< 0.014	0.016	0.014	< 0.015	0.036	< 0.014	< 0.015	0.036	< 0.013	< 0.015				(1,600)[4,v]	NA[2.1]	NA[2.2]		

Notes:

- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Italic values represent an exceedance of the adopted Class 4 WasteMINZ Mangedfill Criteria*
- **Bold values represent concentrations report above the laboratory detection limit.**
- "[7,k]" Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- "[4,k]" Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- (2.1) NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site. For protection of groundwater quality i.e. 20,000 mg/kg for TPH, 10,000 mg/kg for other contaminants).
- (2.2) NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.
- v: volatisation
- p: produce
- x: PAH surrogate
- m: maintenance/excavation
- PQL: Practical Quantitation Limit - laboratory detction limit.

Guidelines References:

(1 & 2) - values taken from Table B3 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(3) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan Operative in Part

(4) - values taken from Tables 4.10 and 4.13 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(5) - values taken from Table 4.19 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(6) - values taken from Table 4.20 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(7) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(8) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

			Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	NES SCS Health Rural Residential 10% produce [1]	NES Commercial / Industrial Outdoor Worker (unpaved) [2]	AUP Permitted Activity Soil Acceptance Criteria [3]	M/E OIG Residential - Silty Clay - <1m - All Pathways [4]	M/E OIG Maintenance / Excavation - Silty Clay - surface soil - All Pathways [5]	M/E OIG Protection of Groundwater Quality Silty Clay GW 4m [4]	WasteMINZ Soil Disposal Managed Fill Criteria[7]	Redvale Landfill Waste Acceptance Criteria Maximum Waste Total Concentration [8]
		Location	BH116	BH116	BH116	BH117	BH117	BH117	HA116	HA116	HA116								
		Sample	BH116 - 0.1m 02-Nov-2020	BH116 - 0.5m 02-Nov-2020	BH116 - 2.0m 02-Nov-2020	BH117 - 0.1m 09-Nov-2020	BH117 - 0.5m 09-Nov-2020	BH117 - 2.0m 09-Nov-2020	HA116 0m 02-Dec-2020 1:10 pm	HA116 0.5m 02-Dec-2020 1:17 pm	HA116 1.0m 02-Dec-2020 1:23 pm								
		Date	2/11/2020	2/11/2020	2/11/2020	9/11/2020	9/11/2020	9/11/2020	2/12/2020	2/12/2020	2/12/2020								
		Lab number	2467062.1/ 2471441.8	2467062.2/ 2471441.9	2467062.4/ 2471441.10	2470943.8/ 2471441.14	2470943.9/ 2471441.15	2470943.10/ 2471441.16	2486806.24/ 2487331.33	2486806.25/ 2487331.34	2486806.26/ 2487331.35								
		Soil suite	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3	Soil suite 3								
Hydrocarbons		Maximum Reported Concentrations (mg/kg)																	
Total Petroleum Hydrocarbons in Soil (mg/kg)	C_7 - C_9	0	< 8	< 8	< 8	< 9	< 8	< 10	< 9	< 8	< 9				2,700[7,4]	20,000	NA[2.2]	120	500
	C_{10} - C_{14}	69	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20				(560)[7,4]	NA[2.1]	NA[2.2]	58	510
	C_{15} - C_{36}	2300	< 40	< 40	< 40	< 40	< 40	< 40	41	< 40	< 40				NA[2.2]	NA[2.1]	NA[2.2]		20,000
	Total hydrocarbons (C_7 - C_{36})	2300	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70								
Polycyclic Aromatic Hydrocarbons Screening in Soil (mg/kg)	Total of Reported PAHs in Soil	9.5	0.6	< 0.3	< 0.4	0.8	< 0.3	< 0.4	1.6	< 0.4	< 0.4								200
	1-Methylnaphthalene	0	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	< 0.014	< 0.013	< 0.014								
	2-Methylnaphthalene	0	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	< 0.014	< 0.013	< 0.014								
	Acenaphthylene	0.065	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	< 0.014	< 0.013	< 0.014								
	Acenaphthene	0.02	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	< 0.014	< 0.013	< 0.014								
	Anthracene	0.123	0.019	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	0.016	< 0.013	< 0.014								
	Benzo[a]anthracene	0.74	0.036	< 0.013	< 0.014	0.049	< 0.013	< 0.016	0.114	< 0.013	< 0.014								
	Benzo[a]pyrene (BAP)	0.94	0.04	< 0.013	< 0.014	0.07	< 0.013	< 0.016	0.152	< 0.013	< 0.014								
	Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	1.37	0.05	< 0.03	< 0.04	0.1	< 0.03	< 0.04	0.23	< 0.04	< 0.04	10	35	20	0.27[6]	25	NA[2.2]	2	
	Benzo[a]pyrene Toxic Equivalence (TEF)	1.36	0.05	< 0.03	< 0.04	0.1	< 0.03	< 0.04	0.22	< 0.04	< 0.04								
	Benzo[b]fluoranthene + Benzo[j]fluoranthene	1.01	0.044	< 0.013	< 0.014	0.079	< 0.013	< 0.016	0.171	< 0.013	< 0.014								
	Benzo[e]pyrene	0.65	0.03	< 0.013	< 0.014	0.047	< 0.013	< 0.016	0.11	< 0.013	< 0.014								
	Benzo[g,h,i]perylene	0.72	0.027	< 0.013	< 0.014	0.05	< 0.013	< 0.016	0.129	< 0.013	< 0.014								
	Benzo[k]fluoranthene	0.38	0.018	< 0.013	< 0.014	0.033	< 0.013	< 0.016	0.068	< 0.013	< 0.014								
	Chrysene	0.7	0.034	< 0.013	< 0.014	0.061	< 0.013	< 0.016	0.122	< 0.013	< 0.014								
	Dibenz(a,h)anthracene	0.132	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	0.022	< 0.013	< 0.014								
	Fluoranthene	1.19	0.088	< 0.013	< 0.014	0.118	< 0.013	< 0.016	0.25	< 0.013	< 0.014								
	Fluorene	0.016	< 0.014	< 0.013	< 0.014	< 0.014	< 0.013	< 0.016	< 0.014	< 0.013	< 0.014								
	Indeno(1,2,3-c,d)pyrene	0.68	0.026	< 0.013	< 0.014	0.05	< 0.013	< 0.016	0.122	< 0.013	< 0.014								
	Naphthalene	0	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07	< 0.07				69[6]	NA[2.1]	NA[2.2]		
	Perylene	0.24	0.017	< 0.013	< 0.014	0.015	< 0.013	0.154	0.034	< 0.013	< 0.014								
	Phenanthrene	0.38	0.078	< 0.013	< 0.014	0.037	< 0.013	< 0.016	0.076	< 0.013	< 0.014								
	Pyrene	1.48	0.081	< 0.013	< 0.014	0.136	< 0.013	< 0.016	0.25	< 0.013	< 0.014				(1,600)[6,4]	NA[2.1]	NA[2.2]		

