# aurecon

Appendix C – Application for Landowner Approval



## Application for landowner approval

### Land Advisory Services, Community Facilities

The following is to be completed for the assessment of the project by the Land Advisory team. If you do not provide the necessary information, your application may not be accepted for processing.

Each landowner approval application requires the support of the relevant local board prior to approval/decline by Land Advisory Services.

1. Applicant details	
Name	Aurecon New Zealand
Address	110 Carlton Gore Road, Auckland 1023, New Zealand
Mobile	+64 211006287
Email	Tracy.Howe@aurecongroup.com
Consultant details	Tracy Howe, Lead Consultant

2. Site details	
Park name	Basque Reserve
Park address	13 Norwich Street, Auckland 1021, New Zealand
Legal description	Section 8 SO 433443, Part Lot 46 DP 7541
Lease number N/A	Expiry date N/A
Resource consent number N/A	Building consent number N/A
Have you previously a lf yes, please specify:	applied for landowner approval for this site or a related project? Yes No

3. General application details									
This application is for: (tick all of the boxes necessary to	o cover the proposal)								
Installing a public facility or service over or on the	e park								
Installing a private utility or service over or on the	park								
Creating a new asset on the park									
Modifying an existing private / club / user group asset on the park									
Undertaking planting on a park / establishing a community garden on a park									
Plant or seed collection / research on a park									
Requesting an easement or right of way on a parl	(								
Requesting temporary access over a park									
Licence to occupy / mobile trading									
	gation including the drilling of three boreholes and installation								
of groundwater monitoring at one of the boreholes.									
4 Project details									
<ul><li>4. Project details</li><li>4.1 Detailed description of project (please also include photo)</li></ul>	s of the proposed works site to assist us with processing the application)								
Geotechnical investigations are being undertaken consenting and design of a new wastewater netwo Investigations required to support the project at this groundwater monitoring. Please refer to the attach	on behalf of Watercare Services Limited to inform rk from the Auckland CBD to Western Springs Reserve. s location include three geotechnical boreholes and ed site plan for location details. To minimise disruption to ling schedule can be flexible – Aurecon are open to								
All physical works will be undertaken in alignment wimplement a Health and Safety Management Plan a practice is followed. All personnel on site will wear a	and Task Based Risk Assessment process to ensure best								
We will provide adequate buffer from any trees and	existing utilities.								
4.2 What other options have you considered for this site	? Why is this the chosen option?								
In order to keep our team safe and out of busy tra Reserve to establish a safe working site that will n	nsport corridors, Aurecon request access to Basque ninimise disruptions to members of the public.								
4.3 Have you provided the relevant supporting documer	nts?								
Site plans	Stormwater report								
Arborist report	Engineers report								
Iwi consultation	Planting and maintenance plan								
Resource consent	Building consent								
Asset owner approval									

#### 4.4 How will the proposed works impact the park and the public?

Boreholes will be: a) 100 mm in diameter; b) A construction laydown/storage area measuring a max 10 m x 4 m working area; c) Borehole depths will be approximately 20-25 m. Drilling time is expected to be a maximum of 5 days per borehole. Access to drilling sites will be limited to Drilling contractors and Aurecon. The proposed drilling will not prevent public use of the park, the working area will be safely cordoned off. Visual impacts will be limited where possible. Groundwater monitoring may include installation of a standpipe with mounted monitoring device or an in-ground device, flush with the surface and covered with grass. Groundwater monitoring will continue for a 12-month period.

#### 4.5 Proposed mitigation for the works

Drilling sites will be fenced to limit access to authorised personnel. Acoustic panels will be added to reduce noise. Geotextile mates will be laid across the site to minimise damage to grassed areas. The working areas will be re-instated to pre-investigation conditions (i.e. infilled and regressed) or per-instruction from Auckland Council. Drilling works will be coordinated to avoid conflicts with events or any planned maintenance/upgrade works Council may be undertaking in the park. Proposed timing of works allows for changes in program scheduling.

4.6 Timing of works

Proposed physical works start date: 01/05/2024

Proposed physical works end date: 6/05/2024

NB: Any physical works on parks must be carried out in accordance with the requirements of the Health and Safety at Work Act 2015. The applicant must ensure that any contractors undertaking works on council owned land comply with all necessary statutory and council Health and Safety standards.

#### **FEES AND CHARGES**

Visit the Landowner approvals page on the Auckland Council website for the schedule of fees and charges.

There is a 50 per cent reduction in all fees for:

- · registered community groups
- · incorporated societies
- · charitable trusts.

5. Applicant's signature	Date
Tracy Howe	3/4/2024

Please submit completed application form, along with relevant plans and your supporting documents, to: landadvisors@aklc.govt.nz







## Attachment C - Borelogs for shaft



Project: WIWQIP Motions Catchment Improvements
Location: Suffolk Reserve

Project Reference: 521290-064

**BH06** 

Sheet 1 of 8

Me Equ	BOREHOLE INFORMATION Method: Rotary Core Wireline Equipment: Hydrapower Trekker 2100 Contractor: Drill Force NZ Ltd  CO-ORDINATES: NZTM2000 Easting: 1756390.70m Northing: 5918882.84m Ground level: 43.71m (NZVD2016)								e started: e completed: ination: muth:			2024 2024		Logged by: AP Input by: AP Checked by: PK Reviewed by: SM	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Mat	erial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws ws mws Fracture cs Lod		Stratigraphy Defect Description Additional Notes	Installation
	- - - -	- - - -			brown. Firm, moist, low basalt. Organics consist 0.18m to 0.32m:With smottled black, dark brow 0.55m to 0.9m:With sc	some clay and gravel; brown with yn and red brown.  ome clay and minor sand; brown with		0.5m: ISHSV=145/50kPa					0m: 0.05i	FILL m to 0.2m: ES BH06_0.05-0.2	X//
A H		_ _ _ 1 _ _		Fc	orange.	rown and mottled light grey and inor clay and trace sand; orange with	ML	1m: ISHSV=62/22kPa	100				         1m t	o 1.1m: ES BH06_1-1.1	
	-  -  -	_			<b>1.35m to 1.6m:</b> With so orange.	ome clay; light grey with mottled		1.5m: ISHSV=151/48kPa					       1.4m	n <b>to 1.5m:</b> ES BH06_1.4-1.5	<b>%</b> T\$
SPT	42	_		ERc	<b>1.6m</b> : CLAY; grey. Stiff, SOILS ECBF]	moist, high plasticity. [RESIDUAL	СН	1.5m: SPT 1,1// 1,1,2,2 N = 6	100			             		n: EAST COAST BAYS FORMATION	
8		2		K K	1.95m: CORE LOSS.		+	_	0				1.95i	m: ES BH06_1.95 Flushed out hole so push tube would	
U54	_  _	- - -		EWx	<b>2m</b> : PUSH TUBE				100				be u	ndisturbed material. '	
HQ3	41		× × × × × × × × × × × × × × × × × × ×			noist, high plasticity. ine to medium SAND. Black disseminated throughout, <3mm.			100					im: BP 15°	
SPT	_ - - -	3	× × × × × × × × × × × × × × × × × × ×	Z	3.06m to 3.25m:Silty fi 3.25m to 3.47m:SILT v medium.	ine to medium SAND.		3m: IBHSV=UTP 3m: SPT 0,1// 1,2,2,2 N = 7	100				 		
	40		× × × × × × × × × × × × × × × × × × ×	ERZ	3.47m to 3.7m:Silty fin	e to medium SAND.	MH						 		
HQ3	  -  -  -	4	× × × × × × × × × × × × × × × × × × ×		3.95m to 4m:Sandy Sl	ILT.			95						
	-	-  -  -  -		EWs	SANDSTONE; Extremel SAND).	d, grey, silty fine to medium ly weak. Poorly cemented. (Silty seous material band <3mm, 20°.	HW	4.5m: SPT 2,3// 5,4,4,7					               	<b>m</b> : 50mm core loss.	
SPT	39	5	× × × × × × × × × × × × × × × × × × ×	EWz	weak. (SILT).	d, grey, SILTSTONE; Extremely ine to medium SANDSTONE. (Silty	HW	-N = 20	89	100	76		     		
1) (	Geoph	dinate nysica	I profiling	g unde	ng a Leico Zeno FLX100 plus ertaken downhole on 05/09/24 al Sample.	s smart antenna, with a horizontal accuracy 3d 4, comprising of optical and acoustic teleview	m and er dow	d vertical accuracy of n the length of the ho	2cm. ole.				29/08 04/09 05/09 06/09	pr Level Readings: Time   Hole Depth   Water Level 3/24 00:00   1.00m   1.00 m bg  3/24 15:00   25.00m   2.00 m bg  3/24 07:30   25.00m   3.35 m bg  3/24 07:30   25.00m   3.35 m bg  3/24 08:00   36.00m   2.00 m bg  3/24 14:00   36.00m   2.00 m bg	

<sup>3)</sup> ES refers to Environmental Sample.



Tel: +64 9 520 6019 www.aurecongroup.com

Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Suffolk Reserve Project Reference: 521290-064 **BH06** 

Sheet 2 of 8

Me Eq	REH thod: uipme ntract	ent:	Hyc	ary C Irapo	CO-ORDINATES: NZTM2000 Easting: 1756390.70m Northing: 591882.84m Ground level: 43.71m (NZVD2016	Date starte Date comp Inclination: Azimuth:	letec	l: 6		2024 2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SM	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture	Stratigraphy Defect Description Additional Notes
HQ3	38	- - -	× × × × × × × × × × × × × × × × × × ×	EWz	4.68m: Highly weathered, grey, SILTSTONE; Extremely weak. (SILT). 5.15m: Moderately weathered, grey, SILTSTONE; extremely weak. 5.26m to 5.5m:Moderately weathered, grey, silty fine to medium SANDSTONE; Very weak. Moderately cemented.  5.91m: Moderately weathered, grey, silty fine to medium	HW		100	100	76		5.15m: BP 50° 5.23m: JI 30° 5.50m: BP 15° 5.68m: JT 15° PI, Ro, CI 5.91m: BP 60°
SPT	-  -  -  -	_		EWs	SANDSTONE; extremely weak. Moderately cemented. Black carbonaceous material dissemenated throughout.	MW	6m: SPT 2,5// 8,12,18,12 for 50mm N = 50+	100				
HQ3	37	- - 7	× × × × × × × × × × × × × × × × × × ×	EWz	6.52m: Moderately weathered, grey, SILTSTONE; very weak. 6.66m:10mm band of SANDSTONE, inclined 10°. 6.84m to 7m:Sandy SILTSTONE; extremely weak. Poorly cemented. Sand is fine to medium. (Sandy SILT).	MW		100	95	95		6.60m: BP 50°
SPTC	36	- - - -		EWs	<b>7.19m</b> : Moderately weathered, grey, SANDSTONE; very weak. Moderately cemented.	MW	7.5m: SPTC 7.12// 17,20,13 for 50mm N = 50+	N/A	N/A	N/A		7.19m: BP 45°  7.45m: JT 35° PI, Sm, CI 7.45m: JT 40° PI, Sm, CI 7.5m: Changed to SPTc due to competent rock.
	_ - - -	8	× × × × × × × × × × × × × × × × × × ×	EUz	7.85m: Slightly weathered, grey, laminated SILTSTONE; very weak. 7.86m to 7.92m:Seam of pink SILTSTONE, inlcined 50°. 8.25m: Slightly weathered, grey, fine to medium	sw						8.20m: BP 50°
HQ3	_ _ _ _ 35	_	× × × × × × ×	EUs2	SANDSTONE; very weak. Moderately cemented. 8.36m:Black carbonaceous material bands, inclined 50°. 8.45m:Black carbonaceous material bands, inclined 50°. 8.48m to 8.6m:SILTSTONE; very weak. 8.63m: Slightly weathered, grey, laminated SILTSTONE; very weak.	sw		100	100	100		8.56m: JI 50° Calcite with brown staining.
SPTC	-  -  -  -  -	9	× × × × × × × × × × × × × × × × × × ×	2 EUz2	9.25m: Slightly weathered, grey, fine to medium	sw	9m: SPTC 7,14// 32,18 for 25mm N = 50+	N/A	N/A	N/A		
EQH RE	34 	10	× × × × × × × × × × × × × × × × × × ×	EUz2 EUs2	9.4m: Signty weathered, grey, line to medium SANDSTONE; extremely weak. Moderately cemented.  9.4m: Slightly weathered, grey, SILTSTONE; extremely weak. Inclined 20°.  9.7m to 9.85m:Fine to medium SANDSTONE.	sw		100	100	100		9.45m: JT 30° PI, Ro, CI  9.65m: JT 40° PI, Sm, CI  9.70m: BP 20°  9.85m: JT 25° PI, Ro, CI  Water Level Readings: Date Time   Hole Depth   Water Level

Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 3cm and vertical accuracy of 2cn
 Geophysical profiling undertaken downhole on 05/09/24, comprising of optical and acoustic televiewer down the length of the hole.
 ES refers to Environmental Sample.

Date Time | Hole Depth | Water Lew 29/08/24 00:00 | 1.00m | 1.00 m bg| 04/09/24 15:50 | 25.00m | 2.00 m bg| 05/09/24 07:30 | 25.00m | 3.35 m bg| 06/09/24 08:00 | 36.00m | 2.20 m bg| 06/09/24 14:00 | 36.00m | 2.00 m bgl

Database File: CC2MOTIONS MASTER 02(41).GPJ Library file: LBRARY\_20240925\_V13 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18102/2025



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Suffolk Reserve Project Reference: 521290-064 **BH06** 

Sheet 3 of 8

	Metl Equ	REH hod: ipme tract	ent:	Hyd	ary ( drapo	TION Core Wireline ower Trekker 2100 ce NZ Ltd	CO-ORDINATES: Easting: Northing: Ground level:	Date starte Date comp Inclination: Azimuth:	oleted	: 6		2024 2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SM			
	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	V	Material Description	Meatherial Description  We atterial Description				SCR (%)	RQD (%)	wws Fracture wws Fracture cs Log ecs	Stratigraphy Defect Description Additional Notes	IIIstaliatioii
Box 3	HQ3		_ _ _ _	× × × × × × × × × × × × × × × × × × ×	EUz2	9.4m: Slightly weather weak. Inclined 20°.	ered, grey, SILTSTO	NE; extremely	sw		100	100	100		10.30m: BP 10° 10.35m: Drilling induced breaks.	- - -
	33	33	_ _ _ _ 	* *	52	10.67m: Slightly wea SANDSTONE; very v					100	100	100		10.67m: ВР 30° Calcite vein	
Box 4	HQ3	32	_ 		EUs2	11.4m to 11.52m:S		ONE venueek	SW		100	100	100		11.40m: BP 30°	-
_			12	× × × × × × × × × × × × × × × × × × ×	EUz2	12.2m: Slightly weath SANDSTONE; very v	nered, grey, fine to m	edium	sw						11.8/m: 5F 20 12.24m: JT 10° PI, Sm, CI	LOG Date Generated: 18/02/2029
	HQ3	31			EUs2	12.8m to 12.91m:S	ILTSTONE.	sw .TSTONE.							12.51m: JT 10° PI, Sm, CI 12.60m: JT 25° PI, Ro, CI	01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18/02/2022
			- - - - -	× × × × × × × × × × × × × × × × × × ×		13.2m: Slightly weath 13.21m to 13.5m:lr sandy SILTSTONE (							13.5m to 17.4m: Sealed microfractures. No discolouration along fractures. Possible faulting?	Defendance File: CC2 MOTIONS MASTER 02(JL), GPJ LIbrary file; LBRARY_20240925_V/3 (1) GLB Template; DATATEMPLATE.GDT Report File: 01 MOTIC		
Box 5	HQ3	_	14 	x x x x x x x x x x x x x x x x x x x	EUz2				SW		100	100	100		13.96m: JT 70° PI, Sm, CI 14m to 17.5m: Water pressure permeability test (BH06_PPT01) 14.20m: BP 10°	ile: LIBRARY_20240925_V13 (1).GLB Tem
				× × × × × × × × × × × × × × × × × × ×	ed us	ing a Leico Zeno El V100	nlus smart antenna "*	h a horizontal acquisco 200	m and	Vertical accuracy of	2cm				14.55m: BP 15° PI, Ro, CI Clay infill (2mm) 14.66m: BP 15° PI, Ro, CI  Water Level Readings: Date Time   Hole Depth   Water Level	NS MASTER 02(JL).GPJ Library fl
	2) G 3) E	eoph S refe	iysica ers to	profiling Environ	g unde menta		9/24, comprising of opti	h a horizontal accuracy 3ci cal and acoustic televiewe							Date Ime   Note Depth   Water Level 29/08/24 00000   1.00m   1.00 m bgl 04/09/24 15:50   2.00m   2.00 m bgl 05/09/24 03:00   2.00m   3.35 m bgl 06/09/24 08:00   36.00m   2.20 m bgl 06/09/24 14:00   36.00m   2.00 m bgl	Database File: CC2 MOTION



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Suffolk Reserve Project Reference: 521290-064 **BH06** 

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-	BOREHOLE INFORMATION Method: Rotary Core Wireline Equipment: Hydrapower Trekker 2100 Contractor: Drill Force NZ Ltd  CO-ORDINATES: NZTM2000 Easting: 1756390.70m Northing: 5918882.84m Ground level: 43.71m (NZVD2016)								Date starte Date comp Inclination: Azimuth:	leted	: 6		2024 2024	Sheet 4 of 8  Logged by: AP Input by: AP Checked by: PK Reviewed by: SM			
-	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	∥ Material Description	Weathering/LISC		Testing	TCR (%)	SCR (%)	RQD (%)	wws wws Fracture cs Log	Stratigraphy Defect Description Additional Notes		
Box 5	НФЗ	28		× × × × × × × × × × × × × × × × × × ×		<b>15.57m to 15.63m:</b> weak.	nered, grey, SILTSTONE; very weak.  Fine to medium SANDSTONE; very				100	100	90		15m: Loss of 10% of water return.  15.57m: BP 20° 15.63m to 15.70m: JT 80° PI, Sm, CI  15.90m: BP 10° PI, Ro, CI  16.14m to 16.20m: JT 70° PI, Sm, CI 16.20m: BP 50°		
		27		× × × × × × × × × × × × × × × × × × ×		50°.	Fine to medium SANDSTONE, inclined								16.32m: JT 20° PI, Ro, CI  16.5m to 17.22m: Incipient fracturing.		
Box 6	HQ3			× × × × × × × × × × × × × × × × × × ×	EUz2		sv	sw		100	100	100		16.95m: BP 8° PI, Sm, CI			
_	НОЗ			× × × × × × × × × × × × × × × × × × ×		<b>18.85m to 18.98m:</b> 30°. (SILT).	SILTSTONE; extremely weak. Inclined				100	93	93		18.60m to 18.70m: JT 50° PI, Sm, CI  18.85m: BP 30°  Water Level Readings: Date Time   Hole Depth   Water Level 29/08/24 00:00   1.00m   1.00 m bg  04/09/24 15:50   25.00m   2.00 m bg  05/09/24 07:30   25.00m   3.35 m bg  06/09/24 08:00   36.00m   2.20 m bg  06/09/24 08:00   36.00m   2.20 m bg  06/09/24 14:00   36.00m   2.20 m bg		
Box 7				× × × × × × × × × × × × × × × × × × ×								100	100		Water Level Readings: Date Time   Hole Depth   Water Level		
	2) G 3) E	Seoph S ref	iysical ers to	l profiling Environ	g unde menta		plus smart antenna, with a horizontal accuracy 19/24, comprising of optical and acoustic televing the state of the state o								29/08/24 00:00   1 .00m   1 .00 m bg) 04/09/24 1550   25.00m   2.00 m bg  05/09/24 07:30   25.00m   3.35 m bg  06/09/24 06:00   36.00m   2.20 m bg  06/09/24 14:00   36.00m   2.00 m bg		



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Suffolk Reserve Project Reference: 521290-064 **BH06** 

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BOREHOLE INFORMATION Method: Rotary Core Wireline Equipment: Hydrapower Trekker 2100 Contractor: Drill Force NZ Ltd  CO-ORDINATES: NZTM2000 Easting: 1756390.70m Northing: 5918882.84m Ground level: 43.71m (NZVD2016)								Date starte Date comp Inclination: Azimuth:	leted	: 6		2024 2024	Sheet 5 of 8  Logged by: AP Input by: AP Checked by: PK Reviewed by: SM		
Method	2010011	K.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Material Description  Material Description				RQD (%)	wws Fracture cs Log	Stratigraphy Defect Description Additional Notes		
L XOG	F			× × × × × × × × × × × × × × × × × × ×		13.2m: Slightly weathered, grey, SILTSTONE; very weak.  20.9m to 21m:Fine to medium SANDSTONE.  21m to 21.08m:Silty fine SANDSTONE.			100	100			20.55m: BP 10°		
HO3				× × × × × × × × × × × × × × × × × × ×	EUz2	21.08m to 21.29m:Silty fine to medium SANDSTONE.  21.65m to 22m:Sandy SILTSTONE. Sand is fine.	sw		100	100	100		21.95m: BP 50°		
0.000	2	21	- - - -	× × × × × × × × × × × × × × × × × × ×		22.5m to 22.57m:Fine to medium SANDSTONE.  22.79m: Slightly weathered, grey, fine to medium SANDSTONE; very weak. Well cemented. Black carbonaceous material dissementated throughout, <3mm. Minor calcite veins.							22.35m: JT 20° PI, Sm, CI 22.57m: BP 20° 22.79m: BP 30°		
HO3	-		- - - - -		EUs2	പ്പ <b>23.88m:</b> Black carbonaceous material inclusion 10mm.	sw		100	100	100				
HD3	H			× × × × × × × × × × × × × × × × × × ×	EUz2	23.92m: Slightly weathered, grey, SILTSTONE; very weak.  24.64m to 24.68m:Fine to medium SANDSTONE.	sw		100	100	95		23.92m: BP 30° 24m to 28m: Water pressure permeability test (BH06_PPT02)  24.25m: BPJT 50° St, Sm, Cl  24.43m: BPJT 40° PI, Sm, Cl  24.50m: BP 40°		
1) 2 3	Geo	ordi ophy refe	25 S: inates ysical ers to	× × × × captur profilino Environ	g unde imenta	ing a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 3cr ertaken downhole on 05/09/24, comprising of optical and acoustic televiewer al Sample.							Water Level Readings: Date Time   Hole Depth   Water Level 29/08/24 00:00   1.00m   1.00 m bgl 04/09/24 15:50   25.00m   2.00 m bgl 05/09/24 07:30   25.00m   3.35 m bgl 06/09/24 08:00   36.00m   2.20 m bgl 06/09/24 14:00   36.00m   2.00 m bgl		



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Suffolk Reserve Project Reference: 521290-064 **BH06** 

Sheet 6 of 8

BOREHOLE INFORMATION Method: Rotary Core Wireline Equipment: Hydrapower Trekker 2100 Contractor: Drill Force NZ Ltd  CO-ORDINATES: NZTM2000 Easting: 1756390.70m Northing: 5918882.84m Ground level: 43.71m (NZVD2016)							Date com	Date started: 4/09/2024 Date completed: 6/09/2024 Inclination: -90° Azimuth: N/A				In C	Sheet 6 of 8  Logged by: AP Input by: AP Checked by: PK Reviewed by: SM			
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	M	aterial Description		Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws wws Fracture cs Log		Stratigraphy Defect Description Additional Notes	Installation
НФЗ	- - -	- - - -	× × × × × × × × × × × × × × × × × × ×			nered, grey, SILTSTON e to medium SANDST	=			100	100			25.10m: E		
НОЗ		26	× × × × × × × × × × × × × × × × × × ×		10°. Black carbonaced	ine to medium SANDS ous material disseminat ine to medium SANDS	ted throughout.			100	97	97		25.84m: J 25.99m: E 26.15m: E		
HQ3	16	27	××××××××××××××××××××××××××××××××××××××	EUz2	inclined 20°. <b>27.65m to 27.68m:</b> F inclined 20°.	ne to medium SANDST ine to medium SANDS ine to medium SANDS	TONE band,	sw		100	97	97		27.35m: J 27.50m: E 27.90m: E	27.15m: JI 60° T 40° PI, Sm, CI BP 20° SP 10° PI, Sm, CI T 40° PI, Sm, CI	
НФЗ	15	29	× × × × × × × × × × × × × × × × × × ×		<b>29m to 29.1m</b> :Fine \$	SANDSTONE, inclined	60°.			100	100	100		28.72m: E	8P 20°	
	14	30	× × × × × × × × × × × × × × × × × × ×		<b>29.6m to 29.65m:</b> .Fir	ne SANDSTONE, inclin	ed 60°.									
REMARKS:  1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 3cm and vertical accuracy of 2cm.  2) Geophysical profiling undertaken downhole on 05/09/24, comprising of optical and acoustic televiewer down the length of the hole.  3) ES refers to Environmental Sample.										<del></del>	29/08/24 00 04/09/24 15 05/09/24 07 06/09/24 08	al Readings:   Hole Depth   Water Level :000   1.00m   1.00 m bgl :50   25.00m   2.00 m bgl :30   25.00m   3.35 m bgl :00   36.00m   2.20 m bgl :00   36.00m   2.00 m bgl	<u> </u>			



Hand Shear Vane Serial No: 3178 Correction Factor: 1.398

Client: Watercare Services Ltd

**Project: WIWQIP Motions Catchment Improvements** 

Location: Suffolk Reserve
Project Reference: 521290-064

**BH06** 

Sheet 7 of 8

Database File: CC2MOTIONS MASTER 02(JL.) GP LIbrary file: LIBRARY \_20240925\_V13 (1), GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18/02/2025

Me Eq	BOREHOLE INFORMATION Method: Rotary Core Wireline Equipment: Hydrapower Trekker 2100 Contractor: Drill Force NZ Ltd  CO-ORDINATES: NZTM2000 Easting: 1756390.70m Northing: 5918882.84m Ground level: 43.71m (NZVD2016)								: 6		2024 2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SM
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture	Stratigraphy Defect Description Additional Notes
	_ _ _ _ _ _ _ _		× × × × × × × × × × × × × × × × × × ×	EUz2	23.92m: Slightly weathered, grey, SILTSTONE; very weak. 30.11m to 30.24m:Fine to medium SANDSTONE. Black carbonaceous material disseminated througout. 30.3m to 30.5m:Fine to medium SANDSTONE.	sw						0.60m: BP 45°
Box 11 HQ3	_ _ _ _	31	X X	EUs2	<b>30.74m:</b> Slightly weathered, grey, fine to medium SANDSTONE; extremely weak. Moderately cemented.	SW		100	100	100		0.75m: BP 40°
		_ - - -	× × × × × × × × × × × × × × × × × × ×	EUz2	<b>31.12m</b> : Slightly weathered, grey, SILTSTONE; extremely weak.	sw						1.22m: BP 35°
	12	32	× × × × × × × × × × × × × × × × × × ×		<b>31.8m:</b> Slightly weathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented.							
HQ3				EUs2	32.4m to 32.43m:Black carbonaceous material layer fibrous <5mm. 32.6m:Extremely weak.	sw		100	100	100	32	2.40m: BP 40°
Box 12 HQ3					33.35m to 33.41m:SILTSTONE. 33.5m to 33.55m:SILTSTONE. 33.69m to 33.8m:SILTSTONE.			100	100	100	33	3.27m: JT 40° PI, Sm, Cl 3.40m: JT 42° PI, Sm, Cl
	  -  -  -  -	34	× × × × × × × × × × × × × × × × × × ×	EUz2	<b>33.9m:</b> Slightly weathered, grey, laminated SILTSTONE; very weak. Inclined 5°.	sw						3.90m: BP 5°
Box 13 HQ3	9		× × × × · · · · · · · · · · · · · · · ·	EUs2	<b>34.53m:</b> Slightly weathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented.	sw		100	100	100	re 34         34	J.5m to 34.6m: Core damaged during moval from splits. I.55m to 34.60m: JT 70° PI, Sm, CI I.66m: BP 5° PI, Sm, CI
RE 1) (	Geoph	dinate nysica	l profiling	g unde	ng a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 3c rtaken downhole on 05/09/24, comprising of optical and acoustic televiewe al Sample.	sw m and v r down	vertical accuracy of 2 the length of the hol	2cm. e.			W Da 29 04 05 06	ater Level Readings: ater Level Readings: ater Time   Hole Depth   Water Level 1/08/24 00:00   1.00m   1.00 m bgl 1/08/24 15:50   2.500m   2.00 m bgl 1/08/24 07:30   25.00m   3.35 m bgl 1/08/24 08:00   3.600m   2.20 m bgl



**Watercare Services Ltd** Client:

Project: WIWQIP Motions Catchment Improvements

Location: Suffolk Reserve Project Reference: 521290-064 **BH06** 

Sheet 8 of 8

BOREHOLE I	NFORMATION
Method:	Rotary Core Wireline

Hydrapower Trekker 2100 Equipment:

CO-ORDINATES: NZTM2000 Easting: Northing: 1756390.70m 5918882.84m Date started: 4/09/2024 Date completed: 6/09/2024 Inclination: -90°

Logged by: ΑP Input by: AP Checked by: PK

ontra	ctor:	Dril	For	ce NZ Ltd	Ground level: 43.71m (NZVD)	2016)	Azimuth:		١	N/A		Reviewed by: SM	
5 I.	1 ==	Graphic Log	Layer Code	N	laterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	www. Fracture cs Log cs Log ecs	Stratigraphy Defect Description Additional Notes	Installation
8	- - - -	× × × × × × × × × × × × × × × × × × ×	EUz2	very weak.		sw		100	100	100			
	36		EUs2	SANDSTONE; extrer	nely weak. Moderately cemented.	sw							
	R.L. (m)	8 -			A C C C C C C C C C C C C C C C C C C C	Material Description    A	Material Description  Solution  Material Description  Solution  Material Description  Solution  Material Description  Solution  Solution	Material Description  Salary  Metrial Description  Metrial Description  Salary  Metrial Description  Salary  S	Material Description  Sample Control of the control	Material Description  Section:  Material Description  Material Description  Material Description  Material Description  Section:  Sectio	Material Description  Solution  Material Description  Material Description  Meather of the description  Solution  Meather of the description  Meather of the description  Solution  So	Material Description  Material Description  Meathering (m) (m) 100 100 100 100 100 100 100 100 100 10	Material Description  Material Description  Material Description  Meather in D

End of borehole at 36m (Termination Depth Achieved)

REMARKS:

<sup>1)</sup> Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 3cm and vertical accuracy of 2cm. 2) Geophysical profiling undertaken downhole on 05/09/24, comprising of optical and acoustic televiewer down the length of the hole. 3) ES refers to Environmental Sample.



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 27 Mostyn Street Project Reference: 521290-064 **BH10** 

Sheet 1 of 5

BOR Meth Equip Cont	nod: pme	ent:	Hyd	ary C Irapo	CO-ORDINATES: NZTM2000 Easting: 1755959.16m Northing: 5918491.96m Ground level: 26.24m (NZVD2016)	1	Date starte Date comp Inclination Azimuth:	oletec	d: 9	I/07/2 9/07/2 90° I/A			Logged by: THH Input by: THH Checked by: BGW Reviewed by: SM	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws ws Fracture cs Log		Stratigraphy Defect Description Additional Notes	Installation
-	- 26	-		Fg	Om: Silty fine to coarse GRAVEL with minor rootlets, cobbles and trace anthropogenic material; brown. Tightly packed, moist, well graded. Gravel is subangular, basalt and concrete. Cobbles are road debris, up to 70 mm length. Anthropogenic material includes glass and plastic fragments. [FILL]	GW-GI	1					0m: I 0.05r	FILL n to 0.2m: ES BH10_0.05-0.2	
H					0.5m:Scoriaceous basalt cobbles 100mm and 240mm     0.6m: SILT with some sand and gravel; dark brown. Firm, saturated, low plasticity. Gravel is subangular ballast. Sand is fine to coarse.     0.65m to 0.85m:Tree roots, up to 20mm diameter.	ML	0.6m: ISHSV=UTP	100						
-	- 25 -			Fc	1m: SILT with some sand and minor gravel; light brown. Firm, saturated, low plasticity. Gravel is fine to coarse, subangular ballast. Sand is fine to coarse.	ML	1.2m: ISHSV=49/10kPa						o 1.1m: ES BH10_1.0-1.1	
SPT				TAX TAZ	1.5m:Glass fragment up to 70mm length 1.6m to 1.7m:Decomposing rootlets and wood fragments.  1.7m: Sandy SILT with some clay; greenish grey. Firm, moist, low plasticity. Sand is fine to medium. [UNDIFFERENTIATED ALLUVIUM]  1.8m: CORE LOSS	MI-SP	1.5m: ISHSV=32/16kPa 1.5m: SPT 0,0// 0,1,0,1 N = 2	67					: TAURANGA GROUP ALLUVIUM to 1.9m: ES BH10_1.8-1.9	
	- - 24	2	× × × × × × × × × × × × × × × × × × ×	TAz	1.95m: Sandy SILT with some clay; greenish grey. Soft, moist, low plasticity. Sand is fine to medium.  2.36m to 2.38m:Silty fine to coarse SAND; dark brown.	MI-SF								
НОЗ			*   X   X   X   X   X   X   X   X   X	TAc	2.38m: Silty CLAY with trace sand; greenish grey. Soft, moist, high plasticity. Sand is fine.  2.84m: Clayey SILT with minor sand; greenish grey. Soft,	СН		100						
SPT	- - - 23		× × × ×	TAZ	moist, high plasticity. Sand is fine.	МН	3m: IBHSV=23/10kPa 3m: SPT 0,0// 0,0,0,0 N = 0	71					ito 3.4m: ES BH10 3.3-3.4	
	-	_	×	z TAx	3.32m: CORE LOSS  3.45m: Clayey SILT with minor sand; greenish grey. Soft,							3.32r finge	<b>n to 3.45m:</b> Driller changed to use r catcher.	
-	- - -	_	× <u>×</u> ×	TAs	moist, high plasticity. Sand is fine.  3.6m: Silty SAND with minor organics; grey. Very loose, moist, poorly graded. Organics are decomposing wood fragments up to 35mm length. Sand is fine to medium.	SM								
НОЗ	- - 22	4	× × × × × × × × × × × × × × × × × × ×		<b>3.91m:</b> SILT with some clay and minor sand; grey. Stiff, moist, low plasticity. Sand is fine.	ML		100						
HQ3	- - -	 _   _	× × × × × × × × × × × × × × × × × × ×	TAZ	<b>4.57m:</b> Sandy SILT with trace clay; grey. Stiff, moist, low plasticity. Sand is fine to medium.	MI-SF	4.5m: IBHSV=52/13kPa	100						
REM.			×	od usi	ing a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 2c	m an	d vertical accuracy of	f 3cm				Water	r Level Readings: Time   Hole Depth   Water Level	1:1

Water Level Readings: Date Time | Hole Depth | Water Level 04/07/24 11:45 | 1.50m | 0.90 m bg| 05/07/24 07:30 | 1.50m | 0.75 m bg| 05/07/24 15:10 | 16.40m | 2.20 m bg| 08/07/24 10:00 | 16.40m | 0.82 m bg| 08/07/24 10:00 | 16.40m | 0.82 m bg| 08/07/24 16:40 | 19.00m | 1.45 m bg| 09/07/24 08/00 | 19.00m | 0.56 m bg| 09/07/24 14:30 | 25.00m | 0.72 m bg|

Database File: CC2MOTIONS MASTER 02(JL.) GP LIbrary file: LIBRARY \_20240925\_V13 (1), GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18/02/2025

<sup>1)</sup> Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 2cm and vertical accuracy of 3cm. 2) Geophysical profiling undertaken downhole on 09/07/2024, comprising an Optical and Acoustic Televiewer. 3) ES refers to environmental sample



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 27 Mostyn Street Project Reference: 521290-064 **BH10** 

Sheet 2 of 5

Met Equ	REH hod: lipme ntrac	ent:	Hyc	ary C Irapo	TION CO-ORDINATES: NZTM2000 Easting: 1755959.16m Northing: 5918491.96m Ground level: 26.24m (NZVD2016	)	Date starte Date comp Inclination: Azimuth:	oletec	l: 9 -		2024 2024	Logged by: THH Input by: THH Checked by: BGW Reviewed by: SM
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture	Stratigraphy Defect Description Additional Notes
U54	21	_ _ _		TAx	5m: PUSHTUBE			100				5.20m to 5.60m: Drilling induced breaks
НДЗ	_ _ _ 		X   X   X   X   X   X   X   X   X   X	TAx TAz	5.5m: Clayey SILT with minor organics and trace sand. Soft, moist, high plasticity. Organics are decomposing wood fragments up to 17mm length. Sand is fine.      5.9m: CORE LOSS	мн		80				5.9m to 6m: Material dropped out of barrel
	20	6	X   X   X   X   X   X   X   X   X   X	±	6m: Clayey SILT with minor organics and trace sand. Soft, moist, high plasticity. Organics are decomposing wood fragments up to 34mm length. Sand is fine. 6.02m to 6.2m:Decomposing wood (tree branch) 6.26m to 6.39m:Decomposing wood (tree branch)							5.9m to 6m: Material dropped out of barrel and re-drilled, recovered core was highly disturbed. ES BH10, 5.9-6.0     6m: IBHSV not possible due to shortened runs to allow for pushtube.
HQ3	_ _ _ 		*	TAz		МН		100				
U54	19	- 7 - -	× - × -		7m: PUSHTUBE			100				7m: EAST COAST BAYS FORMATION
	_ _ _ _ _		/ \ ×	ERz	<b>7.5m:</b> Clayey SILT with trace fine sand and minor black carbonaceous material. Soft, moist, high plasticity. Black carbonaceous material up to 34mm length. [RESIDUAL SOIL ECBF]	МН						
	_ _ _ _ 	8	× ×	EWs	7.86m: Highly weathered, greenish grey, fine SANDSTONE; extremely weak. Poorly cemented. (Silty SAND).  8.17m: Moderately weathered, grey, SILTSTONE; very	HW					                   	
НОЗ			× × × × × × × × × × × × × × × × × × ×		weak.			100	55	55		
SPT	_ _ 	- - -	× × × × × × × × × × × × × × × × × × ×	EWZ	9.42m to 9.62m; minor very thin hade of fire	MW	9m: IBHSV=UTP 9m: SPT 2,3// 9,11,16,14 for 50mm N = 50+	100				<b>9.4m to 9.5m</b> : ES BH10_9.4-9.5
ноз	  -  -  -  -		× × × × × × × × × × × × × × × × × × ×		9.43m to 9.62m:minor, very thin beds of fine SANDSTONE.  9.62m to 9.8m:silty SAND.  9.8m to 10.95m:minor, very thin beds of fine SANDSTONE.			100	88	73		9.62m: JT 25° PI, Ro, CI 9.74m: JT 45° PI, Sm, CI 9.82m: BP 5°
	MARK Co-ord	S:	s captur	ed usi	ing a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 2	cm an	d vertical accuracy of	f 3cm.				Water Level Readings: Date Time   Hole Depth   Water Level

<sup>1)</sup> Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 2cm and vertical accuracy of 3cm.
2) Geophysical profiling undertaken downhole on 09/07/2024, comprising an Optical and Acoustic Televiewer.
3) ES refers to environmental sample

Date Time | Hole Depth | Water Level 04/07/24 11:45 | 1.50m | 0.90 m bgl 05/07/24 07:30 | 1.50m | 0.75 m bgl 05/07/24 15:10 | 16.40m | 2.20 m bgl 08/07/24 16:10 | 16.40m | 2.20 m bgl 08/07/24 16:40 | 19.00m | 1.45 m bgl 09/07/24 800 | 19.00m | 0.56 m bgl 09/07/24 14:30 | 25.00m | 0.72 m bgl

Database File: CC2MOTIONS MASTER 02(41).GPJ Library file: LBRARY\_20240925\_V13 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18102/2025



**BOREHOLE INFORMATION** 

Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Date started:

4/07/2024

Location: 27 Mostyn Street Project Reference: 521290-064

**CO-ORDINATES: NZTM2000** 

**BH10** 

Logged by:

Sheet 3 of 5 THH

Met Equ	hod: lipme tract	ent:	Hyc	ary C Irapo	Core Wireline ower Trekker 2100 ce NZ Limited	Easting: 1755959.16m Northing: 5918491.96m Ground level: 26.24m (NZVD201		Date starte Date comp Inclination Azimuth:	oleted	d: 9		2024	Logged by: THH Input by: THH Checked by: BGW Reviewed by: SM
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	laterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture	Stratigraphy Defect Description Additional Notes
НФЗ	 	_	× × × × × × × × × × × × × × × × × × ×	EWz	8.17m: Moderately we weak.	eathered, grey, SILTSTONE; very	MW		100	88	73		10.07m: BP 2° 10.17m: JT 5° PI, Sm, Cl 10.25m: BP 2° 10.40m: BP 10°
SPTC		- - - - 11	× × × × × × × × × × × × × × × × × × ×	EUz2 EUx	10.5m: NO RECOVE  10.69m: Slightly weat	RY hered, grey SILTSTONE; very weak.	SW	10.5m: SPTC 5,33// 50 for 40mm N = 50+	N/A	N/A	N/A		10.69m to 11.24m: Contains minor beds of disseminated black carbonaceous material <2mm.
HQ3	_ _ 	- - - -	× × × × × × × × × × × × × × × × × × ×		11.24m: Slightly weat weak. Moderately cer	hered, grey, fine SANDSTONE; very nented.			100	100	100		11.50m: BP 2°
SPTC		12		EUx EUs2	12m: NO RECOVER	Y	sw	12m: SPTC 21,29 for 135mm// N = 50+	N/A	N/A	N/A		11.73m: BP 2°
S		_	× × × × × × × × × × × × × × × × × × ×	EUz2 E	12.25m: Slightly weat	hered, grey SILTSTONE; very weak. hered, grey, fine to medium veak. Moderately cemented.	SW	N = 50+					12.47m: JT 10° PI, Sm, Cl
HQ3		13		EUs2			sw		100	100	100		
		- - - -											
		14	× × × × × × × × × × × × × × × × × × ×	EUz2	13.89m: Slightly weat	hered, grey SILTSTONE; very weak.	sw						13.65m: JT 25° PI, Sm, CI  13.97m to 14.02m: Bed of disseminated black carbonaceous material <2mm.
HQ3	12 - -	-  -  -  -		EUs2	SANDSTONE; very w	hered, grey, fine to medium yeak. Moderately cemented. hered, grey SILTSTONE; very weak.	sw		100	100	100		14.57m to 14.61m: Minor beds of
REN			× × × × × × × × × × × × × × × × × × ×	EUz2			SW	-					disseminated black carbonaceous material <2mm.  14.79m: JT 25° PI, Sm, Cl  14.89m to 14.92m: Minor beds of disseminated black carbonaceous material Water Level Readings:

| Mater Level Readings: | Date Time | Hole Depth | Water Level 04(07724 11:45 | 1.50m | 0.90 m bg| 05/07/24 07:30 | 1.50m | 0.75 m bg| 05/07/24 15:10 | 16.40m | 2.20 m bg| 08/07/24 15:00 | 16.40m | 2.20 m bg| 08/07/24 16:40 | 19.00m | 1.45 m bg| 08/07/24 16:40 | 19.00m | 1.45 m bg| 09/07/24 14:30 | 25.00m | 0.72 m bg|

Database File: CC2MOTIONS MASTER 02(41).GPJ Library file: LBRARY\_20240925\_V13 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18102/2025

<sup>1)</sup> Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 2cm and vertical accuracy of 3cm. 2) Geophysical profiling undertaken downhole on 09/07/2024, comprising an Optical and Acoustic Televiewer. 3) ES refers to environmental sample



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 27 Mostyn Street Project Reference: 521290-064 **BH10** 

Sheet 4 of 5

BOREH Method Equipm Contrac	: ent:	Roi Hyd	tary ( drapo	FION CO-ORDINATES: NZTM2000 Easting: 1755959.16m Northing: 5918491.96m Ground level: 26.24m (NZVD2016	)	Date started Date complinction: Azimuth:		: 9 }-		2024 2024	Sneet 4 or 5  Logged by: THH Input by: THH Checked by: BGW Reviewed by: SM
Method R.L. (m)		Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	www.wws www.s.Fracture cs Log cs Log	Stratigraphy Defect Description Additional Notes
HQ3	- - - - - - - 16		2	14.95m: Slightly weathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented.			100	100		<2mm	i. m: BP 2°
10	- - - - - - - -		EUs2	16.45m to 16.5m:SILTSTONE.	sw						o 19m: Water pressure permeability H10_PPT01 n to 16.12m: Minor beds of ninated black carbonaceous material .  m to 16.68m: JT 80° Un, Ro, CI highly red zone m: JT 2° PI, Ro, CI m to 16.93m: JI 85° Un, Sm, CI m to 16.88m: JI 55° Un, Sm, CI m to 16.88m: JI 55° Un, Sm, CI m to 16.88m: JI 55° Un, Sm, CI
HO3		× × × × × × × × × × × × × × × × × × ×	EUz2	17m: Slightly weathered, grey SILTSTONE; very weak.  17.25m: Slightly weathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented.	SW		98	73	73		m: JT 45° Un, Ro, Cl m: BP 2°
- - - -		× × × × × ×	EUz2 EUs2	17.7m to 17.79m:SILTSTONE. 17.82m: Slightly weathered, grey SILTSTONE; very weak.	sw					17.62	m: BP 2° m: JT 35° PI, Sm, CI m: BP 5°
HØ3	- - - - - -	× × × × × × × × × × × × × × × × × × ×	i ii	18.16m: Slightly weathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented.  18.51m to 18.66m:Slightly weathered, grey SILTSTONE; very weak.	sw		100	100	100		m: BP 55°
7 OH -			EUs2	19m to 19.07m:SILTSTONE.  19.24m to 19.32m:SILTSTONE.  19.32m: Slightly weathered, grey, fine SANDSTONE; very weak. Moderately cemented. Contains minor layers of disseminated black carbonaceous material <2mm.	SW		100	100	100		
EÖH —				<b>19.67m:</b> Slightly weathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented.	sw		100	97	87		Level Readings:

Water Level Readings:
Date Time | Hole Depth | Water Level 04(07/24 11:45 | 1.50m | 0.90 m bg| 05:07/24 07:30 | 1.50m | 0.75 m bg| 0.5:07/24 15:10 | 16.40m | 2.20 m bg| 08:07/24 10:00 | 16.40m | 0.82 m bg| 08:07/24 16:40 | 19.00m | 1.45 m bg| 09:07/24 08:00 | 19.00m | 0.56 m bg| 09:07/24 14:30 | 25.00m | 0.72 m bg|

Database File: CC2.MOTIONS MASTER 02,LL),GPU. Library file. LIBRARY. 2024/9255,V13 (1) GLB Tamplate: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18102/2025

<sup>1)</sup> Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 2cm and vertical accuracy of 3cm. 2) Geophysical profiling undertaken downhole on 09/07/2024, comprising an Optical and Acoustic Televiewer. 3) ES refers to environmental sample



Auckland, New Zealand Tel: +64 9 520 6019 www.aurecongroup.com

Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 27 Mostyn Street Project Reference: 521290-064 **BH10** 

Sheet 5 of 5

Met Equ	REH hod: lipme ntrac	ent:	Hyc	ary C Irapo	Core Wireline ower Trekker 2100	CO-ORDINATES: NZTM2000           Easting:         1755959.16m           Northing:         5918491.96m           Ground level:         26.24m (NZVD2016		Date starte Date comp Inclination Azimuth:	oletec	d: 9		2024 2024	Logged by: THH Input by: THH Checked by: BGW Reviewed by: SM	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Ма	aterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture  wws Fracture  ss Log  ess	Stratigraphy Defect Description Additional Notes	Installation
	6	_		EUs2	19.67m: Slightly weath SANDSTONE; very we 20.09m to 20.17m:S	ered, grey, fine to medium aak. Moderately cemented. ILTSTONE.	sw						20.03m: JT 50° PI, Sm, CI 20.07m: BP 15° PI, Ro, CI 20.16m: JT 45° PI, Sm, CI	
HQ3			× × × × × × × × × × × × × × × × × × ×	EUz2		red, grey SILTSTONE; very weak. nin 30-40mm beds of subhorizontal fine ANDSTONE	SW		100	97	87		20.57m: JT 10° Un, Ro, Cl 20.64m: JT 10° Pl, Sm, Cl 20.65m to 20.71m: Minor beds of disseminated black carbonaceous material <2mm. 20.80m: JT 25° Pl, Sm, Cl	
	5 _ _	-	× × × × × × × × × × × × × × × × × × ×										21.04m: BP 2° 21.50m: JI 5°	
HQ3				EUs2		ered, grey, fine to medium eak. Moderately cemented.	sw		100	100	100			
	<u>4</u> _ _	_	× × × × × × × × × × × × × × ×		22.21m: Slightly weath	ered, grey SILTSTONE; very weak.							22.34m: BP 10° 22.35m to 22.37m: Bed of disseminated black carbonaceous material, <2mm.	
			× × × × × × × × × × × × × × × × × × ×	EUz2	<b>22.91m to 22.97m</b> :S.	ANDSTONE	SW						22.70m: JT 30° PI, Sm, CI 22.76m: BP 5° PI, Ro, CI 22.79m: BP 5° PI, Ro, CI	
HQ3	3		x x	EUs2	weak. Moderately cem	ANDSTONE; extremely weak. Poorly	SW		100	88	63		23.22m: BP 2° PI, Ro, CI 23.38m: BP 2° PI, Ro, CI 23.45m: BP 2° PI, Ro, CI 23.50m: BP 2° PI, Ro, CI	
	_ _ _ _ 2	24	× × × × × × ×	EUz2	24.04m: Slightly weath	ered, grey SILTSTONE; very weak.	sw						24.09m: JT 50° PI, Ro, Cl	
НОЗ	_	_ _ 		EUs2		ered, grey, fine SANDSTONE; very ented. Contains disseminated black I, <2mm.	sw		97	92	92			
	_	_ _ _ _ 	× × × × × × × × × × ×	EUz2	24.69m: Slightly weath	ered, grey SILTSTONE; very weak.	SW						24.69m: BP 45°	

Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 2cm and 2) Geophysical profiling undertaken downhole on 09/07/2024, comprising an Optical and Acoustic Televiewer.
 ES refers to environmental sample

Date Time | Hole Depth | Water Lew 04/07/24 11:45 | 1.50m | 0.90 m bg| 05/07/24 07:30 | 1.50m | 0.75 m bg| 05/07/24 15:10 | 16.40m | 2.20 m bg| 08/07/24 10:00 | 16.40m | 0.82 m bg| 08/07/24 10:00 | 16.40m | 0.82 m bg| 08/07/24 16:40 | 19.00m | 1.45 m bg| 09/07/24 08:00 | 19.00m | 0.56 m bg| 09/07/24 14:30 | 25.00m | 0.72 m bg|

Database File: CC2.MOTIONS MASTER 02(LL),GPJ. Library file: LIBRARY. 2024/9355. V13 (1),GLB Template: DATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG bate Generated: 18/02/2035



Project: WIWQIP Motions Catchment Improvements
Location: New Bond Street

521290-064 Project Reference:

**BH13** 

Sheet 1 of 5

Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture	Stratigraphy Defect Description Additional Notes
		-		_	<b>0m:</b> SILT with minor clay, trace sand; brown. Stiff, moist, low plasticity. Sand is fine to coarse. [TOPSOIL]	OL.						0m: FILL 0.05m to 0.2m: ES BH13_0.05-0.2.
	- - - -	- - - -		Fg	0.3m: Silty GRAVEL, dark brown. Tightly packed, dry. Gravel is slightly weathered to unweathered, grey sandstone and greywacke. [FILL]  0.4m: Silty CLAY with minor gravel; yellowish brown. Very stiff, moist, high plasticity. Gravel is slightly weathered to unweathered, grey sandstone and greywacke.	GM	0.5m: ISHSV=UTP					<b>0.4m to 0.5m</b> : ES BH13_0.4-0.5.
		1	-				1m: ISHSV=158/17kPa					<b>1m to 1.1m</b> : ES BH13_1.0-1.1.
VACEX	- - - -	-  -  -  -			1.3m to 1.9m:Yellow. 1.5m:Stiff.	СН	1.5m: ISHSV=60/34kPa					<b>1.4m to 1.5m</b> : ES BH13_1.4-1.5.
		2	-	Fc	1.9m to 2.5m:Brownish grey.		2m: ISHSV=64/25kPa					
		- - -			<b>2.5m:</b> Silty CLAY with some gravel; brown, speckled orange brown. Stiff, moist, high plasticity. Gravel is completely weathered, grey sandstone and greywacke.	СН	2.5m: ISHSV=54/20kPa					
	26	3	-		3m to 3.15m:Yellowish grey.		3m: ISHSV=84/30kPa				11111	
SPT	_	_		¥	3.15m: CORE LOSS		3m: SPT 0,0// 0,0,0,0 N = 0	33				<b>3.2m</b> : Cased to 3.2m.
	_ 	_ _ _			<b>3.45m:</b> Silty CLAY; yellow, speckled grey. Very soft, moist, high plasticity.							
HQ3	 	4	-	Fc		СН		100				
	_				4.5m: PUSH TUBE.		4.5m:					
U54		_ _ _ _ 5		Fx	A.G.II. FOOT FORE.		IBHSV=8/3kPa	100				
1) (	MARK Co-ord S ref	dinate	es captur o environ	ed usi menta	ng a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of a sample.	2cm a	and vertical accuracy	of 3cr	n.			Water Level Readings: Date Time   Hole Depth   Water Level 11/07/24 08:00   15.00m   3.33 m bg  12/07/24 08:00   15.00m   4.50 m bg  12/07/24 13:00   25.00m   4.10 m bg



Tel: +64 9 520 6019

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: New Bond Street 521290-064 Project Reference:

**BH13** 

Sheet 2 of 5

CO-ORDINATES: NZTM2000 BOREHOLE INFORMATION Date started: 10/07/2024 Logged by: FG Rotary Core Wireline Massenza MM3 Rig McMillan Drilling Ltd 1755685.52m 12/07/2024 Method: Easting: Date completed: Input by: FG Equipment: Northing 5918252.96m Inclination: -90° Checked by: **BGW** 28.98m (NZVD2016) N/A Reviewed by: SM Contractor: Ground level: Azimuth: Weathering/USC Graphic Log Code Fracture Log Installation Length (m) Stratigraphy  $\Xi$ Testing TCR (%) 8 % Method Defect Description SCR ( RQD ( Material Description R.L Layer Additional Notes **5m:** Silty CLAY; yellowish orange, speckled grey. Firm, moist, high plasticity. HQ3 100 5.7m to 6.45m:...Soft. 23 СН 6 6m: IBHSV=22/4kPa 6m: SPT 0,0// 0,0,0,0 N = 0 **6m:** Vibrating wire transducer (S/N: 361129). 11111 SPT 100 6.45m to 6.65m:...Grey, speckled yellow. 6.9m: Clayey SAND with some silt; greenish grey. Firm, 22 <del>1</del>03 7 86 moist, low plasticity.
7.02m to 7.15m:...Grey SC 7.15m: CORE LOSS. ĭ **7.3m**: Silty SAND with trace clay; grey. Very dense, moist, non-plastic. [RESIDUAL SOIL ECBF] 7.3m: EAST COAST BAYS FORMATION ERs RS 7.5m: Moderately weathered, grey SILTSTONE; Very weak. 7.5m: SPT 4,8// 50 EWZ SPT MW 100 N = 50+ **7.73m:** Moderately weathered, grey, fine to medium SANDSTONE; Very weak, moderately cemented. 21 7.92m: JT 15° Un, Ro, Cl 8 8.14m; BP 20° 8.15m to 8.53m:...Fine SANDSTONE. 8.21m: JT 10° Un, Ro, CI 8.31m: JT 30° Un, Ro, Cl HQ3 EWs MW 100 95 84 8.46m: JT 20° Un, Ro, Cl 8.53m to 8.78m:...SILTSTONE. 8.61m: BP 2° 8.68m:...20mm of black carbonaceous material. 8.69m: BP 2° 20 9 8.94m to 8.97m:...Extremely weak, poorly cemented. 8.94m: BPJT 10° Un, Ro, Cl 9m: SPTC 12,38// N = 50+ SPTC 9m: NO RECOVERY.  $\pm 1111$ N/A N/A N/A × × × EUz2 9.15m: Slightly weathered, grey SILTSTONE; extremely SW weak. 9.31m:...10mm of black carbonaceous material. 9.32m: Slightly weathered, grey, fine to medium 9.43m: BP 5° PI, Ro, CI SANDSTONE; extremely weak, moderately cemented. SW 9 100 99 78 9.78m: Slightly weathered, grey SILTSTONE; extremely SW 19 REMARKS 1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm. 2) ES refers to environmental sample.