Notes:

- All units in mg/kg except if specifically mentioned
- Shaded values exceed the corresponding guideline
- *Italic values represent an exceedance of the adopted Class 4 WasteMINZ Managed fill Criteria*
- **Bold values represent concentrations report above the laboratory detection limit.**
- [7,4] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- [4,4] Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.
- (2.1) NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site. For protection of groundwater quality i.e. 20,000 mg/kg for TPH, 10,000 mg/kg for other contaminants).
- (2.2) NA indicates estimated criterion exceeds 20,000 mg/kg. At 20,000 mg/kg residual separate phase is expected to have formed in soil matrix. Some aesthetic impact may be noted.
- v: volatisation
- p: produce
- x: PAH surrogate
- m: maintenance/excavation
- PQL: Practical Quantitation Limit - laboratory detction limit.

Guidelines References:

(1 & 2) - values taken from Table B3 of National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012)

(3) - values taken from Table E30.6.1.4.1 of Auckland Unitary Plan Operative in Part

(4) - values taken from Tables 4.10 and 4.13 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(5) - values taken from Table 4.19 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(6) - values taken from Table 4.20 of Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011)

(7) - values taken from Appendix G Table G-1 Class 4 Landfill Waste Acceptance Criteria for Inorganic and Organic Elements in Waste Management New Zealand (WasteMINZ) Technical Guidelines for Disposal to Land dated August 2018

(8) - values taken from Redvale Landfill Waste Acceptance Criteria Version 10 dated 16 November 2007.

Soil Analytical Results Maximum Reported Concentrations of Asbestos in Soil

	Non HAIL Site		
Location	ENVR-HA04		
Sample	ENVR-HA04-0.0-0.1m 10-Nov-2020		
Date	10/11/2020		
Lab number	2470910.5/ 2471363.5		
Soil suite	Soil suite 3 + OCPs		
Semi-Quantitative Asbestos in Soils		**Units**	**BRANZ - Soil Guideline Values for Asbestos in Soil - Residential [1]**
Asbestos type	Chrysotile (White Asbestos) detected.		
Asbestos form	Loose fibres		
Asbestos as ACM	< 0.001	(w/w%)	0.01
Asbestos Fibres/Fine	< 0.001	(w/w%)	0.001

Notes

Shaded values exceed the corresponding guidelines.