Water Level Readings: Date Time | Hole Depth | Water Level 11/07/24 08:00 | 15.00m | 3.33 m bgl 12/07/24 08:00 | 15.00m | 4.50 m bgl 12/07/24 13:00 | 25.00m | 4.10 m bgl



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: New Bond Street Project Reference: 521290-064 **BH13** 

Sheet 3 of 5

Met Equ	REH hod: ipm itrac	ent:	Mas	ary C	<b>FION</b> Core Wireline za MM3 Rig n Drilling Ltd	CO-ORDINATES: NZTM2000 Easting: 1755685.52m Northing: 5918252.96m Ground level: 28.98m (NZVD201	16)	Date starte Date comp Inclination Azimuth:	oleted	: 1		7/2024 7/2024	Logged by: FG Input by: FG Checked by: BGW Reviewed by: SM
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	٨	<i>f</i> laterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws Fracture cs Log	Stratigraphy Defect Description Additional Notes
HQ3	- - - -	_	× × × × × × × × × × × × × × × × × × ×	EUz2	weak.	nered, grey SILTSTONE; extremely ne to medium SANDSTONE; extremely	sw		100	99	78		10.14m: BP 3° 10.26m: BP 2° 10.30m: BPJT 5° Un, Ro, Cl
SPTC	_		X	EUx	10.5m: NO RECOVE	RY. thered, grey SILTSTONE; extremely		10.5m: SPTC 3,17// 40,10 for 20mm N = 50+	N/A	N/A	N/A		
	_ 18 _	11	× × × × × × × ×	EUz2	weak. 10.88m to 10.97m:	Zone of black carbonaneous material. red, grey, fine to medium SANDSTONE;	SW						10.93m: BP 10° 11.00m: BP 10°
HQ3	- - - - -	_		EUs2		Extremely weak, poorly cemented.	100	96	88		11.20m: BP 20° 11.45m: BP 5° 11.75m: JT 30° Un, Ro, Cl		
	 17 	12	× × × × × × ×		,	nered, grey SILTSTONE; Very weak. Fine to medium SANDSTONE.							11.88m: JT 15° Pl, Ro, Cl 11.95m: JT 10° Pl, Ro, Cl
	- - - -	_ - - -	× × × × × × × × × × × × × × × × × × ×	EUz2	<b>12.5m:</b> 3mm of blace	sk carbonaceous material.	sw						12.22m: BP 2° 12.26m: JT 15° PI, Ro, CI 12.39m: BP 5° 12.50m to 12.53m: BPJT 2° Un, Ro, Co, (Infill: black carbonaceous material 2mm)
9	_ _ _ 	13			SANDSTONE; extre	thered, grey, fine to medium mely weak, poorly cemented. ack carbonaceous material.			100	100	92		12.70m: Black carbonaceous material, inclined at 15°. 12.80m: JT 15° PI, Ro, Cl 12.87m: JT 20° PI, Ro, Cl
	- - -	_		EUs2	<b>13.3m to 13.31m</b> :S	SILTSTONE.	sw						13.20m: JT 10° PI, Ro, Cl 13.40m: BP 2°
	- -	_				tremely weak, poorly cemented.							13.70m: BP 5° PI, Ro, CI
	_ 15 _	14	× × × × × ×	EUz2	14m: Slightly weathe		SW						14.01m: JT 15° Un, Ro, Cl
SANDSŤOŇE and SILTSTONE; Very weak. SANDSTONE is very thin in beds 10mm thick. SILTSTONE is very thin in beds 20mm thick.									100	72	72		
		14.4m to 14.45m:Extremely weak, poorly cemented. 14.4m to 15m:SILTSTONE.  14.5m: Slightly weathered, grey, fine to medium SANDSTONE; Very weak, moderately cemented. 14.51m to 14.56m:SILTSTONE.											14.40m to 14.43m: JT 30° Un, Ro, Cl 14.45m: BP 5° Un, Ro, Cl
) C	//ARk	dinates	s captur		ing a Leico Zeno FLX100 al sample.	plus smart antenna, with a horizontal accuracy	of 2cm a	I and vertical accuracy	of 3cm	n.			Water Level Readings: Date Time   Hole Depth   Water Level 11/07/24 08:00   15.00m   3.33 m bgl 12/07/24 08:00   15.00m   4.50 m bgl 12/07/24 13:00   25.00m   4.10 m bgl



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: New Bond Street Project Reference: 521290-064 **BH13** 

Sheet 4 of 5

M E	ORE etho quipi ontra	d: mer	nt:	Mas	ary C		CO-ORDINATES: NZTM: Easting: 17556 Northing: 59182	2000 85.52m 52.96m n (NZVD2016)		Date starte Date comp Inclination: Azimuth:	leted	: 1 -		7/2024 7/2024	Sheet 4 of 5  Logged by: FG Input by: FG Checked by: BGW Reviewed by: SM
Method	BI (m)	N.L. (III)	Length (m)	Graphic Log	Layer Code	N	Material Description		Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture cs Log	Stratigraphy Defect Description Additional Notes
HO3 Box 4	-	3	- - - - - 16	× × × × × × × × × × × × × × × × × × ×	EUz2 EUs2	SANDSTÖNE; Very	nered, grey, fine to medium weak, moderately cemented red, grey SILTSTONE; Very		SW		100	90	86		15.2m: Vibrating wire transducer (S/N: 365171). 15.20m to 15.33m: JT 75° Un, Ro, Cl 15.21m: BPJT 2° Un, Ro, Co, (Infill: black carbonaceous material members of the carbonaceous memb
Box 5	E	2	 - - - - 17	× × × × × × × × × × × × × × × × × × ×	EUz2 EUs2	weak, moderately cell 16.78m to 16.92m:l 16.92m: Slightly weat 16.98m to 17.04m: 17.06m:20mm of bit 17.17m:30mm of bit	Fine to medium SANDSTON thered, grey SILTSTONE; Von Extremely weak. lack carbonaceous material. lack carbonaceous material. thered, grey, fine SANDSTO	NE. ery weak.	sw		100	97	97		16.44m: JT 30° PI, Ro, CI  16.95m to 16.96m: JT 45° Un, Ro, CI  17.13m: JT 45° Un, Ro, CI
	_ _ _ _ 1	1	- - - <u>18</u> - -		2	SANDSTONE; Very v siltstone, 40-50mm th			sw						17.49m: JT 20° Un, Ro, Cl 17.54m: JT 20° Un, Ro, Cl 17.75m: JT 10° Un, Ro, Cl 17.92m: JT 25° Un, Ro, Cl 18.06m: BP 5° Un, Ro, Cl
Box 6 HO3	- - - 1 - - -	0			EUS2	SANDSTÖNE; Very v. 18.46m:3mm of bla 18.48m to 18.5m:2 18.55m to 18.75m:1 18.67m to 18.75m:1 18.95m to 18.96m:1 19m to 19.1m:SILT	nered, grey, fine to medium weak, moderately cemented ack carbonaceous material. ixtremely weak, poorly ceme SILTSTONE.  Extremely weak.		sw		100	96	86		18.47m: Black carbonaceous material, inclined at 25°. 18.61m: BP 5° PI, Ro, CI Fractured 18.70m: BP 5° PI, Ro, CI 18.80m: SST 2mm thick, drilling induced.  19.05m: BP 10° 19.14m: Black carbonaceous material, inclined at 25°.
EOH	9 EMAI		- - 20	× × × × × × × × × × × × × × × × × × ×	EUz2	19.5m: Slightly weath	extremely weak, poorly ceme nered, grey SILTSTONE; Vei or (8%) fine sandstone, 10-5	ry weak.	SW		100	98	98		Water Level Readings:
2	ESr	refer	s to	environi	menta	ng a Leico Zeno FLX100 Il sample. DR4940 Correction Facto	plus smart antenna, with a horizo	ontal accuracy of 2	2cm ar	nd vertical accuracy	of 3cn	n.			Date Time   Hole Depth   Water Level   11/07/24 08:00   15.00m   3.33 m bg    12/07/24 08:00   15.00m   4.50 m bg    12/07/24 13:00   25.00m   4.10 m bg



Project: WIWQIP Motions Catchment Improvements
Location: New Bond Street

Project Reference: 521290-064

**BH13** 

Sheet 5 of 5

N E	/leth Equi	REHO nod: ipme tract	ent:	Mas	ary C	CO-ORDINATES: NZTM2000 Easting: 1755685.52m Northing: 5918252.96m Ground level: 28.98m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	leted	: 1		7/2024 7/2024	Logged by: FG Input by: FG Checked by: BGW Reviewed by: SM
N A LABOR DE	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws Fracture ws Log	1 - 1
-	HQ3		- - -	× × × × × × × × × × × × × × × × × × ×		19.5m: Slightly weathered, grey SILTSTONE; Very weak. Interbedded with minor (8%) fine sandstone, 10-50mm thick. 20.04m to 20.06m:Extremely weak, poorly cemented.			100	98	98		
Box 6		8	_ _ 	× × × × × × × × × × × × × × × × × × ×	EUz2	20.66m to 20.67m:Extremely weak, poorly cemented. 20.7m to 20.85m:Fine to coarse SANDSTONE.	sw						20.75m: BP 5° St, Ro, Cl 20.85m: BP 5° PI, Ro, Cl
	HQ3	 	- - - -	× × × × × × × × × × × × × × × × × × ×		21.57m: Slightly weathered, grey, fine to medium SANDSTONE; Very weak, moderately cemented.			100	100	100		21.53m: BP 5°
		7			52	22m to 22.2m:SILTSTONE.							22.00m to 24.00m: Drilling induced breaks (discing)
Box 7	НОЗ	6			EUs2	<b>22.91m to 22.95m:</b> SILTSTONE.	SW		87	78	78		22.62m to 22.75m: JT 70° Un, Ro, Cl
			- - -	× × × × × × × × × × × × × × × × × × ×	EUz2	23.45m: Slightly weathered, grey SILTSTONE; Very weak.	sw						23.50m: BP 5° 23.54m to 23.55m: JT 5° Un, Ro, Cl
	-	5			EUx	23.8m: CORE LOSS.  24m: Slightly weathered, grey, fine to medium SANDSTONE; Very weak, moderately cemented.							
_ 3	HQ3	- ; - ; - ;	_ _ _ _ _		EUs2	24.42m to 24.7m:SILTSTONE.	SW		100	100	100		
1	1) C	- 4 IARK	linates	s capture	ed usi	24.76m:Black carbonaceous material laminae.  End of borehole at 25m (Termination Depth Achieved) ng a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of	2cm ar	nd vertical accuracy	of 3cm	1.			Water Level Readings: Date Time   Hole Depth   Water Level
2	2) E	S refe	ers to	environ	menta	al sample.  DR4940 Correction Factor: 1.678							11/07/24 08:00   15.00m   3.33 m bgl 12/07/24 08:00   15.00m   4.50 m bgl 12/07/24 13:00   25.00m   4.10 m bgl



Project: WIWQIP Motions Catchment Improvements

Location: Nixon Park Carpark
Project Reference: 521290-064

**BH14** 

Met Equ	REH hod: lipmo ntrac	ent:	Hyc	ary C Irapo	CION Core Wireline Inwer 015 Ce NZ Ltd	CO-ORDINATES: NZTM2000 Easting: 1755471.53m Northing: 5918203.21m Ground level: 21.78m (NZVD201	6)		Date start Date com Inclinatior Azimuth:	pleted	d:		)/2024 )/2024		Logged by: KL Input by: KL Checked by: BGW Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	Material Description	Weathering/USC		Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture		Stratigraphy Defect Description Additional Notes
	- - - -	- - - -		FEK	<b>0m:</b> ASPHALT <b>0.04m:</b> Medium to coa brown. Tightly packed,	rse GRAVEL with some cobbles; grey and dry. [FILL]	GP								Om: FILL
VACEX	21	- - - 1		Fc	<b>0.6m:</b> Silty CLAY with high plasticity. Sand is	trace sand; yellowish brown. Stiff, moist, fine.	СН	0.9m:	=53/16kPa						
	- - -	- - -		FEK		GRAVEL with minor boulders/cobbles and rown. Tightly packed, dry.	GP								1m: SPT unable to be undertaken due to prescence of boulder
	20			Fx	1.5m: CORE LOSS										
<b>~</b>	- - -	2	/ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	FEK	plasticity. Gravel is slig 2.1m to 2.2m:Stiff, n		СН						           		
HOS	_	- - -	× × × × × × × × × × × × × × × × × × ×		2.2m: Clayed SILT with Firm, moist, low plastic ALLUVIUM]	h trace sand and organics; darkish grey. city. Sand is fine. [UNDIFFERENTIATED	МН			73					2.2m: TAURANGA GROUP ALLUVIUM
	19	- 3		TAc	2.6m: Silty CLAY with Firm, moist, high plasti	trace sand and organics; brownish orange. icity. Sand is fine.									
I AS	 _ 				<b>3.1m:</b> Stiff.		СН	IBHSV: 3m: SP 0,0// 1,0,1,1 N = 3 3.1m:		100					
	_ _ _ _ 	-  -  -	× × × × × × × × × × × × × × × × × × ×		light grey. Śtiff, moist, l silt layers.	th trace organics; yellowish brown mottled high plasticity. Fragmental ogranics within e decomposed organics.			-02/ <del>13</del> NF a						
HOS	_	_ _ 4 _	× × × × × × × × × × × × × × × × × × ×	TAz			МН			100					
	 - -	- - -	× × × × × × × × × × × × × × × × × × ×		4.5m: PUSH TUBE										4.5m to 4.8m: Push Tube discontinued due
HQ3 U54	17	5	× × ×	TAZ TAX	<b>4.8m:</b> Clayey SILT with brown. Very stiff, moist	n minor sand; light grey, mottled orange t, high plasticity. Sand is fine to medium.				100				             	4.5m to 4.8m: Push Tube discontinued due to hard ground
1) C 2) A 3) C	star Seoph	KS: dinate ndpipe	es captu e was in	stalle	d in BH14 with a screene dertaken downhole on 19	of plus smart antenna, with a horizontal accu ed interval between 4-6m bgl. 9/09/2024, comprising an Optical and Acoust m on 20/09/2024. No water flow found.	•		d vertical ac	ccuracy	of 8	cm.		11	Water Level Readings: Date Time   Hole Depth   Water Level 16/09/24 15-40   4.50m   1.54 m bgl 17/09/24 08:30   4.50m   2.63 m bgl 17/09/24 15:30   21.00m   5.90 m bgl 18/09/24 08:30   30.00m   4.69 m bgl 18/09/24 08:30   30.00m   1.69 m bgl



Project: WIWQIP Motions Catchment Improvements

Location: Nixon Park Carpark Project Reference: 521290-064 **BH14** 

Sheet 2 of 6

IMPROVEMENTS LOG Date Generated:

Database File: CC2 MOTIONS MASTER 02(JL),GPJ LIbrary file: CC2 LIBRARY, 20241122 V18 SECTIONS, GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT

**BOREHOLE INFORMATION** CO-ORDINATES: NZTM2000 Date started: 16/09/2024 Logged by: KL Rotary Core Wireline Easting: 1755471.53m Date completed: 18/09/2024 Input by: Equipment: Hydrapower 015 Northing 5918203.21m Inclination: -90° Checked by: BGW 21.78m (NZVD2016) Drill Force NZ Ltd N/A Contractor: Ground level: Azimuth: Reviewed by: SS Weathering/USC **Graphic Log** Code Fracture Installation Length (m) TCR (%) Stratigraphy  $\Xi$ Testing 8 8 Method Log Defect Description SCR ( RQD Material Description R.L. Layer Additional Notes WS WS CS CS CS **4.8m:** Clayey SILT with minor sand; light grey, mottled orange brown. Very stiff, moist, high plasticity. Sand is fine to medium. × × × МН 5.4m to 5.45m:...Mottled orange brown with trace organics. Iron oxide staining on the organics. 100 5.5m:...Thin layers of organic material. 16 **5.8m:** Clayey SILT with trace sand; greyish brown. Very stiff, moist, low plasticity. Sand is fine. [COMPLETELY WEATHERED 5.8m: EAST COAST BAYS FORMATION ×  $\perp$ 6 × 6m: SPT 2,2// 3,3,3,5 N = 14 ×  $\Box$ SPT 100 \_X CW  $\Pi\Pi\Pi$ × 6.45m to 7m:...Grey × × 15 × × Box ; HQ3 7 100 7m: Highly weathered, grey, fine to medium SANDSTONE  $\Pi\Pi$ Extremely weak, poorly cemented. (Silty fine to medium SAND; Medium dense). HW  $\Pi\Pi$ 7.4m: Highly weathered, grey, sandy SILTSTONE; Extremely  $\Pi\Pi\Pi$ weak (Sandy SILT; Very stiff) 7.5m: SPT 3,4// IIIII5,6,8,11 N = 30  $I \cup I \cup I$ I I I I100 SPT 14  $I \cup I \cup I$ HW  $\Pi\Pi\Pi$ IIIII8  $\Pi\Pi$ ++++8.20m: BP 45°  $\Pi\Pi\Pi$ 8.3m: Moderately weathered, grey, medium SANDSTONE;  $\Pi\Pi\Pi$ Extremely weak, poorly cemented HQ3  $I \mid I \mid I \mid$ 100 97 0  $\Pi \Pi \Pi$  $\Pi\Pi\Pi$ 13 ERs  $\Pi\Pi\Pi$ MW 9 9m: SPT 11,6// 19,21,10 for 40mm N = 50+  $\Pi\Pi$ SPT 9.25m:...Fine SANDSTONE. 9.30m to 9.55m: CZ **9.54m:** Moderately weathered, grey, SILTSTONE; Very weak, moderately cemented. HQ3 100 75 12 **9.74m:** Moderately weathered, grey, medium SANDSTONE; Extremely weak, poorly cemented. ERs MW 9.9m to 10.2m:...poorly cemented, highly fractured. REMARKS NEWMANS.

1) Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with a horizontal accuracy of 5cm and vertical accuracy of 8cm.

2) A standpipe was installed in BH14 with a screened interval between 4-6m bgl.

3) Geophysical profiling undertaken downhole on 19/09/2024, comprising an Optical and Acoustic Televiewer.

4) Packer testing was undertaken between 24.5-30m on 20/09/2024. No water flow found.

| Water Level Readings: | Date Time | Hole Depth | Water Level | 16/09/24 15:40 | 4.50m | 1.54 m bgl | 17/09/24 40:30 | 4.50m | 2.63 m bgl | 17/09/24 15:30 | 21.00m | 5.90 m bgl | 8/09/24 08:30 | 30.00m | 4.69 m bgl | 19/09/24 09:00 | 30.00m | 1.69 m bgl

Hand Shear Vane Serial No: 3732 Correction Factor: 1.649



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: Nixon Park Carpark
Project Reference: 521290-064

**BH14** 

Sheet 3 of 6

	Metl Equ		ent:	Hvc	ary C	TION Core Wireline ower 015 ce NZ Ltd	CO-ORDINATES: Easting: Northing: Ground level:	NZTM2000 1755471.53m 5918203.21m 21.78m (NZVD2016)		Da Inc	ate starte ate comp clination: zimuth:	oleted	: 1 -9		/2024 /2024	Inpu Che	ged by: t by: cked by: ewed by:	KL KL BGW SS		
	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	ħ	Material Descriptic	on	Weathering/USC	5 5 7 7	lesting	TCR (%)	SCR (%)	RQD (%)	ws Fracture kws Fracture cs Log Ecs	A	Stratigra fect Des dditional	scription	Installation	
	НОЗ	- - -	- - -			9.74m: Moderately we Extremely weak, poorl		n SANDSTONE;				100	75	75						-
Box 3	SPTC	- - 11				<b>10.7m to 12.15m:</b> ∨	ery weak, moderately	cemented.		10.5m: SP 5,26// 50 for 50n N = 50+		N/A	N/A	N/A						
	НОЗ	  			ERs				MW			100	100	95						-
_	0	_ 10 _ _	_ _ _ _ 			11.75m to 11.8m:Sl	LTSTONE			12m: SPT0	С					11.70m: JT 5° 11.75m: JT 5°	PI, Ro, CI PI, Ro, CI			Generated: 19/02/2025
	SPTC	- - -	_ _ _ _	× × × × × × × × × × × × × × × × × × ×	EUz2	12.15m: Slightly weath moderately cemented. 12.3m: Slightly weath weak, moderately cem	ered, grey silty fine SA		sw	16,34// N = 50+		N/A	N/A	N/A		12.15m to 12.2 material at 12 12.4m to 12.5i	.15m, incline	arbonaceous ed 5°. is sub horizontal a	t	APROVEMENTS LOG Date
Box 4	HQ3	9										100	100	74		5°. 12.40m: JT 5°. 12.45m: JT 5°. 12.55m: BP 5°. 12.65m: JT 5°.	PI, Ro, CI PI, Ro, CI			ATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 19/02/2025
-	HQ3	8			EUs2				SW			100	100	100		14.50m: JT 5°	PDI Po CI			Delabase File: CC2 MOTIONS WASTER 02.41, GPJ Library file: CC2_LIBRARY_20241122_V18 SECTIONS. GLB Template: DATATEMPLATE.GDT Report F
Box 5																14.65m: JT 5°				r ASTER 02(JL),GPJ Library f
	1) C 2) A 3) G 4) P	o-ord standeoph	X X N 14.8m: Slightly weathered, grey SILTSTONE; Very weak.													Water Level Re. Date Time   Hol 16/09/24 15:40 17/09/24 08:30 17/09/24 15:30 18/09/24 08:30 19/09/24 09:00	e Depth   Wat   4.50m   1.5   4.50m   2.6   21.00m   5.   30.00m   4.	i4 m bgl i3 m bgl 90 m bgl 69 m bgl		tabase File: CC2 MOTIONS MA



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Nixon Park Carpark
Project Reference: 521290-064

**BH14** 

Sheet 4 of 6

1	∕leth Equi	REHO hod: ipme tract	ent:	Hyc	ary C Irapo	TION Core Wireline ower 015 ce NZ Ltd	CO-ORDINATES: NZTM20 Easting: 1755471 Northing: 5918203 Ground level: 21.78m	1.53m		Date starte Date comp Inclination: Azimuth:	leted	: 1 !-		/2024 /2024		Logged by: KL Input by: KL Checked by: BGW Reviewed by: SS		
	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	١	Material Description		Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture ws Fracture cs Log		Stratigraphy Defect Description Additional Notes	Installation	
Box 5	HQ3	6		× × × × × × × × × × × × × × × × × × ×	EUz2 EUs2	15.1m: Slightly weath moderately cemented.  15.4m: Slightly weather slight	ered, grey, sandy SILTSTONE; \	/ery weak,	sw sw		100	100	100			n: BP 10° n: BP 5°		
	HQ3	5	- - - - - 17 - - -			weak, moderately cem 16.5m to 16.7m:Silt 16.7m: Slightly weath SILTSTONE/SANDST and sub horizontal. Sa and Siltstone (50%).	ered, grey, silty fine SANDSTON lented.  y medium SANDSTONE. Poorly lered, grey, interbedded ONE; Very weak. Bedding is mondstone (50%) is fine, moderate	cemented.	sw		100	100	100		<b>17.25r</b> materi 17.30r	m to 16.60m: JT 10° PI, Ro, CI  n to 17.3m: Black carbonaceous al, 2-5mm thick. m: BP 5° m: JT 10° Ro		III. 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 19/02/2025
Box 6	HQ3	3		× × × × × × × × × × × × × × × × × × ×	EUs2	(20-25%) interbeds of moderately cemented.  18.7m to 18.9m:Slig Very weak.	ed, grey, silty fine SANDSTONE moderately thin SILTSTONE; Ve ghtty weathered, grey, sandy SIL ghtly weathered, grey, sandy SIL ghtly weathered, grey, sandy SIL	ery weak,	SW		100	100	100		<b>18.25</b> r 18.25r 18.45r	m: JT 5° PI, Ro, CI  n to 18.35m: Rip-up clasts m to 18.35m: BP 5°  m: BP 10°  m to 19.10m: JT 10° PI, Ro, CI		Database File: CC2 MOTIONS MASTER UZUL),GPJ Library file: CC2_LIBRARY_20241122_V18 SECTIONS.GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CA
	1) C 2) A 3) G 4) Pa	stan eoph acke	linate dpipe iysica r testi	was in Il profilir ing was	stalle ng und unde	d in BH14 with a screen dertaken downhole on 1	00 plus smart antenna, with a hor ed interval between 4-6m bgl. 9/09/2024, comprising an Optical m on 20/09/2024. No water flow t	l and Acoustic	•		100 curacy	97 of 8d	97 cm.		16/09/2 17/09/2 17/09/2	Level Readings: ime   Hole Depth   Water Level 24 15:40   4.50m   1.54 m bg  24 08:30   4.50m   2.63 m bg  24 15:30   21.00m   5.90 m bg  24 08:30   30.00m   4.69 m bg  24 09:00   30.00m   1.69 m bg		Database File: CC2 MOTIONS MASTER 02(JL),GPJ Library file: CC2



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Nixon Park Carpark
Project Reference: 521290-064

**BH14** 

Sheet 5 of 6

HQ3 HQ3 Method Method R.L. (m)	(m) (m) February (m)	K X X X X X X X X X X X X X X X X X X X	18m: Slightly weathered, grey, silty fine SANDSTONE with some (20-25%) interbeds of moderately thin SILTSTONE; Very weak, moderately cemented. 20m to 20.2m:Slightly weathered, grey, sandy SILTSTONE; Very weak.  20.43m: Slightly weathered laminated SILTSTONE; Very weak. Bedding is moderately thin, gently inclined.	% Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	Fracture Fracture Cs Log	
HQ3 HQ3	21	KXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	(20-25%) interbeds of moderately thin SILTSTONE; Very weak, moderately cemented.  20m to 20.2m:Slightly weathered, grey, sandy SILTSTONE; Very weak.  20.43m: Slightly weathered laminated SILTSTONE; Very weak.  Bedding is moderately thin, gently inclined.  20.65m to 20.7m:poorly cemented.  20.8m to 20.95m:Fine SANDSTONE; Very weak, poorly cemented.							
HQ3	21		Bedding is moderately thin, gently inclined.  20.65m to 20.7m:poorly cemented.  20.8m to 20.95m:Fine SANDSTONE; Very weak, poorly cemented.	sw						20.2m to 20.35m: Black carbonaceous material bedding less than 5°.
	21					100	97	97		 
- - - - - - - - -	22	EUs2	weak, poorly cemented.  21.13m to 21.3m:Silty fine SANDSTONE	SW		87	87	87		 
		××××××××××××××××××××××××××××××××××××××	22.3m: Slightly weathered, grey, medium SANDSTONE; Very weak, moderately cemented. 22.41m: Slightly weathered, grey, sandy SILTSTONE; Very weak.	SW						
- ED	24	X X X X X X X X X X X X X X X X X X X	23.2m: Slightly weathered, grey, fine to medium SANDSTONE; Very weak, moderately cemented.  23.5m to 23.6m:SILTSTONE			100	100	100		 
HQ3		EUs2	24m to 24.1m:Coarse SANDSTONE.  24.1m to 24.15m:SILTSTONE.  24.45m to 25.5m:Silty fine SANDSTONE.	SW		100	93	93		
2) A star 3) Geop	25	es captured u	d using a Leica Zeno FLX100 plus smart antenna, with a horizontal accurace alled in BH14 with a screened interval between 4-6m bgl. undertaken downhole on 19/09/2024, comprising an Optical and Acoustic and			curacy	of 8cr	m.		Water Level Readings: Date Time   Hole Depth   Water Level   16/09/24 15:40   4.50m   1.54 m bg    17/09/24 08:30   4.50m   2.63 m bg    17/09/24 08:30   3.00m   4.69 m bg

<sup>3)</sup> Geophysical profiling undertaken downhole on 19/09/2024, Comprising an Optical and Acoustic Televiewer.
4) Packer testing was undertaken between 24.5-30m on 20/09/2024. No water flow found.



Hand Shear Vane Serial No: 3732 Correction Factor: 1.649

Client: Watercare Services Ltd

Project: WIWQIP Motions Catchment Improvements

Location: **Nixon Park Carpark**Project Reference: **521290-064** 

**BH14** 

Sheet 6 of 6

IMPROVEMENTS LOG Date Generated: 19/02/2025

Database File: CC2 MOTIONS MASTER 02(JL),GPJ LIbrary file: CC2 LIBRARY, 20241122 V18 SECTIONS, GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT

**BOREHOLE INFORMATION** CO-ORDINATES: NZTM2000 Date started: 16/09/2024 Logged by: KL Rotary Core Wireline 1755471.53m Easting: Date completed: 18/09/2024 Input by: Checked by: BGW Equipment: Hydrapower 015 Northing 5918203.21m Inclination: -90° 21.78m (NZVD2016) Drill Force NZ Ltd N/A Contractor: Ground level: Azimuth: Reviewed by: SS Weathering/USC Code Fracture Installation Length (m) Stratigraphy  $\Xi$ Testing 8 8 8 Log Defect Description Graphic TCR ( SCR ( RQD Material Description R.L. Layer Additional Notes 23.2m: Slightly weathered, grey, fine to medium SANDSTONE; Very weak, moderately cemented. **25.1m to 25.3m:**...SANDSTONE; Well cemented. 25.10m to 25.30m: JT 50° St, Ro, CI НÖЗ 100 93 93 EUs2 25.3m to 25.45m:...Pinkish fine to coarse SANDSTONE with SW some gravel; Weak, well cemented. 25.5m to 25.9m: Rip-up clasts 25.65m: Slightly weathered, grey sandy SILTSTONE; Very weak. -4 25.80m: BP 15°
25.85m to 25.9m: Black carbonaceous material inclined at 10° 26 **26.2m to 26.4m:** Black carbonaceous material bedding at 45°. 26.20m to 26.40m: BP 45° HQ3 26.2m to 26.4m:...Grey to black SANDSTONE; Very weak, well 100 100 cemented. 26.6m to 26.8m:...Sandy SILTSTONE. Bedding inclined around 26 60m to 26 80m: BP 10° sw 5-10°. -5 26.85m: JT 30° PI, Ro, CI 27  $\Pi\Pi\Pi$ I I I I27.7m: Slightly weathered, grey, silty fine SANDSTONE; Very **E** 27.70m: JT 25° PI, Ro, CI -6 100 93 93  $I \cup I \cup I$ weak, moderately cemented  $\Pi \Pi \Pi$ EUs2 SW 28 28.00m: JT 15° PI, Ro, CI 28.1m: Slightly weathered, grey, SILTSTONE; Very weak. 28.10m to 28.15m: BP 30°  $\perp$ Bedding dips 30° at 28.15m EUz2 28.4m to 28.5m: ...poorly cemented. SW 28.61m: JT 30° PI, Ro, CI -7 **28.8m:** Slightly weathered, grey, silty fine SANDSTONE; Very weak, moderately cemented. 29 EUs2 SW 29.10m; JT 30° Pl. Ro. Cl Н В 100 95 87 29.3m: Slightly Weathered, grey, SILTSTONE; Very weak. 29.40m: JT 30° PI, Ro, CI EUz2 SW -8 29.9m:...poorly cemented. Water Level Readings:
Date Time | Hole Depth | Water Level |
16/09/24 15:40 | 4.50m | 1.54 m bgl |
17/09/24 08:30 | 4.50m | 2.63 m bgl |
17/09/24 15:30 | 21.00m | 5.90 m bgl |
18/09/24 08:30 | 30.00m | 4.69 m bgl |
19/09/24 09:00 | 30.00m | 1.69 m bgl | End of borehole at 30m (Termination Depth Achieved) REMARKS 1) Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with a horizontal accuracy of 5cm and vertical accuracy of 8cm.
2) A standpipe was installed in BH14 with a screened interval between 4-6m bgl.
3) Geophysical profiling undertaken downhole on 19/09/2024, comprising an Optical and Acoustic Televiewer.
4) Packer testing was undertaken between 24.5-30m on 20/09/2024. No water flow found.



**Project: WIWQIP Motions Catchment Improvements** 

Location: 52 Kingsland Avenue Project Reference: 521290-064 **BH17** 

Sheet 1 of 7

Met Equ	REH hod: iipme itract	ent:	Mas	ary C	CO-ORDINATES: NZTM2000	)	Date starte Date comp Inclination: Azimuth:	leted	l: 1 -	5/09/2 10/09 90° N/A	2024 /2024	Logged by: GMR Input by: GMR Checked by: PK Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws wws Fracture cs Log	
		_		Ь	Om: ASPHALT.  0.07m: Medium to coarse GRAVEL; dark grey. Tightly packed, dry. Gravel is subangular, slightly weathered, moderately strong basalt. [FILL]	GW						0m: FILL 0.05m: ES BH17_0.05 0.07m: ES BH17_0.07
	-				O.3m: Medium to coarse GRAVEL with minor cobbles and trace sit; dark grey. Tightly packed, moist. Gravel is subangular, slightly weathered, moderately strong basalt.							
		_					0.5m: ISHSV=89/48kPa	0				
	_ _ 18	1		Fg		GW						
							1m: ISHSV=53/22kPa					
	_											
			X		1.5m: Silty CLAY with trace sand; light orange mottled grey. Stiff, moist, high plasticity. Sand is fine. [UNDIFFERENTIATED ALLUVIUM]		1.5m: IBHSV=70/31kPa 1.5m: SPT 0,0// 1,1,1,1,1	100				1.5m: TAURANGA GROUP ALLUVIUM 1.5m to 1.95m: ES BH17_1.5-1.95
_	_ _ 17		- X- X- X- X- X- X- X- X- X- X- X- X- X- X	TAc		СН	N = 4					
		_	× × ×		2.2m: SILT with some clay and minor sand; greenish grey.							
			× × × × × × × × × × × × × × × × × × ×		Stiff, moist, high plasticity.			100				
	-	_	× × × × × ×	TAZ		МН						
	_ _ 16	3	× × × × × ×									
	1 1	_	$\bigvee$	TAx	3m: PUSH TUBE.			70				3m: ISHSV failed due to shear vane slipping downhole in disturbed material.
		_		Τ.			0.5					
		_	- <u>-</u>		3.5m: CLAY with some silt and trace organic material; brownish grey. Firm, moist, high plasticity. Organics are rootlets, 10-15mm.		3.5m: SPT 0,0// 0,1,1,1 N = 3	100				3.5m to 3.95m: ES BH17_13.5-3.95
	_ _ 15	4	<u>/</u>	TAo		ОН						3.95m: Cased to 2m bgl at 3.95m.
	_	_	<u>-\</u>		<b>4.2m</b> :soft.			100				
			//	TAc	<b>4.3m:</b> Silty CLAY with minor organics; light bluish grey. Soft, moist, high plasticity. Organics are rootlets, 5-15mm.	СН	4.500					
		_		TAx	4.5m: PUSH TUBE.		14.5m: IBHSV=22/8kPa	100				
1	_ _ 14	_ _ 5		T,				,50				
E	S = E stand eoph	linate Inviro dpipe iysica	nmental was inst	Samp talled unde	n BH17 with a screened interval between 6.8-8.2m bgl. rtaken downhole on 10/09/2024, comprising an Optical and Acoustic Telev			of 3cn	n.			Water Level Readings: Date Time   Hole Depth   Water Level 05/09/24 16:00   7.50m   2.95 m bg  06/09/24 07:30   7.50m   1.80 m bg  06/09/24 4.00   24.00m   2.55 m bg  09/09/24 07:30   24.00m   0.40 m bg
					aken between 16-20.5m on 11/09/2024. 3178 Correction Factor: 1.398							09/09/24 10:00   30.00m   0.45 m bgl 10/09/24 08:00   30.00m   0.70 m bgl 11/09/24 00:00   30.00m   0.40 m bgl

Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm at 2) ES = Environmental Sample.
 A standpipe was installed in BH17 with a screened interval between 6.8-8.2m bgl.
 Geophysical profiling undertaken downhole on 10/09/2024, comprising an Optical and Acoustic Televiewer.
 Packer testing was undertaken between 16-20.5m on 11/09/2024.



Tel: +64 9 520 6019

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: 52 Kingsland Avenue 521290-064 Project Reference:

**BH17** 

Sheet 2 of 7

BOREHOLE INFORMATION CO-ORDINATES: NZTM2000 Date started: 5/09/2024 Logged by: **GMR** Rotary Core Wireline 1755198.45m Method: Easting: Date completed: 10/09/2024 Input by: **GMR** Northing Equipment: Massenza MM3 5918229.65m Inclination: -90° Checked by: McMillan Drilling (N I) Ltd 19.00m (NZVD2016) N/A Reviewed by: SS Contractor: Ground level: Azimuth: Weathering/USC Graphic Log Code Fracture Log Installation Ξ Testing Stratigraphy  $\Xi$ TCR (%) 8 % Method Defect Description Length SCR ( RQD ( Material Description R.L Layer Additional Notes 5m: Silty CLAY with minor organics; light bluish grey. Soft, 5m to 5.45m: ES BH17\_5.0-5.45 × moist, high plasticity. Organics are rootlets, 5-15mm. СН SPT 100 5.3m: Sandy SILT with minor clay; greenish grey. Firm,  $\Pi\Pi\Pi$ ·× moist, low plasticity. Sand is fine.  $\Pi\Pi\Pi$ ×. 5.45m:...mottled orange and dark grey. TAZ ML +11111HQ3 **5.7m:** Silty CLAY with trace sand; light grey mottled orange. 100 × Firm, moist, high plasticity. Sand is fine. TAc СН × 6 13 6m: PUSH TUBE.  $\Pi\Pi\Pi$ 6m: ISHSV failed due to shear vane slipping downhole in disturbed material. 11111 **U54** Ϋ́ 100  $\Pi\Pi\Pi$ 11111 6.5m: SPT 0,1// 1,1,1,2 N = 5 6.5m: Silty CLAY with trace sand; dark grey. Firm, moist, 6.5m to 6.95m: ES BH17 6.5-6.95 high plasticity. Sand is fine.  $\perp$ TAc 100 SP 6.85m: Silty SAND with trace clay; greyish orange. Loose, 12 7 moist. Quick, dilatant.  $\Pi\Pi\Pi$ TAs SM H H 100 11111 $\Pi\Pi\Pi$ 11111 7.4m:...orange. **7.5m**: Loose sand at bottom of run. Shear vane not stable. **7.51m to 7.95m**: ES BH17\_7.5-7.95 7.5m: **7.54m:** SILT with minor clay and trace sand; light grey. Very stiff, moist, low plasticity. [RESIDUAL SOIL ECBF] IBHSV=8/0kPa × 7.5m: SPT 1,1// 2,3,6,9 N = 20 × 7.55m to 7.68m:...fine silty sand.  $\perp$ 7.54m: EAST COAST BAYS FORMATION SPT ERZ 100 ML × 8 11 **7.95m:** Moderately weathered, light grey silty fine SANDSTONE; extremely weak. Moderately cemented. 8.10m: JT 20° PI, Ro, CI 8.20m: JT 30° PI, Sm, CI EWs MW 8.42m: JT 60° PI, Sm, CI HQ3 100 8.55m: poorly cemented. 8.55m; JT 35° Pl. Sm. Cl 8.62m to 8.77m: JT 85° PI, Sm, CI 8.7m: EAST COAST BAYS FORMATION \*\*\*\* 8.7m: Moderately weathered, light grey SILTSTONE; extremely weak. 8.85m: JT 25° PI, Ro, CI 8.90m: JT 30° PI, Sm, CI **8.95m to 9m:** Core loss 0.05m. **9m to 9.33m:** ES BH17\_9.0-9.33 10 9 EWs 9m: SPT 8,15// 20,18,12 for 30mm N = 50+ MW 9.05m to 9.25m:...silty fine sandstone. 100 100 0 SP 9.33m: Slightly weathered, light grey, fine SANDSTONE; 9.36m: BPJT 25° 9.36m: BPJT 25°
9.42m: black carbonaceous material, 5mm, inclined 35°, 9.42m: BP 35°
9.42m: BP 35°
9.44m: black carbonaceous material, 3mm, inclined 20°, 9.46m: black carbonaceous material, 15mm, inclined 15°, 9.49m: JT 25° PI, Ro, Cl. 9.78m: JT 45° St, Ro, Cl. 9.78m: JT 45° St very weak. Moderately cemented. 1119.5m to 9.76m:...medium sandstone HQ3 EUs SW 100 100 79 30x 3 9.82m to 9.98m:...siltstone. 9.80m to 9.89m: JT 70° St, Ro, Cl REMARKS

1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm. 2) ES = Environmental Sample.

3) A standpipe was installed in BH17 with a screened interval between 6.8-8.2m bgl.

Geophysical profiling undertaken downhole on 10/09/2024, comprising an Optical and Acoustic Televiewer. Packer testing was undertaken between 16-20.5m on 11/09/2024.

Hand Shear Vane Serial No: 3178 Correction Factor: 1.398

| Water Level Readings: | Date Time | Hole Depth | Water Level | 05/09/24 16:00 | 7.50m | 2.95 m bg| | 06/09/24 17:30 | 7.50m | 1.80 m bg| | 06/09/24 14:00 | 2.55 m bg| | 09/09/24 17:30 | 24.00m | 0.40 m bg| | 09/09/24 10:00 | 30.00m | 0.45 m bg| | 10/09/24 08:00 | 30.00m | 0.70 m bg| | 11/09/24 00:00 | 30.00m | 0.70 m bg| | 11/09/24 00:00 | 30.00m | 0.40 m bg|

Database File: CC2MOTIONS MASTER 02(JL),GPJ LIbrary file: LIBRARY\_20240925\_V13 (1),GLB Template: DATATEMPLATE.GDT



Tel: +64 9 520 6019 www.aurecongroup.com

Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 52 Kingsland Avenue Project Reference: 521290-064 **BH17** 

Sheet 3 of 7

I E	OR Meth quip Cont	od: pme	ent:	Mas	ary (	TION Core Wireline za MM3 n Drilling (N I) Ltd	CO-ORDINATES: NZTM2000 Easting: 1755198.45m Northing: 5918229.65m Ground level: 19.00m (NZVD2016	)	Date starte Date comp Inclination Azimuth:	oletec	l: 1 -		2024 9/2024	Logged by: GMR Input by: GMR Checked by: PK Reviewed by: SS
:	Memod	R.L. (m)	Length (m)	Graphic Log	Layer Code		aterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture ws Fracture cs Log cs Log	Stratigraphy Defect Description Additional Notes
			_ _ _		EUs	9.33m: Slightly weath very weak. Moderatel	ered, light grey, fine SANDSTONE; y cemented.	sw		100	100	79		9.90m: JT 30° PI, Sm, CI 9.92m: BPJT 20° 10.08m: BPJT 10° 10.12m: JT 45° PI, Ro, CI 10.28m: JT 55° PI, Ro, CI 10.36m: JT 35° PI, Ro, CI 10.46m: BP 35°
	SPIC	-	_		EUx	10.5m: NO RECOVE			10.5m: SPTC 5,6// 7,11,10,22 for 65mm N = 50+	N/A	N/A	N/A		10.47m: JT 20° PI, Ro, CI 10.5m to 10.95m: ES BH17_10.5-10.95
						10.94m: Slightly weat very weak. Moderatel								10.94m: JT 25° PI, Sm, CI 11.02m: JT 10° PI, Ro, CI
Box 3	- H	11.6n		<b>11.6m to 11.68m</b> :si	tstone inclusions, 5-10mm.	SW		100	92	92		11.56m: JT 20° St, Ro, Cl 11.71m: JT 20° Pl, Ro, Cl 11.85m to 11.95m: JI 75°		
	고 -	7	12		EUx	12m: NO RECOVER	<i>(</i> .	sw	12m: SPTC 8,34// 50 for 65mm N = 50+	N/A	N/A	N/A		12m to 12.22m: ES BH17_12.0-12.22
	1000	-			EUs	12.22m: Slightly weat very weak. Moderatel	nered, light grey, fine SANDSTONE; y cemented.	sw		100	95	92		<b>12.22m to 12.4m</b> : steep veins (70-80°), anastamosing.  12.62m to 12.65m: JI 30° 12.71m: JT 55° PI, Ro, CI 12.77m: JI 50°
		6	<u>13</u> - - -			12.95m to 13.18m:r upwards. 13.18m to 13.25m:s	nedium to coarse sandstone, fining							13.02m: JT 25° PI, Sm, CI  13.18m: JT 20° PI, Ro, CI  13.24m: JT 10° PI, Ro, CI  13.38m: BP 15°  13.42m: disseminated black carbonaceous
	- -	-			EUx	13.5m: NO RECOVE 13.64m: Slightly weat very weak. Moderatel 13.65m to 13.77m: 13.87m to 13.92m:s	nered, light grey, fine SANDSTONE; y cemented. oorly cemented.	sw	13.5m: SPTC 16,34 for 140mm// N = 50+	N/A	N/A	N/A		material, 10mm, inclined 15°. 13.46m: JT 30° PI, Sm, CI 13.5m to 13.64m: ES BH17_13.5-13.64 13.50m: JT 10° PI, Sm, CI 13.64m: Core loses due to poorly cemented sandstone. 13.77m: BP 35° 13.79m: black carbonaceous material, 2mm, inclined 40°.
Box 4	201	5			EUs	14.05m to 14.16m:s		sw		92	83	83		14.26m: BP 25°
	-	- -	- -		EUx	14.48m: CORE LOSS	•	SW						14.37m: JT 50° PI, Ro, CI
		- - - 4	_ _ _ _ _ 		EUs		nered, light grey, fine to medium eak. Moderately cemented.	sw						14.70m: JT 70° St, Sm, Cl 14.85m: JT 10° Pl, Sm, Cl
1	EEMARKS: ) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2c ) ES = Environmental Sample							2cm a	and vertical accuracy	of 3cn	n.			Water Level Readings: Date Time   Hole Depth   Water Level 05/09/24 16:00   7.50m   2.95 m bgl

Date Time | Hole Depth | Water Leve 05(09)24 16:00 | 7.50m | 2.95 m bg| 06(09)24 07:30 | 7.50m | 1.80 m bg| 06(09)24 14:00 | 24.00m | 2.55 m bg| 09(09)24 14:00 | 24.00m | 0.40 m bg| 09(09)24 10:00 | 30.00m | 0.45 m bg| 10(09)24 08:00 | 30.00m | 0.70 m bg| 11/09)24 00:00 | 30.00m | 0.40 m bg|

Database File: CC2MOTIONS MASTER 02(41).GPJ Library file: LBRARY\_20240925\_V13 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18102/2025

<sup>1)</sup> Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm at 2) ES = Environmental Sample.
3) A standpipe was installed in BH17 with a screened interval between 6.8-8.2m bgl.
4) Geophysical profiling undertaken downhole on 10/09/2024, comprising an Optical and Acoustic Televiewer.
5) Packer testing was undertaken between 16-20.5m on 11/09/2024.



Tel: +64 9 520 6019

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: 52 Kingsland Avenue Project Reference: 521290-064 **BH17** 

Sheet 4 of 7

CO-ORDINATES: NZTM2000 BOREHOLE INFORMATION Date started: 5/09/2024 Logged by: **GMR** Rotary Core Wireline 1755198.45m Method: Easting: Date completed: 10/09/2024 Input by: **GMR** Massenza MM3 McMillan Drilling (N I) Ltd Equipment: Northing 5918229.65m Inclination: -90° Checked by: 19.00m (NZVD2016) N/A Reviewed by: SS Contractor: Ground level: Azimuth: Weathering/USC Graphic Log Code Fracture Log Installation Length (m) Testing Stratigraphy (E) TCR (%) 8 % Method Defect Description SCR ( RQD ( Material Description R.L Layer Additional Notes **14.59m:** Slightly weathered, light grey, fine to medium SANDSTONE; very weak. Moderately cemented. **15m to 15.19m:...**poorly cemented. 14.97m: JT 10° PI, Sm, CI 15.19m: BPJT 5° 15.24m to 15.28m:...siltstone. 15.55m to 15.59m:...siltstone. 15.64m: BP 30° 15.69m: JT 15° PI, Ro, CI 1111HQ3 100 100 15.76m: BP 20° 15.80m: BP 25° 15.79m to 15.9m:...siltstone. 3 16 EUs SW 16.03m; JT 25° Pl. Sm. Cl 16.47m: BPJT 25° 16.5m to 17.1m:...poorly cemented. 2 17 × × × 17.1m: Slightly weathered, light grey SILTSTONE; very EUz weak SW HQ3 100 48 В2 17.29m: JI 30° 17.31m: JI 25° 17.33m: JT 30° PI, Sm, CI 17.3m: Slightly weathered, light grey, fine SANDSTONE; very weak. Moderately cemented. 17.46m; JT 30° Pl. Sm. Cl 17.55m: JT 65° PI, Sm, CI 17.60m: JT 35° PI, Sm, CI 17.6m to 17.7m:...poorly cemented. 17.70m: JT 55° PI, Sm, CI 17.84m to 17.94m: JT 80° PI, Ro, CI 17.85m to 17.9m:...siltstone. EUs SW 18 18.27m to 18.54m:...poorly cemented. 18.47m to 18.5m: Core loss 0.03m. × × 18.54m: Slightly weathered, light grey SILTSTONE; very EUz sw weak. **18.7m:** Slightly weathered, light grey, fine to medium SANDSTONE; very weak. Moderately cemented. HQ3 98 75 75 18.76m to 18.9m:...poorly cemented. 0 19 18.96m to 19.02m:...siltstone. 18.97m: BP 15° 19.00m to 19.10m: JI 70° 19.11m to 19.22m:...poorly cemented. 19.16m: JT 40° PI, Ro, CI 19.28m: BP 25° EUs SW 19.40m: BP 15° 19.5m: Core loss due to poorly cemented sandstone. 19.6m to 19.8m:...medium sandstone with shell fragments 1-2mm; poorly cemented. 19.70m: JT 50° PI, Ro, CI HQ3 19.80m: JT 40° PI, Ro, CI 19.84m: JT 20° PI, Ro, CI | Water Level Readings: | Date Time | Hole Depth | Water Level | 05/09/24 16:00 | 7.50m | 2.95 m bg| | 06/09/24 17:30 | 7.50m | 1.80 m bg| | 06/09/24 14:00 | 2.55 m bg| | 09/09/24 17:30 | 24.00m | 0.40 m bg| | 09/09/24 10:00 | 30.00m | 0.45 m bg| | 10/09/24 08:00 | 30.00m | 0.70 m bg| | 11/09/24 00:00 | 30.00m | 0.70 m bg| | 11/09/24 00:00 | 30.00m | 0.40 m bg| REMARKS 1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm. 2) ES = Environmental Sample.

3) A standpipe was installed in BH17 with a screened interval between 6.8-8.2m bgl.

Geophysical profiling undertaken downhole on 10/09/2024, comprising an Optical and Acoustic Televiewer. Packer testing was undertaken between 16-20.5m on 11/09/2024.

Hand Shear Vane Serial No: 3178 Correction Factor: 1.398

Database Flie: CC2 MOTIONS MASTER 02J.J. GPJ LIbrary file: LIBRARY\_20240925\_V13 (1) GLB Template: DATATEMPLATE.GDT Report Flie: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated:



Hand Shear Vane Serial No: 3178 Correction Factor: 1.398

Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: **52 Kingsland Avenue**Project Reference: **521290-064** 

**BH17** 

Sheet 5 of 7

Database File: CC2MOTIONS MASTER 02(LL).GPJ Library file: LBRARY\_20240925\_V13 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 181022025

	Met Equ	REH hod: iipme itract	ent:	Mas	ary C	TION Core Wireline za MM3 n Drilling (N I) Ltd	CO-ORDINATES: NZTM2000 Easting: 1755198.49 Northing: 5918229.69 Ground level: 19.00m (NZ	5m 5m		Date starte Date comp Inclination: Azimuth:	leted	: 1		2024 //2024	Logged by: GMR Input by: GMR Checked by: PK Reviewed by: SS
	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	laterial Description		Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture cs Log	Stratigraphy Defect Description Additional Notes
			_		EUs	SANDSTONE; very v 20m to 20.15m:poo	•		sw						
	HQ3	- - - - - - - -			EUx	20.21m: CORE LOS	5.		sw		47	38	38		
Вох б	НФ3				EUs	21m: Slightly weather weak. Moderately cereals. Moderately cerealssi 21.46m to 21.5m:si 21.61m to 21.68m:si	ltstone. poorly cemented.		sw		75	73	73		21m: Core loss due to poorly cemented sandstone. 21.11m: BPJT 10° 21.15m to 21.25m: BP 25°  21.38m: JT 30° PI, Sm, CI 21.46m: JI 25° 21.55m: JT 45° PI, Sm, CI 21.59m: JI 40° 21.69m: BPJT 20°
	-  -  -  -  -  -	-3 -3 -	22		ECX 22.	<b>22.13m</b> : CORE LOS			sw						21.96m: BPJT 20° 21.97m: black carbonaceous material, 2mm, inclined 20°.
_						22.5m: Slightly weath SANDSTONE; very w	ered, light grey, fine to medium veak. Moderately cemented.  Itstone.								22.62m: BP 25° 22.65m: BP 35°
Box 7	HQ3		- - - - -		EUs	23.2m to 23.3m:silt 23.31m to 24m:me fragments <1mm.	stone inclusions. dium to coarse sandstone, shell		SW		100	99	95		23.20m: JT 20° PI, Sm, CI 23.32m: BP 15° 23.34m: BP 15° 23.40m: BP 30°
Bo		-5 - - -				24m: Slightly weathe with shell fragments (	red, light grey, medium SANDST 1-6mm); weak +. Well cemented	i.	SW						23.90m: JT 15° PI, Sm, CI 24m: Switched drillbit, rock too hard. 24.27m: JT 10° PI, Ro, CI
	HQ3		- - -			24.42m:siltstone litt 24.43m to 24.54m: 24.54m: Slightly weat very weak. Moderate 24.68m to 24.79m:	coarse sandstone. :hered, light grey, fine SANDSTO ly cemented. medium sandstone.		SW		84	83	83		24.54m: JT 35° PI, Ro, CI 24.59m: black carbonaceous material, 1mm, inclined 20°. 24.79m: BP 25° 24.86m: BP 35°
	1) C 2) E 3) A 4) G 5) P	S = E stand eoph acker	linates Enviro dpipe ysical r testii	s captur nmental was ins I profiling ng was i	Samp talled under undert	ing a Leico Zeno FLX100 ple. in BH17 with a screened i	plus smart antenna, with a horizontal a nterval between 6.8-8.2m bgl. 9/2024, comprising an Optical and Ac on 11/09/2024.			vertical accuracy	of 3cn	n.			Water Level Readings: Date Time   Hole Depth   Water Level 05/09/24 16:00   7.50m   2.95 m bg  06/09/24 07:30   7.50m   18.0 m bg  06/09/24 07:30   7.50m   18.0 m bg  09/09/24 07:30   24.00m   0.45 m bg  09/09/24 07:30   24.00m   0.45 m bg  10/09/24 08:00   30.00m   0.45 m bg  10/09/24 08:00   30.00m   0.70 m bg  11/09/24 00:00   30.00m   0.40 m bg



Hand Shear Vane Serial No: 3178 Correction Factor: 1.398

Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 52 Kingsland Avenue Project Reference: 521290-064 **BH17** 

Sheet 6 of 7

Database File: CC2MOTIONS MASTER 02(41).GPJ Library file: LBRARY\_20240925\_V13 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18102/2025

	BORE Metho Equip Contra	d: ment:	Mas	ary (	TION Core Wireline za MM3 n Drilling (N I) Ltd	CO-ORDINATES: Easting: Northing: Ground level:	<b>NZTM2000</b> 1755198.45m 5918229.65m 19.00m (NZVD201	6)	Date starte Date comp Inclination: Azimuth:	oletec	l: 1 -	5/09/2 10/09 90° N/A	2024 //2024	Logged by: GMR Input by: GMR Checked by: PK Reviewed by: SS	
•	Method	I ength (m)	Graphic Log	Layer Code	N	laterial Descriptio	on	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture wws Fracture cs Log ecs	Stratigraphy Defect Description Additional Notes	notallation
	HQ3	-		EUs	24.54m: Slightly wear very weak. Moderate 25.18m to 25.22m: 25.26m: CORE LOSS	ly cemented.	e SANDSTONE;	sw		84	83	83		25.01m: black carbonaceous material, 1mm, inclined 20°. 25.03m: BPJT 20° 25.05m: BP 25° 25.15m: BP 20°	
Box 7	_	-  -		EUX	<b>25.5m</b> : Slightly weath	ered light grev med	lium SANDSTONE	sw							
Box 8	H03			EUZ EUS	25.5m: Slightly Weat very weak. Moderate 25.66m: Slightly weat very weak. Moderate 25.88m to 25.97m: 26m to 26.2m:siltst 26.25m to 26.29m:siltstone inclusions. 26.29m to 26.4m:si 27.16m: Slightly weat weak. 27.16m: Slightly weat very weak. Moderate 27.28m to 27.53m:	ly cemented.  hered, light grey, find by cemented.  coorly cemented.  cone laminations.  medium to coarse satistione.  hered, light grey SIL  hered, light grey, find by cemented.	e SANDSTONE; andstone and	sw		96	95	95		25.9m: disseminated black carbonaceous material, inclined 45°. 25.99m: BP 15° 26.13m: BP 25° 26.21m: BPJT 10° 26.38m: JT 25° PI, Ro, CI 26.52m: JT 25° PI, Ro, CI 26.68m: JT 20° PI, Ro, CI 26.83m: BP 25° 26.94m to 27m: Core loss 0.06m. 27.04m: BP 35°	
-	HQ3	9 28	3	EUs	27.8m to 27.9m:silts 28m to 28.18m:silts 28.38m to 28.95m:	stone.		SW		95	84	89		27.46m: JT 20° PI, Sm, CI 27.53m: BP 20° 27.71m: JT 35° PI, Ro, CI 27.88m: JT 30° PI, Ro, CI, (Infill: clayey silt Firm 10mm) 27.96m: JT 25° PI, Sm, CI 28.00m: BP 30° 28.42m to 28.5m: Core loss 0.08m.	
Box 9	HQ3	110 29	× × × × × × × × × × × × × × × × × × ×	EUS	29.08m: Slightly weak weak. 29.2m: Slightly weath very weak. Moderate 29.28m to 29.35m: 29.45m to 29.58m:	ered, light grey, fine ly cemented. poorly cemented. poorly cemented.		sw		100	86	86		28.94m: JT 30° PI, Ro, CI 29.00m: BPJT 10° 29.03m: JT 10° PI, Ro, CI 29.20m: JT 25° PI, Ro, CI 29.29m: BPJT 15° 29.34m: BP 15° 29.38m: BP 15° 29.58m: BP 30° 29.64m: BP 30° 29.79m: BP 40° 29.92m: black carbonaceous material,	
	2) ES: 3) A st 4) Geo	ordina = Envi andpip physic	onmental e was ins al profilin	Sam talled und	End of borehole at 30 ing a Leico Zeno FLX100 ple. in BH17 with a screened i ertaken downhole on 10/0 taken between 16-20.5m of	plus`smart antenna, with nterval between 6.8-8.2 9/2024, comprising an 0	n a horizontal áccuracy o m bgl.		d vertical accuracy	of 3cm	n.			Water Level Readings: Date Time   Hole Depth   Water Level 05(09):24 16:00   7.50m   2.95 m bg  06(09):24 07:30   7.50m   1.80 m bg  06(09):24 14:00   24.00m   2.55 m bg  09(09):24 07:30   24.00m   0.40 m bg  09(09):24 10:00   30.00m   0.45 m bg  10(09):24 00:00   30.00m   0.70 m bg  11(09):24 00:00   30.00m   0.70 m bg	



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: 52 Kingsland Avenue Project Reference: 521290-064 **BH17** 

Sheet 7 of 7

BOREHOLE INFORMATION

Rotary Core Wireline Massenza MM3 McMillan Drilling (N I) Ltd Method: Equipment: Contractor:

CO-ORDINATES: NZTM2000 Easting: 1755198.45m

5918229.65m 19.00m (NZVD2016) Northing Ground level:

5/09/2024 Date started: Date completed: 10/09/2024 Inclination: -90° N/A

Logged by: **GMR** Input by: Checked by: GMR Checked by: PK Reviewed by: SS

Graphic Log Length (m) Layer Code R.L. (m)

Material Description

Weathering/USC Testing

Azimuth:

Fracture Log SCR (%) RQD (%) TCR (%)

Stratigraphy Defect Description Additional Notes

Installation

VWS WS CS CS VCS ECS

1mm, inclined 15°. 29.94m: black carbonaceous material, 1mm, inclined 15°.

REMARKS:

NEWARKS:

1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm.

2) ES = Environmental Sample.

3) A standpipe was installed in BH17 with a screened interval between 6.8-8.2m bgl.

4) Geophysical profiling undertaken downhole on 10/09/2024, comprising an Optical and Acoustic Televiewer.

5) Packer testing was undertaken between 16-20.5m on 11/09/2024.

| Water Level Readings: | Date Time | Hole Depth | Water Level | 05/09/24 16:00 | 7.50m | 2.95 m bg| | 06/09/24 07:30 | 7.50m | 1.80 m bg| | 06/09/24 14:00 | 2.400m | 2.55 m bg| | 09/09/24 17:30 | 24.00m | 0.40 m bg| | 09/09/24 10:00 | 30.00m | 0.45 m bg| | 10/09/24 08:00 | 30.00m | 0.70 m bg| | 11/09/24 00:00 | 30.00m | 0.70 m bg|

Database File: CC2MOTIONS MASTER 02(41).GPJ Library file: LBRARY\_20240925\_V13 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 181022025



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: 67 Finch Street

Project Reference: 521290-064

**BH21** 

Sheet 1 of 6

BOREHOL Method: Equipmen Contractor	ıt:	Rota Han	ary C jin D	FION Core Wireline &B-10D n Drilling (N I) Ltd	CO-ORDINATES: NZTM2000 Easting: 1754694,30m Northing: 5918287,43m Ground level: 16.38m (NZVD2016	)	Date start Date com Inclination Azimuth:	pleted	d: 2		5/2024 5/2024	Logged by: GMR Input by: GMR Checked by: PK Reviewed by: SS
Method R.L. (m)	Length (m)	Graphic Log	Layer Code	N	laterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws Fracture cs Log	Stratigraphy o it length of the strategraphy o
16	33		Fg Fg	sand; dark grey. Tig supported. Gravel is greywacke, slightly w 60-200mm. [FILL] <b>0.4m to 4m:</b> some	parse GRAVEL with some silt and trace httly packed, moist, bedded. Clast subangular to angular basalt and yeathered. Bedding is sub-horizontal (<5°), clay, brownish grey. plastic, wood, concrete, and glass.			0				O.5m: Inferred uncontrolled fill. Attempted contamination sampling but unable to collect sample due to tightly packed ground.  2m to 2.5m: Concrete on side wall, 200mm thick beams of concrete with 100mm gap inbetween.  2.5m to 4m: Difficult to observe material, inferred to be similar to overlying fill.  4m: Core loss due to wash out of gravel. Flushed hole for SPT @ 4.5m.
12 Lds	- /		Fg		arse GRAVEL with some silt and minor um dense, moist. Gravel is subangular to		4.5m: SPT 9.4// 5.4.5.4 N = 18	38				
2) Vacuum ( bGL.	ates exca	avation of	unde	leted to 4.0m bGL due to ertaken downhole on 20/0	plus smart antenna, with a horizontal accuracy of a 1200mm diameter stormwater pipe within 1.0m 6/2024, comprising an Optical and Acoustic Telev	of the	borehole location, a	71 / of 3cm	n. oth of	3.5m		Water Level Readings: Date Time   Hole Depth   Water Level   18/06/24 16:35   9.45m   3.50 m bgl   19/08/24 07:35   9.45m   3.50 m bgl   20/06/24 10:00   30.00m   3.70 m bgl



Hand Shear Vane Serial No: DR4940 Correction Factor: 1.678

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: 67 Finch Street

Project Reference: 521290-064 **BH21** 

Sheet 2 of 6

CO-ORDINATES: NZTM2000 BOREHOLE INFORMATION Date started: 19/06/2024 Logged by: **GMR** 1754694.30m 5918287.43m 16.38m (NZVD2016) Rotary Core Wireline Hanjin D&B-10D McMillan Drilling (N I) Ltd 20/06/2024 Method: Easting: Date completed: Input by: **GMR** Northing Equipment: Inclination: -90° Checked by: N/A Reviewed by: SS Contractor: Ground level: Azimuth: Weathering/USC Graphic Log Code Fracture Log Installation Length (m) Stratigraphy  $\Xi$ Testing TCR (%) 8 % Method Defect Description SCR ( RQD ( Material Description R.L Layer Additional Notes 4.95m: 100% water loss during core run, cased to 5.5m. 5.1m: Medium to coarse GRAVEL; light grey. Medium 0 dense, dry. Gravel is subangular to angular, slightly weathered greywacke.

5.2m: CONCRETE; light grey. Clasts within concrete matrix are medium, subangular, slightly weathered, moderately 长 11 111115.4m to 5.5m: ES BH21\_5.40-5.50m vesicular basalt HQ3 5.45m: EAST COAST BAY FORMATION **5.4m to 5.45m:**...silty fine sand with minor fine gravel; 1111greenish grey. 0 5.45m: Sitty fine SAND; light greenish grey. Medium dense, moist. [COMPLETELY WEATHERED ECBF] ERs 6 **6m:** Highly weathered, light greenish grey, silty fine SANDSTONE; extremely weak. Poorly cemented. (Silty fine 6m: IBHSV=UTP 6m: SPT 1,4// 6,6,7,9 N = 28 SAND). SPT 89 10 +11116.4m to 6.45m: Core loss 0.05m EWs HW 6.45m: Core loss due to wash out. 100% water loss downhole. Driller slowed drilling for next run. IIIIIIII6.6m to 6.7m: ES BH21\_6.60-6.70m IIIIIIIIIIIIIIII + I + I9 7 0 6.95m: CORE LOSS 16 9 7.5m: Highly weathered, light grey, silty fine SANDSTONE; 7.5m: SPT IIIII7.511. 5. 2,6// 7,9,11,11 N = 38 extremely weak. Weakly cemented. (Silty fine SAND) IIIIIIIIIISPT 80 IIIII7.86m to 7.95m; Core loss 0.09m. HW  $\Pi\Pi\Pi$ 8 7.95m: Cased to 7m at 7.95m bGL to try prevent water loss and wash out. Driller attached extended nozzle. 8 8.35m: CORE LOSS. Database File: CC2 MOTIONS MASTER 02(JH).GPJ LIbrary file: LIBRARY\_20240925\_V13 (1).GLB Template: DATATEMPLATE.GDT HQ3 0 | | | | |IIIIIIIIIIIIIII9 **9m:** Highly weathered, light grey, silty fine SANDSTONE; extremely weak. Poorly cemented. (Fine SAND with minor silt) 9m: SPT 3,7// 9,12,14,15 N = 50 SP 89 200 **9.4m to 9.45m:** Core loss 0.05m. 9.45m: Cased to 8.5m at 12m bGL. Driller noted sand coming up around casing. | | | |HW IIIII I I II I I IHQ3 100 0  $\Pi\Pi$ 9.75m to 9.85m:...poorly cemented IIIIIWater Level Readings: Date Time | Hole Depth | Water Level 18/06/24 16:35 | 9.45m | 3.50 m bgl 19/06/24 07:35 | 9.45m | 3.50 m bgl 20/06/24 10:00 | 30.00m | 3.70 m bgl REMARKS Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm.
Vacuum excavation completed to 4.0m bGL due to a 1200mm diameter stormwater pipe within 1.0m of the borehole location, at a depth of 3.5m 30) Geophysical profiling undertaken downhole on 20/06/2024, comprising an Optical and Acoustic Televiewer. 4) ES = Environmental Sample. 5) BH49 backfilled on completion of drilling.



Hand Shear Vane Serial No: DR4940 Correction Factor: 1.678

Client: Watercare Services Ltd

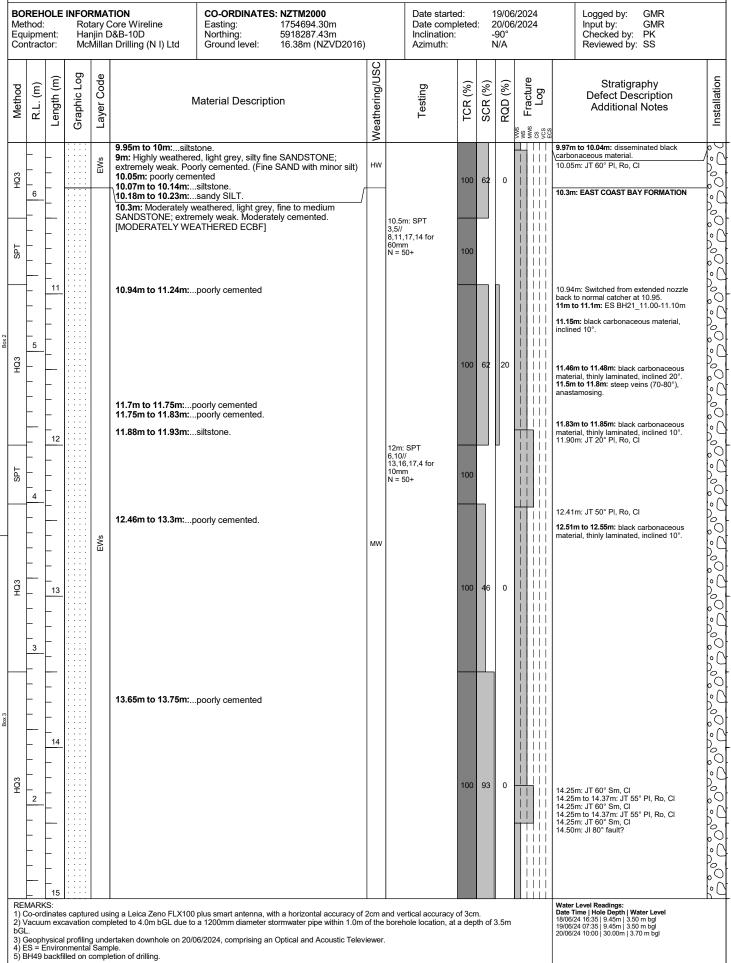
Project: WIWQIP Motions Catchment Improvements

Location: 67 Finch Street

Project Reference: 521290-064

**BH21** 

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Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: 67 Finch Street

521290-064 Project Reference:

**BH21** 

Sheet 4 of 6

ľ	Metl Equ	REHOD: hod: ipme tract	ent:	Har	ary C njin D	TION Core Wireline &B-10D n Drilling (N I) Ltd	CO-ORDINATES Easting: Northing: Ground level:	S: NZTM2000 1754694.30m 5918287.43m 16.38m (NZVD2016	)	Date starte Date comp Inclination: Azimuth:	leted	: 2		5/2024 5/2024		Logged by: Input by: Checked by: Reviewed by:		
:	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	/laterial Descripti	on	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture	ECS	Stratigra Defect Des Additional	cription	Installation
Box 3		- - - 1	_ _ _			10.3m: Moderately w SANDSTONE; extrei [MODERATELY WE.	nely weak. Moderat								carbona 15.1m: b	to 15m: disseminaceous material. black carbonaceoed, inclined 5°.	ated black bus material, thinly	
	HQ3	- - -	 - -			<b>15.5m to 15.7m:</b> po	orly cemented.				100	100	0	1111	15.71m: thinly la	: black carbonace minated, inclined	ous material, 5°.	000000
					EWs	15.89m to 15.93m: 16.05m to 16.15m:	-		MW									
		<u>0</u> - -				16.63m to 16.65m:	clayey SILT, infilling	at joint.				T				o <b>16.5m:</b> ES BH2 : JT 30° infilled	1_16.40-16.50m	
		- - -	_ _ 			<b>16.9m to 17.1m</b> :po	-											
Box 4	HQ3	- -1 - -	- - -		EUs2	17.23m: Slightly wea very weak. Moderate ECBF]			sw		93	73	73		17.23m:	East Coast Bays	<b>Formation</b>	
		- - -			EUx	17.7m to 17.8m:po 17.9m: CORE LOSS 18m: Slightly weathe		o medium							18m: Ca	ased to 10m at 19	9.5m bGL.	
		- - - -2	_ _ _			SANDSTONE; very v 18.15m to 18.3m:p 18.33m to 18.43m:	weak. Moderately co	emented.										000
	HQ3	- - - -				18.76m to 18.82m:					100	66	66		material	to 18.49m: black I, thinly laminated : BPJT 70° Un, R	, inclined 5°.	
		- - - - -3	19 _ _ _		EUs2	18.9m to 18.97m:c 18.98m to 19.02m: 19m to 19.15m:pod 19.05m to 19.55m:	sandy SILT. orly cemented	i siitstone clasts.	sw							: JT 25° PI, Ro, C ff 20mm)	il, (Infill: clayey SILT	
Box 5	НОЗ	_ <del></del>    -  -  -	_  _			<b>19.5m to 19.6m:</b> .po		siltstone.			100	87	75		19.55m	Cased to 13m at to 19.74m: JT 70 to 19.68m: disseluceous material.	)° PI, Ro, CI	
	REN 1) C 2) V	acuur	linates	s captur				th a horizontal accuracy of formwater pipe within 1.0m					3.5m		19.82m: Water Le Date Tim 18/06/24		) m bgl	COLON OF THE PROPERTY OF THE P
	bGL 3) G 4) E 5) B	eoph S = E H49 b	ysical nviro backfi	profiling nmental lled on o	unde Samp omple	ertaken downhole on 20/0	6/2024, comprising an	Optical and Acoustic Telev			•				20/06/24	07:35   9.45ff   3.5t 10:00   30.00m   3.1	70 m bgl	



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: 67 Finch Street

Project Reference: 521290-064

**BH21** 

Sheet 5 of 6

BOREHOLE Method: Equipment: Contractor:	Rota Han	ary C jin D	CION         CO-ORDINATES: NZTM2000           ore Wireline         Easting: 1754694.30m           &B-10D         Northing: 5918287.43m           Drilling (N I) Ltd         Ground level: 16.38m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	leted	: 2		6/2024 6/2024	Logged by: GMR Input by: GMR Checked by: PK Reviewed by: SS	
Method R.L. (m) Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture wws Fracture cs Log	Stratigraphy Defect Description Additional Notes	Installation
8 21		EUs2	18m: Slightly weathered, light grey, fine to medium SANDSTONE; very weak. Moderately cemented.  20.45m to 20.5m:poorly cemented.	sw		100	87	75		20.12m: BP 20° 20.2m to 20.25m: disseminated black carbonaceous material. 20.3m to 20.35m: disseminated black carbonaceous material	
-5	× × × × ×	EUz2	21.23m to 21.25m:coarse sandstone.  21.35m: Slightly weathered, light grey SILTSTONE; very weak.	sw						21.26m: black carbonaceous material, thinly laminated, inclined 15°. 21.36m: JT 20° PI, Ro, CI 21.40m: JT 10° PI, Ro, CI	
HO33	\$.\$. 	Ш	21.53m: Unweathered, light grey, fine SANDSTONE; very weak. Moderately cemented. Ocassional interbeds of medium sandstone, 20-70mm. [UNWEATHERED ECBF] 21.62m to 21.68m:poorly cemented.			96	89	52			00000
										21.95m to 22.40m: JT 70° tight fault?  22.19m to 22.26m: JT 60° PI, Ro, CI  22.43m to 22.44m: black carbonaceous	
		EUs2	22.71m to 22.8m:concretion? 22.73m to 22.78m:siltstone.	UW						material, thinly laminated, inclined 5°.  22.4m to 22.5m: Core loss 0.06m.  22.5m: Cased to 16m @ 24m bGL.  22.71m to 22.72m: black carbonaceous material, thinly laminated, inclined 10°.  22.71m: JT 15° Pl, Ro, Cl  22.72m to 22.86m: JT 65° Un, Ro, Cl  22.81m to 22.86m: JI 65°  22.85m: JT 20° Pl, Ro, Cl  22.89m to 22.94m: JI 65°	
89			23.65m to 23.7m:siitstone.			81	78	68		23.26m: JT 10° PI, Ro, Cl DI?	
		EUx	23.72m: CORE LOSS.								0000
		EUs2	24m: Unweathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented. 24.01m to 24.03m:sittstone. 24.18m to 24.65m:coarse sandstone. 24.2m to 24.3m:ocassional siltstone clasts, between 5-20mm.  24.54m to 24.57m:silty SAND. 24.65m to 25.18m:poorly cemented.	UW		79	44	35		24m: Core loss due to poorly cemented sand.  24.25m: JT 30° Un, Ro, Cl 24.27m: JT 30° Un, Ro, Cl 24.37m to 24.35m: JT 50° Pl, Ro, Cl 24.35m to 24.45m: disseminated black carbonaceous material, thinly laminated, inclined 10°.  24.59m: black carbonaceous material, thinly laminated, inclined 10°.  24.69m: black carbonaceous material, thinly laminated, inclined 40°.	
			ng a Leica Zeno FLX100 plus smart antenna, with a horizontal accuracy of eted to 4.0m bGL due to a 1200mm diameter stormwater pipe within 1.0m					3.5m		Water Level Readings: Date Time   Hole Depth   Water Level 18/06/24 16:35   9.45m   3.50 m bgl 19/04/24 07:35   9.45m   3.50 m bgl 20/06/24 10:00   30.00m   3.70 m bgl	(° C



Hand Shear Vane Serial No: DR4940 Correction Factor: 1.678

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: 67 Finch Street

Project Reference: 521290-064

**BH21** 

Sheet 6 of 6

	BORE Metho Equip Contra	od: me	nt:	Har	ary C njin D	TION Core Wireline 0&B-10D n Drilling (N I) Ltd	CO-ORDINATES: NZTM2000 Easting: 1754694.30m Northing: 5918287.43m Ground level: 16.38m (NZVI		Date starte Date comp Inclination: Azimuth:	letec	d: 2		5/2024 5/2024		Logged by: Input by: Checked by: Reviewed by		
	Method	R.L. (III)	Length (m)	Graphic Log	Layer Code	٨	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture	SS	Stratigi Defect De Additiona	scription	Installation
Box 6	HQ3	9	- - -		EUx EUs2	very weak. Moderate 25m:poorly cement 25.18m: CORE LOS	ted S.	UW		79	44	35		mater 25.23	m to 25.03m: black rial, thinly laminate 3m: JT 40° PI, Sm, 5m: BP 75°	d, inclined 5°.	
	HQ3	110			EUx EUs2	SANDSTONE; very v	oorly cemented.	UW		77	69	69		sand. 25.59	n: Core loss due to	CI CI	
Box 7	HQ3	111				very weak. Moderate				95	95	95		27.27 mater 27.47	m to 27.29m: black rial, laminated, sub rm: BP 35°	c carbonaceous -horizontal.	
	HQ3	112	28		EUs2		e sandstone, becomes darker grey.	υw		100	100	100			<b>m to 28.5m:</b> Core l	oss 0.07m.	
Box 8	2) Vac bGL. 3) Geo 4) ES:	ordi uum ophy = Er	nates n exc /sical nviror	avation profiling nmental	comp g unde Samp	ing a Leica Zeno FLX100 pleted to 4.0m bGL due to ertaken downhole on 20/0	Om (Termination Depth Achieved) plus smart antenna, with a horizontal acct a 1200mm diameter stormwater pipe with 6/2024, comprising an Optical and Acous	in 1.0m of the	nd vertical accuracy borehole location, at	of 3cr a dep	n. oth of	3.5m		29.64 29.77 Water Date 1 18/06/ 19/06/	2m: JT 20° Un, Ro, im: BP 15° 'm: BP 35° Level Readings: Firme   Hole Depth   W 24 16:35   9.45m   3: 24 07:35   9.45m   3: 24 10:00   30.00m   3	Vater Level 50 m bgl 50 m bgl	



Tel: +64 9 520 6019 www.aurecongroup.com

**Watercare Services Ltd** Client:

**Project: WIWQIP Motions Catchment Improvements** Location: Finch Street - Berm outside 1 Levonia Street Project Reference: 521290-064

**BH22** 

Sheet 1 of 7

**BOREHOLE INFORMATION** 

Method: Rotary Core Wireline CO-ORDINATES: NZTM2000 Easting: 1754685.77m Date started: Date completed: 23/05/2024 24/05/2024 Logged by: Input by:

Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Ma	aterial Descrip	tion	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	MWS Fracture		Stratigraphy Defect Description Additional Notes	Installation
	18	_			Om: Sandy SILT with n medium. Gravel is coa Minor rootlets. [FILL]	ninor gravel; brov rse sub-angular	wn. Sand is fine to basalt, 20mm-80mm.							0m:	FILL n to 0.3m: ES BH22_0.2-0.3	.₽
	_	_			0.3m: CLAY; brown.			СН								00(
	17	- - 1 - - -		Яc	<b>0.6m</b> : CLAY; light brow rootlets.	n. Stiff, moist, hi	gh plasticity. Minor	СН							n: ES BH22_0.6	
	16	2		-	<b>1.9m:</b> Silty fine to medi Moist.	um SAND with r	ninor gravel; brown.	SM		0						
	15	3		TAc	2.8m: Not observed. T	O ALLUVIUM]								2.8n   2.8n   1   2.8n   1   1   1   1   1   1   1   1   1   1	n: TAURANGA GROUP ALLUVIUM n: Possible Tauranga Group??	
200	14	- - -	X		<b>4m:</b> Silty CLAY with traplasticity.	ce sand; light gr	ey. Stiff, moist, high	ML		100				4m: of T	Picked up 0.5m, suspect due to swelling auranga clay	
	- ; - ;				4.5m: Sandy CLAY wit organics; light yellowist Disseminated black fib fragments). Sand is fin	n grey. Very stiff, rous organics up	moist, high plasticity.		4.5m: IBHSV=110/44kPa 4.5m: SPT 1,1// 1,2,2,2 N = 7	100						
) C	acuur S refe	S: inates n Exc ers to	cavated t	o 4m nenta	ng a Leico Zeno FLX100 pl to due to potentail 1918 ca I sample.	us smart antenna, st iron sewer pipe r	with a horizontal accurac unning through the site.	y of 2cm a	nd vertical accuracy		า.		1111	Wat	er Level Readings: 'Time   Hole Depth   Water Level 5/24 15:52   18.38m   3.00 m bgl 5/24 08:00   18.38m   2.70 m bgl 5/24 12:18   30.00m   2.13 m bgl	עאל

## REMARKS:

- NEWARKS:

  1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm.

  2) Vacuum Excavated to 4m to due to potentail 1918 cast iron sewer pipe running through the site.

  3) ES refers to environmental sample.

  4) Vibrating wire piezometer (VWP) were installed at 18.5 m bgl (BH22\_PZ01) and 22m bgl (BH22\_PZ02). S/N: 366162 and 364111.



**Watercare Services Ltd** Client:

**Project: WIWQIP Motions Catchment Improvements** Location: Finch Street - Berm outside 1 Levonia Street Project Reference: 521290-064

**BH22** 

Sheet 2 of 7

BOREHOLE INFORMATION	CO-ORDINATES

Rotary Core Wireline Massenza MM3 Method: Equipment:

S: NZTM2000 1754685.77m 5918270.02m Easting: Northing:

Date started: 23/05/2024 Date completed: 24/05/2024 Inclination: -90°

Logged by: ΑP Input by: AP Checked by: PK

	ntrac						5918270.02m 18.30m (NZVD2016	5)	Azimuth:		١	90° N/A			Checked by: Reviewed by	: SS	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Materi	al Descriptior	n	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	www. www. Fracture cs. Log		Stratigr Defect De Additiona	scription	Installation
НФЗ	13			TAc	4.5m: Sandy CLAY with so organics; light yellowish gre Disseminated black fibrous fragments). Sand is fine to	ey. Very stiff, mo organics up to	ack fibrous ist, high plasticity. 30mm (wood	CL		100							
1 U54	_ _ 	_ _ _ _		TAx	6m: PUSH TUBE. 6.01m to 6.5m:Sandy CL organics; light grey. Very st Sand is fine.	AY with minor b tiff, slightly moist	lack fibrous , moderately plastic.		∃6m: IBHSV=73/23kPa	100							
HQ3 SPT	_ _ _ _ _ _ _ _	7	× × × × × × × × × × × × × × × × × × ×	TAs	<b>6.5m:</b> Silty fine to medium wood organics.	SAND; grey. Stif	f, moist. Minor	\$W-SI	6.5m: SPT 2,2// 2,3,6,5 N = 16	100				6.7m: F siltston	Residual ECBF st e or sandstone fa	oils? No relict abric	
SPT	  -  -  -  -	- - - -	×	ERs	7.4m: Fine to medium SAN Medium dense, moist. [RE 7.5m:Trace disseminated 1mm.	ID with some silt SIDUAL SOILS I black carbonad	i; light grey. ECBF] :eous material	SW.	7.5m: IBHSV=UTP 7.5m: SPT 3.3// 6,6,8,10 N = 30	93				7.4m: E	EAST COAST BA	YFORMATION	
. НФ3	10	8		ls	7.95m: Highly weathered, gextremely weak. Poorly cer	nented. (Silty fin	ANDSTONE; le SAND).			100	0	0					
HQ3 SPT	9	9		EWs	9.25m to 9.3m:Sandy SII 9.65m to 9.75m:Sandy S			HW	9m: SPT 4,5// 5,7,9,10 N = 31	100	29	29					
PE	MAR	10												Water I	evel Readings:		

REMARKS:

Hand Shear Vane Serial No: DR4938 Correction Factor: 1.452

Water Level Readings: Date Time | Hole Depth | Water Level 23/05/24 15:52 | 18.38m | 3.00 m bgl 24/05/24 08:00 | 18.38m | 2.70 m bgl 24/05/24 12:18 | 30.00m | 2.13 m bgl

Database File: CC2MOTIONS MASTER 02(4H).GPJ Library file: LIBRARY \_20240925\_V/3 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 19/02/2025

NEWARKS:

1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm.

2) Vacuum Excavated to 4m to due to potentail 1918 cast iron sewer pipe running through the site.

3) ES refers to environmental sample.

4) Vibrating wire piezometer (VWP) were installed at 18.5 m bgl (BH22\_PZ01) and 22m bgl (BH22\_PZ02). S/N: 366162 and 364111.



**Watercare Services Ltd** Client:

**Project: WIWQIP Motions Catchment Improvements** Location: Finch Street - Berm outside 1 Levonia Street

Project Reference: 521290-064 **BH22** 

Sheet 3 of 7 **BOREHOLE INFORMATION** CO-ORDINATES: NZTM2000 Date started: 23/05/2024 Logged by: ΑP

Rotary Core Wireline Massenza MM3 McMillan Drilling NI Ltd Input by: Checked by: Reviewed by: Method: Easting: 1754685.77m Date completed: 24/05/2024 Equipment: Contractor: Northing: Ground level: 5918270.02m 18.30m (NZVD2016) -90° N/A Inclination:

Co	ontra	actor	:	McN	/lillar	Drilling NI Ltd Ground level: 18.30m (NZVD2016	)	Azimuth:			N/A		Reviewed by: SS
Method	( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( (	R.L. (M)	Lengin (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture ws Fracture cs Log	Stratigraphy Defect Description Additional Notes
HQ3	8	3			EWx	10.1m: CORE LOSS.	HW		62	29	29		10.1m to 10.5m: Core loss due to cohesiveness of sand
SPT	- - - - - - -	- - - 1	1		EWs	10.4m: Highly weathered, grey, fine to medium SANDSTONE with some silt; extremely weak. Uncemented. (Fine to medium SAND with some silt).      10.5m to 10.6m:SILTSTONE.	HW	10.5m: SPT 4,6// 10,10,12,11 N = 43	78				
Box 2 HQ3	-	- - - - - - 1	2		EWx	11.35m: CORE LOSS.			38	0	0		11.35m to 12m: Core loss due to cohesiveness of sand
SPT	_ _ _	3 -				12m: Highly weathered, grey, fine to medium SANDSTONE; extremely weak. Uncemented. (Fine to medium SAND with some silt).		12m: SPT 5,7/I 9,11,12,14 N = 46	89				
	_	- - -	-		EWs	12.6m:Very thin layer of black carbonaceous material, 10mm. 12.77m to 12.8m:SILTSTONE.	HW						
HQ3		- 1 - - - 5	3		EW×	12.8m to 13.05m:Very weak.  13.05m: CORE LOSS.			40	0	0		13.05m to 13.5m: Core loss due to cohesiveness of sand
Box 3	- - - -	- - - - 1	4			13.5m: Moderately weathered, grey, silty fine to medium SANDSTONE; extremely weak. Poorly cemented. (Silty fine to medium SAND).      13.7m:Trace black carbonaceous material disseminated throughout, 1mm.		13.5m: SPT 8,11// 11,14,16,9 for 30mm N = 50+	91				
HQ3	4 	- - - - - -	-		EWs		MW		92	64	64		44.04m to 45m. Dilling induced
1) 2) 3)	Co- Vac ES	uum E refers	tes ca	apture ated t	o 4m nenta	ng a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy o to due to potentail 1918 cast iron sewer pipe running through the site. I sample. (VWP) were installed at 18.5 m bgl (BH22_PZ01) and 22m bgl (BH22_PZ				n.			14.91m to 15m: Drilling induced core loss
На	and \$	Shear	Vane	Seria	al No:	DR4938 Correction Factor: 1.452							



**Watercare Services Ltd** Client:

**Project: WIWQIP Motions Catchment Improvements** Location: Finch Street - Berm outside 1 Levonia Street Project Reference: 521290-064

**BH22** 

Sheet 4 of 7

## **BOREHOLE INFORMATION**

Rotary Core Wireline Massenza MM3 McMillan Drilling NI Ltd Method: Equipment:

CO-ORDINATES: NZTM2000 Easting: 1754685.77m Northing: 5918270.02m 18.30m (NZVD2016) Date started: 23/05/2024 Date completed: 24/05/2024 -90° Inclination:

Logged by: ΑP Input by: Checked by: AP PK SS

Co	ntra	actor:	McI		n Drilling NI Ltd	Ground level:	18.30m (NZVD2016)	)	Azimuth:		1	N/A		Reviewed by: SS	
Method	(m)	R.L. (m) Length (m)	Graphic Log	Layer Code	Ν	1aterial Descripti	ion	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture cs Log	Stratigraphy Defect Description Additional Notes	Installation
SPTC	_ _ _ _ _	3		EWs	13.5m: Moderately w SANDSTONE; extre medium SAND).	eathered, grey, silty mely weak. Poorly (	r fine to medium cemented. (Silty fine to	MW	15m: SPTC 7,11/1 15,16,17,2 for 15mm N = 50+	N/A	N/A	N/A			
HQ3	-	16			15.9m: Slightly weath 16.05m:Horizontal I thick.				-	95	63	56		15.87m: JT 45° PI, Sm, CI 15.99m: JT 50° PI, Ro, CI 16.03m: JT 45° PI, Ro, CI 16.09m: JT 40° PI, Ro, CI	
SPTC			× × × × × × × × × × × × × × × × × × ×	EUz2				SW	16.5m: SPTC 6,15// 43,47,75 N = 50+	N/A	N/A	N/A			
НОЗ	_ _ _ _ _ 1	17 - - - -	<del>*************************************</del>	EUs2	16.88m: Slightly weat weak. Moderately cer	mented.		SW		93	76	71		17.15m: JT 20° PI, Sm, CI	
Ī	-				17.84m: CORE LOSS	<b>S</b> .			18m: SPTC					17.55m: JT 30° PI, Sm, CI 17.60m: JT 40° PI, Sm, CI 17.62m: JT 70° Sm, CI 17.84m to 18m: Core loss due to cohesiveness of sand 17.86m: JT 80° PI, Ro, CI	
SPTC	0	)		EUx	18.38m: Interbedded weak. SILTSTONE (5	50%) is unweathere	ed, grey. Fine to		11,30// 30,20,55 N = 50+	N/A	N/A	N/A			
НОЗ		19	× × × × × × × × × × × ×	EUi2	medium SANDSTON moderately cementer spacing, moderately carbonaceous beddir sandstone.  18.58m to 18.73m:	IE (50%) is slightly of the control	weathered, grey, pedding, very close ing. 1mm black	UW		100	91	91		18.58m: JT 85° PI, Sm, CI 19.02m: JT 70° PI, Sm, CI	
НОЗ			× × × × × × × × × × × × × × × × × × ×							93	91	76		19.57m: JT 60° PI, Sm, CI 19.74m: JT 40° PI, Ro, CI 19.90m: JT 90° PI, Ro, CI	
	I A	20 RKS:						1	<u> </u>					Water Level Readings:	

Water Level Readings: Date Time | Hole Depth | Water Level 23/05/24 15:52 | 18.38m | 3.00 m bgl 24/05/24 08:00 | 18.38m | 2.70 m bgl 24/05/24 12:18 | 30.00m | 2.13 m bgl

Database File: CC2MOTIONS MASTER 02(JH),GPJ Library file: LIBRARY\_20240825\_V13 (1),GLB Template: DATATEMPLATE.GDT

NEWARKS:

1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm.

2) Vacuum Excavated to 4m to due to potentail 1918 cast iron sewer pipe running through the site.

3) ES refers to environmental sample.

4) Vibrating wire piezometer (VWP) were installed at 18.5 m bgl (BH22\_PZ01) and 22m bgl (BH22\_PZ02). S/N: 366162 and 364111.



Hand Shear Vane Serial No: DR4938 Correction Factor: 1.452

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Finch Street - Berm outside 1 Levonia Street

Project Reference: 521290-064

**BH22** 

Sheet 5 of 7

M E	leth qui		ent:	Mas	ary (	TION Core Wireline za MM3 n Drilling NI Ltd	CO-ORDINATES: NZTM2000 Easting: 1754685.77m Northing: 5918270.02m Ground level: 18.30m (NZVD2016)	)	Date starte Date comp Inclination: Azimuth:	oletec	l: 2		5/2024 5/2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS
Mothon	Melliod	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	laterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture cs Log	Stratigraphy Defect Description Additional Notes
1004 1004		- -2 - -		× × × × × × × × × × × × × × × × × × ×		weak. SILTSTONE ( medium SANDSTON moderately cemente spacing, moderately carbonaceous beddii sandstone.				93	91	76		
Box 6	-	-3 -3 		× × × × × × × × × × × × × × × × × × ×	EUi2			UW		100	95	95		21.22m: JT 20° Pl, Ro, Cl 21.81m: JT 20° Pl, Sm, Cl 21.95m: JT 20° Pl, Sm, Cl 22.20m: JT 20° Pl, Sm, Cl
			  	× × × × × × × × × × × × × × × × × × ×		22.8m to 22.9m:po 23.07m to 23.4m:p	•			87	33	23		22.74m: JT 40° PI, Sm, CI  22.92m: JT 40° PI, Ro, CI  23m to 27m: Core highly disturbed due to being extremely weak and removal from splits and handling 23.10m to 23.40m: JT
Вох 6				× × · · · · · · · · · · · · · · · · · ·	EUx EUs1	extremely weak. Poo 23.7m to 23.75m:B fragments. 23.8m: CORE LOSS 24m: Unweathered,	grey, fine to medium SANDSTONE; rly cemented. (Fine to medium SAND).  lack carbonaceous decomposed wood  grey, fine to medium SANDSTONE; rly cemented.(Fine to medium SAND).	uw						23.8m to 24m: Core loss due to cohesiveness of sand?
3		-6			EUx EUs1	24.5m: CORE LOSS	пу сеттениеи.(гіпе to meaium SAND).	UW		26	0	0		24.5m to 25.5m: Core loss due to cohesiveness of sand
1 2 3	) Co 2) Va 3) ES	cuui 3 refe	linate: m Exc ers to	cavated environ	to 4m menta	to due to potentail 1918 o al sample.	plus smart antenna, with a horizontal accuracy of last iron sewer pipe running through the site. 8.5 m bgl (BH22_PZ01) and 22m bgl (BH22_PZ0		·		n.		Liiiii	Water Level Readings: Date Time   Hole Depth   Water Level 23/05/24 15:52   18.38m   3.00 m bgl 24/05/24 08:00   18.38m   2.70 m bgl 24/05/24 12:18   30.00m   2.13 m bgl



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** Location: Finch Street - Berm outside 1 Levonia Street Project Reference: 521290-064

**BH22** 

Sheet 6 of 7

			Project Reference: 521290-064		-					Sheet 6 of 7
BOREHOLI Method: Equipment: Contractor:	R M	otary ( assen	CO-ORDINATES: NZTM2000 Easting: 1754685.77m Northing: 5918270.02m Ground level: 18.30m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	leted	l: 2		/2024 /2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS
Method R.L. (m) Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	vws wws Fracture cs Log	Stratigraphy Defect Description Additional Notes
 3 -7 -	X	EUX	24.5m: CORE LOSS			26	0	0		
	<u> </u>	EUs1	25.5m: Unweathered, grey, fine to medium SANDSTONE; extremely weak. Poorly cemented. (Fine to medium SAND). 25.56m to 25.72m:SILTSTONE. 25.69m to 25.88m:Trace black carbonaceous material disseminated throughout, 1mm width. 25.72m to 25.91m:Coarse SANDSTONE; very weak. Well cemented.	UW		26	0	0		
27	X	EUX	26.6m: CORE LOSS							
-9		EUs1	27m: Unweathered, grey, fine to medium SANDSTONE; extremely weak. Poorly cemented. (Fine to medium SAND).	UW						
28		EUx	27.75m: CORE LOSS			50	13	13		27.75m to 28.5m: Core loss due to cohesiveness of sand
	2		28.5m: Unweathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented.							28.74m: JT 30° PI, Sm, Cl
-11		EUs2	29.1m to 30m:Dissemenated 1mm clasts of silt and 1mm black carbonaceous material.	UW		100	53	53		29.19m: JT 85° PI, Sm, CI 29.25m: JT 50° PI, Sm, CI 29.46m to 29.54m: JT 80° PI, Sm, CI
30 REMARKS: ) Co-ordinate ) Vacuum E: ) ES refers to	es capt xcavate o envire	ured us	ng a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2 to due to potentail 1918 cast iron sewer pipe running through the site. I sample.  (VWP) were installed at 18.5 m bgl (BH22_PZ01) and 22m bgl (BH22_PZ02)	cm an	d vertical accuracy	of 3cn	n.			29.80m: JT 60° PI, Ro, CI  Water Level Readings: Date Time   Hole Depth   Water Level 23/05/24 15.52   18.38m   3.00 m bg  24/05/24 08.00   18.38m   2.70 m bg  24/05/24 12.18   30.00m   2.13 m bg



**Watercare Services Ltd** Client:

**Project: WIWQIP Motions Catchment Improvements** Location: Finch Street - Berm outside 1 Levonia Street

Project Reference: 521290-064

**BH22** 

Sheet 7 of 7

IFORMATION
Rotary Core Wireline
Massenza MM3
McMillan Drilling NI Ltd

: NZTM2000
1754685.77m
5918270.02m
18.30m (NZVD2016)

Date started:	23/05/2024
Date completed:	24/05/2024
Inclination:	-90°
Azimuth:	N/A

Logged by:	ΑP
Input by:	ΑP
Checked by:	PΚ
Reviewed by:	SS

							•						_	
	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws ws wws Fracture cs vcs Log ecs	Stratigraphy Defect Description Additional Notes	Installation
Box 7	SPTC	i	_		EUs2	<b>28.5m:</b> Unweathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented.	UW	30m: SPTC 14,30// 50 for 45mm N = 50+	N/A	N/A	N/A		<b>30m to 30.2m:</b> SPTc was done to confirm strength at this depth due to poorly cemented sand.	
						End of borehole at 30.2m (Termination Depth Achieved)								

REMARKS:

REMARKS:

1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm.

2) Vacuum Excavated to 4m to due to potentail 1918 cast iron sewer pipe running through the site.

3) ES refers to environmental sample.

4) Vibrating wire piezometer (VWP) were installed at 18.5 m bgl (BH22\_PZ01) and 22m bgl (BH22\_PZ02). S/N: 366162 and 364111.