ND - indicates asbestos not detected.

Guideline References

[1] - values taken from Table 5 of BRANZ: New Zealand Guidelines for Assessing and Managing Asbestos in Soil (2017). Residential criteria under the BRANZ guidelines *"Single dwelling site with garden and/or accessible soil. Also includes daycare centres, preschools, primary and secondary schools and rural residential."*

**Groundwater Analytical Results
Summary of Reported
Concentrations of
Dissolved Heavy Metals
and TPH in Water**

			HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site	Non HAIL Site		
		Location	BH113	BH05A	BH05B	BH06	BH08	BH110	BH111	BH116	BH117		
		Sample	BH113	BH05A	BH05B	BH06	BH08	BH110	BH111	BH116	BH117		
		Date	27/11/2020	2/12/2020	27/11/2020	27/11/2020	27/11/2020	2/12/2020	27/11/2020	27/11/2020	2/12/2020		
		Lab number	2482688.8	2486837.7/ 2486837.8	2482688.4	2482688.5	2482688.6	2486837.3	2482688.7	2482688.9	2486837.5		
		Groundwater suite	Suite 2	Suite 3	Suite 3	Suite 3	Suite 3	Suite 3	Suite 3	Suite 3	Suite 3		
		pH	6.3	7.5	6.4	4	6.8	8.1	5.5	6.2	6.8	**ANZECC 2000 FW 80%** (1)	**ANZECC 2000 FW 95%** (2)
Heavy Metals (Dissolved)	Dissolved Arsenic	**0.0016**	< 0.0010	**0.0016**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0016**	**0.14**	**0.013**
	Dissolved Cadmium	**0.00023**	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	**0.00023**	< 0.00005	**0.0008**	**0.0002**
	Dissolved Chromium	**0.0007**	< 0.0005	< 0.0005	< 0.0005	**0.0007**	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	**0.04**	**0.004**
	Dissolved Copper	**0.003**	0.0008	< 0.0005	0.0007	**0.003**	0.0006	0.0012	< 0.0005	0.0025	< 0.0005	**0.0025**	**0.0013**
	Dissolved Lead	**0.00052**	< 0.00010	< 0.00010	0.00011	**0.00052**	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	**0.0094**	**0.0044**
	Dissolved Mercury	**0**	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	**0.0054**	**0.0006**
	Dissolved Nickel	**0.072**	0.0025	0.0015	0.0014	**0.072***	0.0009	0.0012	0.0022	0.0099	0.0048	**0.017**	**0.07**
	Dissolved Zinc	**0.042**	0.0071	0.0026	0.022	**0.042***	0.0081	< 0.0010	0.0136	0.036*	0.022	**0.031**	**0.015**
Total Petroleum Hydrocarbons	C_7 - C_9	**0.14**	-	< 0.10	**0.14**	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		
	C_{10} - C_{14}	**0**	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2		
	C_{15} - C_{36}	**0**	-	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4		
	Total hydrocarbons (C_7 - C_{36})	**0**	-	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7		

Notes
*Calculated water criteria exceeds solubility limit for pure compound in water.
- All units in g/m^3 except if specifically mentioned
- Shaded values exceed the corresponding guideline
- * Concentrations exceeds both criteria adopted.
- BOLD values maximum reported concentrations (g/m3)
Guidelines:
(1) - Criteria from Table 3.4.1 Trigger values for toxicants at alternative levels of protection in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000 Guidelines) for 80% freshwater species.
(2) - Criteria from Table 3.4.1 Trigger values for toxicants at alternative levels of protection in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000 Guidelines) for 95% freshwater species.

GHD

Level 3, GHD Centre
27 Napier Street
T: 64 9 370 8000 F: 64 9 370 8001 E: aklmail@ghd.com

\\ghdnet\ghd\NZ\Auckland\Projects\51\12508391\Tech\Environment\Package 1\3. DSI\3. Reporting\12508391-RPT-Whenuapai-Redhills WW Servicing Package 1 DSI_Rev 0_11.06.2021.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Draft A	H. Berger	M. Ballard (SQEP)				
Rev 0	H. Berger	pp. M. Ballard (SQEP)			Digitally signed by Dragan Jovanovic Date: 2021.06.11 15:55:04 +12'00'	

www.ghd.com