Water Level Readings: Date Time | Hole Depth | Water Level 23/05/24 15:52 | 18.38m | 3.00 m bgl 24/05/24 08:00 | 18.38m | 2.70 m bgl 24/05/24 12:18 | 30.00m | 2.13 m bgl



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: 19 Myrtle Street
Project Reference: 521290-064

**BH25** 

Sheet 1 of 6

Metl Equ	REHO hod: ipme tract	ent:	Mas	ary C	Core Wireline za MM3 ns (NI) LTD	CO-ORDINATES: NZTM2000 Easting: 1754337.00m Northing: 5918306.62m Ground level: 13.52m (NZVD2	2016)			d:	2/09/ 3/09/ -90° N/A	2024 2024		Sheet 1 of 6  Logged by: SMG Input by: SMG Checked by: Reviewed by: SS	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture wws Fracture cs Log	SS	Stratigraphy Defect Description Additional Notes	notallation
	13	- - - - - 1		Fg	Firm, moist, low plast \(\tag{TOPSOIL}\) \(0.15\mathrm{m}\): Silty fine to complete the complete	arse GRAVEL with minor cobbles and ellow. Loosely packed, dry. lightly weathered basalt. n minor gravel & cobbles; brown and st, high plasticity. Gravel/cobbles are	SM GW-G	0.6m: ISHSV=195/58 1m: ISHSV=150/68	100	)			Om: Fl	LL	
	12		X	TAc	1.35m: Silty CLAY with stiff, moist, high plast [UNDIFFERENTIATE]  2m:Light grey.	th trace organics; orangey brown. Ver icity. Organics are woody fragments ED ALLUVIUM]	сн	1.5m: ISHSV=133/36 1.5m: SPT 0,0// 1,1,1,1 N = 4	100				1.35m	: TAURANGA GROUP ALLUVIUM	
			X	TAC TAZ	\Firm, moist, high plas 3.18m: Sandy CLAY; 3.35m: Silty medium	th some clay, grey mottled orange. sticity. light grey. Firm moist, high plasticity. to coarse SAND with minor clay; grey sticity. [RESIDUAL SOIL ECBF]		3m: IBHSV=36/16/ 3m: SPT -0,0// 0,0,1,1 N = 2 3.1m: IBHSV=36/29/	100				3.35m	: EAST COAST BAYS FORMATION	
-	9	- - 4 - - -	× × × × × × × × × × × × × × × × × × ×	ERx ERs	4.35m: CORE LOSS.	um SAND; grey. Medium dense, moist	SP	4.5m: SPT	87						
	-   -   -		× × × × × × × × × × × × × × × × × × ×	ERs	4.75m:Yellowish bro			1,1// 2,3,2,3 N = 10	100	)					

<sup>2)</sup> A Standpipe was installed (BH25\_SP01) with a screening interval from 4 mbgl to 6 mbgl 3) ISHSV = In-situ Hand Shear Vane 4) IBHSV = In-barrel Hand Shear Vane

29/08/24 07:30 | 1.50m | 1.50 m bgi 29/08/24 15:45 | 22.50m | 2.50 m bgi 02/09/24 07:30 | 22.50m | 1.40 m bgi

Database File: CC2 MO

Hand Shear Vane Serial No: 2006 Correction Factor: 1.622



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: 19 Myrtle Street Project Reference: 521290-064 **BH25** 

Sheet 2 of 6

CO-ORDINATES: NZTM2000 BOREHOLE INFORMATION Date started: 2/09/2024 Logged by: SMG Rotary Core Wireline Easting: 1754337.00m 3/09/2024 Method: Date completed: Input by: SMG Massenza MM3 McMillans (NI) LTD 5918306.62m 13.52m (NZVD2016) Equipment: Northing Inclination: -90° Checked by: N/A Reviewed by: SS Contractor: Ground level: Azimuth: Weathering/USC Graphic Log Code Length (m) Installation Testing Fracture Stratigraphy  $\Xi$ TCR (%) 8 % Method Log Defect Description SCR ( RQD ( Material Description R.L. Layer Additional Notes 4.5m: Silty medium to coarse SAND; grey. Medium dense, ERS HQ3 8 5.6m: CORE LOSS. ERX 6 **6m:** Fine to coarse SAND with minor silt; grey. Medium dense, moist. [COMPLETELY WEATHERED ECBF] 6m: SPT SPT 100 ERS CW Database File: CC2MOTIONS MASTER 02/JL), GPJ Library file: LIBRARY 20240925 V13 (1), GLB Template: DATATEMPLATE, GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated; 20/02/2025 HQ3 7 100 7.2m: Highly weathered, grey, fine to medium SANDSTONE; Extremely weak, poorly cemented (fine to medium SAND. Medium dense). 11111 7.45m: JT 45° PI, Ro, CI 7.5m: SPT 3,4// 5,7,9,12 N = 33 +11111SPT 100  $\square$ 8 HW HQ3 100 5 8.71m to 10.3m:...Coarse SANDSTONE. 8.72m: BPJT 5° PI, Sm, CI 1111 $\Pi\Pi\Pi\Pi$ 9 8.95m: JT 3° PI, Ro 9m: SPTC 5,7// 10,10,11,16 N = 47  $\Pi\Pi\Pi$ 9.05m: JT 5° Un, Ro SPTC N/A N/A N/A **9.45m:** Highly weathered, grey, fine to medium SANDSTONE; Extremely weak, poorly cemented (fine to medium SAND. Dense) 4 HQ3 100 HW  $\Box\Box\Box$ 9.90m to 10.05m: JT 70° PI, Ro Water Level Readings: Date Time | Hole Depth | Water Level 29/08/24 07:30 | 1.50m | 1.50 m bgl 29/08/24 15:45 | 22.50m | 2.50 m bgl 02/09/24 07:30 | 22.50m | 1.40 m bgl REMARKS 1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 1.12cm and vertical accuracy of 1.4cm.
2) A Standpipe was installed (BH25\_SP01) with a screening interval from 4 mbgl to 6 mbgl
3) ISHSV = In-situ Hand Shear Vane
4) IBHSV = In-barrel Hand Shear Vane

Hand Shear Vane Serial No: 2006 Correction Factor: 1.622



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: 19 Myrtle Street Project Reference: 521290-064 **BH25** 

Sheet 3 of 6

BORE Method Equipn Contra	d: nent:	Ma	ary C	CON         CO-ORDINATES: NZTM2000           Flore Wireline         Easting:         1754337.00m           Flore MM3         Northing:         5918306.62m           Flore MM5         Ground level:         13.52m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	leted	: 3	2/09/2 8/09/2 90° N/A		Logged by: SMG Input by: SMG Checked by: Reviewed by: SS
Method R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	www. www. Fracture	Stratigraphy Defect Description Additional Notes
HQ3	-		EWs	9.45m: Highly weathered, grey, fine to medium SANDSTONE; Extremely weak, poorly cemented (fine to medium SAND. Dense)	HW		100				10.25m: JT 60° Pl, Ro
3	- - -	× × × ×	EWZ	10.4m: Highly weathered, grey SILTSTONE; Extremely weak.	HW	10.5m: SPTC 5,10// 12,12,12,13 N = 49	12,13		N/A		10.35m: JT 55° Pl, Ro
	11	× × × × × × × × × × × × × × × × × × ×	В	11.15m: Highly weathered, grey, fine to medium							
2 2	-  -  -  -		EWs	SANDSTONE; Extremely weak, poorly cemented.  11.55m:Extremely weak.	HW		86				11.2m: Core broken when retrieved from splits  11.55m: Core broken when retrieved from splits
-	12		EWx	11.85m: CORELOSS							spits
				12m: Moderatley weathered, grey, fine to medium SANDSTONE; Extremely weak, poorly cemented.		12m: SPT 6,11// 23,10 for 30mm N = 50+	100	100	100		12.32m: SPT stopped early - Incorrect reading
	 _ _										12.68m: JT 5° PI, Sm, Cl
- - -	13						100	100	89		13.15m: BPJT 2° PI, Ro, CI 13.20m: BPJT 2° PI, Sm, CI
0	-  -  -		EWs			13.5m: SPT 14,23// 5 for 74mm N = 50+	100	100			13.28m: BPJT 2° PI, Sm, CI
<u>+</u> - - -	14			14.03m to 14.11m:SILTSTONE							
27 -1							100	100	100		14.10m: JT 8° PI, Ro
-	- - - -	× × × × × × × × × ×	EWz	14.65m: Moderatley weathered, grey, SILTSTONE; Extremely weak. Contains disseminated black carbonaceous material.	MW						13.15m: BPJT 2° PI, Ro, CI 13.20m: BPJT 2° PI, Sm, CI 13.28m: BPJT 2° PI, Sm, CI 13.48m: BPJT 5° PI, Ro, CI  14.10m: JT 8° PI, Ro  14.65m: BPJT 15° PI, Ro  14.78m: BPJT 2° PI, Ro
2) A Sta	rdinate andpip	e was ins	stalled	ng a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 1.1 (BH25_SP01) with a screening interval from 4 mbgl to 6 mbgl ar Vane	2cm a	and vertical accuracy	of 1.4	cm.			Water Level Readings: Date Time   Hole Depth   Water Level 29/08/24 07:30   1.50m   1.50 m bg  29/08/24 15-45   22.50m   2.50 m bg



Hand Shear Vane Serial No: 2006 Correction Factor: 1.622

Client: Watercare Services Ltd

Project: WIWQIP Motions Catchment Improvements

Location: 19 Myrtle Street
Project Reference: 521290-064

**BH25** 

Sheet 4 of 6

CO-ORDINATES: NZTM2000 BOREHOLE INFORMATION Date started: 2/09/2024 Logged by: SMG Rotary Core Wireline Massenza MM3 McMillans (NI) LTD 1754337.00m 3/09/2024 Method: Easting: Date completed: Input by: SMG 5918306.62m 13.52m (NZVD2016) Equipment: Northing Inclination: -90° Checked by: N/A Reviewed by: SS Contractor: Ground level: Azimuth: Weathering/USC Graphic Log Code Installation Length (m) Fracture Testing Stratigraphy  $\Xi$ TCR (%) 8 % Method Log Defect Description SCR ( RQD ( Material Description R.L. Layer Additional Notes MWS CS CS /CS EWz MW 19,31// for 65mm N = 50+ N/A N/A N/A 15.14m: Moderatley weathered, grey, fine SANDSTONE; Extremely weak 15.39m to 15.49m:...SILTSTONE MW -2 15.65m:...Poorly cemented 15.74m: CORELOSS HQ3 16 -3 16.5m: Moderatley weathered, grey, fine SANDSTONE; Extremely weak. 16.70m: DB 60° PI, Ro, Core disturbed wher retrieved splits. 16.75m to 17.15m:...poorly cemented. I I I IEWs MW 00 16.90m: DB 64° PI, Ro, Core disturbed when retrieved splits. 17  $\frac{1}{2}$ HQ3 17.2m: Slightly weathered, grey, fine SANDSTONE; Very 100 weak, moderately cememented 17.4m to 17.8m:...poorly cemented. 18 18m: Minor disseminated black carbonaceous material
18m to 18.15m: Minor disseminated black carbonaceous material

18m to 18.15m: Minor disseminated black 18m to 18.15m: Minor disser carbonaceous material 18.05m: BPJT 2° PI, Ro, CI 18.15m: BPJT 5° PI, Sm, CI 18.35m: BPJT 2° PI, Sm, CI 18.41m: BPJT 2° PI, Sm, CI SW -5 IIIIIHQ3 100 96 96 19 19.15m: BPJT 2° PI, Sm, CI 19.2m: Minor disseminated black carbonaceous material 19.2m to 19.4m: Minor disseminated black 19.2m to 19.5m:...SILTSTONE -6 19.45m: JT 10° PI, Sm, CI 19.5m: Slighlty weathered, grey, interbedded SANDSTONE/SILTSTONE; Very weak. Bedding is moderately thin (80 mm), sub-horizontal. Sandstone (55%) is fine to IIIII× IIIIIEUi2 medium, poorly cemented and SILTSTONE (45%). 19.75m to 19.95m:...poorly cemented. E E 100 30x 6 SW 65 65  $\Pi\Pi$ IIIIIWater Level Readings: Date Time | Hole Depth | Water Level 29/08/24 07:30 | 1.50m | 1.50 m bgl 29/08/24 15:45 | 22.50m | 2.50 m bgl 02/09/24 07:30 | 22.50m | 1.40 m bgl REMARKS 1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 1.12cm and vertical accuracy of 1.4cm.
2) A Standpipe was installed (BH25\_SP01) with a screening interval from 4 mbgl to 6 mbgl
3) ISHSV = In-situ Hand Shear Vane
4) IBHSV = In-barrel Hand Shear Vane



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: 19 Myrtle Street
Project Reference: 521290-064

**BH25** 

Sheet 5 of 6

BOREHOLE Method: Equipment: Contractor:	Rota Mas	ry C senz	COON         CO-ORDINATES: NZTM2000           Easting:         1754337.00m           Northing:         5918306.62m           Ground level:         13.52m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	leted	: 3		2024 2024	Logged by: SMG Input by: SMG Checked by: Reviewed by: SS
Method R.L. (m) Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture wws Fracture cs Log ecs	Stratigraphy Defect Description Additional Notes
8 -7	× × × × × × × × × × × × × × × × × × ×	EUi2	19.5m: Slightly weathered, grey, interbedded SANDSTONE/SILTSTONE; Very weak. Bedding is moderately thin (80 mm), sub-horizontal. Sandstone (55%) is fine to medium, poorly cemented and SILTSTONE (45%). 20.25m to 20.5m:poorly cemented.	sw		100	65	65		19.95m to 20.10m: JT 75° PI, Ro 20.00m to 20.10m: JT 65° PI, Ro, Core disturbed when retrieved splits. Suspect intersecting joints, dip angle approximate. 20.25m to 20.50m: Core disturbed when retrieved splits. Suspect intersecting joints, unkown orientation
	× × × × × × × × × × × × × × × × × × ×		22.1m: Slightly weathered, grey, fine SANDSTONE; Very weak, moderately cemented.			100	86	86		21.10m: DI 2° PI, Ro, Drilling induced defect 21.15m: DI 2° PI, Ro, Drilling induced defect 21.20m: BPJT 2° PI, Ro 21.30m to 21.32m: BPJT 5° Un, Ro 21.45m: JI 4° Un, Ro 21.50m to 21.53m: JI 2° PI, Ro 21.55m to 21.53m: JI 2° PI, Ro 21.55m: DI 2° PI, Ro, Drilling induced defect 21.72m: JI 2° PI, Ro 21.55m: JI 2° PI, Ro, Drilling induced defect
-9 -9    - 23			22.6m to 23.1m:Coarse SANDSTONE							22.40m: JT 5° PI, Ro
-10 -10 -10 		EUs2	23.4m to 24.1m:Coarse SANDSTONE	sw		100	90	90		23.13m: JI 2° PI, Ro 23.16m: JI 2° PI, Ro 23.40m: JI 2° PI, Ro, Drilling induced defect 23.43m: JT 4° PI, Ro 23.55m: BPJT 4° PI, Ro
			<b>24.67m to 24.77m</b> :SILTSTONE			100	95	95		24.15m to 25.3m: Minor disseminated black carbonaceous material 24.33m to 24.35m: BPJT 2° PI, Sm, Cl
			24.92m to 24.97m:poorly cemented.  ng a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 1. (BH25 SP01) with a screening interval from 4 mbgl to 6 mbgl	  2cm a	and vertical accuracy	of 1.4	cm.			Water Level Readings: Date Time   Hole Depth   Water Level 29/08/24 07:30   1.50m   1.50 m bg  29/08/24 1545   22.50m   1.250m bg

<sup>4)</sup> IBHSV = In-barrel Hand Shear Vane



Hand Shear Vane Serial No: 2006 Correction Factor: 1.622

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: 19 Myrtle Street
Project Reference: 521290-064

**BH25** 

	www.a	urecon	group.cor	n	Project Reference: 521290-	064	1						Sheet 6 of 6	
Me Equ	REH hod: lipme ntrac	ent:	Mas	ary (	CO-ORDINATES: NZTM2000 Core Wireline za MM3 Is (NI) LTD  CO-ORDINATES: NZTM2000 Easting: 1754337.00m Northing: 5918306.62m Ground level: 13.52m (NZVI		Date starte Date comp Inclination: Azimuth:	leted	: 3		2024 2024		Logged by: SMG Input by: SMG Checked by: Reviewed by: SS	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture	I	Stratigraphy Defect Description Additional Notes	Installation
					<b>22.1m:</b> Slightly weathered, grey, fine SANDSTONE; Very weak, moderately cemented.	'								0(
HQ3	_ _ _  12	_			25.55m to 25.75m:SILTSTONE; Very weak.	sw		100	95	95			m: BPJT 2° Pl, Sm, Cl	
	_ _ _ _			EUs2	23.00.1.0 25.70.11								m: BPJT 2° PI, Sm, CI m: BPJT 2° PI, Sm, CI m: BPJT 22° PI, Sm, CI	
3	_ _ _	_			<b>26.1m</b> : Slighty weathered, grey, fine to medium SANDSTONE; Very weak, well cemented.	sw		60	59	59				000
	-13 - -			EUx	26.4m: CORELOSS									
			(	EUs2	27m: Slighty weathered, grey, fine to medium SANDSTO Very weak, well cemented. 27.08m to 27.2m:Laminated SILTSTONE.  27.32m to 27.4m:poorly cemented. 27.4m: CORE LOSS.	NE;							m: BPJT 8° PI, Ro m: BPJT 5° PI, Sm, CI m to 27.40m: Core disturbed when red splits. Suspect defects, orientatior wn	
	- - -			EUx				67	48	30				
	_ _ _ _  15	_	V	EUs	28.1m: slightly weathered, grey, coarse, SANDSTONE; weak, well cemeneted. 28.2m to 28.25m:poorly cemented. 28.5m: Slightly weathered, grey, coarse SANDSTONE;	SW							m: BPJT 2° Un, Ro, Cl	
	_ _ _		X X X X X X X X X X X X X X X X X X X	EUz2	\Weak, well cemented. <b>28.6m:</b> Slightly weathered, grey, SILTSTONE; Very weak							28.70   28.80   28.90	m: BP 2° PI, Ro m: BP 2° PI, Sm, CI m: BPJT 2° PI, Sm, CI	
		_			<b>28.95m</b> : Slightly weathered, grey, coarse SANDSTONE; Weak, well cemented.			100	94	94		29.15	m: JT 8° PI, Ro, CI m: DI 2° PI, Ro, Drilling induced defec	
	_ -16 _ _ _			EUs2		sw							m: DI 2° PI, Ro, Drilling induced defec	t
) ( ) / ) I	Stan	linates dpipe ' = In-s	was ins situ Han	talled d She	End of borehole at 30m (Termination Depth Achieved) ing a Leico Zeno FLX100 plus smart antenna, with a horizontal accu (BH25_SP01) with a screening interval from 4 mbgl to 6 mbgl ar Vane hear Vane	uracy 1.12cm and	vertical accuracy	of 1.4	cm.			29/08/ 29/08/	Level Readings: 'ime   Hole Depth   Water Level 24 07:30   1.50m   1.50 m bgl 24 15:45   22.50m   2.50 m bgl 24 07:30   22.50m   1.40 m bgl	6



**BOREHOLE INFORMATION** 

Tel: +64 9 520 6019 www.aurecongroup.com

**Watercare Services Ltd** Client:

**Project: WIWQIP Motions Catchment Improvements** 

Date started:

5/06/2024

Location: 88 Tuarangi Road Project Reference: 521290-064

**CO-ORDINATES: NZTM2000** 

**BH29** 

Logged by:

Sheet 1 of 6 AP

M E	OREH ethod quipm ontrad	: ient:	Mas	ary C senz	FION Core Wireline za MM3 n Drilling NI Ltd	CO-ORDINATES: NZTM2000 Easting: 1754278.56m Northing: 5918527.29m Ground level: 13.49m (NZVD2016	i)	Date starte Date comp Inclination Azimuth:	oleted	l: 7		2024 2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Ma	aterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture cs Log	Stratigraphy Defect Description Additional Notes	Installation
XACEX		- - - - - - 1		FEg	packed (medium dens slightly weathered, sub- substitution of the substitution of the o.5m:Brick fragment	with some cobbles; brown. Tightly se), moist. Gravel and cobbles are bangular, basalt (up to 140mm). [FILL] ss.	GC	0.5m: ISHSV=44/9kPa 1m: ISHSV=77/14kPa	0				Om: FILL 0.05m to 0.2m: ES BH29_0.05-0.2	
TGS	12		× ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	Va	1.4m: SILT with minor  1.95m: CORE LOSS	clay; orange brown. Stiff, moist.	ML	1.4m: ISHSV=93/12kPa 1.5m: SPT 1.1// 1.1,2,1 N = 5	89				Completely weathered volcanic soil - relict basalt fabric.  1.95m to 2.35m: Washed out.	
Box.				VWb Va	high plasticity. Sand is 2.5m: CLAY with trace plasticity. Sand is fine weathered basalt. 2.64m: Slightly weather	ce sand; orange brown. Firm, moist, fine to medium. Minor rootlets. e sand; orange brown. Firm, moist, high to medium. Subangular clasts of slightly ered, dark grey, slightly vesicular cles are 0.5mm to 10mm in diameter.	CL CL		40	27	23		2.77m: JT 30° PI, Ro, Vn, (Infill: clay)	
НОЗ	10	4		VUb	<b>3.3m to 3.6m</b> :Basalt High plasticity. Possibl	t clast with clay infill. Clay; light grey. le void infill?	sw		100	87	68		3.20m to 3.33m: CZ 80° Un, Ro, Co, (Infill: clay 3) 3.33m to 3.45m: JT 50° Pl, Ro, Co, (Infill: clay) 3.38m to 3.47m: CZ 50° Pl, Ro, Co, (Infill: clay) 3.48m to 3.68m: JT 40° Pl, Ro, Co, (Infill: clay) 3.50m: JT 37° Pl, Ro, Co, (Infill: clay) 3.79m to 3.90m: CZ 70° Un, Ro, Co, (Infill: clay 10) 4.03m to 4.09m: JT 30° Pl, Ro, Vn, (Infill: clay) 4.10m: JT 5° Pl, Sm, Vn, (Infill: clay)	
	- EMAR		s capture	d usi	ng a Leico Zeno FLX100 pi	lus smart antenna, with a horizontal accuracy o	f 2cm a	nd vertical accuracy	100		26		4.75m: JT 20° PI, Ro, Vn, (Infill: clay) 4.80m: JT 10° PI, Sm, Vn, (Infill: clay) 4.83m: JT 10° PI, Sm, CI 4.90m: JT 40° PI, Sm, CI  Water Level Readings: Date Time   Hole Depth   Water Level 05/06/24 13/0   6.00m   1.90 m bol	

1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm.
2) Ground Access Portal (GAP) service clearance to 1.5m.
3) ES refers to Environmental Sample.
4) Vibrating wire piezometer (VWP) were installed at 16.5 m bgl (BH29\_PZ01) and 21.5m bgl (BH29\_PZ02). S/N: 366179 and 366161.

| Date Time | Hole Depth | Water Lew 05/06/24 13:40 | 6.00m | 1.90 m bgl 06/06/24 09:00 | 6.00m | 3.91 m bgl 06/06/24 14:20 | 18.90m | 4.80 m bgl 07/06/24 09:30 | 18.90m | 4.90 m bgl 07/06/24 13:30 | 30.00m | 2.20 m bgl

Database File: CC2MOTIONS MASTER 02(4H).GPJ Library file: LIBRARY \_20240925\_V/3 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 19/02/2025



Tel: +64 9 520 6019 www.aurecongroup.com

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: 88 Tuarangi Road Project Reference: 521290-064 **BH29** 

Sheet 2 of 6

1	BOR Meth Equip Cont	od: pme	nt:	Mas	ary C	TION Core Wireline za MM3 n Drilling NI Ltd	Northing: 59	ZTM2000 54278.56m 18527.29m .49m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	letec	l: 7		2024 2024		Logged by: Input by: Checked b Reviewed I	AP y: PK	
	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	٨	Material Description		Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws ws Fracture ss Log	S	Defect D	graphy escription nal Notes	Installation
	HQ3	8					nered, dark grey, slightly sicles are 0.5mm to 10m				100	84	26		5.03n 5.12n 5.20n 5.29n 5.33n 5.50n 5.58n 5.60n 5.70n 5.72n	n: JT 10° PI, Sm, n: JT 30° PI, Sm, n: JT 40° PI, Sm, n: JT 90° PI, Ro, n: JT 50° PI, Ro, n: JT 50° PI, Sm,	Cl Vn, (Infill: clay) Vn, (Infill: clay) Cl Cl Vn, (Infill: clay) Cl /n, (Infill: clay) Cl /n, (Infill: clay) Cl	
Box 2	HQ3		7						sw		100	75	60		6.21n 6.31n 6.61n 6.64n 6.69n 6.88n clay)	n to 7.01m: JT 50	CI	
Box 3	HQ3	6	8 8		νυδ	moderately inclined. 7.54m to 7.55m:Ve moderately inclined.	ery thin flow banding of v Vesicles are 2-3mm in d ery thin flow banding of v Vesicles are 2-5mm in d	iameter. esicles, iiameter.			100	87	85		7.91n 7.99n 8.29n 8.33n 8.55n		Co, (Infill: clay) 3° PI, Sm, Cl	
Box 4	REM.	o-ordi	inates	capture	ed usi	very strong. Vesicles	ark grey, trace vesicles, are less than 2mm in di	iameter.	UW 2cm ar	d vertical accuracy	100		22		9.31n 9.41n clay) 9.54n 9.56n 9.78n clay)	n: JT 70° PI, Sm, n to 9.54m: JT 80 n: JT 30° PI, Sm, n: JT 30° PI, Sm,	80° Un, Ro, Vn, (Infill:	

1) Co-ordinates captured using a Leico Zeno FLXTUU plus smart antenna, with a norizontal accuracy of zero and usertical accuracy of 5c. 2) Ground Access Portal (GAP) service clearance to 1.5m.

3) ES refers to Environmental Sample.

4) Vibrating wire piezometer (VWP) were installed at 16.5 m bgl (BH29\_PZ01) and 21.5m bgl (BH29\_PZ02). S/N: 366179 and 366161.

Date Time | Hole Depth | Water Lev 05/06/24 13:40 | 6.00m | 1.90 m bg| 06/06/24 09:00 | 6.00m | 3.91 m bg| 06/06/24 14:20 | 18.90m | 4.80 m bg| 07/06/24 09:30 | 18.90m | 4.90 m bg| 07/06/24 13:30 | 30.00m | 2.20 m bg|

Database File: CC2MOTIONS MASTER 02(4H).GPJ Library file: LIBRARY \_20240925\_V/3 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 19/02/2025



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: 88 Tuarangi Road Project Reference: 521290-064 **BH29** 

Sheet 3 of 6

I E	/leth Equi		ent:	Ro Ma	tary sser	ATION Core Wireline nza MM3 an Drilling NI Ltd	CO-ORDINATES: NZTM2000 Easting: 1754278.56m Northing: 5918527.29m Ground level: 13.49m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	leted	: :		/2024 /2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
:	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture cs Log	Stratigraphy Defect Description Additional Notes	Installation
	HQ3	- - - 3	- - -			9m: Unweathered, d very strong. Vesicles	ark grey, trace vesicles, BASALT (solid); are less than 2mm in diameter.			100	34	22		0m: JT 30° PI, Sm, CI 0m to 10.47m: JT 60° PI, Sm, CI	
Box 4	HQ3									100	100	1000	11.4 clay)	8m to 11.63m: JT 70° Pl, Sm, Vn, (Infill: 8m: JT 10° Pl, Sm, Cl	20.5
	HQ3	1 1	12		dUV	<b>12.7m to 14m:</b> Ven 0.5mm vesicles, ven	y thin sub-horizontal flow bands of	UW		100	83	83		1m: JT 20° PI, Sm, Vn, (Infill: clay) 5m to 12.65m: JT 80° PI, Sm, Vn, (Infill:	ITT Renor File: () MOTIONS CATCHMENT IMPROVEMENTS () C Date Consorted: (9(0))20
Box 5	HQ3		14							100	96	93		3m to 13.61m: JT 80° PI, Sm, Cl	Duranse File: CC2 MOTIONS MASTER (0) this CE1. Library file: IBRARY 3704(0)55 vi3 (1) (3) R Tenentate DATATENDIATE (0)T
	1) Cc 2) Gr 3) ES 4) Vil	ound refe oratin	inates d Acce ers to ng wire	ess Por Enviror e piezo	tal (G nmen mete	SAP) service clearance to tal Sample.	16.5 m bgl (BH29_PZ01) and 21.5m bgl (BH29_PZ0				n.		05/06 06/06 06/06 07/06	r Level Readings: Time   Hole Depth   Water Level 1/24 13:40   6.00m   1.90 m bgl 1/24 99:00   6.00m   3.91 m bgl 1/24 14:20   18.90m   4.80 m bgl 1/24 14:20   18.90m   4.90 m bgl 1/24 13:30   30.00m   2.20 m bgl	intabase File: CC2 MOTIONS MASTE

<sup>1)</sup> Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm.
2) Ground Access Portal (GAP) service clearance to 1.5m.
3) EST refers to Environmental Sample.
4) Vibrating wire piezometer (VWP) were installed at 16.5 m bgl (BH29\_PZ01) and 21.5m bgl (BH29\_PZ02). S/N: 366179 and 366161.



Level 3, Te Tihi, 110 Carlton Gore Road PO Box 9762, Newmarket Auckland, New Zealand Tel: +64 9 520 6019 www.aurecongroup.com

Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 88 Tuarangi Road Project Reference: 521290-064 **BH29** 

Sheet 4 of 6

I E	Meth Equi	REH nod: ipme tract	ent:	Mas	ary C	TION         CO-ORDINATES: NZTM2000           Core Wireline za MM3         Easting: 1754278.56m           Northing: 5918527.29m         Northing: 13.49m           Oround level: 13.49m         NZVD201		Date starte Date comp Inclination: Azimuth:	letec	l: 7		2024 2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS
:	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws Fracture cs Log	Stratigraphy Defect Description Additional Notes
Box 5	HQ3	-2 -2 -3			VUb	9m: Unweathered, dark grey, trace vesicles, BASALT (solid); very strong. Vesicles are less than 2mm in diameter.  15.48m to 17.3m:Slightly weathered, light grey, BASALT.	uw		100	73	69		15.48m: JT 30° PI, Sm, Vn, (Infill: clay) 15.56m to 15.64m: JT 70° PI, Sm, Vn, (Infill: clay) 15.60m: JT 20° PI, Sm, CI 15.64m: JT 20° PI, Sm, Vn, (Infill: clay)  15.95m: JT 20° PI, Sm, Vn, (Infill: clay)
Box 6	HQ3		17		ERc TAc TAo	17.3m: Silty ORGANIC CLAY with charcoal; black. Very stiff, moist, high plasticity. (Baked margin). [UNDIFFERENTIATED ALLUVIUM] 17.5m: Silty CLAY with minor black carbonaceous material; dark brown grey. Very stiff, moist, high plasticity. The black carbonaceous material comprised of decomposed rootlets.  17.8m: Silty CLAY; grey mottled orange brown. Very stiff, moist, high plasticity. [COMPLETELY WEATHERED ECBF].	CL CL		100	40	0		16.57m: JT 5° PI, Sm, CI 16.65m: JT 5° PI, Sm, CI 16.73m to 16.82m: JT 50° PI, Sm, CI 16.76m: JT 20° PI, Sm, Vn, (Infill: clay)  17.04m: JT 10° PI, Sm, CI 17.12m: JT 10° PI, Sm, CI 17.12m: JT 10° PI, Sm, CI 17.12m: JT 10° PI, Sm, CI 17.22m: JT 40° PI, Sm, CI 17.22m: JT 40° PI, Sm, CI 17.3m: TAURANGA GROUP ALLUVIUM  17.8m: EAST COAST BAY FORMATION 17.80m: CZ
	U54	- - - - - - - 5	_ _ _		ERx	18m: PUSH TUBE.  18.01m to 18.45m:Silty CLAY with some sand, grey mottled orange brown. Very stiff, slightly moist, moderately plastic. Sand is fine.		18m: IBHSV=UTP	100				18m: Unable to carry out IBHSV, core moved in barrel
	SPT	-			EWs ERs	18.45m: Silty fine to medium SAND with some clay; grey with some mottled orange. Loose, moist.     18.55m: Highly weathered, oxidised greenish grey, silty fine to medium SANDSTONE; very weak. Moderately cemented.	HW	148.45m: SPT 5,13// 13,17,20 for 70mm N = 50+	82	0	0		
8	SPTC HQ3	- - - - -6			EUs2	<b>19m:</b> Slightly weathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented.	sw	19.5m: SPTC 15,35 for 130mm// N = 50+	100 N/A	100 N/A	100 N/A		
	EOH REM	- - MARK		s captur	ed us	19.63m: Unweathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented.      19.85m to 19.91m:SILTSTONE.  ing a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy.	UW		100		96		Water Level Readings: Date Time   Hole Depth   Water Level 05/06/24 13:40   6.00m   1.90 m bg  06/06/24 09:00   6.00m   3.91 m bg

05/06/24 13:30 | 6.00m | 1.90 m bg| 06/06/24 09:00 | 6.00m | 3.91 m bg| 06/06/24 14:20 | 18.90m | 4.80 m bg| 07/06/24 09:30 | 18.90m | 4.90 m bg| 07/06/24 13:30 | 30.00m | 2.20 m bg|

Database File: CC2MOTIONS MASTER 02(4H).GPJ Library file: LIBRARY \_20240925\_V/3 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 19/02/2025

<sup>1)</sup> Co-ordinates captured using a Leico Zeito FLX for pits smart antenna, with a nonzontal accuracy of zern and ventical accuracy of Sc 2) Ground Access Portal (GAP) service clearance to 1.5m.

3) ES refers to Environmental Sample.

4) Vibrating wire piezometer (VWP) were installed at 16.5 m bgl (BH29\_PZ01) and 21.5m bgl (BH29\_PZ02). S/N: 366179 and 366161.



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 88 Tuarangi Road Project Reference: 521290-064 **BH29** 

Sheet 5 of 6

Metho Equipo Contra	od: omer	nt:	Mas	ary C	CO-ORDINATES: NZTM2000 Easting: 1754278.56m Northing: 5918527.29m Ground level: 13.49m (NZVD2016		Date starte Date comp Inclination Azimuth:	oletec	l: 7		2024 2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS
Method (m)	K.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture was Log	Stratigraphy Defect Description Additional Notes
HQ3		- - - - -			19.63m: Unweathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented. 20m to 20.06m:SILTSTONE. 3mm black carbonaceous material bedding on boundary. 20.16m to 20.26m:SILTSTONE.  20.75m to 20.82m:SILTSTONE. Black carbonaceous material layer on boundary.	UW		100	100	96		
SPTC	-8	<u>21</u> - - -		EUs2	<b>21.21m to 22.28m:</b> Weak. Well cemented. <b>21.28m to 21.33m:</b> .SILTSTONE.		21m: SPTC 8,10// 50 for 55mm N = 50+	N/A	N/A	N/A		
HQ3		- - - 22			$\textbf{21.78m to 21.89m} : SILTSTONE. Thinly laminated (<2mm) bands of black carbonaceous material inclined 5^{\circ}.$			100	100	79		21.60m: JT 15° PI, Sm, Cl
- - - -	-9	-	× × × × × × × × × × × × × × × × × × ×	EUz2	22.28m: Unweathered, grey, SILTSTONE; weak. Thinly laminated, horizontal bedding of black carbonaceous material.  22.55m to 22.56m:Fine to medium SANDSTONE.  22.57m to 22.58m:Fine to medium SANDSTONE.  22.65m to 22.79m:Fine to medium SANDSTONE.	UW						22.68m: JT 5° PI, Ro, Cl
HQ3	-10	23	× × × × × × × × × × × × × × × × × × ×		23.08m: Unweathered, grey, fine to medium SANDSTONE; weak. Well cemented. 23.09m to 23.38m:Thinly laminated (<2mm), subhorizontal bedding of black carbonaceous material. 23.38m to 23.51m:Medium to coarse SANDSTONE. 23.53m to 23.76m:Laminated SILTSTONE horizontal bedding. Disseminated black carbonaceous material (1mm) throughout.			100	100	96		23.20m: JT 5° PI, Sm, Cl
	-11	- 24 - - - -		EUs2	23.95m to 24.1m:Medium to coarse SANDSTONE.  24.24m to 24.36m:Very thin subhorizontal bands of SILTSTONE.  24.49m to 24.8m:~60mm bands of SILTSTONE.	UW		93	93	93		

05/06/24 13:40 | 6.00m | 1.90 m bgl 06/06/24 09:00 | 6.00m | 3.91 m bgl 06/06/24 14:20 | 18.90m | 4.80 m bgl 07/06/24 09:30 | 18.90m | 4.90 m bgl 07/06/24 13:30 | 30.00m | 2.20 m bgl

Database File: CC2MOTIONS MASTER 02(4H),GPJ Library file: LIBRARY\_20240935\_V13 (1),GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 19/02/2026

<sup>1)</sup> Co-ordinates captured using a Leico Zeito FLX for pits smart antenna, with a nonzontal accuracy of zern and ventical accuracy of Sc 2) Ground Access Portal (GAP) service clearance to 1.5m.

3) ES refers to Environmental Sample.

4) Vibrating wire piezometer (VWP) were installed at 16.5 m bgl (BH29\_PZ01) and 21.5m bgl (BH29\_PZ02). S/N: 366179 and 366161.



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 88 Tuarangi Road Project Reference: 521290-064 **BH29** 

	www.a	urecon	group.cor	"	Projec	ct Reference: <b>521290-064</b>							Sheet 6 of 6
Me Eq	PREH ethod: uipm entrac	: ent:	Mas	tary C ssen:	FION Core Wireline za MM3 n Drilling NI Ltd	CO-ORDINATES: NZTM2000 Easting: 1754278.56m Northing: 5918527.29m Ground level: 13.49m (NZVD201	6)	Date starte Date comp Inclination: Azimuth:	letec	d: 7	5/06/2 7/06/2 90° N/A	2024 2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	laterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws wws Fracture cs Log	Stratigraphy Defect Description Additional Notes
HQ3	- - - - -12		× × × × × × × × × × × × × × × × × × ×	EUz2	25.1m: Unweathered	, grey, SILTSTONE; weak.	UW		93	93	93		
	- - - -	_ _ _ _ 	× × ×		very weak. Moderate	, grey, fine to medium SANDSTONE;	UW						
HQ3	- - - -13	-			26.32m to 26.6m:S				95	95	86		6.2m to 26.27m: Core loss middle of run ue to wash out of uncemented material
<del></del>	  -  -  -  -	  				60mm bands of SILTSTONE. Disseminated black carbonaceous width.							
HQ3	- -14 -	_ _  _							100	83	83		
Ĭ	- - - -	28		EUs2	<b>27.9m to 28m</b> :poor	ly cemented.	UW		100		33		8.00m: JT 45° Ro
	-15				28.3m to 28.45m:pc	•							
HQ3	  -  -  -	29							100	100	95		
<del>-</del>	-16 -				<b>29.67m to 29.9m</b> :20	0-60mm bands of SILTSTONE.							
	L	30											9.86m: JT 20° PI, Sm, Cl 9.92m: JT 20° PI, Sm, Cl

REMARKS: End of borenole at 30m (Termination Depth Achieved)
1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm.
2) Ground Access Portal (GAP) service clearance to 1.5m.
3) ES refers to Environmental Sample.
4) Vibrating wire piezometer (VWP) were installed at 16.5 m bgl (BH29\_PZ01) and 21.5m bgl (BH29\_PZ02). S/N: 366179 and 366161.

Hand Shear Vane Serial No: DR4938 Correction Factor: 1.452

Water Level Readings:
Date Time | Hole Depth | Water Level
05/06/24 13:40 | 6.00m | 1.90 m bgl
06/06/24 09:00 | 6.00m | 3.91 m bgl
06/06/24 14:20 | 18.90m | 4.80 m bgl
07/06/24 09:30 | 18.90m | 4.90 m bgl
07/06/24 13:30 | 30.00m | 2.20 m bgl

Database File: CC2MOTIONS MASTER 02(4H).GPJ Library file: LIBRARY \_20240925\_V/3 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 19/02/2025



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Western Springs Park - Southernmost Section
Project Reference: 521290-064

**BH30** 

Sheet 1 of 6

Met Equ	REH hod: iipme itract	ent:	Mas	ary C senz	FION Fore Wireline ora MM3 I Drilling Ltd	CO-ORDINATES: NZTM2000 Easting: 1754155.64m Northing: 5918511.70m Ground level: 13.16m (NZVD2016	)	Date starte Date comp Inclination: Azimuth:	leted	l: '		5/2024 5/2024	Logged by: BGW Input by: BGW Checked by: PK Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	laterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture ws Log cs Log Ecs	Stratigraphy Defect Description Additional Notes
HQ3 HQ3 VACEX	13			VUb	brown. Hard, moist, Is subangular basalt. Si 0.23m: CLAY, some sand; yellow brown. Is slightly weathered su fragments.	ne clay, minor fine to medium gravel; obe plasticity. Gravel slightly weathered and is fine to medium. [FilL] silt, trace fine to medium gravel and lard, moist, high plasticity. Gravel is bangular to angular basalt. Minor brick	MI-SF	0.23m: ER  0.62m: ER	100		40		2.5m: AUCKLAND VOLCANIC GROUP 2.5m: AUCKLAND VOLCANIC GROUP 2.5m: 100mm drilling induced core loss. 2.5m: 100mm core loss driller induced 2.5m: 100mm drilling induced core loss. 2.60m: JT 45° Infill with clay 3.00m: to 3.10m: JT 90° PI, Ro, St 3.00m: J35° PI, Ro, St 3.00m: J36° PI, Ro, St 3.00m: J30° PI, Ro, St 3.00m: J10° PI, Ro, St 3.10m: J130° 3.80m: JT 10° PI, Ro, Co
HQ3	- -				<b>4.7m:</b> Unweathered, vesicular.	grey BASALT. Strong. Slightly	UW		100	85	71		4.50m to 4.60m: JT 35° PI, Ro, Co 4.66m: JT 45° PI, Ro, Co 4.70m: JT 20° PI, Ro, Co
	MARK co-ord		s capture	ed usi	ng a Leica Zeno FLX100	plus smart antenna, with a horizontal accuracy of	2cm a	and vertical accuracy	of 3cn	n.			Water Level Readings: Date Time   Hole Depth   Water Level 13/05/24 09:45   2.50m   2.50 m bgl 13/05/24 17:00   15.00m   5.03 m bgl 14/05/24 19:30   15.00m   5.13 m bgl 15/05/24 16:00   27.00m   4.75 m bgl 16/05/24 07:30   27.00m   5.05 m bgl 16/05/24 11:00   30.00m   4.90 m bgl



Hand Shear Vane Serial No: DR4938 Correction Factor: 1.452

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements Location: Western Springs Park - Southernmost Section 521290-064 Project Reference:

**BH30** 

Sheet 2 of 6

CO-ORDINATES: NZTM2000 Date started: 13/05/2024 BOREHOLE INFORMATION Logged by: **BGW** Rotary Core Wireline Massenza MM3 McMillan Drilling Ltd 1754155.64m 5918511.70m 13.16m (NZVD2016) Easting: Date completed: 16/05/2024 BGW Method: Input by: Checked by: Equipment: Northing Inclination: -90° N/A Reviewed by: SS Contractor: Ground level: Azimuth: Weathering/USC Graphic Log Code Fracture Log Installation Length (m) Stratigraphy (E) Testing TCR (%) 8 8 Method Defect Description SCR ( RQD ( Material Description R.L. Layer Additional Notes 4.7m: Unweathered, grey BASALT. Strong. Slightly 5.00m: JT 80° PI, Sm, St 8 5.09m: JT 70° PI, Ro, Co 5.33m: JT 50° PI, Ro, Co 5.35m: JT 70° PI, Ro, Co 5.44m: JT 80° PI, Ro, Co HQ3 100 85 5.85m: JT 10° PI, Ro, Co 6 7 6.11m: JT 65° PI, Ro, Co 6.22m: JT 70° PI, Ro, Co 6.30m: JT 50° PI, Ro, Co 6.44m: JT 50° PI, Ro, Co 6.62m; JT 45° Pl. Ro. Co 100 87 80 6.76m: JT 10° PI, Ro, Co 7.00m: JT 70° PI, Ro, Co 6 7.32m: JT 10° PI, Ro, Co UW 7.58m: JT 10° PI, Ro, Co 8 7.99m: JT 45° PI, Sm, Co 5 8.09m: JT 45° PI, Sm, Co 100 97 92 8.37m: JT 45° PI, Ro, Co 8.62m: JT 15° PI, Ro, Co 8.75m; JT 15° Pl. Ro. Co 9 8.93m: JT 45° PI, Ro, Co 9.05m to 9.29m: JT 70° PI, Ro, Co HQ3 100 6.5 Database File: CC2 MOTIONS MASTER 02(JH).GPJ Library file: 9.75m: JT 60° PI, Ro, Co Water Level Readings:
Date Time | Hole Depth | Water Level
13/05/24 945 | 2.50m | 2.50 m bgl
13/05/24 17:00 | 15.00m | 5.03 m bgl
14/05/24 19:30 | 15.00m | 5.13 m bgl
14/05/24 19:30 | 15.00m | 4.75 m bgl
15/05/24 16:00 | 27.00m | 4.75 m bgl
16/05/24 11:00 | 30.00m | 4.90 m bgl REMARKS 1) Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm.



Hand Shear Vane Serial No: DR4938 Correction Factor: 1.452

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements Location: Western Springs Park - Southernmost Section Project Reference: 521290-064

**BH30** 

Sheet 3 of 6

BOREHOLE INFORMATION CO-ORDINATES: NZTM2000 Date started: 13/05/2024 Logged by: **BGW** Rotary Core Wireline Massenza MM3 McMillan Drilling Ltd 1754155.64m 5918511.70m 13.16m (NZVD2016) Easting: Date completed: 16/05/2024 Input by: BGW Method: -90° N/A Checked by: Equipment: Northing Inclination: Reviewed by: SS Contractor: Ground level: Azimuth: Weathering/USC Graphic Log Code Fracture Log Installation Length (m) Stratigraphy (E) Testing TCR (%) 8 8 Method Defect Description SCR ( RQD ( Material Description R.L. Layer Additional Notes 4.7m: Unweathered, grey BASALT. Strong. Slightly 3 HQ3 10.20m: JT 45° PI, Ro, Co 100 10.75m: JT 40° PI, Ro, Co 10.97m: JT 40° PI, Ro, Co 2 HQ3 100 80 80 11.40m to 11.60m; JT 70° Pl. Ro. Co 12 12.00m: JT 80° PI, Ro, CI 12.41m: JT 40° PI, Ro, Co UW 12.61m; JT 60° Pl. Ro. Co 12.70m: JT 10° PI, Ro, Co H B 3 100 83 83 13.02m: JT 35° PI, Ro, Co 0 13.40m: JT 45° PI, Ro, Co 100 85 85 14.40m: JT 50° PI, Ro, Co Database File: CC2 MOTIONS MASTER 02(JH) GPJ Library file: 14.80m to 14.96m: JT 90° PI, Sm, Co Water Level Readings:
Date Time | Hole Depth | Water Level
13/05/24 945 | 2.50m | 2.50 m bg|
13/05/24 17:00 | 15.00m | 5.03 m bg|
14/05/24 19:30 | 15.00m | 5.13 m bg|
14/05/24 19:30 | 15.00m | 4.75 m bg|
15/05/24 16:00 | 27.00m | 4.75 m bg|
16/05/24 11:00 | 30.00m | 4.90 m bg| REMARKS 1) Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm.



Hand Shear Vane Serial No: DR4938 Correction Factor: 1.452

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements Location: Western Springs Park - Southernmost Section 521290-064 Project Reference:

**BH30** 

Sheet 4 of 6

CO-ORDINATES: NZTM2000 BOREHOLE INFORMATION Date started: 13/05/2024 Logged by: **BGW** Rotary Core Wireline Easting: 1754155.64m 16/05/2024 Method: Date completed: Input by: **BGW** Massenza MM3 McMillan Drilling Ltd 5918511.70m 13.16m (NZVD2016) Equipment: Northing Inclination: -90° Checked by: N/A Reviewed by: SS Contractor: Ground level: Azimuth: Weathering/USC Graphic Log Code Fracture Log Installation Length (m) Stratigraphy  $\Xi$ Testing TCR (%) 8 % Method Defect Description SCR ( RQD ( Material Description R.L. Layer Additional Notes 4.7m: Unweathered, grey BASALT. Strong. Slightly -2 15.12m: JT 40° PI, Ro, Co 15.20m: JT 40° PI, Ro, Co 15.26m: JT 35° PI, Ro, Co 15.33m: JT 40° PI, Ro, Co 15.60m to 15.80m: JT 60° PI, Ro, Co HQ3 100 15.86m; JT 25° Pl. Ro. Co UW 16 -3 16.10m: JT 80° Pl. Ro. Co 16.5m: Changed to PQ3 due to install considerations. **16.9m**: Silty CLAY, minor completely weathered fine organics and trace fine sand; greyish brown. Stiff, moist, high plasticity. [UNDIFFERENTIATED ALLUVIUM] 16.9m: TAURANGA GROUP ALLUVIUM Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 19/02/2025 17 PQ3 X 100 СН 17.2m: Sandy SILT, some clay, trace decomposed organic rootlets (BCM); brownish grey. Stiff, moist, high plasticity. Sand is fine. Organics up to 10mm length. [EAST COAST BAYS 11111 ·×  $\Pi\Pi\Pi$ MI-SF × 11111 FORMATION] 17.5m: Silty SAND minor clay, trace decomposed fibrous 17.5m: IBHSV=102/20kPa 17.5m: EAST COAST BAY FORMATION ERs U54 organics; greenish grey streaked brown. Very stiff, moist, low plasticity. Sand is fine. Organics are low plasticity. CW 100 17.5m: 300mm expanded core. [COMPLETELY WEATHERED ECBF]

17.51m to 17.6m:...Sandy SILT with some clay, brownish  $\perp$ grey mottled orange. Very stiff, slightly moist, high plasticity. MW 80 Sand is fine. 17.6m to 17.7m:...Moderately weathered, greenish grey, fine 18 18m: SPTC to medium SANDSTONE; very weak. Moderately cemented 7,18// 12,11,27 N = 50+ 17.7m: Moderately weathered greenish grey fine to medium SANDSTONE. Very weak, moderately cemented.
17.8m:...Horizontal bedding SILTSTONE 50mm. -5 SPTC N/A N/A N/A 11111 18m: No Recovery. **18.38m:** Moderately weathered greenish grey fine to medium SANDSTONE. Very weak, moderately cemented. **18.39m:**...SILTSTONE 50mm. 18.74m: Poorly cemented, drilling induced. PQ3 MW 100 100 100 19 -6 19.5m: SPTC 15,35// Database File: CC2 MOTIONS MASTER 02(JH).GPJ Library file: 19.5m: No Recovery. N/A N/A for 55mm N = 50+ 19.63m: Moderately weathered greenish grey fine to medium SANDSTONE. Very weak, moderately cemented. PQ3 EWs MW 94 94 94 Water Level Readings:
Date Time | Hole Depth | Water Level
13/05/24 0945 | 2.50m | 2.50 m bgl
13/05/24 17:00 | 15.00m | 5.03 m bgl
14/05/24 19:30 | 15.00m | 5.13 m bgl
15/05/24 16:00 | 27.00m | 4.75 m bgl
16/05/24 07:30 | 27.00m | 5.05 m bgl
16/05/24 11:00 | 30.00m | 4.90 m bgl REMARKS 1) Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm.



Hand Shear Vane Serial No: DR4938 Correction Factor: 1.452

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements Location: Western Springs Park - Southernmost Section

521290-064 Project Reference:

**BH30** 

Sheet 5 of 6

CO-ORDINATES: NZTM2000 BOREHOLE INFORMATION Date started: 13/05/2024 Logged by: **BGW** Rotary Core Wireline Easting: 1754155.64m 16/05/2024 Method: Date completed: Input by: **BGW** Massenza MM3 McMillan Drilling Ltd 5918511.70m 13.16m (NZVD2016) Equipment: Northing Inclination: -90° Checked by: N/A Reviewed by: SS Contractor: Ground level: Azimuth: Weathering/USC Graphic Log Code Fracture Log Installation Length (m) Stratigraphy (E) Testing TCR (%) 8 8 Method Defect Description SCR ( RQD ( Material Description R.L. Layer Additional Notes MW -7 20.1m: Slightly weathered, grey, fine SANDSTONE. Weak +, highly cemented. Trace fine gravels. EUs3 SW 20.27m to 20.40m: JT 45° PI, Ro, Co **20.5m:** Slightly weathered, grey, fine to medium SANDSTONE. Very weak, moderately cemented. PQ3 20.7m:...poorly cemented. SW 94 94 21 21m: SPTC 10,25// 50 for 65mm N = 50+ 21m: No Recovery. -8 SPTC **21.22m:** Slightly weathered, grey, fine to medium SANDSTONE. Very weak, moderately cemented N/A N/A N/A 21.58m to 21.73m: JT 65° PI, Ro, Co 21.73m:...Poorly cemented, 50mm (base of defect). EUs2 PQ3 SW 100 100 100 22 File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: -9 22.5m: SPTC 22.5m: East Coast Bays Formation 22.5m: No Recovery. 10.40// N/A N/A N/A SP for 40mm N = 50+ 22.65m: Unweathered, grey, fine to medium SANDSTONE Very weak, moderately cemented. 22.80m to 22.92m: JT 45° Un, Ro, Co 23 -10 PQ3 97 89 89 23.32m:...Fine SANDSTONE. Weak +, well cemented. UW 24 23.94m:...SILTSTONE 110mm. 24.00m to 25.50m; DI 24.4m:...Fine SANDSTONE. Weak +, highly cemented. PQ3 100 97 70mm 97 Database File: CC2 MOTIONS MASTER 02(JH).GPJ Library file: 24.50m to 24.60m: JT 45° PI, Ro, Co  $\Box$ Water Level Readings:
Date Time | Hole Depth | Water Level
13/05/24 945 | 2.50m | 2.50 m bgl
13/05/24 17:00 | 15.00m | 5.03 m bgl
14/05/24 19:30 | 15.00m | 5.13 m bgl
14/05/24 19:30 | 15.00m | 4.75 m bgl
15/05/24 16:00 | 27.00m | 4.75 m bgl
16/05/24 11:00 | 30.00m | 4.90 m bgl REMARKS 1) Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with a horizontal accuracy of 2cm and vertical accuracy of 3cm.



Hand Shear Vane Serial No: DR4938 Correction Factor: 1.452

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Western Springs Park - Southernmost Section
Project Reference: 521290-064

**BH30** 

Sheet 6 of 6

	Metl Equ	REH hod: ipme trac	ent:	Mas	ary C	TION Core Wireline za MM3 n Drilling Ltd	CO-ORDINATES Easting: Northing: Ground level:	<b>S: NZTM2000</b> 1754155.64m 5918511.70m 13.16m (NZVD2016)	)	Date starte Date comp Inclination: Azimuth:	oleted	l: 1 -		/2024 //2024		Logged by: Input by: Checked by: Reviewed by			
	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code		laterial Descript		Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture		Stratigr Defect De Additiona	scription	Installation	
Box 9	PQ3	- -12 - -	_	× ×		22.65m: Unweathere Very weak, moderate 25.35m: Unweathere	ely cemented.		UW		100	97	97						-
		- - -	_	× × × × × × × × × × × × × × × × × × ×	EUs2	20.00m. Onwooding	a, gray oil randi	z. vory mount	UW										
	PQ3	- - - -13	26		EL	25.82m: Unweathere Very weak, moderate		lium SANDSTONE.	UW		100	76	76						-
	PC	- - -	_			<b>26.35m:</b> Fine SANE 100mm.					100	70	76						-
Box 10			_ _ _ _ _27	× × × × × × ×		26.58m: Unweathere fine to medium SANI cemented. Bedding, horizontal sandstone 26.85m to 26.95m:	OSTONE. Very wea thin to moderately t	ik to weak, moderately											100000
		- -14 - -	_	× × × × × × × × × × × × × × ×	EUi2	27.15m to 27.25m:	poorly cemented.		UW							m to 28.50m: DI			100 Oct 100 Oc
	PQ3	-  -	_	× × × × × ×	В						99	89	89			m to 27.58m: JT 4	0° PI, Ro, Co		THE PROPERTY OF THE PROPERTY O
		- -15 -		× × × × × × · · · · · · · · · · · · · ·		28m to 28.06m:poo		um SANDSTONE.											ON DO THE PROPERTY OF THE PROP
		- - -	_		EUs3	Weak +, highly ceme  28.59m:BCM, 21m  28.67m:BCM, 10m	nted. m thick.		UW						28.50	m to 30.00m: DI			DATATEMBIATE COT
Box 11	-	_ _ _	29		EUi3	28.91m: Unweathere fine SANDSTONE. V	d, grey, Interbedde	d SILTSTONE and	UW										(1) G B Tompleto
	PQ3	-16 - -	- -			29.08m: Unweathere Very weak, moderate		lium SANDSTONE.			97	95	95						
		- - - -			EUs2				UW										01 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -
		MARK o-ord		s captur	ed usi	End of borehole at 30 ng a Leica Zeno FLX100	Om (Termination De plus smart antenna, w	epth Achieved) rith a horizontal accuracy of	2cm an	d vertical accuracy	of 3cn	n.			Date T 13/05/2 13/05/2 14/05/2 15/05/2	Level Readings: ime   Hole Depth   W 24 09:45   2.50m   2.5 24 17:00   15.00m   5. 24 19:30   15.00m   5. 24 16:00   27.00m   4. 24 07:30   27.00m   5. 24 11:00   30.00m   5.	.13 m bgl .75 m bal		GET-OWN ONOITOW COO. SIE



Hand Shear Vane Serial No: 3732 Correction Factor: 1.649

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Western Springs - Bullock Road
Project Reference: 521290-064

**BH31** 

Sheet 1 of 5

/leth	nod: pme	ent:	Rot Ma:	ary C	Core Wireline za MM3	Easting: 1754228.07 Northing: 5918574.64	7m 4m ZVD2016)		Date comp	letec	l: 1 -	I/10/2 90°		Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
Mernod	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	Material Description		Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)			Installation
VACEA	13			Fc	moist. Ğravel is sligh  0.35m: SILT with min moist, high plasticity.	ntly weathered sub-angular basalt.	. [FILL] G	ML	0.5m: ISHSV=145/33kPa 1m: ISHSV=211/13kPa	0				0.35m to 1.5m: Fill was compact produ high shear vane results.  0.5m: ES BH31_0.5 Jar and Tub	
-	- - - - - - - 11			٧t	orange and pinky ora Relict ash layers.  2m: Slightly weathere	ange. Very stiff, moist, high plastic		СН	1.5m: ISHSV=139/16kPa 2m: ISHSV=UTP					1.5m: AUCKLAND VOLCANIC GROUP	
200	- - - - - 10				2.8m to 3m:Iron ox inclined 80°.	kide staining in flow banding vesicl	les,			100	60	43		banding vesicles.  2.41m to 2.59m: JT 80° PI, Ro, Vn  2.60m: JT 50° PI, Ro, St Blue green ar brown staining  2.71m: JT 20° PI, Ro, St	w o d red
TIQ3	- - - - - - 9			VUb		=		SW		100	88	85		3.12m: JT 15° PI, Ro, Vn 3.15m: JT 20° PI, Ro, Vn 3.34m: JT 40° PI, Sm, Cl 3.36m: JT 10° PI, Ro, Vn 3.45m: JT 45° PI, Sm, Cl 3.55m: JT 10° PI, Ro, Co 3.68m: JT 5° PI, Sm, Vn 4.01m: JT 5° PI, Sm, Vn	
TICS	   									100	92	86		4.25m: JT 40° PI, Sm, Co  4.40m: JT 15° PI, Ro, CI  4.53m: JT 5° PI, Ro, CI  4.56m: JT 40° PI, Ro, Vn  4.70m: JT 30° PI, Ro, CI  4.81m: JT 40° St, Ro, CI  4.82m: JT 40° PI, Ro, CI	
	Methodonion (Methodonion)	Method: quipmed pointract (E) 13 13 13 14 15 15 15 15 15 15 15 15 15 15 15 15 15	Method: quipment: contractor:  (w) T3  13	Method: Mac	Method: Massen: McMillar Massen: McMillar Massen: McMillar Massen: McMillar	Assenza MM3 McMillan Drilling NI Ltd    Contractor: Massenza MM3 McMillan Drilling NI Ltd   Contractor: McMillan Drilling NI Ltd   Cont	Rethod:   Massenza M/3   Modified   Modifi	Rethod:   Massenza MMS   McMillan Drilling NI Ltd   Strong   Str	Rethod guipment   Rotary Core Wireline   Massenza MM3   McMillan Drilling NI Ltd   Rotary Core Wireline   Site State (13.08m (NZVD2016))	Relation   Relation	Relation of the complete complete complete contractor:  Rolary Core Wireline (authorities):  Rolary Core Wireline (authori	Rethod upment: Ontractor: Rotary Core Wireline (upment): Ontractor: Rotary Core Wireline (upment): Material Description  Material De	Retardor: McMillan Drilling NI Ltd Resulting: 591874-6494 (M2VD2016)  Material Description  Material Descripti	Rotary Core Wireline (uppment: McMillian Drilling NI Ltd.	Relative Crew Wireling generated.  Rectange Crew Wireling generated.  Rectange Signify (New York)  Morthing State (1997)  Morth (New York)  Morth (New York)



Hand Shear Vane Serial No: 3732 Correction Factor: 1.649

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Western Springs - Bullock Road
Project Reference: 521290-064

**BH31** 

Sheet 2 of 5

Database File: CC2MOTIONS MASTER 02(4H):GPJ Library file: LIBRARY\_20240925\_V13 (1):GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 19/02/2025

BOREHOLE Method: Equipment:	Rotary	<u> </u>	CO-ORDINATES: NZTM2000 Easting: 1754228.07m Northing: 5918574.64m		Date started Date comple Inclination:		: 1	0/09/ /10/2 90°	2024	Sheet 2 of 5  Logged by: AP Input by: AP Checked by: PK	
Method R.L. (m) Length (m)		an Drilling NI Ltd	Ground level: 13.08m (NZVD2016	Weathering/USC	Azimuth:	TCR (%)	SCR (%)	RQD (%) ≥	Fracture Log	Reviewed by: SS  Stratigraphy Defect Description Additional Notes	Installation
8		vesicular; strong. Ve 5.06m:Flow bandii 5.13m:Flow bandii 5.23m:Flow bandii	red, dark grey, BASALT, slightly scicles are 1mm to 3mm. ng vesicles, <5mm, inclined at 5°.	sw		100	92	86	MWS	5.73m: JT 10° PI, Sm, CI	
EOH 7 6		<b>6m</b> : Unweathered, strong.	dark grey, BASALT slightly vesicular;			100	93	777			
				UW		100	60	53		7.90m: JT 20° PI, Sm, Vn 8.00m: JT 20° PI, Sm, Vn 8.04m: JT 25° PI, Sm, Vn 8.07m: JT 20° PI, Sm, Vn 8.08m to 8.35m: JT 80° Un, Ro, Co Clay infill; light greyish green. 8.35m to 8.38m: JT 15° PI, Sm, Vn 8.45m: JT 15° PI, Sm, Vn 8.45m: JT 40° PI, Sm, Vn 8.77m: JT 40° PI, Sm, Vn 8.78m to 8.90m: JT 80° PI, Sm, Vn	
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\						100	60	48		9.12m: JT 30° PI, Sm, Vn 9.25m to 9.37m: JT 80° PI, Sm, Vn 9.37m: JT 10° PI, Sm, Vn 9.59m: JT 10° PI, Sm, Vn 9.70m: JT 45° PI, Sm, Vn 9.74m: JT 35° PI, Sm, Co	



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Western Springs - Bullock Road
Project Reference: 521290-064

**BH31** 

	www.a	urecon	group.con	n	Proj	ect Reference:	521290-064								S	heet 3 of 5	
Me Eq	REH thod: uipm ntrac	ent:	Mas	ary (	FION Core Wireline za MM3 n Drilling NI Ltd	CO-ORDINATES: Easting: Northing: Ground level:	NZTM2000 1754228.07m 5918574.64m 13.08m (NZVD2016	)		Date starte Date comp Inclination: Azimuth:	leted	: 1	80/09 1/10/2 90° N/A	/2024 2024	Logged by: Input by: Checked by Reviewed b	AP y: PK	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code		Material Description	n	Weathering/USC		Testing	TCR (%)	SCR (%)	RQD (%)	wws wws Fracture cs cs Log	Defect D Addition	graphy escription al Notes	Installation
HQ3	3	_			<b>6m:</b> Unweathered, strong.	, dark grey, BASALT sl	ightly vesicular;				100	60	48		10.18m: JT 5° PI, Sm, 10.23m: JT 30° PI, Sn 10.40m to 10.50m: JT	n, Vn	
	- - -														10.59m to 10.63m: JT 10.65m: JT 80° PI, Sn 10.70m to 10.79m: JT 10.78m: JT 10° PI, Sn	n, Vn 80° Pl, Sm, Vn n, Vn	
НОЗ	_ _ _ _	_									100	57	57		10.95m: JT 5° PI, Ro, 10.96m to 11.12m: JT 11.14m: JT 40° PI, Sn 11.20m: JT 50° PI, Sn	n, Vn n, Vn	
B0x 4	- - -														11.43m: JT 5° PI, Sm, 11.48m to 11.57m: JT 11.68m to 11.76m: JT 11.75m: JT 5° PI, Sm, 11.79m: JT 10° PI, Sn	50° PI, Sm, Vn Vn n, Vn	000000
	1 -														11.96m: JT 10° St, Sn 11.97m: JT -8° Pl, Sm 12.00m to 12.07m: JT 12.32m: JT 10° Pl, Sn 12.33m: JT 10° Pl, Sn	n, Vn n, St	000000
НОЗ	- - - -			qn/				uw			100	62	51		12.44m to 12.52m: JT sand. 12.55m: JT 20° PI, Sm 12.67m: JT 5° PI, Sm,	n, Co Fine sand. Vn	000000
	0	13													12.91m to 13.09m: JT 13.15m: JT 40° PI, Sm 13.17m: JT 40° PI, Sm 13.23m: JT 5° PI, Sm,	60° PI, Sm, Vn n, Cl n, Cl Vn	000000
	- - - -	_													13.40m to 13.78m: JT	80° PI, SM, VN	200000
HQ3	- <u>-1</u> - - -	14 									100	87	62		14.04m to 14.09m: JT 14.09m: JT 20° PI, Sn 14.10m to 14.23m: JT 14.35m: JT 30° PI, Sn	n, Vn 70° Pl, Ro, Vn	000000
	  -  -  -  -														14.46m: JT 60° PI, Sn 14.47m: JT 30° PI, Sn 14.71m: JT 25° PI, Sn	n, Vn n, Cl	
	MARK Co-ord		s captur	ed us	ing a Leico Zeno FLX10	00 plus smart antenna, with	n a horizontal accuracy 3d	cm and	vertical	accuracy of	3cm.				Water Level Readings: Date Time   Hole Depth 30/09/24 15:30   12.00m 01/10/24 07:30   12.00m	3.30 m bgl	60
Ha	nd Sh	ear Va	ane Seri	al No:	3732 Correction Facto	r: 1.649											



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Western Springs - Bullock Road
Project Reference: 521290-064

**BH31** 

Sheet 4 of 5

BOI Met Equ Con	hod: ipme	ent:	Ma	ary (	TION Core Wireline za MM3	CO-ORDINATES: NZTM Easting: 1754: Northing: 5918:	<b>//2000</b> 228.07m 574.64m 8m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	leted	: 1		/2024 2024		Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Ma	aterial Description		Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws wws Fracture		Stratigraphy Defect Description Additional Notes	Installation
3	-2			γΩρ	<b>6m:</b> Unweathered, da strong.	rk grey, BASALT slightly v	vesicular;	UW							5.04m to 15.21m: JT 80° PI, Ro, Vn	000
HQ3	-	_	× × × × ×	TAz		or clay; black. Stiff, moist, ct. [UNDIFFERENTIATED		МН		100	47	0		ii -	5.21m: TAURANGA GROUP ALLUVIUM	0000
U54			×	TAx	dark blackish grey spe moist. 15.5m to 15.6m:SIL <sup>-</sup> Very stiff to hard, sligh 15.6m to 15.7m: CL/ organics. Very stiff to h	ne to coarse SAND with trackled orange. Medium de  I with trace organics; blac tly moist. AY, dark blackish grey wit hard, slightly moist, highly	ense, slightly kish grey. h trace plastic.		15.95m: SPT	100						
SPT	-3 - -	_	× × × × × × × × × × × × × × × × × × ×		stiff to hard, slightly mo	N, blue grey with trace on pist, highly plastic. ne clay; blue grey with mo t, high plasticity. [RESIDU	ttled orange		1,2// 4,4,4,4 N = 16	100						
ğ	- -	_	× × × × × × × × × × × × × × × × × × ×						16.5m: IBHSV=112/20kPa	100			         	Ш		
SPT		17	× × × × × × × × × × × × × × × × × × ×	ERz	16.6m:Minor fine sar	nd. arbonaceous material, <1	mm.	МН	16.5m: SPT 0,0// 1,2,2,2 N = 7	100				             		
	-4		× × × × × × × × × × × × × × × × × × ×													lo C
НДЗ	- ,	_	× ^ ; × × ; × × ;							69						
	-	- - -	××	ERX	17.55m: SILT with son blue grey. Very stiff, m WEATHERED ECBF] 17.67m: CORE LOSS.	ne sand; orange brown m oist, high plasticity. [COM	ottled with PLETELY	МН							7.55m: East Coast Bays Formation	
	-5 -5	18	× × ×	ERz	<b>18m:</b> SILT; light grey.	Very stiff, moist, high plas	ticity.	MH	18m: SPT 1,2// 2,2,6,6 N = 16				         	Ш		0000
SPT	-			ERs	18.2m: Fine to mediun oxidised green. Stiff, m		ey with	SP	N = 10	100			         			
33	<del>-</del> ,				18.52m: Highly weather SANDSTONE; very we	ered, grey, fine to medium eak. Moderately cemented of black carbonaceous n 10°.	d.			100					3.55m: BP 10° 3.80m: BP 10°	
HQ3	-6 -			EWs				HW		100	93	93				
SPTC	_	_							19.5m: IBHSV=UTP 19.5m: SPTC 14,36 for 145mm//	N/A	N/A	N/A				
HQ3	- - -				19.69m: Moderately we SANDSTONE; very we	eathered, grey, fine to me eak. Moderately cemented	dium d.	MW	N = 50+	100	93	93	Ϊİİ			
	MARK o-ord		s captur	ed us	ing a Leico Zeno FLX100 pl	lus smart antenna, with a hori	zontal accuracy 3cr	m and	vertical accuracy of	3cm.				Da 30	ater Level Readings: ate Time   Hole Depth   Water Level //09/24 15:30   12.00m   3.30 m bgl /10/24 07:30   12.00m   3.65 m bgl	.,
Han	d She	ear Va	ane Seri	al No:	: 3732 Correction Factor: 1.	649										



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Western Springs - Bullock Road Project Reference: 521290-064

**BH31** 

Sheet 5 of 5

	Meth Equi	REHO nod: ipme tract	ent:	Mas	ary C	TION Core Wireline za MM3 n Drilling NI Ltd	CO-ORDINATES: NZTM2000 Easting: 1754228.07m Northing: 5918574.64m Ground level: 13.08m (NZVD201	6)	Date starte Date comp Inclination: Azimuth:	letec	l: 1 -		9/2024 2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture	Stratigraphy Defect Description Additional Notes	Installation
Box 7	HQ3	-7 			EWs	SANDSTONE; very 20.03m to 20.12m:	weathered, grey, fine to medium weak. Moderately cemented. Interbedded SILTSTONE, inclined 10°. Sandy SILTSTONE, inclined 20°.	MW		100	93	93		20.03m: BP 10° 20.12m: BPJT 10° 20.40m: BP 20° 20.43m: BP 20°	

End of borehole at 21m (Termination Depth Achieved)

REMARKS:
1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 3cm and vertical accuracy of 3cm.

Water Level Readings: Date Time | Hole Depth | Water Level 30/09/24 15:30 | 12.00m | 3.30 m bgl 01/10/24 07:30 | 12.00m | 3.65 m bgl

Database File: CC2MOTIONS MASTER 02(4H).GPJ Library file: LIBRARY\_20240925\_V13 (1).GLB Template: DATEMPLATE.GDT Report File: 01MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 19/02/2025



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Ophir Street

521290-064 Project Reference:

**BH35** 

Sheet 1 of 5

Me Equ	REH hod: lipme ntrac	ent:	Ma	ary C	TION Core Wireline za MM3 Rig n Drilling Ltd	CO-ORDINATES Easting: Northing: Ground level:	S: NZTM2000 1756480.25m 5919219.13m 58.92m (NZVD201	16)	Date sta Date cor Inclinatio Azimuth:	npleted n:	l: 2		6/2024 6/2024	Logged by: FG Input by: FG Checked by: BGW Reviewed by: SM	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	٨	flaterial Descript	ion	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws Fracture cs Log	Stratigraphy Defect Description Additional Notes	Installation
	59	_		Р	Om: ASPHALT.  0.045m: Fine to cour Gravel is slightly wea and graywacke. [FILI	thered to unweathe	Tightly packed, dry. rred, grey sandstone	GW						n: FILL	
	60	1		FEg	<b>0.5m:</b> Gravelly fine S dense, moist. Gravel grey sandstone and	is slightly weathere	r; yellow. Medium d to unweathered,	SP							
VACEA	- 				<b>1.5m:</b> Sandy CLAY; y is fine.	yellow. Stiff, moist, I	nigh plasticity. Sand		-						
۸	61	2													
	_ _ _ _	- - - -		Fc				СН							
	62	3												<b>2m</b> : Cased to 6.6m.	
3	_	_			3.4m: Silty CLAY; yell plasity. 3.45m to 3.6m:Gre		e. Soft, moist, high	СН	-	100			3.4	<b>4m to 3.5m:</b> ES BH35_3.4-3.5.	
		  -  -	× × × × × × × × × × × × × × × × × × ×		3.6m: Clayey SILT; g [RESIDUAL SOIL EC	rev. Firm. moist. hid	gh plasticity.		3.6m: IBHSV=24/6kPa				3.0	6m: EAST COAST BAYS FORMATION	
2	63	4	× × × × × × × × × × × × × × × × × × ×	ERZ				МН		100			4n	<b>n to 4.1m</b> : ES BH35_4.0-4.1.	
-			× - × - × - × - × - × - × - × - × - × -	ERc	4.5m: Silty CLAY; gre	ey. Firm, moist, high	plasticity.	СН	4.5m: IBHSV=42/16kPa 4.5m: SPT 0,0// 0,1,1,1 N = 3	100					
1) (		KS: dinate			ing a Leico Zeno FLX100 al sample.	plus smart antenna, w	ith a horizontal accuracy	of 2cm a	and vertical accurac	100	n.	1	Wa	ater Level Readings: ate Time   Hole Depth   Water Level //06/24 08:00   12.45m   1.80 m bgl //06/24 08:00   20.00m   9.48 m bgl	<u> 1/11</u> 2



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: Ophir Street

Project Reference: 521290-064

**BH35** 

Sheet 2 of 5

Me Eq	PRE ethod uipn ntra	d: nen	t:	Mas	ary C	FION Core Wireline za MM3 Rig n Drilling Ltd	CO-ORDINATES: NZTM2000 Easting: 1756480.25m Northing: 5919219.13m Ground level: 58.92m (NZVD2	2016)	Date s Date c Inclina Azimu	ompleted tion:	: 2		/2024 /2024	Sheet 2 of 5  Logged by: FG Input by: FG Checked by: BGW Reviewed by: SM
Method	R.L. (m)		Lengtn (m)	Graphic Log	Layer Code	M	laterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture cs Log	Stratigraphy CO Defect Description Additional Notes
Box 1 HQ3	64 - - - - -	4	× · · · · · · · · · · · · · · · · · · ·	× × × × × × × × × × × × × × × × × × ×	ERc	<b>4.95m:</b> Silty CLAY; gr <b>5.35m to 5.5m:</b> San	ey. Very stiff, moist, high plasticity. dy SILT.	СН		100				<b>5.3m to 5.4m:</b> ES BH35_5.3-5.4. <b>5.5m:</b> Vibrating wire transducer (S/N: 361078).
SPT	- - -	5		× × × × × × × × × × × × × × × × × × ×	ERc ERs	plasticity.	vith tracy clay, grey. Loose, moist, low	SM	6m: SPT 0,1// 1,2,2,2 N = 7	100				
НОЗ		6	7 2		ERz	6.45m: Clayey SILT; [COMPLETELY WEA	,	МН		76				
SPT	-  -  -  -  -		- \( \times \)	× ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	ERX	<ul><li>7.25m: CORE LOSS.</li><li>7.5m: Clayey SILT; gr</li></ul>	rey. Very stiff, moist, high plasticity.		7.5m: SPT 1,2// 4,5,5,6 N = 20	100				7.4m to 7.5m: ES BH35_7.4-7.5.
4.600	67	7 _	3 2	<del>-×</del>	ERz			мн						
HQ3	- - - -	-	:	× - × - × - × - × - × - × - × - × - × -	ERs	8.5m: Silty fine SAND plasticity. 8.51m to 8.54m:Gre	with tracy clay; grey. Stiff, moist, low	SM		90				8.60m to 8.70m: JT 45° Un, Ro, Cl
SPT	68	8 -	) ×	× × × × × × × × × × × × × × × × × × ×	z ERx	8.9m: CORE LOSS. 9m: Clayey SILT; gre	y. Very stiff, moist, high plasticity.		9m: SPT 1,2// 4,5,7,7 N = 23	100				
НОЗ	- - -		- × × × × × × × × × × × × × × × × × × ×	* * * * * * * * * * * * * * * * * * *	RX ERZ	9.45m to 9.5m:San	dy SILT.	МН		43				
1)		RKS:	ates				olus smart antenna, with a horizontal accur	acy of 2cm a	nd vertical accu	racy of 3cm	1.			Water Level Readings: Date Time   Hole Depth   Water Level 25/06/24 08:00   12.45m   1.80 m bgl 26/06/24 08:00   20.00m   9.48 m bgl



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Ophir Street

Project Reference: 521290-064

**BH35** 

Sheet 3 of 5

				Froject Reference. 521290-004							Sheet 3 of 5
BOREHOME Method: Equipme Contract	ent:	Rot Ma:	ary C	CO-ORDINATES: NZTM2000 Core Wireline Easting: 1756480.25m Northing: 5919219.13m Ordiling Ltd Ground level: 58.92m (NZVD2016)		Date starte Date comp Inclination Azimuth:	oletec	d: 2		/2024 /2024	Logged by: FG Input by: FG Checked by: BGW Reviewed by: SM
Method R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	www. www. Fracture	Stratigraphy Defect Description Additional Notes
69	_	/		9.9m: CORE LOSS.							
H — H	_ _ _		ERx				43				
	<u> </u>	× × × × × × × × × × ×		<b>10.5m</b> : Highly weathered, grey SILTSTONE; Extremely weak (Sandy SILT, some clay; grey. Very stiff, moist, high plasticity. Sand is fine).		10.5m: SPT 1,3// 5,6,6,8 N = 25	100				
70		× × × × × × × × × × × × × × × × × × ×	EWz	<b>11.07m to 11.08m:</b> Fine SAND.	HW						
, F. I	_	× ×		11.33m to 11.38m:Fine SAND. 11.4m: CORE LOSS.							
-		$\setminus$ /		11.4II. CORE 2000.			43				
- - -	_ _ _ 		ERx				l				
71		X X X X X X X X X X X X X X X X X X X	EWz	12m: Highly weathered, grey SILTSTONE; Extremely weak (Sandy SILT, some clay; grey. Very stiff, moist, high plasticity. Sand is fine).	HW	12m: SPT 1,3// 5,6,8,8 N = 27	100				
_	_	× × × × × ×		<b>12.45m:</b> Slightly weathered, grey, indistinctly bedded SILTSTONE; Very weak.							12.45m: Zone of laminated, bedding moderately inclined at 25°.
	_	× × × × × × × × × × × × × × × × × × ×			sw						12.60m: BP 5°
-	13						100	07	00		12.80m: BP 15°
72		× × × × × × × × × × × × × × × × × × ×	EUz2	<b>12.95m:</b> Slightly weathered, grey SILTSTONE; Very weak. Interbedded with some (20%) thin to moderately thin (40-120mm) fine Sandstone.			100	97	93		12.94m: BP 5° 12.97m: BP 5° 13.05m: BP 15°
+	_	× × × ×			sw	13.5m: SPT 3,7//					
_	_	××				11,17,14,8 for 45mm N = 50+	100	100	100		
-	14	× × × × × ×									
73	- "	× × × × × ×									14.00m: BP 2° 14.04m: BP 2° 14.07m: BP 2°
-	_			14.14m: Slightly weathered, grey SILTSTONE; Very weak.							
	_						100	93	93		14.44m: BP 15°
_			EUs2		sw						
-	_ _ _ _ 			14.85m to 14.9m:Greenish grey; Extremely weak, poorly cemented.							14.75m: BP 15°
EMARK Co-ord	S: linate	s captur	ed usi	ng a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of	2cm a	I and vertical accuracy	of 3cr	n.			Water Level Readings: Date Time   Hole Depth   Water Level
ES refe	ers to	environ	menta	l sample.		•					25/06/24 08:00   12.45m   1.80 m bgl 26/06/24 08:00   20.00m   9.48 m bgl



Hand Shear Vane Serial No: 2006 Correction Factor: 1.622

Client: Watercare Services Ltd

**Project: WIWQIP Motions Catchment Improvements** 

Location: Ophir Street

Project Reference: 521290-064

**BH35** 

Sheet 4 of 5

Database File: CC2MOTIONS MASTER 02(JL.) GP LIbrary file: LIBRARY \_20240925\_V13 (1), GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18/02/2025

Second   Part    BOREI Method Equipn Contra	d: nent	: R	Rotar ⁄lass	y Co enz	CO-ORDINATES: NZTM2000		Date starte Date comp Inclination: Azimuth:	letec	l: 2 9		5/2024 5/2024	Sheet 4 of 5  Logged by: FG Input by: FG Checked by: BGW Reviewed by: SM		
1.5   1.5	Method R.L. (m)	l ength (m)	Graphic Log		Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)			Defect Description	:
15   15   15   15   15   15   15   15	O 74	1	$\times$		ž	15m: NO RECOVERY.		4,19// 50 for 55mm	N/A	N/A		14.9	95m: BP 10°	
18.5m; Slightly weathered, grey SiLTSTONE; Very weak.   18.5m; Islightly weathered, grey, fine to medium   19.5m; Silghtly weathered, grey, fine to medium   19.5m; Sil	HQ3	_	6			Interbedded with some (15%) very thin to thin (6-60mm)	sw	N = 50+	100	86	86	15.3 15.3 11   1   15.4	30m to 15.32m: JT 10° Un, Ro, Cl 42m: BP 5° Un, Ro, Cl	
16.75m to 16.8m:50mm black carbonaceous material.  16.75m to 16.8m:50mm black carbonaceous material.  17.05m:.89 15" 17.10m:.89 5" 17.17m:.89 10" 17.05m:.89 15" 17.17m:.89 10" 17.30m to 17.35m:.JT 10" Un. Ro, Cl 17.35m to 17.35m:.JT 10" Un. Ro, Cl 17.35m to 17.35m:.JT 10" Un. Ro, Cl 17.35m to 18.15m:Fine SANDSTONE.  18.15m to 18.15m:Fine SANDSTONE.  18.35m to 18.55m:Extremely weak, poorly cemented.  18.15m to 18.55m:Extremely weak, poorly cemented.  18.75m to 18.75m:Extremely weak, poorly cemented.  18.75m t		- - - -	××		<u> </u>	<b>16.63m:</b> Slightly weathered, grey SILTSTONE; Very weak. Interbedded with some (17%) fine sandstone, 20-130mm	sw	13,37 for 130mm//	N/A	N/A	N/A	16.6	69m: BP 10°	
18.16m to 18.18m: JT 30° Un, Ro, Cl   18.35m to 18.65m:Fine SANDSTONE.   18.45m to 18.55m:Extremely weak, poorly cemented.   18.53m to 18.56m: JT 30° Un, Ro, Cl   18.77m: BP 5°   19.25m: Slightly weathered, grey, fine to medium   SANDSTONE; Very weak, moderately cemented.   19.25m: Slightly weathered, grey, fine to medium   SANDSTONE; Very weak, moderately cemented.   19.25m: Slightly weathered, grey, fine to medium   SANDSTONE; Very weak, moderately cemented.   19.46m: BP 5°   19.			7 × > > × > > × > > × > > × > > × > > × > × > × > × > × > × > × > × > × > × > × > × > × × > × × > × × > × × > × × > × × > ×	××××××××××××××××××××××××××××××××××××××	- UZ2	16.75m to 16.8m:50mm black carbonaceous material.	sw		100	86	82	16.3 17.3 17.3 17.3 17.3 17.3 17.3 17.3 17.3	83m: BP 10°  05m: BP 15°  10m: BP 5°  17m: BP 10°  30m to 17.35m: JT 10° Un, Ro, Cl	
19.25m: Slightly weathered, grey, fine to medium SANDSTONE; Very weak, moderately cemented.    Y   Y   Y   Y   Y   Y   Y   Y   Y		7 1!	9 × > >			<b>18.35m to 18.65m:</b> Fine SANDSTONE.	SW		100	97	92	18. 18. 18. 18. 18.	16m to 18.18m: JT 30° Un, Ro, Cl 53m to 18.56m: JT 30° Un, Ro, Cl 70m to 18.73m: JT 30° Un, Ro, Cl 77m: BP 5°	
x x moderately thin and 20-100mm thick	-		× >		EUSZ	SANDSTONE; Very weak, moderately cemented.  19.5m: Slightly weathered, grey SILTSTONE; Very weak	sw						31m: BP 5°	
-		-	X	× × × × × × × × × × × × × × × × × × ×		Interbedded with some (15%) fine sandstone, thin to	sw		100	97	91	19.6           	69m: BP 15°	



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: Ophir Street

Project Reference: 521290-064 **BH35** 

Sheet 5 of 5

M E	leth qui	REHO nod: pme tract	ent:	Ma	tary C ssen:	FION Core Wireline za MM3 Rig n Drilling Ltd	CO-ORDINATES Easting: Northing: Ground level:	: <b>NZTM2000</b> 1756480.25m 5919219.13m 58.92m (NZVD2016)	1	Date starte Date comp Inclination: Azimuth:	oleted	: 2 9		6/2024 6/2024		Logged by: FG Input by: FG Checked by: BGW Reviewed by: SM	
Method	Mellion	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	Material Description	on	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture		Stratigraphy Defect Description Additional Notes	Installation
Box 5		79	_	× × × × × × × ×		19.5m: Slightly weath Interbedded with som moderately thin and 2	nered, grey SILTSTC ne (15%) fine sandst 20-100mm thick.	DNE; Very weak. cone, thin to							19.96 <b>20m</b> : 36610 20.05	im: BP 5° Vibrating wire transducer (S/N: 600. Im: BP 5° Im: BP 2°	
EQ.	3 -	- - -	_	× × × × × × × ×					SW		100	97	91		!	im: BP 10° im: BP 5°	
	-	- - - - 80		× × × × × × × × × × × × × × × × × × ×		20.88m to 21.05m:	Zone of black carbol	naceous material.									
		-	_	× × × × × × × ×		<b>21.05m:</b> Slightly weat <b>21.12m:</b> 50mm of b										3m: BP 10° Im: BP 10°	
~	, -	 		× × × × × × × × × × × × × × × × × × ×	EUz2												
Box 6	L	- - - 81	22	× × × × × × × × × × × × × × × × × × ×							100	93	93				
		- -	_	× × × × × × × × × ×					SW								
		- - - - 82		× × × × × × × × × × × × × × × × × × ×		<b>22.61m:</b> 40mm of bla <b>22.7m:</b> 10mm of bla									22.67 22.74 22.8n core.	im: BP 5° 'm: BP 15° im: BP 15° n to 23m: Drilling induced discing of	
			_ _ 	× × × × × × × × × × × × × × × × × × ×	EUi2	23.23m: Interbedded SILTSTONE; Very w weathered, moderate SILTSTONE is slightl 100-120mm thick. 23.4m to 23.43m:E	eak. Fine SANDSTO ely thin and in beds 7 y weathered, moder	DNE is slightly 70-130mm thick. cately thin and in beds	sw		87	80	78		23.40	5m: BP 10°	
		-	24	××	EUx	23.8m: CORE LOSS			sw								
Box 7	-	83		× × × × × × × × × × × × × × × × × × ×	EUz2	24.3m to 24.35m:F poorly cemented. 24.35m to 25m:Fin cemented. 24.54m to 24.6m:E	ine SANDSTONE; E e SANDSTONE; Ve	Extremely weak, ry weak, moderately	SW		100	100	100				
1	) Co		linate	× × × × × ×		End of borehole at 25 ng a Leico Zeno FLX100 al sample.		oth Achieved) h a horizontal accuracy of	2cm a	nd vertical accuracy	of 3cm	).			Water Date 1	Level Readings: Filme   Hole Depth   Water Level 24 08:00   12.45m   1.80 m bgl 24 08:00   20.00m   9.48 m bgl	
						2006 Correction Factor:	1.622								26/06/	24 08:00   20.00m   9.48 m bğl	



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Ophir Street Edinburgh Street
Project Reference: 521290-064

**BH36** 

Sheet 1 of 5

Met Equ	REH hod: lipme ntract	ent:	Mas	ary C	CO-ORDINATES: NZTM2000           Core Wireline         Easting: 1756480.85m           za MM3         Northing: 5919223.39m           n Drilling NI Ltd         Ground level: 59.46m (NZVD20°	6)	Date starte Date comp Inclination Azimuth:	oleted	l: ′		/2024 /2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ww. Fracture	Stratigraphy Defect Description Additional Notes	Installation
	_ _ _ _ _ 59	- - - -		Fg P	Om: ASPHALT.  O.1m: Coarse GRAVEL; grey. Tightly packed, moist. Slightly weathered, sub-angular basalt. [FILL]						On	n: FILL n: Vacuum excavation observed and gged by onsite geologist.	X
		1			O.6m:Geotextile mat.  O.65m: Silty CLAY; light grey brown with orange mottling. Stiff, moist, high platicity.  O.9m:Very stiff		0.7m: ISHSV=89/41kPa 0.9m: ISHSV=104/62kPa						
	_ 	_ _ _ _		Fc	<b>1.5m:</b> Light grey with orange mottling. Stiff.	СН	1.5m: ISHSV=77/35kPa	0					
		_ _ _ _ _					2m: ISHSV=74/30kPa						
25					3m: PUSH TUBE.		2.5m: ISHSV=74/38kPa	100					
		_ _ _ _	× ,	X	Sandy CLAY; light brown with dark orange iron staining. Soft to firm, moderate to highly plasticity, moist.  3.11m to 3.29m:CLAY; light grey. Stiff to very stiff, slightly moist, high plasticity.  3.29m to 3.4m:Sandy SILT; light grey. Firm, moderate plasticity, moist. Sand is fine.  3.4m to 3.5m:CLAY with some sand; light grey. Firm, moist, high plasticity. Sand is fine.	0	IBHSV=59/24kPa 3.5m: SPT 0,0//	100				5m: EAST COAST BAYS FORMATION	
		4	× × × × × × × × × × × × × × × × × × ×	ERz	3.5m: SILT with some sand; grey. Stiff, moist, high plasticity. Sand is fine. [RESIDUAL SOIL ECBF] 3.75m to 3.95m:Very stiff.	МН	1.1.1.2 N = 5	100			3.9	<b>95m:</b> ES BH36_3.95	
	 	_ _ _ _ _	× × × × × × × × × × × × × × × × × × ×	ERx	4.45m to 4.5m:Sandy SILT. 4.5m: PUSH TUBE. CLAY; grey. Very stiff to hard, slightly moist, high plasticity. 4.53m:Very thin bands of fine sandy clay.		4.5m: IBHSV=95/21kPa	100			                                     	<b>5m:</b> Casing at 4.5 mbgl.	
C	Seoph	dinate nysica	ıl profiling	g unde	ing a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy ertaken downhole on 16/09/24, comprising of optical and acoustic televie al Sample.	2cm an wer dow	d vertical accuracy of	3cm. ole.				ater Level Readings: tet Time  Hole Depth   Water Level 109/24 15:55   7.50m   1.20 m bgl 109/24 07:30   7.50m   2.90 m bgl 109/24 13:48   25.00m   12.80 m bgl 109/24 09:00   25.00m   14.27 m bgl	



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Ophir Street Edinburgh Street

**BH36** 

Me Equ	thod	l: nent:	Ma	tary C ssen:		CO-ORDINATES: NZTM2000 Easting: 1756480.85m Northing: 5919223.39m Ground level: 59.46m (NZVD201			Date start Date com Inclination Azimuth:	pleted	: 1		7/2024 7/2024	Sheet 2 of 5  Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	laterial Description	Weathering/USC		Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture	Stratigraphy Defect Description Additional Notes	Installation
SPT	_ _ _ _ _ 54	-	× × × × × × × × × × × × × × × × × × ×	,	5m: SILT with some (COMPLETELY WEA	sand. Stiff, moist, high plasticity. ATHERED ECBF]		5m: Si 0,1// 1,2,2,2 N = 7	PT 2	100				Fr., 50 PH20 5 45	
НОЗ	- - - -	6	×	ERZ	<b>5.75m to 5.98m</b> :Ve	ry stiff.	МН			91				<b>5m</b> : ES BH36_5.45 <b>5m</b> : 5mm core loss.	
SPT	_ _ _ _ _ 53	-	× × × × × × × × × × × × × × × × × × ×			nented relict bedding.  aceous material amorphous layer.  b; grey. Firm, moist, moderate plasticity.		6m: SI 1,2// 1,2,3,4 N = 10	1	100				: Core moved in barrel during shear	
	- - -			ERs			SM								
HQ3		7	× × × × × × × × × × × × × × × × × × ×			d, grey, sandy SILTSTONE; extremely ed. Sand is fine. (Sandy SILT).				95					
SPT	- - -	- 8	× × × × × × × × × × × × × × × × × × ×			ty fine to medium SANDSTONE; y fine to medium SAND).		7.5m: 2,4// 4,7,6,7 N = 24	7	100	1	1		<b>5</b> m: ES BH36 7.95	- 11'∟
HQ3	51	- - - - - -	× × × × × × × × × × × × × × × × × × ×	EWz	weak. (Fine to mediu	ne to medium SANDSTONE; extremely m SAND). ry weak. Poorly cemented.	HW			100	11	11	7.9	<b>GII.</b> E3 B130_7.30	
SPT	_ _ _ _ _ _ 50	9	× × × × × × × × × × × × × × × × × × ×					9m: SI 2,3// 4,4,6,7 N = 21	7	100					
HQ3	  -  -  -  -		× × × × × × × × × × × × × × × × × × ×							100	0	0			
1) ( 2) (	Geop	dinate hysica	s captur I profilin	g unde	ing a Leico Zeno FLX100 ertaken downhole on 16/0 al Sample.	plus smart antenna, with a horizontal accuracy 9/24, comprising of optical and acoustic televier	2cm and ver dow	d vertica n the le	al accuracy of	f 3cm. ole.			12/ 13/ 13/ 16/	ter Level Readings:  6 Time   Hole Depth   Water Level  99/24 15:55   7.50m   1.20 m bgl  99/24 07:30   7.50m   2.90 m bgl  99/24 13:48   25.00m   2.80 m bgl  99/24 19:40   25.00m   14.27 m bgl  99/24 12:00   25.00m   14.27 m bgl	

<sup>1)</sup> Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 2cm and vertical accuracy of 3cm. 2) Geophysical profiling undertaken downhole on 16/09/24, comprising of optical and acoustic televiewer down the length of the hole. 3) ES refers to Environmental Sample.



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Ophir Street Edinburgh Street
Project Reference: 521290-064

**BH36** 

Sheet 3 of 5

M	leth qui	REHO nod: ipme tract	ent:	Mas	ary C	FION Core Wireline za MM3 n Drilling NI Ltd	CO-ORDINATES: NZTM2000 Easting: 1756480.85m Northing: 5919223.39m Ground level: 59.46m (NZVD2016)		Date starte Date comp Inclination Azimuth:	pleted	: 1		9/2024 7/2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
70 CT+CV	Mellion	R.L. (m)	Length (m)	Graphic Log	Layer Code	Ν	Naterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture wws Fracture cs Log vcs Ecs	Stratigraphy Defect Description Additional Notes	Installation
Box 2	200	49	_ _ _ _	××××××××××××××××××××××××××××××××××××××		7m: Highly weathered weak. Poorly cement	d, grey, sandy SILTSTONE; extremely led. Sand is fine. (Sandy SILT).		10.5m: SPT 2,4//	100	0	0			
rdo	- L	-	11	× × × × × × × × × × × × × × × × × × ×				HW	4,5,6,6 N = 21	100			10.9	<b>95m</b> : ES BH36_10.95	
Box 3	200	- 48 - -	_ _ _ _ _	× × × × × × × × × × × × × × × × × × ×		very weak. Poorly cer 11.47m:Black carbo	eathered, grey, sandy SILTSTONE; mented. onaceous material band, inclined 5°. Very weak. Poorly cemented.			100	100	100		28m: BP 50°	
H T G O		- - - - - 47	12 	× × × × × × × × × × × × × × × × × × ×	EWZ	11.92m to 11.96m:	Silty fine to medium SANDSTONE; very		12m: SPT 4,6/I 6,15,11,10 N = 42	100					
°C I	200	  		× × × × × × × × × × × × × × × × × × ×		Black carbonaceous	Fine to medium silty SANDSTONE. material layers inclined 20°. NE, 10mm width, inclined 20°.	MW		100	95	95		95m: BP 20°	1. [1.]
- Orgo		- 46	_	× × × × × × × × × × × × × × × × × × ×			ndy SILTSTONE. Sand is fine to		13.5m: SPTC 5,10// 27,23 for 35mm	N/A	N/A	N/A		23m: BP 20°	
Box 4	9	- - - -	14	× × × × × × × × × × × × × × × × × × ×	EUz2	weak. Sand is fine to  13.95m to 14.1m:S  14.1m to 14.15m:S	siltstone. silty SANDSTONE; extremely weak.	SW	N = 50+						
C	2001	45	_ _  _ _	× × × × × × × × × ×	sz EUzz EUsz	SANDSTONE; very v	thered, grey, fine to medium weak. Moderately cemented.  thered, grey, SILTSTONE; very weak.	SW		91	91	85		78m- BD 30°	
1 2	) Co	eoph	linate: iysica	l profiling	unde	very weak. Poorly ce 14.86m: CORE LOSS ng a Leico Zeno FLX100							Wat Date 12/0 13/0 13/0	78m: BP 30°  ter Level Readings:  1 Time   Hole Depth   Water Level   19/24 15.55   7.50m   1.20 m bg  19/24 07:30   7.50m   2.90 m bg  19/24 07:30   7.50m   2.80 m bg  19/24 03:00   2.50 m   14.27 m bg  19/24 12:00   25.00m   16.70 m bg	



Tel: +64 9 520 6019 www.aurecongroup.com

Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Ophir Street Edinburgh Street

Project Reference: 521290-064

**BH36** 

Sheet 4 of 5

M E	letho quip	oment: Massenza MM3 ractor: McMillan Drilling NI				Core Wireline za MM3	CO-ORDINATES: NZTM2000 Easting: 1756480.85m Northing: 5919223.39m Ground level: 59.46m (NZVD2)	2016)	Dat Incl	te started: te comple lination: muth:			9/2024 7/2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
Method	Metrod	R.L. (m)	Length (m)	Graphic Log	Layer Code	٨	<i>I</i> laterial Description	Weathering/USC	Testing		ICK (%)	RQD (%)	ws Fracture	Stratigraphy Defect Description Additional Notes	Installation
SPTC	2 -		_	$\times$	EUx	14.86m: CORE LOS	S.	sw	15m: SPTC 8,21// 50 N = 50+		I/A N	A N/A	111111		
	_		_	× × × × × ×	EUz2	,	thered, grey, SILTSTONE; very weak.	sw						15.28m: BP 10°	
	ļ.	44	_		EUs2	<b>15.4m:</b> Slightly weath very weak. Moderate	nered, grey, medium SANDSTONE; sly cemented.	sw			ı			15.48m to 15.60m: JT 70° PI, Ro, CI	
Box 4 HO3	- - -	· .	_ _ _ 	× × × × × × × × × × × × × × × × × × ×			thered, grey, SILTSTONE; very weak.			Ş	95 9	3 93		1000 77000	
	-	43	_	× × × × × × × × × × × × × × × × × × ×		black carbonaceous 16.04m to 16.15m: medium.	ue to medium SANDSTONE layer with material, inclined 20°. Sandy SILTSTONE. Sand is fine to Fine to medium SANDSTONE. Well				ı			16.00m: BP 20°	
SPTC	2 - 5 -		<del></del>	× × × × × × × × × × ×					16.5m: SPT 8,23// 50 for 45mr N = 50+		I/A N	A N/A	<b>∐</b>		
	E	.	- - 17	× × × × × ×		5mm width, inclined 3	s of black carbonaceous material band, 30°.				ı			16.81m: BP 30°	
		.		× × × × × ×		band, up to 5mm thic 16.93m to 17.07m:	umorphous black carbonaceous materia ck, inclined 20°. Fine to medium SANDSTONE. Well	ial			ı			17.07m: BP 40°	Ш
Ë		42	- -	× × × × × × × × × × × × × × × × × × ×		cemented.  17.31m to 17.48m:	Sandy SILTSTONE.			1	00 10	0 100			
	-			× × × × × × × × × × × × × × × × × × ×	EUz2	17.7m to 17.74m:F Moderately cemented	ine to medium SANDSTONE. d.	sw			ı			17.74m: BP 30°	
	-			× × × × × ×		<b>18.1m:</b> Laminated S	SILTSTONE.			ı				18.20m: BP 20°	
	-	41	-	× × × × × ×			Medium SANDSTONE. Well cemented material disseminated. (Fault?)	d.			ı			18.37m: BP 25° 18.42m: BP 20°	
_			-	× × × × × ×			Medium SANDSTONE. Well cemented material disseminated. (Fault?)	d.			ı			18.57m: BP 20°	
HO3	- - -	· .	_ _ 	× × × × × × × × × × × × × × × × × × ×			Medium SANDSTONE. Well cemented material disseminated. (Fault?)	d.		1	00 10	0 100		18.77m: BP 20°	
	-		- -	× × × × × × × × × × × × × × × × × × ×			Fine to medium SANDSTONE. Well							19.19m: BP 25°	
		40	-  -	× × × × × × × × × ×			bonaceous material disseminated.  Fine to medium SANDSTONE. Well			-				19.60m: BP 10°	
HO3	_	-	20	× × × × × × × ×			bonaceous material disseminated.			1	00 10	0 100			
1 2	́) Ge	ordi	inates ysical	profiling	g unde		plus smart antenna, with a horizontal accura 19/24, comprising of optical and acoustic telev							Water Level Readings: Date Time   Hole Depth   Water Level 12/09/24 15:55   7.50m   1.20 m bgl 13/09/24 07:30   7.50m   2.90 m bgl 13/09/24 13:48   25.00m   2.80 m bgl 16/09/24 09:00   25.00m   14.27 m bgl 16/09/24 12:00   25.00m   6.70 m bgl	



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Ophir Street Edinburgh Street

Project Reference: 521290-064

**BH36** 

Sheet 5 of 5

Me Eq	REH thod: uipm ntrac	ent:	Mas	ary C	COORDINATES: NZTM2000           Bore Wireline ta MM3         Easting: 1756480.85m           In Drilling NI Ltd         Northing: 5919223.39m           Ground level: 59.46m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	oleted	: 1 -9		/2024 /2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	www. www. Fracture	Stratigraphy Defect Description Additional Notes
НОЗ	39		× × × × × × × × × × × × × × × × × × ×	EUz2	15.65m: Slightly weathered, grey, SILTSTONE; very weak. 20.1m to 20.49m:Fibrous black carbonaceous material disseminated throughout.  20.53m to 20.9m:Sandy SILTSTONE. Sand is fine to medium.  20.7m to 20.92m:Fibrous brown carbonaceous material disseminated throughout.	sw		100	100			
НФЗ			* * *	EUs2	21.12m to 21.2m:Fibrous brown carbonaceous material \disseminated throughout. 21.2m: Slightly weathered, grey, silty fine SANDSTONE; very weak. Moderately cemented.	sw		100	100	100		
	37		* * * * * * * * * * * * * * * * * * * *	EUx EUz2	22.34m: Slightly weathered, grey, SILTSTONE; very weak.  22.5m to 22.62m:Sitty SANDSTONE. Moderately cemented.  22.51m to 22.57m:Fibrous black carbonaceous material layers.  22.62m: CORE LOSS.  22.77m: Slightly weathered, grey, fine to medium SANDSTONE; very weak. Well cemented.	sw						22.5m to 25m: Water pressure permeability test (BH36_PPT01)
НОЗ	36			EUs2	23.2m to 23.38m:Laminated SILTSTONE, inclined 5°.  23.38m to 23.41m:Laminated sandy SILTSTONE. Fibrous black carbonaceous material along boundary.  23.77m to 23.83m:Laminated SILTSTONE, inclined 5°.	sw		90	90	90		
НДЗ			× ×	EUs1	24.14m to 24.16m:SILTSTONE.  24.16m: Slightly weathered, grey, fine silty SANDSTONE; extremely weak. Poorly cemented. (Silty fine SAND).  24.6m: Slightly weathered, grey, sandy SILTSTONE; very	SW		100	100	100		
1) ( 2)	Geoph	dinates nysical	profiling	g unde	weak. Sand is fine.  End of borehole at 25m (Termination Depth Achieved) ng a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 2cr traken downhole on 16/09/24, comprising of optical and acoustic televiewer							Water Level Readings: Date Time   Hole Depth   Water Level 12/09/24 15.55   7.50m   1.20 m bg  13/09/24 07.30   7.50m   2.90 m bg  13/09/24 13.48   25.00m   2.80 m bg  16/09/24 09.00   25.00m   14.27 m bg  16/09/24 12.00   25.00m   6.70 m bg



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Gundry Street

Project Reference: 521290-064

**BH38** 

Sheet 1 of 5

/leth		ent:	Mas	ary C	TION Core Wireline za MM3 n Drilling NI Ltd	CO-ORDINATES: NZTM2000 Easting: 1756411.17m Northing: 5919146.11m Ground level: 53.87m (NZVD2016	)	Date starte Date comp Inclination Azimuth:	oleted	: 2		/2024 /2024		Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
Meniod	R.L. (m)	Length (m)	Graphic Log	Layer Code	M	laterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws Fracture cs Loa	- 1	Stratigraphy Defect Description Additional Notes	Inetallation
	- 54 - -			Fg P		rse GRAVEL. Tightly packed. Gravel is ib-angular to angular basalt. [FILL]	>	-				>	0m:       	FILL	
	-  -			Fc	0.6m: CLAY; orange	grey. Firm, moist, high plasticity.							0.5m	to <b>0.6m</b> : ES BH38_0.5-0.6	
	- - - 55	- - 1 -	× × × × × × × × × × × × × × × × × × ×		0.8m: SILT; dark grey [RESIDUAL SOIL EC	r. Firm, moist, moderate plasticity. BF]		1.1m:					0.8m	: EAST COAST BAYS FORMATION  I to 1.2m: ES BH38 1.1-1.2	
	- - -	_ _ _	\( \times \)					ISHSV=30/6kPa	0				     		
	-  -		× ^ > × × > × × >		1.5m:Minor fibrous	rootlets.	ML	1.5m: ISHSV=41/12kPa					1.5m	to <b>1.6m</b> : ES BH38_1.5-1.6	I
	- - 56	_ 	× × × × × × × × × × × × × × × × × × ×	ERz									i   		
	- - -	- - -	× × × × × × × × × × × × × × × × × × ×		2.5m: Clavey SII T: gr	rey with mottled orange. Stiff, moist,		2.5m:							Qï
	 -	_ _ _	× × × × × × × × × × × × × × × × × × ×		high plasticity. [COMF	LETELY WEATHERED ECBF] k carbonaceous material disseminated	CL-MI	ISHSV=53/37kPa	100			             			
	- - 57		× × ,	ERx	<b>3m:</b> PUSH TUBE. Clayey SILT; grey moplasticity.	ttled orange. Very stiff, moist, moderate			100						
-	- -	- - 		EF	crystals. 3.3m:SILTSTONE; Moderately cemented 3.5m: Highly weather	ed, grey, silty fine SANDSTONE;		N = 50+				             			
	-   -   -	_ _ _ _ 4				erately cemented. (Silty fine SAND).	HW		100				3.8m	i: Stopped SPT prematurely due to king that we weren't encountering a ce.	
	- 58 -	<del>-+</del>		EWs	3.95m: Moderately we weak. Well cemented	eathered, grey, fine SANDSTONE; very			100	59	51		4m: 4.05i	Casing to 4m bgl. <b>n to 4.15m:</b> Weakly cemented.	
-	- - -	-  -			4.45m to 4.5m:SILS	STONE; very weak.	MW	4.5m: SPTC 4,8// 11,11,11,10					4.35i	m: Jl 45° Pl, Ro, Cl n: Moved to SPTc due to competent nd.	
	- - -	_ _ _ _ 5	× ×				MW	N = 43			N/A		1		
Ge ES	eoph S refe	inates ysical ers to	l profiling Environ	g unde menta	ertaken downhole on 24/09 al Sample.	olus smart antenna, with a horizontal accuracy 5 g/2024, comprising of optical and acoustic televie 3m bgl (BH38_PZ01). S/N: 376323.	m and	d vertical accuracy of own the length of the	7cm.				19/09 20/09 20/09 23/09	r Level Readings: Time   Hole Depth   Water Level	



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: **Gundry Street**Project Reference: **521** 521290-064 **BH38** 

Sheet 2 of 5

	Met Equ	REH hod: lipme ntract	ent:	Ma	tary ( ssen	TION Core Wireline za MM3 n Drilling NI Ltd	CO-ORDINATES: NZTM2000 Easting: 1756411.17m Northing: 5919146.11m Ground level: 53.87m (NZVD2016	i)	Date start Date com Inclination Azimuth:	plete	d: :		)/2024 )/2024		Logged by: AP Input by: AP Checked by: PK Reviewed by: SS
	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	laterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture		Stratigraphy Defect Description Additional Notes
			_ _ _	× × × × × × × × × ×	EWz	weak. (SILT). 5.07m to 5.23m:La	eathered, grey, SILTSTONE. Extremely minated SILTSTONE; very weak. ndy SILTSTONE. Sand is fine to	MW							5.06m: BP 10° PI, Ro, CI
Box 1	HQ3	- - -	_		EWs	SANDSTONE; very v		MW		100	100	100			5.36m: BP 10° PI, Ro, CI
	SPTC	60	6	× × × × × × × × × × × × × × × × × × ×	EWZ	weak. (SILT). 5.82m to 5.87m:Ve 5.87m to 6m:Sandy to medium. Black car throughout, <2mm th	SILTSTONE; very weak. Sand is fine bonaceous material disseminated ick.	MW	6m: SPTC 8,42 for 145mm// N = 50+	N/A	N/A	N/A			
		_ _ _ _	-  -  -	× ×	EUs2	Well cemented.  6.37m to 6.5m:San	dy SILTSTONE; very weak.	SW						11	
	HQ3	61	- - 7 - -	X	EUz2	6.87m to 6.98m:Sa 6.98m to 7.07m:Ox (Silty fine SAND). Por	idised greenish grey. extremely weak. orly cemented.  TSTONE with some fine sand;	sw		96	90	90			6.86m: JT 45° PI, Sm, Cl
	SPTC	_	_	× × × × × × × × × × × × × × × × × × ×					7.5m: SPTC 5,18// 32,18 for 20mm N = 50+	N/A	N/A	N/A		;       ; 	<b>7.45m</b> : 50mm of core loss.
Box 2	HQ3	62	8		EUs2	weak. Well cemented 7.88m to 8.3m:Fine 8.3m to 8.35m:SIL 8.35m to 8.6m:Silty Moderately cemented	SANDSTONE; weak. Well cemented.  ISTONE; very weak.  Ifine to medium SANDSTONE.	sw		100	100	100			8.00m: JT 80° Un, Ro, Cl 8.30m: BP 20°
-	SPTC	63	9	× × × × × × × × × × × × × × × × × × ×	EUz2		ered, grey, SILTSTONE; very weak.	sw	9m: SPTC 7,10// 12,13,18,7 for 30mm N = 50+	N/A	N/A	N/A			
Box 3	HQ3	_ _ _ _ _		× × × × × × × × × × × × × × × × × × ×	Ī	<b>9.41m to 10.3m:</b> Sa	ndy SILTSTONE; weak.			100	100	100			9.65m: BP 30°
	1) C	MARK Co-ord Seoph	dinate	s captu	red us	I ing a Leico Zeno FLX100 ertaken downhole on 24/0	plus smart antenna, with a horizontal accuracy 5 9/2024, comprising of optical and accustic televi	cm an	d vertical accuracy o	f 7cm.				!	Water Level Readings: Date Time   Hole Depth   Water Level 19/09/24 15:20   12.00m   1.23 m bg  20/09/24 07:45   12.00m   2.81 m bg

| 19/09/24 15:20 | 12.00m | 1.23 m bg| 20/09/24 07:45 | 12.00m | 2.81 m bg| 20/09/24 11:34 | 16.50m | 1.10 m bg| 23/09/24 08:00 | 16.50m | 3.60 m bg| 23/09/24 09:10 | 20.00m | 2.00 m bg| 25/09/24 07:30 | 20.00m | 3.50 m bg|

Database File: CC2MOTIONS MASTER 02(JL.) GP LIbrary file: LIBRARY \_20240925\_V13 (1), GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18/02/2025

Geophysical profiling undertaken downhole on 24/09/2024, comprising of optical and ac
 ES refers to Environmental Sample.
 Vibrating wire piezometer (VWP) were installed at 18m bgl (BH38\_PZ01). S/N: 376323.



Tel: +64 9 520 6019 www.aurecongroup.com

Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Gundry Street

Project Reference: 521290-064

**BH38** 

Sheet 3 of 5

Met Equ	REHO hod: ipme itract	ent:	Mas	ary C	TION Core Wireline za MM3 n Drilling NI Ltd	CO-ORDINATES: Easting: Northing: Ground level:	<b>NZTM2000</b> 1756411.17m 5919146.11m 53.87m (NZVD2016)	)	Date start Date com Inclination Azimuth:	pleted	: 23 90	3/09	/2024 /2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	Aaterial Descriptio	n	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	www. www. Fracture	Stratigraphy Defect Description Additional Notes	Installation
HQ3	64	- - -	× × × × × × × × × × × × × × × × × × ×		8.6m: Slightly weather 10m to 10.18m:Slif Moderately cemented 10.18m to 10.3m:F weak. Well cemented 10.3m to 11.16m:V	y fine SANDSTONE; d. ine to medium SANE d.	very weak.	sw		100	100	100		10.15m: JT 30° PI, Sm, CI 10.31m: BP 30°	
	65	- - - 11	<pre></pre>	EUz2				SW							
HQ3	_	- - - -		EUs2	11.16m: Slightly wear SANDSTONE; extret carbonaceous mater SAND).	mely weak. Moderate ial disseminated.(Silt	ly cemented. Black	sw		100	100	100			
	_ ·	- - - 12	× ×		11.86m to 11.8m:S 11.86m to 11.91m:	SILTSTONE; weak.	E; weak.							11.65m: BP 20° 11.85m: BP 20°	
			× × × × × × × × × × × × × × × × × × ×	EUs2 EUz2	12.23m: Slightly wear SANDSTONE; very v			sw						12.12m: JT 10° PI, Ro, CI 12.18m: JT 40° PI, Ro, CI 12.31m to 12.39m: JT 45° PI, Ro, CI	
HQ3		- - - 13	× × × × × × × × × × × × × × × × × × ×	EUz2	12.54m: Slightly weat	thered, grey, SILTST	ONE; weak.	sw		100	100	92		12.59m: JT 5° Pl, Ro, Cl 12.83m: JT 5° Pl, Ro, Cl 13.05m: JT 5° Pl, Ro, Cl	
		- -  -	* * * * * * * * * * * * * * * * * * *		<b>13.23m to 13.34m:</b> <b>13.24m:</b> .Black carbo	onaceous material la	yer, 3mm thick.							13.34m: JT 5° PI, Ro, CI 13.66m: JT 10° PI, Ro, CI	
		_ _ 		EUs2	13.7m: Slightly weath SANDSTONE; very v	nered, grey, fine to m weak. Poorly cement	edium ed.	sw						13.74m: JT 5° PI, Ro, CI	
HQ3	- -	- - -	× × × × × × × × × × × × × × × × × × ×	EUz2	14.22m:Black carbot 10mm thick.  14.38m: Slightly weat 14.52m: Slightly weat SANDSTONE; weak	thered, grey, SILTST	ONE; weak.	SW		100	100	100		14.39m: BP 5° Pl, Ro, Cl	
	- -	- - - 15		EUx EUs2	14.83m to 14.9m:S	SILTSTONE.		sw							
1) C 2) G 3) E	eoph S refe	inates ysical ers to	profiling Environ	g unde menta	ing a Leico Zeno FLX100 ertaken downhole on 24/0 al Sample. (VWP) were installed at 1	9/2024, comprising of o	otical and acoustic televie	m and wer do	vertical accuracy o	of 7cm. e hole.				Water Level Readings: Date Time   Hote Depth   Water Level 19/09/24 15/20   12.00m   1.23 m bgl 20/09/24 07/45   12.00m   2.81 m bgl 20/09/24 11/34   16.50m   1.10m bgl 23/09/24 08/00   16.50m   3.60 m bgl 23/09/24 08/00   10.200m   20.00m bgl	
Han	d She	ear Va	ine Seri	al No:	: 1378 Correction Factor:	1.479								25/09/24 07:30   20.00m   3.50 m bgl	

<sup>1)</sup> Op-crumates captured using a Leico Zeno FLX100 plus smart antenna, with a norizontal accuracy 5cm and vertical accuracy of 7cm.
2) Geophysical profiling undertaken downhole on 24/09/2024, comprising of optical and acoustic televiewer down the length of the hole.
3) ES refers to Environmental Sample.
4) Vibrating wire piezometer (VWP) were installed at 18m bgl (BH38\_PZ01). S/N: 376323.



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: **Gundry Street**Project Reference: **521** 521290-064 **BH38** 

Sheet 4 of 5

N E	/letl qu	REHO hod: ipme tract	ent:	Mas	ary C	TION Core Wireline za MM3 n Drilling NI Ltd	CO-ORDINATES Easting: Northing: Ground level:	: <b>NZTM2000</b> 1756411.17m 5919146.11m 53.87m (NZVD2016	)	D In	ate starte ate compl clination: zimuth:		l: 2		/202 /202		Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
100000	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	laterial Descripti	on	Weathering/USC	:	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws wws Fracture		Stratigraphy Defect Description Additional Notes	Installation
		69			EUs2	15m: Slightly weather weak. Well cemented		dium SANDSTONE;	sw									
Box 4	HQ3	-	- - - - -	× × × × × × × × × × × × × × × × × × ×	2	15.2m: Slightly weath 15.25m to 15.3m:P 15.64m to 15.68m:I 15.77m to 15.9m:F	oorly cemented.	NDSTONE.				97	94	93			15.21m: JT 5° PI, Ro, CI 15.44m: JT 5° PI, Ro, CI 15.47m: BP 5° PI, Ro, CI	
	-	70		× × × × × × × × × × × × × × × × × × ×	EUz2	16.16m to 16.33m: material within the SI			SW								<b>16.45m to 16.5m:</b> 50mm of core loss.	
Box 5	HQ3	71		* *	EUs2	<b>16.75m:</b> Slightly weat SANDSTONE; very v	thered, grey, fine to veak. Moderately ce	medium mented.	sw			100	100	97			16.75m: BPJT 5° 16.85m: BPJT 5°	
	-	72 - - -		× ×		18m to 18.1m:Extre 18.17m to 18.2m:B laminations, 30mm th 18.2m to 18.5m:Ex	lack carbonaceous nick. tremely weak (Fine	material to medium SAND).									18.40m: CZ 18.45m: CZ 18.50m: CZ	
Box 6	HQ3		   	× × × × × × × × × × × × × × × × × × ×	EUz2	18.6m:Black carbon thick.  19m:Black carbona thick.	iceous material lami		SW			73	63	63			18.59m: CZ 18.70m: JI 45° PI, Ro, CI	
		- - -	- - -	××	EUx	19.1m: CORE LOSS		ONIT	sw									
	57	_	_	× × × × × ×	EUz2	<b>19.5m:</b> Slightly weath	ierea, grey, SILTST	∪in⊑; weak.	sw			100	04	94				
	HQ3	- -	_ _ 	· · · · · · · · · · · · · · · · · · ·	EUs2	19.77m: Slightly weat SANDSTONE; very v 19.9m to 19.95m:P	veak. Moderately ce		sw			100	94	94		         	19.77m: Jl 10° Un, Ro, Cl	
1 2	1) C 2) G	eoph	S: inate: ysical	s capture	g unde			th a horizontal accuracy 5optical and acoustic televie									Water Level Readings: Date Time   Hole Depth   Water Level 19/09/24 15:20   12.00m   1.23 m bgl 20/09/24 07:45   12.00m   2.81 m bgl	

Seponysical profiling undertaken downnoie on 24/09/2024, comprising of optical and ac 3) ES refers to Environmental Sample.

Vibrating wire piezometer (VWP) were installed at 18m bgl (BH38\_PZ01). S/N: 376323.

19/09/24 15:20 | 12:00 m | 2.81 m bgl 20/09/24 07:45 | 12:00 m | 2.81 m bgl 20/09/24 11:34 | 16.50 m | 1.10 m bgl 23/09/24 09:00 | 16.50 m | 3.60 m bgl 23/09/24 09:10 | 20.00 m | 2.00 m bgl 25/09/24 07:30 | 20.00 m | 3.50 m bgl

Database File: CC2MOTIONS MASTER 02(JL.) GP LIbrary file: LIBRARY \_20240925\_V13 (1), GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18/02/2025

Hand Shear Vane Serial No: 1378 Correction Factor: 1.479



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Weathering/USC

Location: Gundry Street

Project Reference: 521290-064 Sheet 5 of 5

Fracture Log

WWS WS CS CS VCS

RQD (%)

BOREHOLE INFORMATION

Rotary Core Wireline Massenza MM3 McMillan Drilling NI Ltd Method: Equipment: Contractor:

CO-ORDINATES: NZTM2000 Easting: 1756411.17m 5919146.11m 53.87m (NZVD2016) Northing Ground level:

19/09/2024 Date started: Date completed: 23/09/2024 Inclination: N/A Azimuth:

Logged by: ΑP Input by: AP Checked by: PK Reviewed by: SS

**BH38** 

Graphic Log Length (m) Layer Code R.L. (m)

Material Description

SCR (%) TCR (%) Testing

Stratigraphy Defect Description Additional Notes

Installation

19.95m to 20m:...Extremely weak. (SAND)

End of borehole at 20m (Termination Depth Achieved)

REMARKS:

1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 5cm and vertical accuracy of 7cm. 2) Geophysical profiling undertaken downhole on 24/09/2024, comprising of optical and acoustic televiewer down the length of the hole. 3) ES refers to Environmental Sample.

4) Vibrating wire piezometer (VWP) were installed at 18m bgl (BH38\_PZ01). S/N: 376323.

| Water Level Readings: | Date Time | Hole Depth | Water Level | 19/09/24 1520 | 12.00m | 1.23 m bg| 20/09/24 07:45 | 12.00m | 2.81 m bg| 20/09/24 17:34 | 16.50m | 1.10 m bg| 23/09/24 09:10 | 20.00m | 3.60 m bg| 25/09/24 09:10 | 20.00m | 3.50 m bg| 25/09/24 07:30 | 20.00m | 3.50 m bg|

Database File: CC2MOTIONS MASTER 02(41).GPJ Library file: LBRARY\_20240925\_V13 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOS Date Generated: 181022025



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 15 Burgoyne Street
Project Reference: 521290-064

**BH39** 

Sheet 1 of 6

Method: Equipment: Contractor:	Tecl	ary C hdrill	CO-ORDINATES: NZTM2000           Core Wireline         Easting: 1756274.10m           I 250 HD         Northing: 5919024.79m           ce NZ Ltd         Ground level: 51.15m (NZVD201		Date starte Date comp Inclination: Azimuth:	letec	d: ´		7/2024 7/2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS
Method R.L. (m) Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws wws Fracture cs Log vcs Log	Stratigraphy Defect Description Additional Notes
51 -		FEg P	Om: ASPHALT.  0.05m: Clayey medium to coarse GRAVEL; yellow brown. Tightly packed, moist. Gravel is slightly weathered, sub-angular basalt. Brick fragments <200mm. [FILL]	GC						m: FILL .2m to 0.3m: ES BH39_0.2-0.3
		FEc	O.35m: Silty CLAY; brown. Very stiff, moist, high plasticity.      O.75m to 1.3m:Orange brown.	СН	0.55m: ISHSV=65/3kPa					. <b>5m to 0.6m:</b> ES BH39_0.5-0.6
AACEX 50 –					1m: ISHSV=133/59kPa	0			 	m to 1.1m: ES BH39_1-1.1
	×××× 		<b>1.3m</b> : CLAY; light grey orange mottling. Very stiff, moist, high plasticity. Minor rootlets. [RESIDUAL ECBF].		1.5m: ISHSV=130/41kPa					.3m: EAST COAST BAY FORMATION .5m to 1.6m: ES BH39_1.5-1.6
				СН	2m: ISHSV=157/24kPa				                           1 	. <b>9m to 2m</b> : ES BH39_1.9-2
HO3		ERc	2.28m: CLAY; light grey with mottling. Very stiff, moist, high plasticity. [COMPLETELY WEATHERED ECBF].			100			2	. <b>4m</b> : Relict rock fabric
48				СН	3m: IBHSV=67/18kPa 3m: SPT 1,1// 1,1,1,1 N = 4	100	-			om: Relict rock fabric and lithorelicts. . <b>01m to 3.45m</b> : ES BH39_3-3.45
88 - 4 - 47	× × × × × × × × × × × × × × × × × × ×	EWz	3.85m: Highly weathered, grey, sandy SILTSTONE; extremely weak. (Sandy SILT).  4.2m to 4.26m:Black carbonaceous laminae disseminated in bands (0-5°).	HW		95				.00m: BP 25°
	× × × × × × × × × × × × × × × × × × ×	EWs	4.7m: Highly weathered, grey, fine to medium SANDSTONE; extremely weak, moderately cemented. (Fine to medium SAND).	HW	4.5m: IBHSV=UTP 4.5m: SPT 1,2// 3,5,6,7 N = 21	100			b	. <b>45m</b> : Core loss 50mm, core washed out outom. . <b>5m to 4.95m</b> : ES BH39_4.5-4.95

- Geophysical profiling undertaken downhole on 19/07/24, comprising of optical and acou
   ES refers to Environmental Sample.
   Vibrating wire piezometer (VWP) was installed at 22 m bgl (BH39\_PZ01). S/N: 361306.

17/07/24 16:00 | 12.45m | 2.37 m pgi 18/07/24 08:00 | 12.45m | 2.53 m bgl 18/07/24 15:20 | 30.00m | 1.63 m bgl 19/07/24 08:00 | 30.00m | 3.70 m bgl

Hand Shear Vane Serial No: 1378 Correction Factor: 1.479



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 15 Burgoyne Street
Project Reference: 521290-064

**BH39** 

Sheet 2 of 6

Λet Equ	hod: iipm itrac	ent:	Ro Te	tary C chdril	FION         CO-ORDINATES: NZTM2000           Core Wireline         Easting: 1756274.10m           I 250 HD         Northing: 5919024.79m           Dee NZ Ltd         Ground level: 51.15m (NZVD2016)	<u></u>	Date start Date com Inclinatior Azimuth:	pleted	l: 1 -		7/202 7/202		Logged by: AP Input by: AP Checked by: PK Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	1	cs Vos Fos	Stratigraphy Defect Description Additional Notes
	46				<b>4.7m</b> : Highly weathered, grey, fine to medium SANDSTONE; extremely weak, moderately cemented. (Fine to medium SAND).							         	
200	_ _ _ _	- - -		EWs	$\textbf{5.35m:}Black \ carbonaceous \ material \ band \ 10mm \ width, \ 5\ ^{\circ}.$	HW		71					5.52m: Jl 10° Pl, Oxidised green
	- -	<u>-</u>		EWx	5.7m: CORE LOSS	HW							
	45	6	X X X X X X X X X X X X X X X X X X X	EWZ	6m: Highly weathered, grey, sandy SILTSTONE; very weak.	HW	6m: SPT 1,3// 4,5,7,8 N = 24	100					6m to 6.45m: ES BH39_6-6.45
		_ _ _ _ 7	× ×	EWs	6.55m: Highly weathered, grey, fine to medium SANDSTONE; very weak, moderately cemented. Greenish grey veins. 6.7m to 6.95m:Greenish grey.	HW		100	90	76	Ιį		
		_	× × ×		7.02m to 7.22m:Weak. 7.19m: Highly weathered, grey, SILTSTONE; very weak.								7.05m to 7.15m: JT 70° PI, Sm, Cl 7.19m: BP 20° 7.20m: JT 65° PI, Ro, Cl
		_ _ _ _	× × × × × × × × × × × × × × × × × × ×	EWz	7.55m to 7.85m:Fine SANDSTONE.	HW	7.5m: SPT 6,7// 7,13,17,13 for 60mm N = 50+	100			         	7                                       	7.05m to 7.15m: JT 70° PI, Sm, CI 7.19m: BP 20° 7.20m: JT 65° PI, Ro, CI 7.30m: JT 70° PI, Sm, Vn  7.5m to 7.95m: ES BH39_7.5-7.95
	43	- - -	× × × × × × × × × × × × × × × × × × ×		<b>8.11m to 8.18m:</b> Fine to medium SANDSTONE; very weak. White veins inclined 80°, calcite?.							                         	7.95m: Crushed during removal from splits. 7.97m: JT 40° PI, Ro, Cl 8.20m: BP 25°
	- - -		× × · · · · · · · · · · · · · · · · · ·	EWs	<b>8.47m</b> : Highly weathered, greenish grey, fine to medium SANDSTONE; extremely weak, poorly cemented. (Fine to medium SAND)	HW		100	96	96	111111111111111111111111111111111111111		8.50m: BP 30°
	- 42 - -	9	× × × × × × × × × × × × × × × × × × ×	EWz	8.95m to 9m:Silty SANDSTONE. 9m: Highly weathered, grey, sandy SILTSTONE; very weak. Sand is fine to medium.	HW	9m: SPT 4,6// 4,7,10,13 N = 34	100					<b>9m to 9.45m</b> : ES BH39_9-9.45
	 _ _	10	× × × ×.	EWs	<b>9.64m:</b> Highly weathered, grey, fine to medium SANDSTONE; very weak, moderately cemented.	HW		100	100	100			
C	Seoph S ref	(S: dinate: nysica ers to	l profilin Enviror	g undenta	ng a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of ortaken downhole on 19/07/24, comprising of optical and acoustic teleview al Sample. (VWP) was installed at 22 m bgl (BH39_PZ01). S/N: 361306.	of 12cm er dow	and vertical accura n the length of the h	cy of 14 ole.	lcm.				Water Level Readings: Date Time   Hole Depth   Water Level 17/07/24 16:00   12.45m   2.37 m bgl 18/07/24 08:00   12.45m   2.53 m bgl 18/07/24 15:20   30.00m   1.63 m bgl 19/07/24 08:00   30.00m   3.70 m bgl



**BOREHOLE INFORMATION** 

Level 3, Te Tihi, 110 Carlton Gore Road PO Box 9762, Newmarket Auckland, New Zealand Tel: +64 9 520 6019 www.aurecongroup.com

Hand Shear Vane Serial No: 1378 Correction Factor: 1.479

Client: Watercare Services Ltd

**Project: WIWQIP Motions Catchment Improvements** 

Date started:

15/07/2024

Location: **15 Burgoyne Street**Project Reference: **521290-064** 

**CO-ORDINATES: NZTM2000** 

**BH39** 

Logged by: AP

Sheet 3 of 6

Database File: CC2MOTIONS MASTER 02(4H).GPJ Library file: LIBRARY\_20240925\_V13 (1).GLB Template: DATEMPLATE.GDT Report File: 01MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 19/02/2025

41  	EWS EWZ	9.64m: Highly weathered, grey, fine to medium SANDSTONE; very weak, moderately cemented.  10.27m:SILTSTONE, 5mm band. 10.29m:SILTSTONE, 5mm band. 10.37m:SILTSTONE, 5mm band. 10.37m:SILTSTONE, 5mm band. 10.5m: Highly weathered, grey, sandy SILTSTONE; extremely weak. Sand is fine to medium. (Sandy SILT)  11.13m: Moderately weathered, grey, SILTSTONE; weak.  11.29m to 11.3m:Band of pink siltstone, inclined 5°. 11.31m:5mm band of pink siltstone, inclined 5°. 11.41m to 11.77m:Very weak.	₹ ¥ Weathering/USC	Duitse_L 10.5m: SPT 8.7// 6.7.12.9 N = 34	100 TCR (%)	(%) SCR (%)	%) 80 RQD (%)	Nws Fracture   Nws	Stratigraphy Defect Description Additional Notes  10.5m to 10.95m: ES BH39_10.5-10.95  11.25m: BP 30°  11.40m: BP 20°
	EWS EWS	SANDSTŎNĒ; very weak, moderately cemented.  10.27m:SILTSTONE, 5mm band. 10.39m:SILTSTONE, 5mm band. 10.37m:SILTSTONE, 5mm band. 10.37m:SILTSTONE, 5mm band. 10.5m: Highly weathered, grey, sandy SILTSTONE; extremely weak. Sand is fine to medium. (Sandy SILT)  11.13m: Moderately weathered, grey, SILTSTONE; weak.  11.29m to 11.3m:Band of pink siltstone, inclined 5°. 11.31m:5mm band of pink siltstone, inclined 5°. 11.41m to 11.77m:Very weak.	HW	8.7//	100				11.25m: BP 30°
- X - X - X - X - X - X - X - X - X - X	EWS EWZ	extremely weak. Sand is fine to medium. (Sandy SILT)  11.13m: Moderately weathered, grey, SILTSTONE; weak.  11.29m to 11.3m:Band of pink siltstone, inclined 5°. 11.31m:5mm band of pink siltstone, inclined 5°. 11.41m to 11.77m:Very weak.	HW	8.7/I 6.7,12.9 N = 34		96	96		11.25m: BP 30°
- X X - X X - X X - X X - X X - X X X - X X X - X X X - X X X X - X	EWs EWs	11.29m to 11.3m:Band of pink siltstone, inclined 5°. 11.31m:5mm band of pink siltstone, inclined 5°. 11.41m to 11.77m:Very weak.	MW		100	96	96		
39 - X - X - X - X - X - X - X - X - X - X	EWs								
	â	12.18m: Slightly weathered, grey, SILTSTONE; very weak.	MW	12m: SPT 3,8// 12,17,21 for 15mm N = 50+	100				<b>12m to 12.45m</b> : ES BH39_12-12.45
Γ L <del>l,</del>	EUs2 EWz	12.65m: Slightly weathered, grey, fine to medium	MW						12.45m: 20% driling fluid loss over 12.45m. 12.6m: Core damaged on transferral to box.
38 - × - × - × - × - × - × - × - × - × - ×	× × × × × × × × × × × × × × × × × × ×	SANDSTONE; weak, well cemented. Black carbonaceous material bands <2mm, inclined 5°.  12.78m: Slightly weathered, grey, SILTSTONE; very weak.  12.82m to 12.84m:Band of pink siltstone, 40°.  13.18m to 13.22m:Fine to medium SANDSTONE.  13.4m to 13.5m:Fine to medium SANDSTONE. Thinly laminated bedding 0-5°.		13.5m: SPTC			100		12.77m: JT 40° PI, Sm, CI  13.5m: Changed to SPTc due to
-	EUz2	13.62m to 15m:Weak  14.2m to 14.29m:Fine to medium SANDSTONE.	SW	10,40 for 99mm// N = 50+	N/A	N/A	N/A		competent rock.
-	× × × × × × × × × × × × × × × × × × ×	14.2m to 14.29m:Fine to medium SANDSTONE.  14.42m to 14.59m:Fine to medium SANDSTONE.			94	94	94		14.49m: BP 30°



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 15 Burgoyne Street
Project Reference: 521290-064

**BH39** 

Sheet 4 of 6

Me Eq	REH thod: uipme ntract	ent:	Tec	ary C hdril	CO-ORDINATES: NZTM2000           core Wireline         Easting: 1756274.10m           250 HD         Northing: 5919024.79m           Se NZ Ltd         Ground level: 51.15m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	leted	l: 1 -		7/2024 7/2024	Sheet 4 of 6  Logged by: AP Input by: AP Checked by: PK Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture wws Log	Stratigraphy Defect Description Additional Notes
HQ3 SPTC	- 36 		* * *	EUs	12.78m: Slightly weathered, grey, SILTSTONE; very weak.  15.11m: Slightly weathered, fine to medium SANDSTONE; weak, well cemented.  15.56m to 15.65m:SILTSTONE.	sw sw	15m: SPTC 26,24 for 105mm// N = 50+	100	N/A 94			5.24m: JT 20° Un, Ro, Cl 5.39m to 15.48m: JT 50° Pl, Sm, Cl 5.60m: BP 25°
HQ3	34		× × × × × × × × × × × × × × × × × × ×		16.39m: Slightly weathered, grey, SILTSTONE; weak.  16.8m to 16.93m:Fine to medium SANDSTONE.  17.13m: Slightly weathered, grey, fine to medium SANDSTONE; weak, well cemented. Inclined 5°.	sw		100	97	97	11 11 11 11 11 11 11 11 11 11 11 11 11	6.5m to 18m: Core damaged during emoval from splits.  7.35m: JT 15° PI, Sm, Cl  7.65m: JT 25° PI, Sm, Cl
HQ3	33			EUs2	18.5m to 18.57m:SILTSTONE.  19.14m to 19.35m:SILTSTONE.  19.42m to 19.49m:SILTSTONE.	sw		100	100	100		
1) ( 2) ( 3) I	Geoph ES refe	linates ysical ers to	× × × × × × × × × × Es captur profiling	g unde menta	19.57m to 19.67m:SILTSTONE.  19.68m to 19.8m:Silty SANDSTONE; very weak, moderately cemented.  19.8m: Slightly weathered, grey, SILTSTONE; very weak.  Ing a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of ritaken downhole on 19/07/24, comprising of optical and acoustic televieweil Sample.  (VWP) was installed at 22 m bgl (BH39_PZ01). S/N: 361306.	SW 12cm dow	and vertical accuracy n the length of the ho	y of 14		100	W D 1:	9.90m: BP 10°  Vater Level Readings: ater Time   Hole Depth   Water Level 7007/24 16:00   12.45m   2.37 m bgl 8007/24 08:00   12.45m   2.53 m bgl 8007/24 08:00   30.00m   1.36 m bgl 9007/24 08:00   30.00m   3.70 m bgl



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: 15 Burgoyne Street
Project Reference: 521290-064

**BH39** 

Sheet 5 of 6

M	leth quip	EHO lod: pme ract	ent:	Tec	ary C hdril	TION Core Wireline I 250 HD ce NZ Ltd	CO-ORDINATES: NZTM2000 Easting: 1756274.10m Northing: 5919024.79m Ground level: 51.15m (NZVD201	6)	Date starte Date comp Inclination: Azimuth:	oleted	: 1 -		7/2024 7/2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS
Method	DOLLOW	R.L. (m)	Length (m)	Graphic Log	Layer Code	M	laterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws wws Fracture cs cs Log	Stratigraphy Defect Description Additional Notes
Box 6 HO3		31 -		× × × × × × × × × × × × × × × × × × ×	EUz2	20.23m to 20.3m:Fi	ered, grey, SILTSTONE; very weak.  ne to medium SANDSTONE.  e to medium SANDSTONE.	sw		100	100	100		20.5m to 23.5m: Water pressure permeability test (BH39_PPT01)
Box7 HO3		30		× × × × × × × × × × × × × × × × × × ×		21.4m: Slightly weath SANDSTONE; weak, material dissemenate	alcite veins disseminated?			100	92	92		22.00m to 22.12m: JT 60° Un, Sm, Cl
HO3	H	- - - - - - - - -			EUs2		onaceous material band 20mm width,	SW		100	100	100		22.00m to 22.12m: JT 60° Un, Sm, Cl
Box 8						23.65m to 24.1m:S material on bottom bo				100	100	97		Water Level Readings: Date Time   Hole Depth   Water Level
1 2 3	) Co ) Ge ) ES	eophy Frefe	inates ysical ers to	l profiling Environ	g unde menta	ing a Leico Zeno FLX100 p ertaken downhole on 19/0 al Sample.	olus smart antenna, with a horizontal accuracy 7/24, comprising of optical and acoustic televier m bgl (BH39_PZ01). S/N: 361306.	of 12cm an	nd vertical accuracy he length of the ho	y of 14 ble.	cm.			Water Level Readings: Date Time   Hole Depth   Water Level   17/07/24   16:00   12:45m   2:37 m bgl   18/07/24 08:00   12:45m   2:53 m bgl   18/07/24 15:20   3:0.00m   1:63 m bgl   19/07/24 08:00   3:0.00m   3:70 m bgl



Tel: +64 9 520 6019

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: 15 Burgoyne Street 521290-064 Project Reference:

**BH39** 

Sheet 6 of 6

BOREHOLE INFORMATION **CO-ORDINATES: NZTM2000** Date started: 15/07/2024 Logged by: AP Rotary Core Wireline Techdrill 250 HD Drill Force NZ Ltd 1756274.10m 19/07/2024 Method: Easting: Date completed: Input by: Equipment: Northing 5919024.79m Inclination: -90° Checked by: 51.15m (NZVD2016) N/A Reviewed by: SS Contractor: Ground level: Azimuth: Weathering/USC Graphic Log Code Fracture Log Installation Length (m) Stratigraphy  $\Xi$ Testing TCR (%) 8 % Method Defect Description SCR ( RQD ( Material Description R.L. Layer Additional Notes **21.4m**: Slightly weathered, grey, fine to medium SANDSTONE; weak, well cemented. Black carbonaceous material dissemenated throughout, <2mm. 25.03m: BP 45° 26 HQ3 100 100 97  $\Pi\Pi$ IIIII $\Pi \Pi \Pi$ I I I IIIIII26 25.95m to 26.2m:...SILTSTONE. 25.95m; BP 60° IIIII $\Pi\Pi$ 25 HQ3 26.2m to 26.7m:...Very weak. 100 100 100  $\Pi\Pi$ IIIIIIIIII26.7m to 27.02m:...SILTSTONE. Black carbonaceous 26.70m; BP 60° IIIIImaterial disseminated along bottom boundary IIIII $\Pi \Pi \Pi$ 27  $\Pi\Pi$ 24 27.1m to 27.67m:...Sandy SILTSTONE; very weak. Fine sand SW  $\Pi\Pi$ IIIIIIIIII27.67m to 28.35m:...Very weak, poorly cemented. HQ3 100 100 100 IIIII+1111 $\Box\Box$ 28 23 Database File: CC2 MOTIONS MASTER 02(JH).GPJ LIbrary file: LIBRARY\_20240925\_V13 (1).GLB Template: DATATEMPLATE.GDT IIIII $\Pi \Pi \Pi$ IIIIII + I + IIIIII28.84m to 28.94m:...SILTSTONE; weak. IIIII29 28.94m to 29.09m:...Very weak, moderately cemented. Black carbonaceous material dissemeninated throughout. 22 29.09m to 29.23m:...SILTSTONE. HQ3 100 100 100 29.23m to 29.28m:...Very weak, moderately cemented. Black carbonaceous material disseminated. 29.3m to 29.32m:...SILTSTONE; weak. IIIII29.4m: Slightly weathered, grey, SILTSTONE; weak. IIIIIEU<sub>2</sub>2 SW  $\Box$ IIIIIEnd of borehole at 30m (Termination Depth Achieved) REMARKS 1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 12cm and vertical accuracy of 14cm.
2) Geophysical profiling undertaken downhole on 19/07/24, comprising of optical and acoustic televiewer down the length of the hole.
3) ES refers to Environmental Sample.
4) Vibrating wire piezometer (VWP) was installed at 22 m bgl (BH39\_PZ01). S/N: 361306.

Water Level Readings: Date Time | Hole Depth | Water Level 17/07/24 16:00 | 12.45m | 2.37 m bgl 18/07/24 08:00 | 12.45m | 2.53 m bgl 18/07/24 15:20 | 30.00m | 1.63 m bgl 19/07/24 08:00 | 30.00m | 3.70 m bgl



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: 17 Fleet Street

Project Reference: 521290-064

**BH43** 

Sheet 1 of 6

OREHOI ethod: quipmen ontractor	nt:	Rota Car	ary C iter F	COORDINATES: NZTM2000           ore Wireline         Easting: 1756551.51m           ig 86         Northing: 5918779.20m           Ground level: 42.58m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	leted	: 2		0/2024 0/2024	Logged by: CSR Input by: CSR Checked by: BGW Reviewed by: SS	
R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws Fracture cs Log	Stratigraphy Defect Description Additional Notes	
++				0m: ASPHALT 0.1m: Fine to medium GRAVEL with minor silt, dark grey.						Or	n: FILL 10m to 0.45m: [GAP 40]	- 1
-  -  -  -	- (			Tightty packed. Gravel is subangular, greywacke. [FILL]	GP						(0.11 0 0.40) [0.11 40]	
42				0.45m: Silty CLAY with minor gravel and trace anthropogenic material; light brown. Very stiff, moist, high plasticity. Gravel is fine to coarse, subangular, dark grey, moderately strong, slightly weathered basalt and greywacke. Anthropogenic material is weathered brick.		0.5m: ISHSV=UTP						
- <u> </u> 1	<u>1</u>				СН	1m: ISHSV=171/16kPa						
41			ш	<b>1.5m</b> :stiff.		1.5m: ISHSV=69/26kPa						
- <u>-</u> <u>-</u> <u>-</u> <u>-</u> -	2			<b>2m:</b> SILT with some clay and trace gravel; light brown mottled reddish brown. Stiff, moist, low plasticity.								
40					ML	2.3m: ISHSV=89/20kPa						0000000000
-  -  -  -  -  -  -  -	- 3 -			3.2m: CLAY with some silt; light grey mottled light brown. Stiff, moist, high plasticity.	СН	3m: ISHSV=102/33kPa 3m: SPT 0,0// 0,1,2,2 N = 5	44				<b>2m to 3.45m:</b> No recovery.	
39	- K			3.45m: CORE LOSS							45m: Core loss caused by cobble being slodged during hydroexcavation.	
- - - - - -	<u>4</u>						10				· · · · · · · · · · · · · · · · · · ·	
38	·   ·	/ ==-}	TAC	<b>4.4m:</b> CLAY with some silt; light grey mottled light brown. Stiff, moist, high plasticity. [UNDIFFERENTIAL ALLUVIUM]	СН	4.5m:				[iiiii]	4m: TAURANGA GROUP ALLUVIUM	
- - - - -	.		TA	4.5m: PUSH TUBE. Sandy CLAY; light grey mottled light brown with occasional organics. Stiff, moist, high plasticity. Sand is fine to coarse 4.7m:CLAY with some fine sand; light brown.  4.9m:Intermixed CLAY and SILT with siltstone gravel.		IBHSV=30kPa	100					20000000000
MARKS:		\		ing a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 2						W	ater Level Readings: ate Time   Hole Depth   Water Level	ŀ:



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: 17 Fleet Street

521290-064 Project Reference:

**BH43** 

Sheet 2 of 6

Me Eq	REH thod: uipme ntrac	ent:	Car	ary C nter F	TION Core Wireline Rig 86 ce NZ Ltd	Northing: 5	<b>IZTM2000</b> 756551.51m 918779.20m 2.58m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	leted	l: 2		)/202 //202		Logged by: CSR Input by: CSR Checked by: BGW Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	Material Description	1	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture		Stratigraphy Defect Description Additional Notes
SPT HQ3	37	6	× × × × × × × × × × × × × × × × × × ×	vz EWc TAc TAz TAx	plasticity.  5.45m: Silty CLAY; b  5.95m:some grave highly weathered sar 6m: Highly weathere (Silty CLAY; stiff). [Cold of the cold of	d, grey SILTSTONE; e. DMPLETELY WEATHE ered, brownish grey SII lyey SILT with trace sal	high plasticity.  ium, subrounded,  ixtremely weak.  ERED ECBF]	ML CH	6m: SPT 1.1// 0.2.2.2 N = 6	70					6m: EAST COAST BAYS FORMATION  6.4m to 6.45m: No recovery.
SPT HQ3	35	- - 7 - - - -	× × × × × × × × × × × × × × × × × × ×	EWS EWZ	6.7m: Moderately we SANDSTONE; very v	reathered, grey SILTST athered, grey, fine to n weak.	nedium	MW	7.5m: SPT 2,8/l 10,14,16,10 for 30mm N = 50+	100	76	76			<b>7.3m:</b> Black carbonaceous laminations, 2mm, inclined 10°.
\$PTC HQ3	34	8	××××××××××××××××××××××××××××××××××××××	EUz2	7.95m to 10.4m:tra	ice sandstone interbed	s, <5mm.	SW	9m: SPTC 11,39 for 115mm// N = 50+	100 N/A	100 N/A			                   	8.20m: BP 5°  8.65m: BP 10°  8.80m: BP 8°
(1)		dinate			sing a Leica Zeno FLX100	) plus smart antenna, with 1.649	horizontal accuracy of 2	cm ar	nd vertical accuracy c	94 of 3cm.	94	94			9.4m: Ripup clasts. 9.51m: BP 14°  9.71m: JT 8° Un, Ro, Cl  Water Level Readings: Date Time   Hole Depth   Water Level 25/09/24 15.41   4.50m   1.66 m bgl 26/09/24 10.00 4.50m   2.70 m bgl 26/09/24 10.04   18.00m   4.60 m bgl 27/09/24 10.30   18.00m   1.60 m bgl



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: 17 Fleet Street

521290-064 Project Reference:

**BH43** 

Sheet 3 of 6

Database File: CC2MOTIONS MASTER 02(JL.) GP LIbrary file: LIBRARY \_20240925\_V13 (1), GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18/02/2025

Me Ec	OREI ethoc quipm ontrac	l: nent:	Car	ary C nter F	TION Core Wireline Rig 86 ce NZ Ltd	CO-ORDINATES: NZTM2000 Easting: 1756551.51m Northing: 5918779.20m Ground level: 42.58m (NZVD2016	)	Date s Date o Inclina Azimu	compleation:		: 2		)/2024 )/2024		Logged by: CSR Input by: CSR Checked by: BGW Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	M	laterial Description	Weathering/USC	Testing		TCR (%)	SCR (%)	RQD (%)	ws ws Fracture		Stratigraphy Defect Description Additional Notes
HQ3	-		× × × × × × × × × × × × × × × × × × ×	EUz2	7.2m: Slightly weather	ered, grey SILTSTONE; very weak.	sw			94	94	94		 	10.07m: BP 10°
Box 2	32	<u></u>	× × × × × × × × × × × × × × × × × × ×	EUx	10.4m: CORE LOSS 10.5m: Slightly weath	ered, grey SILTSTONE; very weak.		10.5m: SPTC 7,22// 50 for 70mm N = 50+		N/A	N/A	N/A			
	31	111 12	× × × × × × × × × × × × × × × × × × ×		<b>11.76m to 11.82m:.</b> f cemented.	fine SANDSTONE; moderately				100	100	92			11.00m: JT 6° Un, Ro, Cl 11.12m: JT 12° Un, Ro, Cl 11.22m: BP 12° 11.40m: BP 12° 11.70m: JT 14° St, Sm, Co, (Infill: clay) 11.78m: BP 14°
Box 3		- - - -	-	EUz2			sw								<b>12m:</b> Ripup clasts.  12.17m: BP 6° 12.20m: BP 6°
FØ3	-  -  -  -	13	× × × × × × × × × × × × × × × × × × ×		12.71m to 12.86m:f	fine SANDSTONE; moderately				100	100	97	<del> </del>		12.68m: JT 12° St, Sm, Co, (Infill: clay)  13.10m: JT 12° Un, Ro, Cl
	29	- - - - - -	× × × × × × × × × × × × × × × × × × ×		<b>13.3m to 13.38m</b> :si	lty fine SANDSTONE, poorly cemented.									13.35m: JT 6° Un, Ro, Co, (Infill: clay) 13.40m: JT 20° St, Sm, Co, (Infill: clay) 13.60m: JT 5° St, Sm, Cl 13.70m: BP 4°
13	- - -	14	× × × · ×	EUs2			sw	_		460	400	407			
Box 4 HQ3	28	- - -	× × × × × × × × × × × × × × × × × × ×	EUz2	14.5m to 14.7m:silt	thered, grey SILTSTONE; very weak.  y fine SANDSTONE; very weak.  Omm thick, well cemented and poorly	sw			100	100	100		::	14.25m: JT 5° Un, Ro, Cl 14.61m: BP 20°
	EMAR ) Co-c		lx x	red us	I sing a Leica Zeno FLX100	plus smart antenna, with horizontal accuracy of	2cm a	Ind vertical accur	racy of	3cm.					Water Level Readings: Date Time   Hole Depth   Water Level 25/09/24 15.41   4.50m   1.66 m bg  26/09/24 10.00   4.50m   2.70 m bg  26/09/24 16.54   18.00m   4.60 m bg  27/09/24 10.30   18.00m   1.60 m bg



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: 17 Fleet Street

Project Reference: 521290-064

**BH43** 

Sheet 4 of 6

N E	ORE letho quip ontr	od: mei	nt:	Car	ary C nter F	CO-ORDINATES: NZTM2000           Core Wireline         Easting: 1756551.51m           Rig 86         Northing: 5918779.20m           Ground level: 42.58m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	leted	: 2	24/09/2024 27/09/2024 90° N/A		Logged by: CSR Input by: CSR Checked by: BGW Reviewed by: SS
A 4 - 41 - 1	Metilod	K.L. (M)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws ws mws Fracture cs Log	Stratigraphy Defect Description Additional Notes
Box 4			- - - 16 -	× × × × × × × × × × × × × × × × × × ×		14.26m: Slightly weathered, grey SILTSTONE; very weak.  15.21m to 15.37m:silty SANDSTONE, poorly cemented.  16.34m to 16.5m:extremely weak. (SILT with minor clay)			100	93	93		15.19m: BP 10° 15.30m: JT 4° St, Sm, Cl  15.79m: JT 22° Un, Ro, Cl 15.90m: JT 10° St, Sm, (Infill: clay) 4mm  16.06m: BP 18°
Box 5			- 17 - - - - -	××××××××××××××××××××××××××××××××××××××	EUz2		sw		100	100	100		16.70m: JT 10° Un, Ro, Cl  17.34m: BP 12°  17.55m: JT 8° Un, Ro, Cl  17.70m: JT 4° PI, Ro, Cl
	2	24	18	× × × × × × × × × × × × × × × × × × ×	EUs2	18m: Slightly weathered, grey, fine to medium SANDSTONE; weak. Well cemented.  18.3m: Slightly weathered, grey SILTSTONE; very weak.	sw		100	100	96		17.9m: Disseminated black carbonaceous matter, inclined 34°.  18.03m to 18.26m: JI 84°
Box 6		23	19 - - - - -	× × × × × × × × × × × × × × × × × × ×	EUz2	19.04m to 19.2m:SANDSTONE, poorly cemented.  19.72m to 19.74m:pink SILTSTONE. 19.81m to 19.89m:SANDSTONE, moderately cemented (ripup clast wedge?).	sw		100	97	97		17.34m: BP 12°  17.52m: BP 4° 17.55m: JT 8° Un, Ro, Cl  17.70m: JT 4° Pl, Ro, Cl  17.9m: Disseminated black carbonaceous matter, inclined 34°.  18.03m to 18.26m: JI 84°  18.03m to 18.26m: JI 84°  19.04m: JT 5° Un, Ro, Co, (Infill: clay)  19m: Black carbonaceous material, <1mm, inclined 5°. 19.04m: JT 6° Un, Ro, Cl 19.10m: JT 10° St, Sm, Co, (Infill: clay)  19.65m: BP 14°  19.78m: JT 28° Pl, Ro, Cl 19.90m to 20.05m: JT 72° Pl, Ro, Cl  Water Level Readings: Date Time   Hole Depth   Water Level 25/09/24 15/14   14.50m   1.66 m bgl 26/09/24 10:00   4.50m   2.70 m bgl 26/09/24 10:00   4.50m   2.70 m bgl 26/09/24 10:00   18.00m   1.60 m bgl 27/09/24 10:30   18.00m   1.60 m bgl
(		-ordi	20   S: linate	× ×		ing a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 2d	cm ar	d vertical accuracy o	of 3cm.				19.90m to 20.05m: JT 72° PI, Ro, CI  Water Level Readings: Date Time   Hole Depth   Water Level 25/99/24 15/41 (4.50m   1.66 m bgl 26/99/24 10:00 4 5/50m   2.70 m bgl 26/99/24 16:54   18.00m   4.60 m bgl 27/09/24 10:30   18.00m   1.60 m bgl



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: 17 Fleet Street

Project Reference: 521290-064

**BH43** 

Sheet 5 of 6

-	Met Equ	REH thod: uipme ntract	ent:	Car	ary C nter F	FION Core Wireline Rig 86 ce NZ Ltd	CO-ORDINATES: NZTM2000 Easting: 1756551.51m Northing: 5918779.20m Ground level: 42.58m (NZVD2016	6)	Da Inc	ate started ate complicition: clination: zimuth:		: 2		/2024 //2024	Logged by: CSR Input by: CSR Checked by: BGW Reviewed by: SS	
	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code		Material Description	Weathering/USC	; ; ;	l esting	TCR (%)	SCR (%)	RQD (%)	wws ws Fracture cs cs Log	Stratigraphy Defect Description Additional Notes	Installation
9	НДЗ			× × × × × × × × × × × × × × × × × × ×	EUz2	20.5m: Slightly weath	nered, grey SILTSTONE; very weak.  Hered, grey, fine to coarse  Well cemented. Green siltstone clasts,	sw			100	97	97			
Box 6						SANDSŤOŇE; very v	red, grey, silty, fine to medium weak. Moderately cemented. fine to coarse sandstone.	SW							21.05m: JT 12° Un, Ro, Cl	
	наз							sw			100	93	91		21.39m to 21.47m: Black carbonaceous material, 3mm, inclined 8°.  21.69m: JT 18° Un, Ro, Cl	
Box 7	2	20			EUs2	22.42m:poorly cem 22.45m to 22.6m:S 22.9m to 23.21m:fir	ented. iILTSTONE. ne to coarse sandstone.								22.47m: JT 26° PI, Ro, CI 22.49m: JT 34° St, Sm, CI	
	HQ3	  				23.45m: Slightly weat SANDSTONE, very v	thered, grey, silty, fine to coarse weak. Poorly cemented.	SW			100	63	63		23.22m: Black carbonaceous laminae, 1mm, inclined 20°. 23.57m: JT 10° PI, Ro, CI	
		- - -		× ×		very weak. Moderate	red, grey, fine to medium SANDSTONE; ly cemented.	sw							23.94m: JT 52° St, Sm, Cl 24m to 24.15m: Recovered as broken core (gravel) 24.15m to 24.3m: Sandstone ripup clasts. 24.30m: JT 4° St, Sm, Cl	
Box 8	НОЗ	18		× × × × × × × × × ×	EUz2			sw			100	86	79		24.40m: JT 8° PI, Ro, CI  24.62m to 24.68m: Black carbonaceous material, 6mm, inclined 28°.	
	DE:		_  		EUs2	very weak. Moderate	thered, grey, silty fine SANDSTONE; ly cemented. ne ripup clasts up to 10mm.	SW							<b>24.7m</b> : Green siltstone ripup clasts up to 10mm. 24.70m: JT 4° Pl, Ro, Cl	
		MARK Co-or		es captu	red us	ing a Leica Zeno FLX100	plus smart antenna, with horizontal accuracy of	<sup>:</sup> 2cm an	d vertical a	accuracy of	3cm.				Water Level Readings: Date Time   Hole Depth   Water Level   25/09/24 15.41   4.50m   1.66 m bg    26/09/24 10.00   4.50m   2.70 m bg    26/09/24 16.54   18.00m   4.60 m bg    27/09/24 10:30   18.00m   1.60 m bg    27/09/24 10:30   18.00m   1.60 m bg	



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 17 Fleet Street

Project Reference: 521290-064

**BH43** 

Sheet 6 of 6

															011001 4 01 4	
M	etho quip		ıt:	Car	ary C	FION Core Wireline Rig 86 ce NZ Ltd	CO-ORDINATES Easting: Northing: Ground level:	S: NZTM2000 1756551.51m 5918779.20m 42.58m (NZVD2016	6)	Date start Date comp Inclination Azimuth:	oleted	d: 2		9/2024 9/2024	Logged by: CSR Input by: CSR Checked by: BGW Reviewed by: SS	
Method	- 1		Length (m)	Graphic Log	Layer Code	Λ	faterial Descripti	ion	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture wws Fracture cs Log Ecs	Stratigraphy Defect Description Additional Notes	Installation
Box 8 HO3	-	-  -			EUs2	24.69m: Slightly wea very weak. Moderate	ly cemented.	ne SANDSTONE;	sw		100	86	79			

End of borehole at 25.5m (Termination Depth Achieved)

Database File: CC2MOTIONS MASTER 02(41).GPJ Library file: LBRARY\_20240925\_V13 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOS Date Generated: 181022025



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Basque Park
Project Reference: 521290-064

**BH44** 

Sheet 1 of 6

BOR Meth Equi Cont	iod: pme	ent:	Be	tary C retta	Core Wireline Easting: 1756569.81m	)	Date starte Date comp Inclination: Azimuth:	oleted	l: '		/2024 /2024	Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws ws mws cs cs Log	Stratigraphy Defect Description Additional Notes
SPT	45			Fx	Om: Sandy SILT with some fibrous rootlets and trace clay; dark brown. Soft, moist, low plasticity. Sand is fine. Rootlets up to 5mm diameter. [TOPSOIL]  0.2m: Clayey SILT with some sand, trace gravel and organics; brown grey. Very stiff, moist, high plasticity. Sand is fine. Gravel is fine to coarse, angular basalt. Organics are fibrous rootlets and decomposing wood fragments up to 40mm. [FILL]  0.35m:plastic piece 25mm.  0.45m:angular glass fragment 35mm.  0.5m:trace fine brick fragments.  0.84m:metal peg 150mm.  0.9m to 1.5m:wet.  1m:trace fine brick fragments.	MI-SF	0.3m: ISHSV=157/56kPa 0.7m: ISHSV=28/8kPa 0.95m: ISHSV=115/14kPa 1m: ISHSV=196/59kPa 1.2m: ISHSV=39/11kPa 1.5m: ISHSV=95/34kPa 1.5m: ISHSV=95/34kPa 1.5m: ISHSV=95/34kPa 1.5m: ISHSV=95/34kPa 1.5m: ISHSV=95/34kPa	100				0.05m to 0.2m: ES BH44_0.05-0.2  0.3m to 0.4m: ES BH44_0.3-0.4  0.5m to 0.6m: ES BH44_0.5-0.6  0.8m to 0.9m: ES BH44_0.8-0.9  1.1m to 1.2m: ES BH44_1.1-1.2  1.4m to 1.5m: ES BH44_1.4-1.5
HQ3	- - - -			FR	2.46m: Silty CLAY with some sand and trace gravels; brown grey mottled orange. Stiff, moist, high plasticity. Sand is fine. Gravel is fine to coarse, angular basalt. [FILL] 2.64m to 2.72m:trace brick fragments up to 17mm.  2.83m to 2.9m:light grey.	СН	3m: SPT 0,11//	51				3m to 3.4m: ES BH44_3.0-3.4
SPT	42	_ _ _		ERx ERc	3.12m: Silty CLAY with trace sand and organics; light grey mottled orange. Stiff, moist, high plasticity. Sand is fine. Organics are decomposed rootlets. [RESIDUAL SOIL ECBF] 3.28m: NO RECOVERY.	СН	0, m N = 8	62				3.12m: EAST COAST BAYS FORMATION
НФЗ	- - - -		X	ERc	3.45m: Sitty CLAY with trace sand and organics; light grey mottled orange. Stiff, moist, high plasticity. Sand is fine. Organics are decomposed rootlets.	СН		100				3.45m to 4.5m: Driller changed to half runs due to core loss.
HQ3	- <u>41</u> - -		× × × × × × × × × × × × × × × × × × ×		4.33m: CORE LOSS.			72				
U54	- - -			ERX	4.5m: PUSH TUBE. CLAY with some sand; light grey mottled orange. Firm, moist, high plasticity. Sand is fine. 4.7m:Stiff, moderate plasticity, slightly moist.			100				
2) A v 3) ES	o-ord vibra S refe	S: inates ting v ers to	vire piez enviror	omete imenta	ng a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 2 or (VWP) was installed at 17.5m bgl (BH44-PZ01), serial no. 365125. Il sample	cm an	d vertical accuracy of	f 3cm.		1		Water Level Readings: Date Time   Hole Depth   Water Level 15:09/24 17:30   12.33m   4.41 m bgl 16:08/24 07:50   12.33m   3.10 m bgl 16:08/24 15:30   25.50m   5.87 m bgl

<sup>3)</sup> ES refers to environmental sample



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Basque Park

Project Reference: 521290-064

**BH44** 

Sheet 2 of 6

Me	PREH ethod: uipme ntrac	ent:	Ber	ary C etta	Core Wireline Easting: 1756569.81m	5)	Date starte Date comp Inclination: Azimuth:	letec	d: '		5/2024 5/2024	Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws Fracture cs Log	Stratigraphy Defect Description Additional Notes
HQ3		- - - - - -	× · · · × · · · × · · · × · · · · × · · · · · × · · · · · × ·	ERx ERs	5m: Silty fine to medium SAND with minor organics; dark brownish grey. Loose, moist, poorly graded. Organics are decomposed rootlets and wood fragments up to 15mm.  5.73m: CORE LOSS.	sw-s	Ja	73				
SPT	39	6	× × × × × × × × × × × × × × × × × × ×	ERS	6m: Silty fine to medium SAND; dark brownish grey. Loose, moist, poorly graded. 6.04m: Clayey SILT with minor sand; grey. Stiff, moist, high plasticity. Sand is fine to medium.	\$w-s	(6m: SPT 1,1/1/ 2,2,2,2 N = 8	100				<b>6m to 6.3m</b> : ES BH44_6.0-6.3
HQ3		7	*	ERs ERz	<b>6.98m:</b> Silty fine to medium SAND; dark brownish grey mottled black. Loose, moist, poorly graded.	MH SP-S		100				6.75m: Black carbonaceous inclusion 4mm.
SPT	- - - -		× × × × × × × × × × × × × × × × × × ×	ERz	7.5m: Sandy SILT with minor organics and trace clay; bluish grey. Firm, wet, low plasticity. Sand is fine to medium. Organics are decomposed wood fragments up to 17mm. [HIGHLY WEATHERED ECBF]	MI-SI	7.5m: SPT 1,0// 1,0,1,1 N = 3	100				
HQ3	37		× · · · × · · · · · · · · · · · · · · ·	EWs	8.05m: Highly weathered, dark brownish grey, fine to medium SANDSTONE; extremely weak, poorly cemented, contains decomposed wood fragments up to 8mm. (Silty SAND).  8.35m: CORE LOSS.	HW		38				8.35m to 9m: Driller changed to half runs due to core loss. Core loss possibly a result of running sand.
	-  -  -  -	9	×	EWx	<b>9m:</b> Highly weathered, dark brownish grey, fine to medium		9m: SPT					
SPT	36	-  -  -  -	× × ×	EWx EWs	9.3m: Moderately weathered, grey, fine SANDSTONE; extremely weathered.  9.4m: CORE LOSS.	HW	0,1// 1,6,43 for 70mm N = 50+	100				9.13m to 9.17m: Black carbonaceous inclusion 40mm.
E DH	EMARK			EWs	<b>9.55m:</b> Moderately weathered, grey, fine SANDSTONE; extremely weak, poorly cemented.	MW		86	74	49		9.86m: JT 9.86m: JT 50° Un, Ro, Cl Water Level Readings: Date Time   Hole Depth   Water Level 15/08/24   7.30   12.33m   4.41 m bg

Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy 2) A vibrating wire piezometer (VWP) was installed at 17.5m bgl (BH44-PZ01), serial no. 365125.
 ES refers to environmental sample

15/08/24 17:30 | 12.33m | 4.41 m bgl 16/08/24 07:50 | 12.33m | 3.10 m bgl 16/08/24 15:30 | 25.50m | 5.87 m bgl

Database File: CC2MOTIONS MASTER 02(41).GP Library file: LBRARY\_20240925\_V13 (1).GLB Template: DATAEMPLATE.GDT Report File: 01MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18/02/2025

Hand Shear Vane Serial No: 3178 Correction Factor: 1.398



Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Basque Park

Project Reference: 521290-064

**BH44** 

Sheet 3 of 6

OREH lethod quipm ontrac	: ent:	Be	tary ( retta	fore Wireline Easting: 1756569.81m		Date starte Date comp Inclination: Azimuth:	letec	d: 1 -		3/2024 3/2024	Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS
R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture cs Log	Stratigraphy Defect Description Additional Notes
35	-		EWs	9.55m: Moderately weathered, grey, fine SANDSTONE; extremely weak, poorly cemented.  10.42m to 10.5m:siltstone.	MW		86	74	49	10   9.	.97m to 10.10m: Not intact. 0.06m: JT 30° Un, Ro, Cl 0.24m: BPJT 0.24m: BPJT 15° PI, Sm, Cl 0.29m: BPJT 10° St, Ro, Cl 0.42m: BPJT 10° St, Ro, Cl 0.42m: BPJT 10° Un, Ro, Cl
- - - -	_ - -		EWx	10.5m: NO RECOVERY.		10.5m: SPTC 5,15// 20,26,4 for 55mm N = 50+	N/A	N/A	N/A		0.5m to 10.6m: ES BH44_10.5-10.6
34			EWs	10.85m: Moderately weathered, grey, fine to medium SANDSTONE; extremely weak, poorly cemented.	MW		100	91	70	11 11 11 11 11 11 11 11 11 11 11 11 11	1.14m: JT 10° PI, Sm, CI 1.35m: BPJT 1.35m: BPJT 5° Un, Ro, CI 1.38m: JT 35° Un, Ro, CI 1.52m: JT 10° PI, Ro, CI 1.59m: JT 1.59m: JT 1.59m: JT 5° PI, Ro, CI
33	12		EWx	12m: NO RECOVERY.		12m: SPTC 3,11// 16,24,10 for 35mm N = 50+	N/A	N/A	N/A	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.86m: JT 1.86m: JT 5° Un, Sm, Cl 1.98m: JT 1.98m: JT 5° Un, Ro, Cl
- - - -	_	× × × × × × × × × × × × × × × × × × ×	EUz2	Slightly weathered, grey, SILTSTONE; very weak.      Slightly weathered, grey, fine to medium SANDSTONE; very weak, moderately cemented.	sw						2.7m: JT
32			EUs2	<b>12.98m to 13.21m:</b> siltstone.	sw		100	89	78	12         12         12         12	2.77m: JT 15° PI, Sm, CI 2.77m: JT 2.77m: JT 30° Un, Ro, CI 2.99m: JT 2.99m: JT 30° PI, Ro, CI Not intact. 3.16m: JT 5° PI, Sm, CI 3.22m: JT 5° PI, Sm, CI
-  -  -  -  -	- - - -	× × × × × × × × × × × × × × × × × × ×	EUz2	13.41m: Slightly weathered, grey, SILTSTONE; very weak.  13.62m to 13.7m:fine sandstone.	SW					13	3.41m: BPJT 3.41m: BPJT 2° 3.62m to 13.7m: Disseminated black arbonaceous material, bedding <2mm, clined 45°, 3.62m: BP 35°
31	14	X X		13.9m: Slightly weathered, grey, fine to medium SANDSTONE; very weak, moderately cemented.  14.21m to 14.34m:siltstone.			93	93	86		3.74m to 13.75m: Disseminated black arbonaceous material, bedding <2mm. 3.82m: BPJT 20°  4.21m: BPJT 4.21m: BPJT 5° Un, Ro, Cl
  -  -  -	-  -  -  -		EUs2	<b>14.49m to 14.59m:</b> siltstone.	sw						4.21m to 14.33m: Layers (2) isseminated black carbonaceous material, edding <2mm, inclined 15°. 4.34m: BPJT 25° PI, Ro, Cl 4.45m: JT 4.45m: JT 35° Un, Ro, Cl 4.59m: BP 15°
EMAR	_ _ 15		EUX	<b>14.8m to 14.89m:</b> siltstone. <b>14.89m:</b> CORE LOSS.							/ater Level Readings:

2) A vibrating wire piezometer (VWP) was installed at 17.5m bgl (BH44-PZ01), serial no. 365125.
 3) ES refers to environmental sample

15/08/24 17:30 | 12.33m | 4.41 m bgl 16/08/24 07:50 | 12.33m | 3.10 m bgl 16/08/24 15:30 | 25.50m | 5.87 m bgl

Database File: CC2.MOTIONS MASTER 02(LL),GPJ LIbrary file. IBRARY. 2024/9255. V13 (1),GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18/02/2035



**BOREHOLE INFORMATION** 

Tel: +64 9 520 6019 www.aurecongroup.com

Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Date started:

14/08/2024

Location: Basque Park

Project Reference: 521290-064 CO-ORDINATES: NZTM2000

**BH44** 

Logged by: THH

Sheet 4 of 6

Met Equ		ent:	Rot Ber	ary C etta	CO-ORDINATES: NZ IM2000  Core Wireline	6)	Date started Date comple Inclination: Azimuth:		l: 1 -		8/2024 8/2024	Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws Fracture cs Log	Stratigraphy Defect Description Additional Notes
	30		× × × × × × × × × × × × × × × × × × ×	EUz2	15m: Slightly weathered, grey, SILTSTONE; very weak.  15.22m: Slightly weathered, grey, fine to medium SANDSTONE; very weak, moderately cemented.	sw						15m to 15.22m: Disseminated black carbonaceous material, bedding <2mm, inclined 10°. 15.05m: JT 15.05m: JT 10° Pl, Sm, Cl 15.22m: BP 15°
HQ3	  	_ _ _ _ _ 		EUs2	15.73m to 15.84m:siltstone.  16.06m to 16.08m:siltstone.	sw		100	82	69		15.72m to 15.82m: Not intact. 15.84m: BPJT 15.84m: BPJT 2° 16.08m: BPJT
			× × × × ×		16.29m to 16.43m:siltstone.  16.55m: Slightly weathered, grey, SILTSTONE; very weak.							16.08m: BPJT 2° 16.23m: JT 16.23m: JT 5° PI, Sm, CI 16.25m: JT 80° PI, Ro, CI 16.30m: JT 16.30m: JT 5° PI, Sm, CI 16.44m: JT 20° PI, Ro, CI 16.44m: JT 30° PI, Sm, CI
HQ3	28	  	× × × × × × × × × × × × × × × × × × ×	EUz2		sw		99	86	77		16.50m: JT 40° Un, Ro, Cl 16.55m: BP 25° 17.24m: JT 17.24m: JT 40° Pl, Sm, Cl 17.48m: JT 17.48m: JT 5° Pl, Sm, Cl
		_ _ _ _ 	× ×									17.55m: JT 45° PI, Sm, CI 17.66m: BP 15° 17.67m: BPJT 17.67m: BPJT 2° 17.84m to 17.86m: Disseminated brown carbonaceous material, bedding <2mm, inclined 15°. 17.98m to 18m: Core loss 18.03m: JT 80° PI, Sm, CI
НФЗ	27			EUs2	18.21m to 18.25m:siltstone. 18.34m to 18.4m:siltstone. 18.6m to 19.1m:extremely weak, poorly cemented.	sw		85	75	68		18.16m to 18.18m: Disseminated black carbonaceous material, bedding <2mm, inclined 15°. 18.33m: BP 2° 18.42m: Disseminated black carbonaceous material, bedding <2mm. 18.6m: JT 18.60m: JT 10° PI, Sm, CI 18.69m: JT 45° Un, Ro, CI 18.81m: JT 35° Un, Ro, CI
				EWx	19.1m to 19.27m:SILTSTONE. 19.27m: CORE LOSS.							18.99m: JT 50° PI, Ro, CI 19.07m: JT 40° Un, Ro, CI 19.14m to 19.19m: Disseminated brown carbonaceous material, bedding <2mm, inclined 65°.
	- -		× × × × × ×	EUz2 E	19.5m: Slightly weathered, grey, SILTSTONE; very weak.	sw						19.5m to 21m: Core fell out of barrel due to fault with catcher during drilling. Core damaged and lost during re-drilling.
HQ3	- - - MARK	_ _ _ 		EUs2	<b>19.67m</b> : Slightly weathered, grey, fine to medium SANDSTONE; very weak, moderately cemented, contains moderately inclined 30mm beds of siltstone.	sw		73	67	57		19.52m to 19.67m: Disseminated brown carbonaceous material, bedding <2mm, inclined 50°. 19.78m: JT 19.78m: JT 10° PI, Ro, CI 19.93m: JT  Water Level Readings:

1) Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 2cm and vertical accuracy of 3cm.
2) A vibrating wire piezometer (VWP) was installed at 17.5m bgl (BH44-PZ01), serial no. 365125.
3) ES refers to environmental sample

Database File: CC2MOTIONS MASTER 02(41) GPJ Library file: LIBRARY\_20240925\_V13 (1) GLB Tempate: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18/02/2025

Hand Shear Vane Serial No: 3178 Correction Factor: 1.398



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: Basque Park
Project Reference: 521290-064

**BH44** 

Sheet 5 of 6

Me Eq	REH thod: uipmentrac	: ent:	Ber	ary C	Core Wireline	CO-ORDINATE Easting: Northing: Ground level:	S: NZTM2000 1756569.81m 5918769.32m 45.18m (NZVD2010	6)	Date starte Date comp Inclination Azimuth:	oletec	l: '		3/202 3/202		Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Ν	/laterial Descript	ion	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	1	cs vcs Ecs	Stratigraphy Defect Description Additional Notes
НДЗ		- - - - -		EUs2	19.67m: Slightly wear SANDSTONE; very with moderately inclined 3 20.33m to 20.44m:	weak, moderately of 80mm beds of siltst siltstone.	emented, contains	sw		73	67	57			19.93m: JT 10° Pl, Ro, Cl 19.97m: JT 19.97m: JT 20° St, Sm, Cl
	 _ _ _	_ _ _ _ 		EUx		red, grey, fine to m	edium SANDSTONE;								carbonaceous material, bedding <2mm. 20.58m: JT 20.58m: JT 15° PI, Sm, CI  21m to 21.5m: Driller changed to half run due to core loss.
HQ3		- - - -		25	21.37m to 21.54m:	siltstone.				100	92	80		:::1	21.fm to 22.23m: Disseminated brown carbonaceous material, bedding <2mm, inclined 15°. 21.fm: JT 21.10m: JT 2° Un, Ro, Cl 21.37m: BP 2°
HQ3		22		EUs2	21.57m to 21.62m: 21.78m to 22.05m:			SW		73	67	66		                 	21.62m: BP 2° 21.78m: BP 5°  22m: JT 22.00m: JT 15° PI, Sm, CI 22.05m: BP 2°
	- - - -	_ - - -		EUx	22.23m: CORE LOSS  22.5m: Unweathered very weak, moderate	, grey, fine to medi	um SANDSTONE; VEATHERED ECBF]								22m: JT
HQ3		23		EUs2	<b>23.34m to 23.4m</b> :si			UW		83	79	79		   	23.40m: BP 2° -23.52m: JT
	 _ _ _			Us2 EUx	23.74m: CORE LOSS  24m: Unweathered, 9	S.		UW							23.52m: JT 10° PI, Sm, CI 23.70m to 23.74m: Not Intact.
13	 _21 	-  -  -  -	× × × × × × × × × × × × × × × × × × ×	EUz2 EU	weak, moderately ce 24.08m: Unweathere	mented. d, grey, SILTSTON	IE; very weak.	UW							24.08m: BP 2° 24.12m: Layers (2) disseminated brown carbonaceous material, bedding <2mm.
HQ3	_ 			EUs2	24.48m: Unweathere very weak, moderate		rse SANDSTONE;	UW		93	91	86	l		carbonaceous material, bedding <2mm. 24.55m: JT 5° Un, Ro, Cl 24.82m: JT 10° Pl, Ro, Cl
1) ( 2) / 3) I	A vibra ES ref	KS: dinates ating v fers to	vire piez environ	omete menta	ing a Leica Zeno FLX100 er (VWP) was installed at al sample 3178 Correction Factor:	17.5m bgl (BH44-PZ	rith horizontal accuracy of 11), serial no. 365125.	2cm and	vertical accuracy of	f 3cm.					Water Level Readings: Date Time   Hole Depth   Water Level   15/08/24 17:50   12.33m   4.41 m bg    16/08/24 07:50   12.33m   3.10 m bg    16/08/24 15:30   25.50m   5.87 m bg



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: Basque Park

Project Reference: 521290-064

**BH44** 

Sheet 6 of 6

Me Eq	REHOD: uipme ntract	ent:	Ber	ary C etta	ore Wireline	CO-ORDINATES Easting: Northing: Ground level:	S: NZTM2000 1756569.81m 5918769.32m 45.18m (NZVD201	6)	Date starte Date comp Inclination: Azimuth:	leted	l: 1		3/2024 3/2024	Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	/laterial Descript	ion	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture cs Log	Stratigraphy Defect Description Additional Notes	Installation
НД3	20		× × × × × ×	EUz2 EUs2	24.48m: Unweathere very weak, moderate 25.16m: Unweathere	ly cemented.	,	UW		93	91	86		25.16m to 25.4m: Minor layers of disseminated brown carbonaceous material, bedding <2mm, inclined 25°.	
	_	_	××	EUX	25.4m: CORE LOSS									-	

End of borehole at 25.5m (Termination Depth Achieved)

REMARKS:

1) Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 2cm and vertical accuracy of 3cm. 2) A vibrating wire piezometer (VWP) was installed at 17.5m bgl (BH44-PZ01), serial no. 365125. 3) ES refers to environmental sample

Water Level Readings: Date Time | Hole Depth | Water Level 15/08/24 17:30 | 12.33m | 4.41 m bgl 16/08/24 07:50 | 12.33m | 3.10 m bgl 16/08/24 15:30 | 25.50m | 5.87 m bgl

Database File: CC2MOTIONS MASTER 02(41).GPJ Library file: LBRARY\_20240925\_V13 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOS Date Generated: 181022025



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Basque Park
Project Reference: 521290-064

**BH45** 

Sheet 1 of 6

sand and trace Sand is fine.  gravel and lasticity. Sand is gular, scoriaceous	0.31 ISH 0.44 ISH 0.71 ISH 1.21 ISH	ISV=168/87kPa 5m: ISV=196/87kPa m: ISV=59/11kPa	100 TCR (%)	SCR (%)	SWA	West   Mark   Practure	Stratigraphy Defect Description Additional Notes  Om: FILL 0.05m to 0.2m: ES BH45_0.05-0.2  0.3m to 0.4m: ES BH45_0.3-0.4
sand and trace Sand is fine.  ML  gravel and lasticity. Sand is gular, scoriaceous	0.31 ISH 0.44 ISH 0.71 ISH 1.21 ISH	ISV=168/87kPa 5m: ISV=196/87kPa m: ISV=59/11kPa m:	100				0.05m to 0.2m: ES BH45_0.05-0.2  0.3m to 0.4m: ES BH45_0.3-0.4
п. мн	1.2r ISH 1.5h	ISV=59/11kPa m:	100			                     	<b>0.8m to 1m</b> : ES BH45_0.8-1.0
	1.1/				- Li		
	2,2, N = 1.6	,3,3 : 10	100				1.4m to 1.6m: ES BH45_1.4-1.6
gravel and			34				
gular, scoriaceous	3m: 3m: 2,2/ 2,2,	: SPT // ,2,2	38				
n grey streaked ne to medium.	M	Ü					3.45m: EAST COAST BAYS FORMATION
t; brownish	4.5i	m: SPT	100			           	<b>4.3m to 4.5m</b> : ES BH45_4.3-4.5
	2,3, N =	.3,3 111					Water Level Readings: Date Time   Hole Depth   Water Level 21/08/24 16:15   18.00m   1.96 m bgl 22/08/24 08:15   18.00m   5.00 m bgl
t	in orange mottled DUAL SOIL ECBF] In grey streaked le to medium.  Milt; brownish	in orange mottled DUAL SOIL ECBF] In grey streaked lie to medium.  MI-SP  Also brownish  SP 4.5 4.5 2.2 2.3 N = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	in orange mottled DUAL SOIL ECBF]  In grey streaked lie to medium.  MI-SP  4.5m: IBHSV=UTP 3m: SPT 2,2/l 2,2.2 N = 8  4.5m: IBHSV=UTP 4.5m: SPT 2,2/l 2,3,3,3 N = 11	gravel and lasticity. Sand is jular, scoriaceous  MH  3m: IBHSV=UTP 3m: SPT 2.2/l 2.2.2.2 N = 8  38  In orange mottled DUAL SOIL ECBF] SM n grey streaked le to medium.  MI-SP  4.5m: IBHSV=UTP 4.5m: SPT 2.2/l 2.3/3,3/3	gravel and lasticity. Sand is jular, scoriaceous  MH  3m: IBHSV=UTP 3m: SPT 2.2// 2.2.2,2 N = 8  38  n orange mottled DUAL SOIL ECBF] n grey streaked lee to medium.  MI-SP  4.5m: IBHSV=UTP 4.5m: SPT 2.2// 2.3,3,3 N = 11  73  orizontal accuracy of 2cm and vertical accuracy of 3cm.	gravel and lasticity. Sand is jular, scoriaceous  MH  3m: IBHSV=UTP 3m: SPT 2.2// 2.2.2.2.2.2.2.3.8  In orange mottled DUAL SOIL ECBF] To grey streaked lie to medium.  MI-SP  4.5m: IBHSV=UTP 4.5m: SPT 2.2// 2.3.3.3.3.3.3.1  N = 11  To orange mottled DUAL SOIL ECBF]  To grey streaked lie to medium.	SP



Hand Shear Vane Serial No: 3178 Correction Factor: 1.398

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Basque Park
Project Reference: 521290-064

**BH45** 

Sheet 2 of 6

Database File: CC2 MOTIONS MASTER 02/41,GPJ LIbrary file: LIBRARY, 20240825,V13 (1) GLB Template: DATATEMPLATE,GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18/02/2025

Met Equ	REH hod: ipme tract	ent:	Ber	ary C etta	Core Wireline	CO-ORDINATES: NZTM2000 Easting: 1756625.85n Northing: 5918743.76n Ground level: 52.57m (NZN	n		Date starte Date comp Inclination Azimuth:	olete	d:		3/2024 3/2024		Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	Material Description		₹Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture	- 1	Stratigraphy Defect Description Additional Notes	20:1010408
HQ3		- - - -	× ×	ERs ERZ	brown. Stiff, moist, lo 5.08m: Fine to medit moist, well graded. 5.1m:sandstone fr 5.17m:sandstone f	um SAND with minor silt; brown. Lou agment 25 mm. ragment 10 mm.	ose,	ML SW.		60				111		
	- - -	6		ERx	5.58m: CORE LOSS		Criff		6m: SPT							
SPI	 _ _ _ 	_	× × × × × × × × × × × × × × × × × × ×		moist, high plasticity. sandstone.	sand, trace clay and gravel; brown. Sand is fine. Gravel is fine to medi be clay; grey. Stiff, moist, high plasti	ium, ´	ML	2,2// 2,3,3,4 N = 12	100	)		                     		<b>m to 6.45m</b> : ES BH45_6.2-6.45	
	- - -	_	× × × × × × × × × × × × × × × × × × ×	ERz	6.6m to 6.85m:fine	to medium SAND; brownish orang	je.						                     	6.8	5m: JT 10° Pl, Ro, Cl relict joint	
2	60	7 - - -	× × × × × × × × × × × × × × × × × × ×	EF	<b>7.38m to 7.43m:</b> fin	e to medium SAND; grey.		ML	7.5m: SPT	100				7.09 7.18 7.29	9m: JT 10° Pl, Ro, Cl relict joint 8m: JT 30° Pl, Ro, Cl relict joint 9m: JT 10° St, Ro, Cl relict joint	
I de	_ _ _		× × × × × × × × × × × × × × × × × × ×		<b>7.85m:</b> Highly weath	ered, grey, fine to medium			7.5H. 3F1 3,6// 5,6,9,10 N = 30	100	)		                 			
		8	× × × × × × × × × × × × × × × × × × ×	EWz EWs	SANDSTŎNÉ; extre medium dense).	mely weak. Poorly cemented. (SAN ered, grey, SILTSTONE; extremely very stiff)	,	HW						8.03	3m: BPJT 2° 3m to 8.22m: Not intact. 2m: JT 10° PI, Ro, Cl 5m: JT 10° PI, Sm, Cl	
2		_		EUs2		reathered, grey, fine to medium mely weak. Poorly cemented. (SAN LTSTONE.		MW		88	69	23		8.48 8.54 8.63   8.63   carl thic	3m: BPJT 5°	
_	_	9	X			ed, grey, fine to coarse SANDSTON	NE;		9m: SPT				111	8.76	6m: JT 5° PI, Sm, CI	
- 5	- -				very weak. Poorly ce	mented.			2,5// 16,24,10 for 25mm N = 50+	100	)		111			
50	62 - - -	_ _ _ _		EUs2	9.4m to 9.52m:SIL	TSTONE.		SW		84	80	74	ΪΪ	9.53	0m: BPJT 5° 2m: BPJT 2° 7m: Disseminated black carbonaceous terial, bedding <3mm.	
() C (2) T	wo vi	linate: bratin	s captur g wire p	ezom	ing a Leica Zeno FLX100 eters (VWP) were installe al sample	plus smart antenna, with horizontal accu d at 7m bgl (BH45-PZ01) and 21m bgl (i	uracy of 2cr BH45-PZ0	m an 2). S	d vertical accuracy o N: 361084 and 3613	f 3cm 302.				21/0	ter Level Readings: e Time   Hole Depth   Water Level )8/24 16:15   18.00m   1.96 m bgl )8/24 08:15   18.00m   5.00 m bgl )8/24 12:50   30.00m   2.30 m bgl	_E



Tel: +64 9 520 6019 www.aurecongroup.com

Hand Shear Vane Serial No: 3178 Correction Factor: 1.398

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Basque Park

Project Reference: 521290-064

**BH45** 

Sheet 3 of 6

Database File: CC2MOTIONS MASTER 02(41) GPJ Library file: LIBRARY\_20240925\_V13 (1) GLB Tempate: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 18/02/2025

Method: Equipme Contract	ent:	Ber	ary C etta	Core Wireline Easting: 1756625.85m		Date starte Date comp Inclination: Azimuth:	letec	d: 2		3/2024 3/2024	Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS
R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws Fracture cs Log	Stratigraphy Defect Description Additional Notes
-			EUs2	<b>9m:</b> Slightly weathered, grey, fine to coarse SANDSTONE; very weak. Poorly cemented.	sw		84	80	74	1	0.01m: JT 5° PI, Ro, Cl 0.04m: JT 5° PI, Ro, Cl 0.13m: JT 2° PI, Ro, Cl
63	F	X	EUx	10.3m: CORE LOSS							
	- - - 11	× × × × × × × × × × × × × × × × × × ×	EUz2	10.5m: Slightly weathered, grey SILTSTONE; very weak.	sw	10.5m: SPTC 15,35 for 110mm// N = 50+	N/A	N/A	N/A		<b>0.97m to 11.01m</b> : Disseminated black
64	-  -  -  -	× × × × × × × × × × × × × × × × × × ×		11.09m to 11.29m:fine to medium SANDSTONE.  11.43m: Slightly weathered, grey, fine to medium SANDSTONE; very weak. Poorly cemented.			100	95	92	1                 1 	arbonaceous material, bedding <2mm, nclined 10°. 1.09m: BPJT 2° 1.29m: BPJT 15° 1.43m: BPJT 2°
- - - - - - - - -	12	× × × × ×	.2 EUs2	12m: Slightly weathered, grey SILTSTONE; very weak.	SW	12m: SPTC 16.34 for 100mm//	N/A	N/A	N/A		1.91m to 11.96m: Not intact.
<del>77</del> -	F	x x x x x . x.	EUz2	12.23m: Slightly weathered, grey, fine to medium	SW	16,34 for 100mm// N = 50+					2.23m: BPJT 2°
65			EUs2	SANDSTONE; extremely weak, poorly cemented.	sw						
- - - -	13	× × × × × × × × × × × × × × × × × × ×		12.59m: Slightly weathered, grey SILTSTONE; very weak.  12.93m to 13.16m:fine SANDSTONE.			100	96	86	1 1 1 1 1 1	2.59m: BPJT 5°  2.76m: JT 5° PI, Sm, CI 2.78m to 12.82m: Not intact. 2.89m: JT 10° Un, Ro, CI 2.93m: BPJT 20°
66	_	× × × × × × × × × ×									3.16m: BPJT 2° 3.33m: JT 5° St, Ro, Cl
-	_	× × × × × × × × × × × × × × ×	EUz2	13.5m to 13.65m:fine to coarse SANDSTONE.	sw						3.50m to 13.53m: Not intact. 3.65m: BP 10°
	14	× × × × × × × × × ×		13.94m to 14.16m:fine to coarse SANDSTONE.			00	00	00		3.94m: BPJT 10°  4.15m: JT 5° St, Ro, Cl 4.16m: BP 15°
67 - - -	_ _ _ _ _	× × × × × × × × × × × × × × × × × × ×		14.35m to 14.58m:fine SANDSTONE.			93	88	80		4.24m: JT 10° PI, Ro, CI  4.69m to 14.72m: Not intact. 4.72m: JT 10° PI, Sm, CI
Г	15	× ×	ň	14.9m: CORE LOSS.						<del>                                     </del>	4.82m: JT 2° PI, Sm, CI 4.85m: JT 5° PI, Sm, CI 4.88m: JT 10° Un, Sm, CI



**BOREHOLE INFORMATION** 

Level 3, Te Tihi, 110 Carl PO Box 9762, Newmarke Auckland, New Zealand Tel: +64 9 520 6019 www.aurecongroup.com

Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Date started:

19/08/2024

Location: Basque Park

Project Reference: 521290-064 CO-ORDINATES: NZTM2000

**BH45** 

Logged by: THH

Sheet 4 of 6

R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture	Stratigraphy Defect Description Additional Notes
	-	× × × × × ×	EUz2	15m: Slightly weathered, grey, SILTSTONE; very weak.	sw						
68 -	- - - - - 16			15.14m: Slightly weathered, grey, fine to medium SANDSTONE; very weak. Poorly cemented.  15.69m to 15.8m:SILTSTONE.			95	95	87		15.39m: JT 2° Un, Ro, Cl 15.42m to 15.45m: Layers (3) of disseminated black carbonaceous material, bedding <2mm, inclined 5°. 15.44m: JT 10° Un, Ro, Cl 15.46m: JT 2° Pl, Ro, Cl 15.64m: JT 10° Un, Ro, Cl 15.67m: JT 15° Pl, Ro, Cl 15.69m: BP 20°
69 -	-   -   -   -   -		EUs2	16.53m to 16.6m:SILTSTONE. 16.65m to 16.92m:SILTSTONE.	sw						16.28m: JT 2° PI, Ro, CI 16.31m: JT 15° Un, Ro, CI 16.43m to 16.5m: Core loss 16.46m to 16.48m: Layers (2) of disseminated black carbonaceous material, bedding <2mm, inclined 10°. 16.53m: BPJT 5° 16.60m: BP 2°
70 -	- - -	× × × × × × × × × × × × × × × × × × ×		17.44m: Slightly weathered, grey SILTSTONE; very weak.			100	96	93		16.92m: BP 5° 16.99m: JT 20° Un, Ro, Cl  17.15m: JT 10° Un, Ro, Cl  17.44m to 17.97m: Disseminated black carbonaceous material, bedding <2mm. 17.44m: BPJT 10°  17.72m: JT 10° Pl, Ro, Cl
71 -	- - - - - - 19	××××××××××××××××××××××××××××××××××××××	EUz2		sw		97	84	78		18.00m to 18.08m: Not intact.  18.37m: JT 45° Un, Sm, Cl 18.45m: JT 45° Pl, Sm, Cl  18.69m: JT 10° Pl, Ro, Cl  18.91m: JT 15° St, Sm, Cl  19.28m to 19.32m: Not intact. 19.36m: JT 5° Un d, Ro 19.40m: JT 10° Un, Ro, Cl 19.41m to 19.43m: Not intact. 19.45m to 19.5m: Core loss 19.59m: JT 10° Pl, Ro, Cl  19.74m: BPJT 20° 19.76m: Disseminated black carbonaceous material, bedding <4mm.
72 -	- - - -	× × × × × × × × × × × × × × × × × × ×	EUs2	19.28m to 19.5m:fine to medium SANDSTONE.  19.74m: Slightly weathered, grey, fine to medium SANDSTONE; very weak. Poorly cemented.	SW		100	94	88		19.28m: BPJT 15° 19.28m to 19.32m: Not intact. 19.36m: JT 5° Un cl, Ro 19.40m: JT 10° Un, Ro, Cl 19.41m to 19.43m: Not intact. 19.45m to 19.5m: Core loss 19.59m: JT 10° Pl, Ro, Cl  19.74m: BPJT 20° 19.76m: Disseminated black carbonaceous material, bedding <4mm.



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: Basque Park
Project Reference: 521290-064

**BH45** 

Sheet 5 of 6

BOREH Method Equipm Contrac	: ent:	Ber	ary C etta	Core Wireline	CO-ORDINATES: NZTM2000 Easting: 1756625.85m Northing: 5918743.76m Ground level: 52.57m (NZVD201	16)	Date started Date complication Azimuth:	pleted	: 2		3/2024 3/2024	Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS
Method R.L. (m)	Length (m)	Graphic Log	Layer Code	N	faterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture	<u>-</u>
73 73 	21		EUs2	SANDSTONE; very v	thered, grey, fine to medium weak. Poorly cemented.	sw		100	94	75		20.91m to 21.00m: Not intact. 21.00m to 21.06m: Not intact.
75	- - - - -	× ×	EU <sub>2</sub> 2 EUx	22.24m: CORE LOSS  22.5m: Slightly weath  22.55m: Slightly weath  SANDSTONE; very very very very very very very very	S.  nered, grey SILTSTONE; very weak.  thered, grey, fine to medium  veak. Poorly cemented.  ILTSTONE.	sw						22.53m: JT 30° Un, Ro, Cl 22.63m: JT 10° Un, Ro, Cl 22.75m: JT 5° St, Sm, Cl 22.89m to 22.94m: Not intact.
76			EUx EUs2	23.42m to 23.7m:o SILTSTONE. 23.7m: CORE LOSS	ontains thin 20-50mm beds of	sw		80	67	59		23.01m to 23.05m: Not intact.     23.13m: JT 45° PI, Sm, CI   23.15m: JT 85° PI, Ro, CI   23.17m: JT 5° PI, Ro, CI   23.42m to 23.7m: Disseminated black carbonacous material, bedding <2mm, inclined 5° to 15°.
77		<i>y</i>	EUs2	very weak. Poorly ce	contains thin 20-50mm beds of	sw		100	91	91		Carbonaceous material, bedding <2mm, inclined 5* to 15°.    24.09m: BP 15°    24.37m: BP 5°    24.54m: BP 10°    24.73m: BP 10°
) Two v ) ES re	KS: dinates ibratin fers to	g wire p environ	iezom menta	ing a Leica Zeno FLX100 eters (VWP) were installe al sample	plus smart antenna, with horizontal accuracy of d at 7m bgl (BH45-PZ01) and 21m bgl (BH45-F	f 2cm and v PZ02). S/N:	ertical accuracy o 361084 and 3613	of 3cm. 302.				Water Level Readings: Date Time   Hole Depth   Water Level   21/08/24 16:15   18.00m   1.96 m bg    22/08/24 08:15   18.00m   5.00 m bg    22/08/24 12:50   30.00m   2.30 m bg



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Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Basque Park

Project Reference: 521290-064

**BH45** 

Sheet 6 of 6

BOREI Method Equipn Contra	l: nent:	Bei	ary C etta	Core Wireline Easting: 1756625.85m	016)	Date starte Date comp Inclination Azimuth:	pleted	: 2		:/2024 :/2024	Sheet 6 of 6  Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS
Method R.L. (m)	l enath (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws ws mws racture cs Log	Stratigraphy Defect Description Additional Notes
- - - - 78		× × ×	EUs2	24m: Slightly weathered, grey, fine to medium SANDSTONi very weak. Poorly cemented.      25.38m: Unweathered, grey SILTSTONE; very weak.			100	91	91		25.35m: JT 10° Un, Ro, Cl 25.35m to 25.41m: Not intact.
-	_	× × × × × ×	EUz2	[UNWEATHERED ECBF]  25.67m: Unweathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented.	UW						25.46m to 25.46m: Layers (2) of disseminated black carbonaceous material, bedding <2mm.  25.67m: BP 2° 25.72m: JT 15°
-  -  -  -  -	20	3		25.79m to 25.83m:ŚILTSTONE.  26.05m to 26.15m:siltstone.	UW		100	95	85		25.79m: BP 20° 25.88m: JT 5° Un, Ro, Cl 25.91m: JT 25° St, Ro, Cl 26.05m: BPJT 10° 26.15m: BP 10°
79 - -				<b>26.32m:</b> Unweathered, grey, fine to coarse SANDSTONE; very weak. Moderately cemented.							26.29m: JT 35° PI, Sm, Cl 26.32m: BPJT 2°
-  -  -	27	-	EUs2	<b>26.83m to 27.17m:</b> SILTSTONE.							26.83m: BPJT 2° 26.91m to 26.93m: Not intact. 26.93m: JT 10° PI, Sm, Cl
80	-			27.17m to 27.29m:fine SANDSTONE.	uw						27.17m: BPJT 5° 27.29m: BPJT 10° 27.29m to 27.31m: Not intact. 27.39m: JT 10° PI, Sm, CI
- - - -	28	3		27.83m to 27.92m:SILTSTONE. 27.92m to 28.31m:fine to medium SANDSTONE.			87	79	73		27.83m: BPJT 2° 27.93m to 27.96m: Layers (4) of disseminated black carbonaceous material, bedding <2mm.
81			EUx	28.31m: CORE LOSS.							28.21m to 28.31m: Not intact.
F	_		Ш	28.5m: Unweathered, grey, fine to coarse SANDSTONE; very weak. Moderately cemented.							28.45m: JT 30° Un, Ro, Cl 28.50m to 28.52m: Not intact.
-		0	EUs2	28.8m to 28.86m:SILTSTONE. 28.86m to 29.28m:fine to medium SANDSTONE.	UW						28.67m: JT 5° Un, Ro, Cl 28.73m: JT 5° Un, Ro, Cl
82		× × × × × × ×	EUz2	29.28m: Unweathered, grey SILTSTONE; very weak. Contains very thin 10-45mm beds of fine to medium sandstone, very closely spaced, gently inclined.	UW		91	84	74		29.22m: JT 15° Un, Ro, Cl 29.28m: BPJT 10°
_		××	EUs2	<b>29.6m:</b> Unweathered, grey, fine to coarse SANDSTONE; very weak. Moderately cemented.	UW						29.57m to 29.6m: Disseminated black carbonaceous material, bedding <2mm.  29.74m: JT 15° Pl, Ro, Cl 29.74m to 29.78m: Not intact.
	30		EUx	29.86m: CORE LOSS.							29.82m to 29.86m: Not intact.
2) Two 3) ES re	rdinat /ibrat fers	ing wire p to environ	iezom menta	End of borehole at 30m (Termination Depth Achieved) ng a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy eters (WWP) were installed at 7m bgl (BH45-PZ01) and 21m bgl (BH4 il sample  3178 Correction Factor: 1.398							Water Level Readings: Date Time   Hole Depth   Water Level   21/08/24 16:15   18.00m   1.96 m bgl   22/08/24 12:50   30.00m   2.30 m bgl   22/08/24 12:50   30.00m   2.30 m bgl



Level 3, Te Tihi, 110 Carlton Gore R PO Box 9762, Newmarket Auckland, New Zealand Tel: +64 9 520 6019 www.aurecongroup.com

Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Basque Park

Project Reference: 521290-064

**BH46** 

Sheet 1 of 5

BORE Metho Equip Contra	d: ner	nt:	Ber		Core Wireline Easting: 1756622.41m T46 Northing: 5918739.97m	)	Date starte Date comp Inclination: Azimuth:	oleted	: 2		/2024 /2024	Sheet 1 of 5  Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS
Metilod P I (m)	1X:E: (III)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	www. www. Fracture cs Log	Stratigraphy Defect Description Additional Notes
5	3 -	-			Om: Clayey SILT with some sand and trace gravel; brown grey. Very stiff, moist, high plasticity. Sand is fine to coarse. Gravel is fine to medium, angular basalt. [TOPSOIL]  0.3m to 0.5m:Non-engineered fill including ceramic fragments up to 62mm.  0.7m:Coarse basalt 25 mm.  0.75m:Coarse basalt 30 mm.		0.4m: ISHSV=151/56kPa 0.55m: ISHSV=103/36kPa 0.9m:	100				0.05m to 0.2m: ES BH46_0.05-0.2
5		1		FR	1.25m to 1.35m:Black discolouration, no odour.  1.46m:Trace fine brick fragments. 1.5m to 2.55m:Minor fine to coarse gravel, angular, basalt.  1.82m:Siltstone fragment 23 mm.	МН	1.35m: ISHSV=UTP 1.5m: SPT 2.2// 4.3.3.3 N = 13 1.6m: ISHSV=196/73kPa	100				<b>1.4m to 1.6m:</b> ES BH46_1.4-1.5
5	5	-		Fx	2.37m to 2.43m:5mm black inclusions with burnt-like odour, inclusions are sand and fine angular gravel.  2.55m: CORE LOSS			57				2.55m: Driller added core catcher.
	6	- - -		Fx FR	3m: Sandy SILT with some clay and gravel. Stiff, moist, high plasticity. Sand is fine to coarse. Gravel is fine to coarse, angular, scoriaceous basalt and trace siltstone.  3.1m to 3.11m:10mm grey sandstone inclusion with lead-like odour, breaks down to a sand on reworking.  3.34m: NO RECOVERY	МН	3m: IBTHSV=UTP 3m: SPT 2,2// 3,3,3,3 N = 12	75				
5				FR	3.45m: Sandy SILT with some clay and gravel. Stiff, moist, high plasticity. Sand is fine to coarse. Gravel is fine to coarse, angular scoriaceous basalt and trace siltstone. 3.67m:Glass fragment 8mm. 3.85m:Coarse scoriaceous basalt 50mm.	MH		95				<b>3.5m to 3.6m</b> : ES BH46_3.5-3.6
REMA	RKS			ad usi	4.45m:Coarse scoriaceous basalt 58mm. 4.5m to 5.13m:Minor fine to medium gravel.  ng a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 7	iom as	4.5m: SPT 1,1// 2,2,3,3 N = 10	89 81				Water Level Readings: Date Time I Hole Depth I Water Level
2) Geo 3) ES i	phys efer	sical rs to	profiling environ	g unde menta	ing a Letta Zerio i Extroo pilos sinan antenna, with notizonial accuracy of a retaken downhole on 26/08/2024, comprising an Optical and Acoustic Tele il sample  3178 Correction Factor: 1.398			oun.				Date Time   Hole Depth   Water Level   26/08/24 08:50   15.00m   5.16 m bg    26/08/24 14:50   21.00m   5.69 m bg    27/08/24 08:00   21.00m   6.04 m bg    28/08/24 12:15   21.00m   6.33 m bg

<sup>1)</sup> Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 7cm and vertical accuracy of 8cm.
2) Geophysical profiling undertaken downhole on 26/08/2024, comprising an Optical and Acoustic Televiewer.
3) ES refers to environmental sample



Level 3, Te Tihi, 110 Carlton Gore Ro PO Box 9762, Newmarket Auckland, New Zealand Tel: +64 9 520 6019 www.aurecongroup.com

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Project: WIWQIP Motions Catchment Improvements

Location: Basque Park
Project Reference: 521290-064

**BH46** 

Sheet 2 of 5

Me Equ	REH thod: uipme ntrac	ent:	Ber		Core Wireline T46	CO-ORDINATE Easting: Northing: Ground level:	S: NZTM2000 1756622.41m 5918739.97m 52.67m (NZVD2016)	)	Date starte Date comp Inclination Azimuth:	oleted	: 2		/2024 /2024		Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS		
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	faterial Descript	ion	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws ws mws Fracture		Stratigraphy Defect Description Additional Notes	Installation	
НОЗ	58	_ _ _ _		FR	5.13m: Clayey SILT v brownish orange with high plasticity. Sand i medium, angular bas 5.5m to 5.55m:2mr Inclusions are sand a	greenish grey incles fine to medium. ( alt.  m black inclusions and fine decompos	usions. Stiff, moist, Gravel is fine to with burnt-like odour. ng wood fragments.	МН		81					5.55m: EAST COAST BAYS FORMAT	ON	- - -
	  - 	6	×	ERZ	5.55m: Clayey SILT v mottled grey. Stiff, modium. [RESIDUAL 5.8m: CORE LOSS	oist, high plasticity.	ownish orange Sand is fine to	MH	- 16m:								-
U54	59	_		ERx	6m: PUSHTUBE. Silty SAND; brownish non-plastic to slightly 6.24m:Sandy SILT; slightly moist, slight to	plasticity. Sand is brownish orange.	Stiff to very stiff,		IBHSV=140/64kPa	80				: :			-
SPT	- - -		/ \ × × × × × ×	ERs	6.42m:Silty SAND; Medium dense, mois fine to coarse. 6.5m: Silty fine to me grey. Loose, moist, u 6.76m:Fine black o sand on reworking.	t, non-plastic to slig dium SAND; brown niformly graded.	tht plasticity. Sand is	МІ	6.5m: SPT 1,1// 2,2,1,2 N = 7	89					<b>5.95m:</b> Major loss of drilling fluid, drille		1/2025
НОЗ	60		× × ×	××	7.09m to 7.15m:SII		gments.			55					n. Major ioss of crilling fluid, drille added casing.		Date Generated: 18/02
SPT	_ - -	- - -	× ×	ERs ERx	<b>7.5m:</b> Silty fine to me grey. Loose, moist, u <b>7.65m:</b> NO RECOVE	niformly graded.	nish orange mottled	MI	7.5m: SPT 0,1// 1,1,1,1 N = 4	33				<b>7</b>	<b>7.5m to 7.8m:</b> ES BH46_7.5-7.8		NS CATCHMENT IMPROVEMENTS LOG Date Generated: 18/02/2025
60	 	8	× : : : : : : : : : : : : : : : : : : :	ERz ERx	7.95m: Sandy SILT v streaked grey. Stiff, n medium.			MI-SF	-								
НОЗ	61	_	×	ERs	8.04m to 8.06m:Sil	parse SAND; brown et. [COMPLETELY	WEATHERED ECBF]	SM		100							GDT Report File: 01 MOTIC
	_	_ - - -			SANDSTŎNÉ; extrer SAND). 8.88m to 9.07m:SII	nely weak. Poorly (	cemented. (Silty	HW							<b>3.5m to 8.7m</b> : ES BH46_8.5-8.7		Template: DATATEMPLATE
SPT	62	9		EWs	9.07m: Moderately w SANDSTONE; very v		to medium		9m: IBHSV=UTP -9m: SPT 5,8// 18,32 N = 50+	100			                   <del>     </del>		<b>9m to 9.3m</b> : ES BH46_9.0-9.3		Y_20240925_V13 (1).GLB
НОЗ	- - - - -				<b>9.66m to 9.84m</b> :Fir	ne to coarse.		MW		100	100	100	l i l i		9.80m: JT 20° Un, Ro, Cl		Database File: CC2 MOTIONS MASTER 02(LL).GPJ Library file: LBRARY 20240925 V18 (1).GLB Template: DATATEMPLATE.GDT
1) (	Geoph	(S: dinates	l profilin	g unde			ith horizontal accuracy of 70 n Optical and Acoustic Telev			f 8cm.				2 2 2 2	Nater Level Readings: Date Time   Hole Depth   Water Level 26/08/24 08:50   15.00m   5.16 m bgl 66/08/24 14:50   21.00m   5.69 m bgl 77/08/24 08:00   21.00m   6.04 m bgl 88/08/24 12:15   21.00m   6.33 m bgl		File: CC2 MOTIONS MAS
Hai	nd Sh	ear Va	ane Seri	al No:	3178 Correction Factor:	1.398											Database



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Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Basque Park
Project Reference: 521290-064

**BH46** 

Sheet 3 of 5

Method: Equipment: Contractor:	Ber		Core Wireline T46	CO-ORDINATES: NZTM200 Easting: 1756622.4 Northing: 5918739.5 Ground level: 52.67m (N	11m		Date starte Date comp Inclination: Azimuth:	leted	: 2		/2024 /2024	Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS
R.L. (m) Length (m)	Graphic Log	Layer Code	N	/laterial Description	Weathering/USC	Ď	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture ws Fracture cs Log	
63 -		EWs	10.23m to 10.34m:disseminated black of 15°. 10.42m to 10.5m:S	eathered, grey, fine to medium weak.  SILTSTONE with minor beds of arbonaceous material, <2mm, in sILTSTONE with trace beds of arbonaceous material, <2mm, in arbonaceous material, <2mm, in a second		10.	.5m: SPTC .35 for 100mm//		100 N/A			10.25m: JT 20° Un, Ro, Cl
11	× × × × × × × × × × × × × × × × × × ×	EUz2	10.6m: Slightly weath 10.85m: Slightly weath	nered, grey SILTSTONE; very weathered, grey, fine to medium weak. Poorly cemented.	eak. sw	N =	= 50+					
64		EUs2	11.48m to 11.59m:	SILTSTONE.	sw	,		100	100	100		         11.48m: BP 5°   
12			<b>12.1m:</b> Slightly weath very weak. Moderate	nered, grey, medium SANDSTO ly cemented.	NE;	15, N =	m: SPTC ,35 for 100mm// = 50+	N/A	N/A	N/A		12m: SPTc bouncing   ES BH46_12.0-12.1   Water pressure permeability test   BH46_PPT01 12.0-13.5 m
-	× × × × × × × × × × × × × × × × × × ×	EUz2	12.39m: Slightly weat Contains minor beds material <2mm, inclin	thered, grey, SILTSTONE; very of disseminated black carbonac led 15°.	weak. ceous	,		100	100	98		   12.56m: BPJT 30° PI, Sm, CI
13 - 13 - 66		EUs2	weak. Poorly cement	thered, grey, fine SANDSTONE; ted. Contains trace beds of disse material <2mm, inclined 10°.		,		100	100	90		 
	× × × × × × × × × × × × × × × × × × ×			thered, grey SILTSTONE; very v	weak.							13.61m: BP 20°  13.79m: BP 10° 13.81m: BP 15°
67 -	× × × × × × × × × × × × × × × × × × ×	EUz2	<b>14.39m to 14.7m:</b> .F	ine to medium SANDSTONE.	sw	,		98	95	93		14.14m: JT 20° Un, Ro, Cl   14.25m: BP 15° 
15 REMARKS: ) Co-ordinate	× × × × × × × × × × × × × × × × × × ×	ed usi	14.79m to 14.82m: disseminated black congressions a Leica Zeno FLX100 ertaken downhole on 26/0	accuracy of 7cm ar	nd ve	ertical accuracy of	8cm.					



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Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Basque Park

Project Reference: 521290-064

**BH46** 

Sheet 4 of 5

Meth Equi	REHOD: hod: ipme tract	ent:	Ber		ore Wireline Easting: 1756622.41m F46 Northing: 5918739.97m		Date starte Date comp Inclination: Azimuth:	letec	l: 2		3/2024 3/2024	Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture cs Log	Stratigraphy Defect Description Additional Notes
-	68		× × × × × × × × × × × × × × × × × × ×	EUz2	13.36m: Slightly weathered, grey SILTSTONE; very weak. 15.12m to 15.36m:Fine SANDSTONE.	sw						15.04m: JT 10° PI, Sm, Cl
HQ3	- - - - 69				15.66m: Slightly weathered, grey, fine to medium SANDSTONE; very weak. Poorly cemented.  15.89m to 16.15m:SILTSTONE.			98	97	84		15.66m: BP 2°  15.89m: BP 25°  16.15m to 16.24m: Beds (6) of disseminated black carbonaceous material <2mm, inclined 2-5°. 16.15m: BP 5° 16.23m: JT 10° PI, Sm, CI 16.41m: JT 30° PI, Ro, CI
HQ3	70			EUs2	16.57m to 17.62m:Moderately thin 40-120mm beds of siltstone.  16.74m to 16.79m:Moderately cemented.  17.16m to 17.21m:Medium to coarse.	sw		75	68	40		16.57m: JT 5° PI, Sm, CI 16.61m: BP 15° 16.66m: JT 20° PI, Sm, CI 16.74m: JT 10° PI, Sm, CI  17.01m to 17.1m: Beds (3) of disseminated black carbonaceous material <2mm, inclined 10°. 17.01m: BP 5° 17.24m: BP 20° 17.28m: JT 7° PI, Ro, CI 17.33m: JT 10° PI, Sm, CI 17.44m: JT 40° Un, Ro, CI 17.52m to 17.62m: Not intact
-	- - - - - - 71		× × × × × × × × × × × × × × × × × × ×	EUs2 EUx	17.62m: CORE LOSS  18m: Slightly weathered, grey, fine to coarse SANDSTONE; very weak. Moderately cemented.  18.12m: Slightly weathered, grey SILTSTONE; very weak. Contains moderately thin 45-180mm beds of fine to medium sandstone.	SW						18.12m: BP 10°  18.25m: JT 10° St, Sm, Cl  18.28m to 18.29m: Disseminated black carbonaceous material <2mm. inclined 15°.
HQ3	- - - - - - -		× × × × × × × × × × × × × × × × × × ×	EUz2	19.16m: CORE LOSS	SW		77	77	76		18.30m: BP 20° 18.35m: BP 30°  18.68m: BP 15° 18.77m: BP 25°  18.95m: BP 18°
HQ3	72		× × × × × × × × × × × × × × × × × × ×	EUz2 EUx	19.5m: Slightly weathered, grey, SILTSTONE; very weak. Contains laminated 2-7mm beds of fine sandstone.	sw		98	97	91		19.86m: JT 10° PI, Ro, CI

Co-ditaliates captured using a Letta Zeno FLX for plus smart antenna, with notizontal accuracy of zen and 22) Geophysical profiling undertaken downhole on 26/08/2024, comprising an Optical and Acoustic Televiewer.

 See refers to environmental sample

Hand Shear Vane Serial No: 3178 Correction Factor: 1.398



Level 3, Te Tihi, 110 Carlton Gore PO Box 9762, Newmarket Auckland, New Zealand Tel: +64 9 520 6019 www.aurecongroup.com

**Watercare Services Ltd** Client:

Project: WIWQIP Motions Catchment Improvements

Location: Basque Park

Project Reference: 521290-064 **BH46** 

Sheet 5 of 5

M	OREH ethod: quipmontrac	ent:	Ber		Core Wireline T46	CO-ORDINATES: NZTM200 Easting: 1756622.4 Northing: 5918739.9 Ground level: 52.67m (N	11m		Date starte Date comp Inclination: Azimuth:	leted	l: 2		3/2024 3/2024	Logged by: THH Input by: THH Checked by: BGW Reviewed by: SS	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	Material Description		Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws wws Fracture cs vcs Log Ecs	Stratigraphy Defect Description Additional Notes	Installation
HO3		- - - -	× × × × × × × × × × × × × × × × × × ×	EUz2	Contains lāminated 2	nered, grey, SILTSTONE; very w 2-7mm beds of fine sandstone. Fine to medium SANDSTONE.	eak.	sw		98	97	91	2	0.42m: BP 2° 0.49m: JT 20° PI, Ro, CI 0.58m: BP 2° 0.69m: BP 10°	

End of borehole at 21m (Termination Depth Achieved)

20.92m: JT 15° PI, Sm, Cl 20.96m to 20.98m: Beds (2) of disseminated black carbonaceous material <2mm, inclined 20°.

REMARKS:

1) Co-ordinates captured using a Leica Zeno FLX100 plus smart antenna, with horizontal accuracy of 7cm and vertical accuracy of 8cm.
2) Geophysical profiling undertaken downhole on 26/08/2024, comprising an Optical and Acoustic Televiewer.
3) ES refers to environmental sample

| Water Level Readings: | Date Time | Hole Depth | Water Level | 26/08/24 08:50 | 15.00m | 5.16 m bg| | 26/08/24 14:50 | 21.00m | 5.69 m bg| | 27/08/24 08:00 | 21.00m | 6.04 m bg| | 28/08/24 12:15 | 21.00m | 6.33 m bg|

Database File: CC2MOTIONS MASTER 02(41).GPJ Library file: LBRARY\_20240925\_V13 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 181022025



Tel: +64 9 520 6019

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: 43 Cooper Street Project Reference: 521290-064 **BH48** 

Sheet 1 of 6

BOREHOLE INFORMATION **CO-ORDINATES: NZTM2000** Date started: 1/07/2024 Logged by: AP Rotary Core Wireline Hydrapower Trekker 2100 Drill Force NZ Ltd 1755526.25m Method: Easting: Date completed: 4/07/2024 Input by: Equipment: Northing 5918324.69m Inclination: -90° Checkéd by: 34.39m (NZVD2016) N/A Reviewed by: SS Contractor: Ground level: Azimuth: Weathering/USC Graphic Log Code Fracture Log Installation Length (m) Stratigraphy  $\Xi$ Testing TCR (%) 8 % Method Defect Description SCR ( RQD ( Material Description R.L Layer Additional Notes 0m: FILL 0.05m to 0.2m: ES BH48\_0.05-0.2 ۵ 0.1m: Silty coarse GRAVEL with some cobbles and concrete; grey. Tightly packed, moist. Gravel is sub-angular, slightly weathered basalt. Cobbles and concrete up to 250mm. Cobbles are slightly weathered, moderately strong basalt. GM 34 111110.5m: ISHSV=UTP 0.6m: CLAY; brown. Very stiff, moist, high plasticity. 0.6m: EAST COAST BAY FORMATION [RESIDUAL ECBF] 0.6m: Residual ECBF soils? ISHSV=139/21kPa ERc CL 33 0 1.5m: ISHSV=118/19kPa 1.5m:...Light brown with orange. Very stiff. 2 **2m**: Silty fine SAND; light brown. Dense, moist. [COMPLETELY WEATHERED ECBF] 2m: ISHSV=139/34kPa 32 ERS 2.5m: ISHSV=UTP 3 **3m:** Moderately weathered, grey mottled orange, SILTSTONE; extremely weak. (SILT). 3m: ISHSV=UTP 3m: EAST COAST BAYS FORMATION 3m: SPT 1,0// 5,10,25,10 for 3m to 3.1m: ES BH48\_3-3.1 3.2m: Moderately weathered, grey, fine to medium SANDSTONE; poorly cemented, extremely weak. (Silty SPT 3.2m: EAST COAST BAY FORMATION 89 25mm N = 50+ MW 31 SAND) **3.45m:** Moderately weathered, grey, SANDSTONE; very weak. Poorly cemented. **3.56m to 3.66m:..**Black carbonaceous material disseminated through layer. MW НОЗ 4 95 95 95 3.95m to 4.05m:...SILTSTONE; very weak. 10mm black carbonaceous material along top boundary. **4.22m:** Slightly weathered, grey, SILTSTONE; very weak. **4.23m to 4.28m:**...Subhorizontal layer of black carbonaceous ×××××××× 30 material disseminated throughout. EU<sub>z</sub>2 4.5m: SPTC 5,12// 50 **4.5m:** Moved to SPTc due to being in competent rock. SPTC N/A N/A N/A N = 50+ 4.73m: Slightly weathered, grey, fine to medium SANDSTONE; very weak. Moderately cemented. 4.8m to 4.89m:...SILTSTONE. 5mm gently inclined black 76 carbonaceous material layer on bottom boundary of the REMARKS

Hand Shear Vane Serial No: 1378 Correction Factor: 1.479

Water Level Readings:
Date Time | Hole Depth | Water Level |
01/07/24 16:00 | 7.50m | 1.18 m bg| 02/07/24 08:00 | 7.50m | 2.00 m bg| 02/07/24 15:30 | 27.00m | 3.00 m bg| 03/07/24 07:30 | 27.00m | 6.72 m bg| 03/07/24 10:30 | 27.00m | 8.44 m bg| 03/07/24 10:20 | 30.00m | 8.44 m bg| 03/07/24 16:20 | 30.00m | 4.90 m bg| 04/07/24 12:00 | 30.00m | 5.54 m bg|

<sup>1)</sup> Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 4cm and vertical accuracy of 4cm.
2) Geophysical profiling undertaken downhole on 03/07/24, comprising of optical and acoustic televiewer down the length of the hole.
3) ES refers to Environmental Sample.

<sup>4)</sup> Vibrating wire piezometer (VWP) were installed at 5.5 m bgl (BH48\_PZ01) and 17m bgl (BH48\_PZ02). S/N: 361080 and 366174.



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Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 43 Cooper Street Project Reference: 521290-064 **BH48** 

Sheet 2 of 6

	Met Equ	REH hod: iipme itract	ent:	Hyd	ary C Irapo	TION Core Wireline ower Trekker 2100 ce NZ Ltd	CO-ORDINATES: NZTM2000 Easting: 1755526.25m Northing: 5918324.69m Ground level: 34.39m (NZVD2016)	)	Date starte Date comp Inclination: Azimuth:	oleted	: 4		/2024 /2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture cs Log	Stratigraphy Defect Description Additional Notes	Installation
		_ _ _ 	_ _ _		EUs2	SANDSTONE; very v	nered, grey, fine to medium weak. Moderately cemented. LTSTONE. Black carbonaceous intal bands, 10mm, on bottom boundary.	sw						m to 5.20m: JT 80° Un, Sm, Cl m: JT 60° Un, Sm, Cl	
Box 1	HQ3		 - -	× × × × × × × × ×		5.6m: Slightly weather	ered, grey, SILTSTONE; very weak.		-	94	76	63		m to 5.61m: JT 65° Un, Sm, Cl n: Core damaged during removal from s to core box.	
-	SPTC	<del> </del>	6	× × × × × × × × × × × × × × × × × × ×	EUz2	6.2m: Slightly weather	ered, grey, fine to medium	sw	6m: SPTC 7,31// 50 for 45mm N = 50+	N/A	N/A	N/A		m: BP 15° SPTs terminated due to N=50+ being eved 3 times.	
			-  -  -  -			SANDSTŎNÉ; very v	weak. Moderately cemented.	sw						n <b>to 6.7m:</b> ES BH48_6.5-6.7	
	HQ3		7		EUs2			sw	_	96	88	88		Core damaged during removal from s.	
			_	× ×		7.47m to 7.57m:SII	LTSTONE, weak.							m: JT 45° Pl, Ro, Cl	
Box 2		<del>-</del> -	8	× × × × × × × × × × × × × × × × × × ×	EUz2		rey, fine to medium SANDSTONE;	UW						m to 8.00m: JT 70° PI, Ro, CI	
	HQ3	_ 	- - - -			8.4m to 8.6m:Very				100	75	73		m to 8.60m: JT 80° PI, Ro, CI	
		- - - -	9		EUs2	8.84m to 9.15m:SII black carbonaceous	LTSTONE; weak. Subhorizontal bed of material, 10mm.	UW							
Box 3	HQ3					9.5m to 9.65m:SIL	TSTONE.			93	93	93	9.60	m: JT 40° PI, Sm, Cl m: JI 50° PI, Ro, Cl	
-	1) C 2) G 3) E 4) V	Geoph S refe ibrati	dinate: nysica ers to ng wir	s captur I profiling Environ	g unde menta meter	ertaken downhole on 03/0 al Sample.	plus smart antenna, with a horizontal accuracy 4.7/24, comprising of optical and acoustic televiewe .5 m bgl (BH48_PZ01) and 17m bgl (BH48_PZ02	er dow	n the length of the ho	ole.			Date 01/07 02/07 03/07 03/07 03/07	r Level Readings: Time   Hole Depth   Water Level 7/24 (16:00   7.50m   1.18 m bg  7/24 (16:00   7.50m   2.00 m bg  7/24 (16:30   27.00m   3.00 m bg  7/24 (17:30   27.00m   6.72 m bg  7/24 (10:00   30.00m   8.44 m bg  7/24 (16:20   30.00m   4.90 m bg  7/24 (12:00   30.00m   5.54 m bg	KAKKA.



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Hand Shear Vane Serial No: 1378 Correction Factor: 1.479

Client: Watercare Services Ltd

**Project: WIWQIP Motions Catchment Improvements** 

Location: 43 Cooper Street
Project Reference: 521290-064

**BH48** 

Sheet 3 of 6

Database File: CC2MOTIONS MASTER 02(4H).GPJ Library file: LIBRARY \_20240925\_V/3 (1).GLB Template: DATATEMPLATE.GDT Report File: 01 MOTIONS CATCHMENT IMPROVEMENTS LOG Date Generated: 19/02/2025

Met Equ	REH hod: ipme tract	ent:	Hyd	ary C drapo	CON Core Wireline wer Trekker 2100 ce NZ Ltd	CO-ORDINATES: NZTM2000 Easting: 1755526.25m Northing: 5918324.69m Ground level: 34.39m (NZVE			Date starte Date comp Inclination Azimuth:	oletec	d: 4		2024 2024		Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	M	laterial Description		Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture		Stratigraphy Defect Description Additional Notes	loctollotion
HQ3	_ _ _ _ 24	-			weak. Moderately cer 10.05m to 10.3m:S subhorizontal bands of	ey, fine to medium SANDSTONE; mented. ILTSTONE. Two thinly laminated, of black carbonaceous material, iced, on top boundary.				93	93	93		out b	<b>n to 10.5m:</b> Core loss due to washing ottom.	
НОЗ	_	_ _ _ _ 			10.63m to 11.04m:\$ 11.04m to 11.11m:\$ carbonaceous materi	Subhorizontal laminated black				97	97	97				
	23				11.62m to 11.69m:\$ 11.82m to 11.88m:\$ 11.88m to 12.05m:\$ disseminated through	SILTSTONE. Black carbonaceous material								                 11.95	<b>5m to 12m:</b> Core loss 0.05m.	
HQ3				EUs2		SILTSTONE.		UW		88	68	68		!	5m to 12.99m: JT 60° PI, Ro, CI	
					13.81m to 14.01m:\$	SILTSTONE. Band of black carbonaceous materia	al.							Core	<b>n to 15m:</b> Core washed out bottom. broken on multiple attempts of vval.	
HQ3	20			EUx	14.54m: CORE LOSS					69	36	36		Drille Tetrie too d	Im: East Coast Bays Formation Im to 15m: Drill induced core loss. In had to go back down multiple times to tive core. Core was retrieved but was amaged to add to corebox. Was noted ore loss due to not being able to log the	
1) C 2) G 3) E	eoph S refe	linates ysical ers to	profiling Environ	g unde imenta	ertaken downhole on 03/07 al Sample.	olus smart antenna, with a horizontal accu 7/24, comprising of optical and accustic te 5 m bgl (BH48_PZ01) and 17m bgl (BH4	eleviewer	down tl	ne length of the ho	le.				Water Date 01/07/ 02/07/ 02/07/ 03/07/ 03/07/ 03/07/	r Level Readings: Time   Hole Depth   Water Level   224 16:00   7.50m   1.18 m bg    224 16:00   7.50m   2.00 m bg    224 16:00   27.00m   3.00 m bg    224 07:30   27.00m   6.72 m bg    224 07:30   27.00m   8.44 m bg    224 16:20   30.00m   8.49 m bg    224 16:20   30.00m   4.90 m bg    224 12:00   30.00m   5.54 m bg	



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Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 43 Cooper Street Project Reference: 521290-064 **BH48** 

Sheet 4 of 6

Me Ec	OREH ethod quipm ontrac	: ient:	Hye	tary ( drapo	TION Core Wireline ower Trekker 2100 ce NZ Ltd	CO-ORDINATES: NZTM2000 Easting: 1755526.25m Northing: 5918324.69m Ground level: 34.39m (NZVD2016	)	Date starte Date comp Inclination: Azimuth:	leted	l: 4		2024 2024	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	faterial Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture	
HQ3				EUs	cemented.	grey, SANDSTONE; weak. Well	UW		95	95	95		
Box 5 HQ3			× × × × × × × × × × × × × × × × × × ×	EU22	16.87m to 16.92m: material disseminate	d, grey, SILTSTONE; weak.  5mm layer of black carbonaceous d throughout. d, grey, SANDSTONE; weak. Well	UW		100	87	85		
HQ3 Box 6 HQ3		19		EUs2	18.4m to 18.5m:SI carbonaceous mater  18.73m to 19m:SIL	TSTONE. 10mm of laminated black ial layers extremely closely spaced.  TSTONE.	UW		100	73	70		
1) 2) 3) 4)	Geopl ES re Vibrat	dinate hysica fers to ting wi	es captur al profilin Enviror re piezo	g undenmenta meter	ertaken downhole on 03/0 al Sample.	plus smart antenna, with a horizontal accuracy 4c 7/24, comprising of optical and acoustic teleview .5 m bgl (BH48_PZ01) and 17m bgl (BH48_PZ02	er dow	n the length of the ho	le.				



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Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: 43 Cooper Street Project Reference: 521290-064 **BH48** 

Sheet 5 of 6

N E	leth quip	od: ome	DREHOLE INFORMATION ethod: Rotary Core Wireline Hydrapower Trekker 2 Drill Force NZ Ltd				CO-ORDINATES Easting: Northing: Ground level:	5: NZTM2000 1755526.25m 5918324.69m 34.39m (NZVD2016)	)	Date sta Date co Inclinati Azimuth	ompleted ion:	: 4		2024 2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS	
Location A	Metrod	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	∕laterial Descripti	on	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws Fracture	Stratigraphy Defect Description Additional Notes	Installation
Box 6	H	14	- - - - -			16.92m: Unweathers cemented. 20.17m to 20.48m: 20.61m to 20.88m:	SILTSTONE.	NE; weak. Well			100	100	100	1111	20.00m: BP 10°	
		13				21.03m to 21.08m:\$ 21.18m to 21.3m:\$	SILTSTONE.	:arbonaceous								
Ğ	-				2	material fragments d boundary. 21.79m to 22.03m:	isseminated 10mm				100	100	100		21.70m: JT 25° PI, Ro, CI 22.00m: BP 40°	
Box 7	-	-   -   -   -   -   -   -   -   -   -			EUs2				UW						<b>22.75m</b> : BP <5°, RO, CI <b>23.15m</b> : BP <5°, RO, CI	
		- 11				23.64m to 23.76m: S					97	97	97			
Box 8		10	- - - - - - - - 25			24.48m to 24.78m: material bands 30mi					100	97	97		24.35m: JT 45° Ro, Cl	
1 2 3 4	) Co ) Ge ) ES ) Vib														Water Level Readings: Date Time   Hole Depth   Water Level 01/07/24 16:00   7.50m   1.18 m bg  02/07/24 08:00   7.50m   2.00 m bg  02/07/24 08:30   27.00m   3.00 m bg  03/07/24 07:30   27.00m   6.72 m bg  03/07/24 10:00   30.00m   8.44 m bg  03/07/24 10:00   30.00m   8.44 m bg  03/07/24 10:00   30.00m   8.45 m bg  04/07/24 12:00   30.00m   5.54 m bg	

<sup>4)</sup> Vibrating wire piezometer (VWP) were installed at 5.5 m bgl (BH48\_PZ01) and 17m bgl (BH48\_PZ02). S/N: 361080 and 366174.



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Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: 43 Cooper Street Project Reference: 521290-064 **BH48** 

quipment: Hydrontractor: Drill	tary Core Wireline drapower Trekker 2100 II Force NZ Ltd	CO-ORDINATES: NZTM2000 Easting: 1755526.25m Northing: 5918324.69m Ground level: 34.39m (NZVD2016)  Material Description	·	Inclination Azimuth:	pleted	: 4	/07/2 //07/2 90° N/A	2024 2024	Logged by: AP Input by: AP Checked by: PK Reviewed by: SS							
R.L. (m) Length (m) Graphic Log	Layer	Material Description	g/USC	Rotary Core Wireline Easting: 1755526.25m Date completed: 4 ent: Hydrapower Trekker 2100 Northing: 5918324.69m Inclination: - tor: Drill Force NZ Ltd Ground level: 34.39m (NZVD2016)												
::::	16.92m: Unweathe		Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws wws Fracture cs Log vcs Log	Stratigraphy Defect Description Additional Notes	Installation						
9	cemented.	red, grey, SANDSTONE; weak. Well			100	97	97									
		<b>25.85m</b> :SILTSTONE.			100	100	100		<b>6.2m</b> : BP <5° <b>6.8m</b> : BP <5°							
7	black carbonaceou 27.4m to 27.5m:  27.6m to 27.62m:. 20mm width. 27.7m to 27.79m:.  28.05m to 28.28m	SILTSTONE.  Band of black carbonaceous material,  SILTSTONE.	UW		93	93	93									
					100	100	100	2	8.5m: Core damaged from removal from plits.							
REMARKS: End of borehole at 30m (Termination Depth Achieved) 1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy 4cm and vertical accuracy of 4cm. 2) Geophysical profiling undertaken downhole on 03/07/24, comprising of optical and acoustic televiewer down the length of the hole. 3) ES refers to Environmental Sample. 4) Vibrating wire piezometer (VWP) were installed at 5.5 m bgl (BH48_PZ01) and 17m bgl (BH48_PZ02). S/N: 361080 and 366174.  BY Water Level Readings: Date Time   Hole Depth   Water Level 01/07/24 fic8/00   7.50m   1.18 m bgl 02/07/24 fic8/00   7.50m   1.20 m bgl 02/07/24 fic8/00   7.50m   1.20 m bgl 03/07/24 fic8/00   30.00 m bgl 03/07/24 fic8/00   30.00 m bgl 03/07/24 fic8/00   30.00 m   4.49 m bgl 03/07/24 fic8/00   30.00 m   4.90 m bgl 04/07/24 fic8/00   30.00 m   5.54 m bgl																

<sup>1)</sup> Co-ordinates captured using a Leico Zeno FLX rou plus smart amerina, with a nonzontal accuracy 4cm and vertical accuracy of 4ci 2) Geophysical profiling undertaken downhole on 03/07/24, comprising of optical and acoustic televiewer down the length of the hole. 3) ES refers to Environmental Sample. 4) Vibrating wire piezometer (VWP) were installed at 5.5 m bgl (BH48\_PZ01) and 17m bgl (BH48\_PZ02). S/N: 361080 and 366174.



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Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Arch Hill Reserve

Project Reference: 521290-064

**BH49** 

www.aurecor	ngroup.com	1	Project Reference: 5212	90-064							Sheet 1 of 4	
BOREHOLE Method: Equipment: Contractor:	Rota Mas	ary C senz	fore Wireline Easting: 1755462. Northing: 5918300.	64m		Date starte Date comp Inclination: Azimuth:	leted	l: ′	3/07/2 12/07 90° N/A	2024 /2024	Logged by: GMR Input by: GMR Checked by: BGW Reviewed by: SM	
Method R.L. (m) Length (m)	Graphic Log	Layer Code	Material Description		Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws Fracture cs Log	Stratigraphy Defect Description Additional Notes	Installation
		_	<b>0m:</b> SILT with minor clay and trace organics; greyish Stiff, moist, low plasticity. Organics are amorphous. [	brown. [TOPSOIL]	ML						0m: FILL 0.05m to 0.2m: ES BH49_0.05-0.20m	0.0
			<b>0.2m</b> : Silty CLAY with some gravel; brown. Very stiff, high plasticity. Gravel is slightly weathered, subangu greywacke. [FILL]			0.35m: ISHSV=129/39kPa					<b>0.3m to 0.4m</b> : ES BH49_0.30-0.40m <b>0.35m</b> : ES BH49_0.35m	0 00
		Fc	0.5m to 0.9m:some fine sand, stiff.			0.5m: ISHSV=76/34kPa					<b>0.5m to 0.6m:</b> ES BH49_0.50-0.60m	<b>V</b>
£		Ľ	0.9m:brownish grey.			0.8m: ISHSV=84/17kPa	100				<b>1m to 1.1m</b> : ES BH49_1.00-1.10m	
			1.2m: Silty CLAY; light orange mottled grey. Stiff, mo plasticity. [RESIDUAL SOIL ECBF]	pist, high							1.2m: EAST COAST BAYS FORMATION	4 4
+-	*	ERc			СН	1.5m:					1.4m to 1.5m: ES BH49_1.40-1.50m	4 0
	×   ×   ×   ×   ×   ×   ×   ×   ×   ×		1.85m: CORE LOSS.			ISHSV=86/11kPa 1.5m: SPT 1,0// 0,0,1,1 N = 2	78					
2		ERX	1.95m: CUAY with some silt and minor sand; light gramottled orange. Stiff, moist, high plasticity. Sand is file									0 0
		ERc			СН		86					0 0 0 0 0
24		×	2.85m: CORE LOSS.								2.7m to 2.8m: ES BH49_2.70-2.80m	Z 0
<u> </u>		H	<b>3m:</b> Sandy CLAY with some silt; light grey mottled or Firm, moist, high plasticity. Sand is fine.	range.		3m: IBHSV=27/0kPa 3m: SPT					3m: SPT sunk under own weight.	4 4
			3.1m:light grey.			0,0// 0,0,0,0 N = 0	100					Z 0 Z 0
23			<b>3.65m:</b> CLAY with some silt and sand; light grey mot orange. Firm, moist, high plasticity. Sand is fine.	ttled light								
		ERc					95					V V V
												V 0
22						4.5m: IBHSV=47/15kPa 4.5m: SPT 0,1// 0,1,1,1 N = 3	100				<b>4.45m to 4.5m</b> : Core loss	
REMARKS: ) Co-ordinate ) Geophysica ) ES = Enviro	Il profiling Inmental wire piezo	unde Samp omete	ng a Leico Zeno FLX100 plus smart antenna, with a horizonta rtaken downhole on 11/07/2024, comprising an Optical and A le. r (VWP) was installed at 17m bgl (BH49-PZ01), serial no. 36 BH49A-PZ01), serial no. 366078.	Acoustic Televie	wer.		of 3cn		pprox		Water Level Readings: Date Time   Hole Depth   Water Level 10/07/24 14:45   15.00m   3.05 m bg  11/07/24 08:00   15.00m   5.53 m bg  11/07/24 41:10   20.00m   2.90 m bg  12/07/24 07:30   20.00m   5.53 m bg  12/07/24 07:30   20.00m   5.53 m bg  12/07/24 11:30   20.00m   5.69 m bg	, <b>7</b> b
land Shear V	ane Seria	al No:	3178 Correction Factor: 1.398									

<sup>3)</sup> L3 - Environmental sample.

A) A vibrating wire piezometer (VWP) was installed at 17m bgl (BH49-PZ01), serial no. 365173. An additional VWP was installed in BH49A, approx. 1m east of BH49, at 7m bgl (BH49A-PZ01), serial no. 366078.



Level 3, Te Tihi, 110 Cariton Gore R PO Box 9762, Newmarket Auckland, New Zealand Tel: +64 9 520 6019 www.aurecongroup.com

Hand Shear Vane Serial No: 3178 Correction Factor: 1.398

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Arch Hill Reserve
Project Reference: 521290-064

**BH49** 

Sheet 2 of 4

INFOR	ΙΔΜ								
Mas	ary C ssenz	CO-ORDINATES: NZTM2000	· .	Date starte Date comp Inclination Azimuth:	oleted	i: 1 -		2024 7/2024	Logged by: GMR Input by: GMR Checked by: BGW Reviewed by: SM
Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws with the way with the way with the with the way willi	Stratigraphy Defect Description Additional Notes
	ERc	4.95m:soft, minor fine SAND. 3.65m: CLAY with some silt and sand; light grey mottled light orange. Firm, moist, high plasticity. Sand is fine.							4.95m: Cased to 3m. 5m to 5.1m: ES BH49_5.00-5.10m
× × × × × × × × × × × × × × × × × × ×	:Rz	<b>5.3m:</b> SILT with some clay; light grey. Stiff, moist, high plasticity. [COMPLETELY WEATHERED ECBF]	МН		100			                 	
× × × × × × × × × × × × × × × × × × ×		5.75m:very stiff, streaked dark brownish grey. 5.8m:some fine SAND. 5.9m: Highly weathered, light greenish grey, silty medium							5.9m to 6m: ES BH49_5.90-6.00m
		SANDSTONE; extremely weak. Poorly cemented. (Silty SAND)  6.15m to 6.25m:fine SANDSTONE.	HW	6m: SPT 1,1// 3,4,5,6 N = 18	100				
	EWs	6.35m to 6.4m:SILTSTONE. 6.55m: Moderately weathered, greenish grey, medium					6.45m: Changed from extended nozzle to normal nozzle at 7m. 6.5m: Drill induced breaks - discing.		
		SANDSTONE; extremely weak. Moderately cemented.	MW						6.55m to 6.75m: JT 70° Un, Ro, CĪ
	EWx	7m: CORE LOSS.  7.15m: Slightly weathered, light grey, fine SANDSTONE; very weak. Moderately cemented.			86	33	33		
	-	<b>7.5m:</b> Slightly weathered, light grey, medium SANDSTONE;	SW	7.5m: SPTC 8,20//	N/A				7.3m to 7.5m: Core fractured upon recovery due to transition from weathered to unweathered material 7.4m: disseminated black carbonaceous material.
		,			N/A	IN/A			7.83m to 8.30m: JT 80° Un, Ro, Cl dip angle 60° from 8.2m.
									8m to 8.1m: ES BH49_8.00-8.10m
	Us2	8.27m to 8.32m:SILTSTONE. 8.32m to 8.65m:coarse SANDSTONE.			100	83	61		8.30m: JT 70° PI, Sm, CI 8.42m: BP 5° PI, Ro, CI
	Ш	8.65m to 9m:SILTSTONE.	sw						8.73m: JT 45° PI, Ro, CI  8.87m: black carbonaceous material,
		9 23m to 9 35m: fine SANDSTONE		9m: SPTC 7,30// 50 for 65mm N = 50+	N/A	N/A	N/A		<2mm, inclined 5°.
		S.Z. I. O. O. O. III. III. O. O. IVIDO I ONE.							9.3m to 9.4m: turbidite sequence?  9.5m to 9.6m: disseminated black carbonaceous material.
		9.6m to 9.66m:fine SANDSTONE. 9.66m to 9.85m:coarse SANDSTONE. 9.7m to 9.85m:SILTSTONE.  9.85m to 10.5m:coarse SANDSTONE with occasional siltstone lithics 2-10mm.			100	97	97		9.63m: JT 10° PI, Ro, CI 9.82m: BP 30°
	X X X X X X X X X X X X X X X X X X X		Material Description  Material Pand in the sand  Material Pand in the san	Material Description  Material Description  Material Description  Material Description  Material Description  4.95m:soft, minor fine SAND 3.55m:.CLAY with some silt and sand; light grey mottled light orange. Firm, moist, high plasticity. Sand is fine.  5.75m:wery stiff, streaked dark brownish grey, 5.5m:some fine SAND  5.75m:very stiff, streaked dark brownish grey, 5.5m:some fine SAND  6.15m: description  6.15m: description  MH  6.35m: sightly weathered, light greenish grey, silty medium SANDSTONE; extremely weak. Poorly cemented. (Silty SAND)  6.15m: to 6.25m:fine SANDSTONE.  6.35m: Moderately weathered, greenish grey, medium SANDSTONE; extremely weak. Moderately cemented.  7.15m: Slightly weathered, light grey, fine SANDSTONE; very weak. Moderately cemented.  7.23m: to 7.36m:medium SANDSTONE.  8.27m: to 8.32m:SlLTSTONE.  8.27m: to 8.32m:SlLTSTONE.  8.27m: to 8.32m:SlLTSTONE.  8.27m: to 8.32m:SlLTSTONE.  8.27m: to 8.35m:coarse SANDSTONE.  9.23m: to 9.35m:fine SANDSTONE.  9.23m: to 9.35m:fine SANDSTONE.  9.23m: to 9.35m:fine SANDSTONE.  9.6m: to 9.66m:fine SANDSTONE.  9.85m: to 10.5m:coarse SANDSTONE.	Material Description    Solution	Material Description  Material Description  Material Description  Material Description  Material Description  John John John John John John John John	Material Description  Material Mate	Material Description  Material Description	Material Description  Material Material Material Ight Material Igh



Level 3, Te Tihi, 110 Carlton Gore R PO Box 9762, Newmarket Auckland, New Zealand Tel: +64 9 520 6019

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Arch Hill Reserve

**BH49** 

	Tel: +	-64 9 52	0 6019 ngroup.cor	m	Proje	ct Reference:	521290-064								Sheet 3 of 4	
M <sub>E</sub>	OREI ethoc quipm ontra	d: nent:	Ma	tary ( ssen:	TION Core Wireline za MM3 n Drilling (N I) Ltd	Northing:	<b>NZTM2000</b> 1755462.64m 5918300.13m 26.87m (NZVD2016)	1	Date starte Date comp Inclination: Azimuth:	leted	l: '		2024 7/202		Logged by: GMR Input by: GMR Checked by: BGW Reviewed by: SM	
Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	N	Material Description	١	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws ws mws Fracture	cs vcs ecs	Stratigraphy Defect Description Additional Notes	Installation
HQ3		- - -		EUs2	7.5m: Slightly weather very weak. Moderate 10.01m to 10.1m:fi		m SANDSTONE;	SW	10.5m: SPTC	100	97	97	i i		9.98m to 10.14m: JT 70° Un, Ro, Cl 10m to 15m: Water Pressure Permeability Test (BH48-PPT01).	
ss SPTd	+	L		EUX	10.63m: CORE LOS	S.			20,30 for 130mm// N = 50+	N/A	N/A	N/A				4 44 4 44
Bo		11		EUs2 EI	10.8m: Slightly weath very weak. Moderate	nered, light grey, coars	se SANDSTONE;	sw							10.86m to 11.12m: JT 85° Un, Ro, Cl 11.07m to 11.14m: JI 85° 11.14m to 11.24m: JT 85° Un, Ro, Cl	
- PAG	- - -	-  -  -  -	× × × × × × × × × × × × × × × × × × ×		11.3m: Slightly weath very weak. Bedding	nered, light grey, lamin is thick, 2-6mm, incline	ated SILTSTONE; ed <5°.			88	74	74			11.45m: BP 20°	
	15	12	× × × × × × × × × × × × × × × × × × ×	EUz2	<b>11.78m to 12m:</b> coa	arse SANDSTONE.		sw							11.78m to 11.8m: disseminated black carbonaceous material. 11.90m to 12.00m: JT 35° Un, Ro, Cl 12m: Driller said core loss in zone of poorly cemented sandstone. 12.12m to 12.2m: black carbonaceous material, <2mm, inclined 5°.	
НОЗ		× × × × × × × × × × × × × × × × × × ×		12.55m to 12.59m: fragments. 12.65m to 12.73m: fragments.	nedium SANDSTONE coarse SANDSTONE coarse SANDSTONE nedium SANDSTONE S.	with shell			67	60	60			12.70m: BP 25°		
Box 4	-	-		EUX										         		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	-	  -  -	× × × × × × × × × × × × × × × × × × ×		SILTSTONE; very w	thered, light grey, lam eak. Bedding is thick, nedium SANDSTONE	2-6mm, inclined <5°.								13.5m: Driller said core loss in zone of poorly cemented sandstone.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	13	14	× × × × × × × × × ×	EUz2	cemented.	medium SANDSTONI		sw					ŀ			77
HQ3	НФ3	  -  -	× × × × × × × × × ×	<u> </u>	14.2m to 14.25m:n	nedium SANDSTONE				87	81	81	ŀ			
		-  -  -  -	× × × × × × × ×		14.58m to 14.65m:										14.73m to 14.75m: black carbonaceous material, <2mm, inclined 10°.	
	12	15	X	ËČ	14.81m: CORE LOS	ა.							Ιij		,,	4 90
1) 2) 3)	Geop	rdinate hysica Enviro	al profilin	g unde I Sam	ertaken downhole on 11/0 ole.	plus smart antenna, with 17/2024, comprising an O 17m bgl (BH49-PZ01), s 366078.	ptical and Acoustic Telev	iewer.				pprox			Water Level Readings:   Date Time   Hole Depth   Water Level	

<sup>1</sup>m east of BH49, at 7m bgl (BH49A-PZ01), serial no. 366078.

Hand Shear Vane Serial No: 3178 Correction Factor: 1.398



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Hand Shear Vane Serial No: 3178 Correction Factor: 1.398

Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements
Location: Arch Hill Reserve
Project Reference: 521290-064

**BH49** 

	com	Project Reference: 521290-064		1					Sheet 4 of 4
Equipment: N	Rotary C Massen:	CO-ORDINATES: NZTM2000           Core Wireline         Easting:         1755462.64m           va MM3         Northing:         5918300.13m           n Drilling (N I) Ltd         Ground level:         26.87m (NZVD2016)		Date starte Date comp Inclination: Azimuth:	leted	: 1 -		2024 7/2024	Logged by: GMR Input by: GMR Checked by: BGW Reviewed by: SM
R.L. (m) Length (m) Grabhic Loa	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	wws ws Fracture cs Log vcs Log	Stratigraphy Defect Description Additional Notes
		Slightly weathered, light grey, fine to medium SANDSTONE; very weak. Moderately cemented.  15.35m to 15.5m:SILTSTONE.	sw		89	82	77	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5m: Driller said core loss in zone of poorly emented sandstone.
	EUs2 EUx	16.33m: CORE LOSS.  16.5m: Slightly weathered, light grey, fine SANDSTONE; very weak. Moderately cemented.  16.65m to 16.75m:SILTSTONE.  16.75m to 17.1m:medium SANDSTONE.	emented. TSTONE.					1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	6.5m: Driller said core loss in zone of oorly cemented sandstone. 6.62m: JT 20° PI, Ro, CI 6.70m: JT 10° PI, Sm, CI 6.75m: black carbonaceous material,
10	EUX	17.1m: CORE LOSS.			60	53	53	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7.1m to 17.7m: Core loss due to poorly emented sandstone.
9 - 18	EUs2	17.7m: Slightly weathered, light grey, medium to coarse SANDSTONE; very weak. Moderately cemented.  17.95m to 18m:SILTSTONE.  18.1m to 18.19m:poorly cemented.	sw						7.95m: JT 10° Un, Ro, Cl 8m: 75% water loss.
	EUX	18.19m to 18.25m:SILTSTONE.  18.27m: CORE LOSS.  18.75m: Slightly weathered, light grey, fine SANDSTONE;			68	61	61		হ ব ব 8.75m to 18.77m: black carbonaceous
8 - 19 	EUs2	very weak. Moderately cemented.  18.9m to 19.28m:coarse SANDSTONE.  19.17m to 19.28m:poorly cemented.  19.25m to 19.5m:occassional siltstone laminations.	sw						naterial, <2mm, inclined 5°.  8.91m: JT 10° St, Ro, Cl
7 20		19.6m to 20m:coarse SANDSTONE.  End of borehole at 20m (Termination Depth Achieved)			100	100	100		9.5m: Cased to 7m.



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Hand Shear Vane Serial No: 3732 Correction Factor: 1.649

Client: Watercare Services Ltd

**Project: WIWQIP Motions Catchment Improvements** 

Location: Arch Hill Reserve Project Reference: 521290-064 **BH51** 

Sheet 1 of 3

**BOREHOLE INFORMATION** CO-ORDINATES: NZTM2000 Date started: 15/08/2024 Logged by: **GMR** Rotary Core Wireline Easting: 1755328.44m Date completed: 16/08/2024 Input by: **GMR** 5918295.36m 22.52m (NZVD2016) Equipment: Massenza MM3 Northing Inclination: -90° Checked by: **BGW** McMillan Drilling (N I) Ltd N/A Contractor: Ground level: Azimuth: Reviewed by: SS Weathering/USC Code Fracture Length (m) Stratigraphy Installation  $\Xi$ Testing 8 8 8 Method Log Defect Description Graphic TCR ( SCR ( RQD ( Material Description R.L. Layer Additional Notes 0m: FILL 0m: 70mm hand auger head. 0.05m to 0.2m: ES BH51\_0.05-0.2 0m: SILT with some clay and trace organics; dark brown. Firm, мн moist, high plasticity. Organics are fibrous rootlets. [TOPSOIL] 0.15m: SILT with some gravel and minor clay; brown mottled orange. Stiff, moist, high plasticity. Gravel is fine to coarse, sub-angular to angular, grey, moderately strong, slightly weathered basalt and greywacke. [FILL] ₹ 100 TITLE Б МН 22 0.5m to 0.6m: ES BH51\_0.5-0.6 IIIII0.6m: ISHSV=73/7kPa 0.7m: Basalt cobble, 75mm. 0.75m: Fine to coarse GRAVEL; bluish grey. Loosely packed, dry. 0.75m: Wash out of fines in fill. Gravel is sub-angular to angular, moderately strong, slightly GW weathered basalt and greywacke. 1m: CORE LOSS. Н В ĸ 21 1.45m: Asphalt with clasts of medium, **1.5m:** Silty CLAY with trace gravel; greenish grey mottled orange. Very stiff, moist, high plasticity. Gravel is fine, rounded, moderately weathered, orangish brown. [UNDIFFERENTIATED ALLUVIUM] \sub-angular basalt gravel +++1X 1.5m: TAURANGA GROUP ALLUVIUM IIIII1.5m: Clay expanded in barrel. HQ3 100 **1.9m:** CLAY with some silt and trace organics; bluish grey. Soft, moist, high plasticity. Organics are fibrous rootlets. 2 2m: SPT 0,0// **2m to 2.45m:** ES BH51\_2.0-2.45 2m: SPT sunk under own weight. **2m to 2.45m:** ES BH51\_2.0-2.45  $\Box\Box\Box$ 0,0,0,0 N = 0 S. 80 СН  $I \cup I \cup I$ 2.36m to 2.45m: Core loss. 2.45m:...pinkish grey, firm. 20 2.45m: Clay expanded in barrel. 2.55m:...trace fine sand. 2.6m:...fibrous wood fragment, 20mm.

2.65m:...fibrous wood fragment, 10mm.

2.7m: Organic CLAY with minor silt; dark pinkish brown. Soft, 100 moist, high plasticity. Organics are amorphous with fibrous rootlets, СН 10-30mm. 3 3m: IBHSV=10/3kPa 3m: PUSH TUBE. 3m to 3.2m: ES BH51\_3.0-3.2  $\Pi\Pi\Pi$ Organic CLAY; dark grey mottled brownish grey, speckled black. Soft, very moist, high plasticity. Ϋ́ **U54** 100 **3.28m:**...Sandy SILT with occasional organics; light grey. Soft to firm, very moist, moderate plasticity. Sand is fine. 19 **3.5m:** Organic CLAY; dark pinkish brown. Soft, moist, high plasticity. Organics are fibrous wood fragments, 30-60mm. 3.5m; SPT **3.5m to 3.95m:** ES BH51\_3.5-3.95 3.5m: SPT sunk under own weight. **3.5m to 3.95m:** ES BH51\_3.5-3.95 IIIII0,0// 0,0,0,0 N = 0 3.6m: CLAY with some silt, minor sand and organics; greenish SPT 100 grey. Soft, moist, high plasticity. Sand is fine. Organics are fibrous rootlets, 20-70mm. I I I I I I3.85m:...firm. 4 3.95m: Cased to 3m at 4.5m bgl TAc СН  $\Pi\Pi\Pi$ **E** 100 18 4.46m: ...45mm rootlet 4.5m: IBHSV=53/13kPa 4.5m: PUSH TUBE. Sandy CLAY with trace organics. Stiff to very stiff, slight moist, moderate to high plasticity. Sand is fine. Ι¥ **U54** 80  $\square$ Water Level Readings: Date Time | Hole Depth | Water Level 15/08/24 16:30 | 15.00m | 1.90 m bgl 16/08/24 08:00 | 15.00m | 1.70 m bgl 1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 4cm and vertical accuracy of 6cm. 2) ES = Environmental Sample.

3) A standpipe was installed in BH51 with a screened interval between 4-6m bgl.



Client: **Watercare Services Ltd** 

Project: WIWQIP Motions Catchment Improvements

Location: Arch Hill Reserve Project Reference: 521290-064 **BH51** 

Sheet 2 of 3

**BOREHOLE INFORMATION** CO-ORDINATES: NZTM2000 Date started: 15/08/2024 Logged by: **GMR** Rotary Core Wireline Easting: 1755328.44m Date completed: 16/08/2024 Input by: **GMR** 5918295.36m 22.52m (NZVD2016) Equipment: Massenza MM3 Northing Inclination: -90° Checked by: **BGW** McMillan Drilling (N I) Ltd N/A Contractor: Ground level: Azimuth: Reviewed by: SS Neathering/USC Code Fracture Installation Length (m) Stratigraphy Testing  $\Xi$ 8 8 8 Log Defect Description Graphic TCR ( SCR ( RQD ( Material Description R.L Layer Additional Notes WS WS CS CS CS 5m: CLAY with some silt, minor sand and organics; light 5m to 5.45m: ES BH51\_5.0-5.45 brownish grey. Soft, moist, high plasticity. Sand is fine. Organics are fibrous rootlets, 20-70mm. 0,0,0,1 N = 1 100 SPT 11111TAc 5.45m: Clay expanded in barrel. Excess taken for laboratory sampling. 17 СН  $\Pi\Pi\Pi$ **E** 100 6 6m: IBHSV=10/3kPa 6m: PUSH TUBE Sandy CLAY with occasional organics. Soft, very moist to wet, high plasticity. Sand is fine to medium. **6.18m:**...Stiff. **U54** 100 16 6.5m: SPT 0,0// 1,1,1,1 N = 4 **6.5m:** CLAY with some silt and minor sand; light brownish grey. Soft, moist, high plasticity. Sand is fine. 6.5m to 6.95m: ES BH51 6.5-6.95 1111 СН 100 SPT 6.7m to 6.74m:...some fine sand.  $\square$ 7 **6.95m:** Sandy CLAY with some silt; bluish grey. Firm, moist, high plasticity. Sand is fine. [RESIDUAL SOIL ECBF] 6.95m: EAST COAST BAYS FORMATION 6.95m: Clay expanded in barrel. Excess taken for laboratory sampling.  $\Pi\Pi\Pi$ **E** ERc 100 7.2m:...medium gravel clasts of moderately cemented fine sand. CH 15 7.5m: PUSH TUBE ERX **J**54 100  $\perp$ 8 8m: SPT 8m: Silty fine SAND with minor clay; bluish grey. Firm, moist, low 8m to 8.45m: ES BH51\_8.0-8.45 3,4// 4,5,7,8 N = 24  $\Pi\Pi\Pi$ plasticity. [COMPLETELY WEATHERED ECBF] ERs SPT SM 78  $\Pi\Pi\Pi$ 11118.35m to 8.45m: Core loss. **8.45m:** Highly weathered, greenish grey sandy SILTSTONE; extremely weak. (SILT with some fine sand). 14 EWz HW × 8.6m: Moderately weathered, greenish grey, fine to medium SANDSTONE; extremely weak. Poorly cemented.
8.65m to 8.7m:...larninated SILTSTONE, bedding 15°, iron oxidation along bedding planes. <u>Б</u> 100 69 8.7m: black carbonaceous material, thinly 111laminated <2mm, <5°. 8.70m: BP 15° St FeO oxidation. 8.85m to 8.95m: JT 75° Pl, Ro, Cl 8.9m to 9m:...laminated SILTSTONE, bedding <5°, iron oxidation 9 along bedding planes. 9m: SPTC 5,7// 10,14,18,8 for 30mm N = 50+ 8.98m: BP 5° **9m to 9.45m:** ES BH51\_9.0-9.45 MW  $\Box$ N/A N/A N/A SP **9.41m:** Moderately weathered, greenish grey, fine to medium SANDSTONE; extremely weak. Moderately cemented. 13 9.42m to 9.6m:...poorly cemented. 9.64m; JT 60° Pl. Ro. Cl HQ3 MM 84 9.72m: JT 75° PI, Ro, St FeO oxidation. 9.77m: JT 35° PI, Ro, St FeO oxidation. 9.8m to 9.87m:...poorly cemented.

REMARKS

1) Co-ordinates captured using a Leico Zeno FLX100 plus smart antenna, with a horizontal accuracy of 4cm and vertical accuracy of 6cm. 2) ES = Environmental Sample.

3) A standpipe was installed in BH51 with a screened interval between 4-6m bgl.

9.87m to 9.89m: ...slightly weathered, fine SANDSTONE.

Water Level Readings: Date Time | Hole Depth | Water Level 15/08/24 16:30 | 15.00m | 1.90 m bgl 16/08/24 08:00 | 15.00m | 1.70 m bgl

9.93m: JT 55° Un, Ro, St FeO oxidation.

MASTER 02(JL), GPJ Library file: CC2 LIBRARY 20241122 V18 SECTIONS, GLB Template: DATATEMPLATE, GDT Report File: 01 MOTIONS CATCHMENT

CC2 MOTIONS

Hand Shear Vane Serial No: 3732 Correction Factor: 1.649



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Client: **Watercare Services Ltd** 

**Project: WIWQIP Motions Catchment Improvements** 

Location: Arch Hill Reserve Project Reference: 521290-064 **BH51** 

Sheet 3 of 3

-	Metl Equ	REHO hod: ipmo itract	ent:	Ma	ary C	CO-ORDINATES: NZTM2000  Core Wireline	6)	Date starte Date comp Inclination: Azimuth:	letec	l: '		3/2024 3/2024	Logged by: GMR Input by: GMR Checked by: BGW Reviewed by: SS
	Method	R.L. (m)	Length (m)	Graphic Log	Layer Code	Material Description	Weathering/USC	Testing	TCR (%)	SCR (%)	RQD (%)	ws Fracture cs Log	Stratigraphy Defect Description Additional Notes
		_	_	X	EWx	10.02m: CORE LOSS.							9.97m: BP 40°
	HQ3	- - -	- - -	× × × × × × × ×	EUz	<b>10.19m:</b> Slightly weathered, light grey SILTSTONE; very weak.	sw		84	41	38		10.24m: BP 5°
Box 3	SPTC		 - -	× ×		10.5m: Moderately weathered, greenish grey, fine to medium SANDSTONE; extremely weak. Moderately cemented.		10.5m: SPTC 7,11// 13,12,19,6 for 25mm N = 50+	N/A	N/A	N/A		10.48m: BP 10°
_		- -  -				<b>11.25m:</b> light grey.			10.94m: BP 35° 10.97m: BP 35° 11.02m to 11.05m: black carbonaceous material, thinly laminated <2mm, 15°. 11.04m: BPJT 15° Un, Ro, Cl 11.10m: JT 50° Pl, Ro, Cl 11.25m: JI 70°				
	НОЗ	_ 	_ 		EWs	11.4m to 11.65m:dark greenish grey.		11.34m: BP 25° 11.42m to 11.50m: BP 75° FeO oxidation. 11.47m to 11.59m: JI 80° 11.48m to 11.64m: JT 75° PI, Ro, Vn FeO oxidation.					
-		- - -	12			11.7m to 12m:medium SANDSTONE.  11.9m to 12m:dark greenish grey.		12m: SPTC					11.67m: JT 55° PI, Ro, CI 11.71m: JT 35° PI, Ro, CI 11.90m: JT 45° PI, Ro, CI 11.94m: BP 40° dark greenish grey weathering. 11.95m: JT 40° PI, Ro, CI 12m to 12.33m: ES BH51_12-12.33 12.48m: JT 40° PI, Ro, CI 12.58m to 12.62m: JI 50° 12.59m: BP 15° 12.61m: JT 10° PI, Ro, CI 12.62m: BP 10° 12.63m: BP 40°
-	SPTC	- - -	_ _ _	× ×		12.33m: Moderately weathered, greenish grey, sandy		10,16// 19,23,8 for 30mm N = 50+	N/A	N/A	N/A		11.95m: JŤ 40° PI, Ro, CI 12m to 12.33m: ES BH51_12-12.33
		10		× × × ×	EWz	SILTSTONE; extremely weak.	MW						12.48m: JT 40° PI, Ro, CI
		- - -	_	× × × × × × × × × ×	EUz	Slightly weathered, light grey SILTSTONE; very weak.     12.6m to 12.65m:interbedded laminations of siltstone, <5mm, sub-horizontal.     Slightly weathered, light grey, fine SANDSTONE; very	sw						12.58m to 12.62m: JI 50° 12.59m: BP 15° 12.61m: JT 10° PI, Ro, CI 12.62m: BP 10°
Box 4	HQ3	-  -	_ _ _ _ _ _ _		EUs	weak. Moderately cemented.  12.82m to 13.14m:medium SANDSTONE. 13m to 13.03m:poorly cemented.  13.14m to 13.22m:siltstone, indistinct bedding.	sw		90	75	67		12.82m: black carbonaceous material, thinly laminated <2mm, 10°.
		-	_		EUx	13.38m: CORE LOSS.	-						13.22m: BPJT 5° PI, Ro, CI 13.24m: black carbonaceous material, thinly laminated <2mm, 10°. 13.25m to 13.38m: JI 85° 13.27m: black carbonaceous material, thinly
		<u>9</u> - -	 - -	× × × × × × × ×	В	13.5m: Slightly weathered, light grey SILTSTONE; very weak.  13.65m to 13.85m:fine to medium SANDSTONE.							13.2m. black carbonaceous material, ulliny laminated <2mm, 10°. 13.34m: JT 10° Pl, Ro, Cl 13.60m: JT 65° Pl, Ro, Cl
		- - 	_ 14 _	× × × × × × × × × × × × × × × × × × ×	EUz	14m to 14.07m:medium SANDSTONE.	sw						14.07m: BP 20°
	HQ3	- - - 8	- - -	**	EUx	14.15m to 14.28m:fine to medium SANDSTONE.  14.28m: CORE LOSS.			75	71	68		14.24m: JT 80° Un, Ro, Cl
Box 5		_ _ _	_ _ _ _ _ 	X X X X X X X X X X X X X X X X X X X	EUz	14.66m: Slightly weathered, light grey, laminated SILTSTONE; very weak. Bedding inclined 10°.  14.9m to 15m:fine SANDSTONE.		13.17m: JT 50° PI, Ro, CI 13.22m: BPJT 5° PI, Ro, CI 13.24m: black carbonaceous material, thinly laminated <2mm, 10°. 13.25m to 13.38m: JI 85° 13.27m: black carbonaceous material, thinly laminated <2mm, 10°. 13.34m: JT 10° PI, Ro, CI 13.60m: JT 65° PI, Ro, CI 14.07m: BP 20°  14.24m: JT 80° Un, Ro, CI  Water Level Readings: Date Time   Holso Depth   Water Level   15/08/24   16:00   15:00m   1.70 m bg					
	1) C 2) E	S = E	(S: linate Enviro	Lx x s captu onmenta	al San	End of borehole at 15m (Termination Depth Achieved) sing a Leico Zeno FLX100 plus smart antenna, with a horizontal accur		Water Level Readings: Date Time   Hole Depth   Water Level 15/08/24 16:30   15.00m   1.90 m bgl 16/08/24 08:00   15.00m   1.70 m bgl					
	Han	d Sh	ear V	ane Se	rial No	o: 3732 Correction Factor: 1.649							



# Attachment D - Photographic evidence



**Client Name:** 

Watercare

Site Location:

**WIWQIP Motions Catchment** Improvements

Project No. 521290-064

Photo No.

Date:

1 08/07/2024

Description:

ACM fibre board identified at 0.35 m bgl at Shaft location SH15 (BH49 and within the Àrch Hill area).



Photo No. 2

Date: 08/07/2024

Description: SH15 (BH49) where the bulk ACM was identified.





**Client Name:** 

Watercare

Site Location:

**WIWQIP Motions Catchment** Improvements

Project No.

521290-064

Photo No.

3

Date: 14/08/2024

**Description:** 

Fill encountered within Basque Park (BH44)



Photo No.

Date: 19/08/2024 4

Description:

Fill encountered within Basque Park (BH45)





**Client Name:** 

Watercare

Site Location:

**WIWQIP Motions Catchment** Improvements

Project No.

521290-064

Photo No.

3

Date: 14/08/2024

**Description:** 

Fill encountered within Basque Park (BH44)



Photo No.

Date: 19/08/2024 4

Description:

Fill encountered within Basque Park (BH45)





**Client Name:** 

Watercare

**Site Location:** 

WIWQIP Motions Catchment Improvements

Project No.

521290-064

Photo No. 5 30/08/2024

Description:
Fill encountered within Suffolk Reserve (BH07).

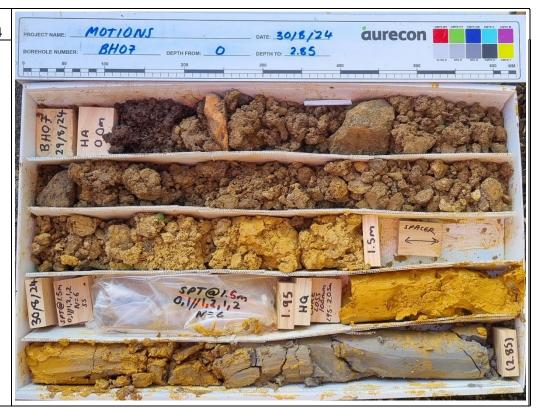


Photo No. Date: 6 13/05/2024

# **Description:**

Location of BH30, facing northeast, in Western Springs Park





**Client Name:** 

Watercare

Site Location:

WIWQIP Motions Catchment Improvements

**Project No.** 521290-064

Photo No. 7

**Date:** 22/07/2024

Description:

Plastic, wood, concrete, and glass encountered within the fill at a depth of 0.5 m bgl at SH06 (BH21).



Photo No.

**Date:** 04/07/2024

Description:

SH13 (BH48) where the exceedance of the PA criteria for lead was recorded.





**Client Name:** 

Watercare

Site Location:

**WIWQIP Motions Catchment** Improvements

Project No. 521290-064

Photo No.

Date: 24/09/2024 9

Description:

SH12A (BH43) where the exceedance of the MfE petroleum guideline soil acceptance criteria for protection of groundwater was recorded.



Photo No.

Date: 26/09/2024 10

Description:

SH02 (BH06) where the exceedance of the ANZG DGVs were recorded.





# Attachment E - Groundwater field monitoring sheets

### 521290-064 WIWQIP MOTIONS CATCHMENT IMPROVEMENTS

DTW: 4.87 @ 7:30am

BH15 - Nixon Park Carpark | Data collected by: T.Hill

DTB: 27 m @ 7:30 am

YSI-6050000 (from ENVCO) Professional plus fill featured Multiprobe No: Sample Method: 38 mm biodegradable BioBailer Sampled at: 1:00pm DTW measured from: Ground level/Top of well pipe/ Top Hat (delete as appropriate) Groundwater Comments: (Colour, Sed, Odour, etc.) Groundwater was discoloured brown (likely impacted from well development) with inclusions of brown specks which floated to the top of sample bottles.

Volume of water purged: 3 x 200L (total 600L)

Containers collected: Dissolved Heavy metals x 2 | Water for organics x 2 BTEX/VOC x 4 | TOC/DOC x 1

Well Condition

Time (min) Time

°c

DO mg/l

μs/cm<sup>c</sup>

μs/cm рН

ORP

DTW

20-Jun-24

BH15

1:11pm

18.4

88.2

8.27

8.33

81.6

11.42 m

Time: 1:00 pm

1:22pm

18.6

8.61

62

1:28pm

18.6

6.49

53.9

NAPL Depth:

1:33pm

18.6

6.13

56.1

Date: Well ID:

> ment had begun including flushing the ho es removing a total of 600L of fluid impling was undertaken directly after well development had finished and whilst groundwater was recharging in the hole (to allow for geotech n

> > 521290-064 WIWQIP MOTIONS CATCHMENT IMPROVEMENTS

Multiprobe No: YSI ProDSS - 16E102905 (from Date: 26-Sep-24 BH51 - Arch Hill | Data collected by: T.Hill

Well ID:	BH51	Time: 11:00	am	NAPL Depth	1: -	DTW: 1.32m @ 11am	DTB:	Sampled at:	Sample Method: 38 mm biodegradable BioBailer
				DT\	N measured	from: Ground level/Top	of well pipe/ 1	op Hat (delete as appropriate)	
Time (min)	0	5	10	15	20				Groundwater Comments: (Colour, Sed, Odour, etc.)
Time	11:09am	11:14am	11:19am	11:24am	11:29am				
°C	15	15	15.2	15.3	15.3				
mbars	1016.6	1016.6	1016.4	1016.4	1016.5				First 1-2 Bailers of liquid water was clear with orange solids
DO%	22.4	24.8	26.6	24.4	39.9				up to ~7mm. Final 3-7 Bailers had increasing tubidity turning a light brown.
DO mg/l	2.26	2.5	2.66	2.44	3.99				a light brown.
μs/cm <sup>c</sup>	525	529	539	663	665				
μs/cm	648	654	663	540	541				Volume of water purged:
рН	6.33	6.34	6.36	6.35	6.41				
ORP	28.9	1.5	-0.1	-8.1	12.5				Containers collected:
Turbidity (NTU)	926.98	25581.26	814.17	561.81	7379.69				Discolused Harris Martala (400 ml) I Martan for Commission
DTW	-	-	-	1.74	1.76				Dissolved Heavy Metals (100ml)   Water for Organics (500ml)   Unpreserved bottle (1L)
Additional Notes:	Water samp	oles were coll	ected from t	he 2nd and 3	e borehole.	(Soothi)   Onpreserved bottle (11)			
								•	-

Well Condition \* dark colour = 3rd bailer sample 'ell was clean, capped, with not evidence of tampering or external env

521290-064 WIWQIP MOTIONS CATCHMENT IMPROVEMENTS

Date: 26-Sep-24 BH06 - Suffolk Reserve | Data collected by: T.Hill Multiprobe No: YSI ProDSS - 16E102905 (from ım biodegradable BioBailer

Well ID:	BH06	Time: 12:35	ipm	NAPL Depth	-	DTW: 0.56		DTB:		Sampled at:	Sample Method: 38 mn	n biodegradable BioBailei
				DTV	/ measured	from: Ground	level/Top of	well pipe/ To	p Hat (delet	e as appropriate		
Time (min)	0	5	10	15	20						Groundwater Comments: (Colo	our, Sed, Odour, etc.)
Time	12:40	12:45	12:50	12:55	1:00							
°c	15.4	15.3	15.4	15.2	15.1							
mbars	1013.1	1013.2	1013.2	1013	1013						First 1-2 Bailers of liquid water was	clear. Final 3-7 Bailers had
DO%	26.1	20.1	22.7	26.7	30.8						increasing tubidity tur	ning brown.
DO mg/l	2.61	2.02	2.27	2.67	3.1							
μs/cm <sup>c</sup>	385.6	380.4	377.7	369.4	370.4							
μs/cm	471.9	467.2	463.1	454.7	457.2						Volume of water purged:	
pН	5.47	5.24	5.27	5.3	5.3						1	
ORP	162	188.8	188.6	194.4	84.4						Containers colle	ected:
Turbidity (FNU)	1718.2	1504.22	6903.09	11470.37	4369.6						Discoluted Harris Martala (100ml)	N Water for Ores :
DTW	0.95	1.68*	1.83*	1.94	1.85						Dissolved Heavy Metals (100ml) (500ml)  Unpreserved bottle	
Additonal Notes	: Water sam	ples were col	lected from t	the 2nd and 3	rd bailer. 7	38mm bailers	s were extra	cted from the	borehole.		(300ml)  Onpreserved bottle	(±L) [ 1F11 (250111)

Well Condition	Well was developed (extracted 3 x well volume on 27th September 2024). * refers to 2x bailers extracted prior to measuring DTW.	* light colour = 2nd bailer sample
Well condition	Well was clean, capped, with not evidence of tampering or external environmental influence.	* dark colour = 3rd bailer sample

				5212	90-064 W	IWQIP MOTION:	S CATCHMEN	IT IMPROVE	MENTS				
Date: 26-Sep	-24	_			ВН46 -	Basque Park   I	Data collecte	d by: T.Hill				Multiprobe No:	YSI ProDSS - 16E102905 (from
Well ID:	BH46	Time: 2:20p	om	NAPL Depth	:-	DTW: 7.85		DTB:		Sampled at:		Sample N	lethod: 38 mm biodegradable BioBaile
				DTV	V measure	ed from: Ground	l level/Top o	well pipe/ T	op Hat (delet	e as appropri	ite)		
Time (min)	0	5	15	52								Groundwater Co	mments: (Colour, Sed, Odour, etc.)
Time	2:23	2:28	2:38	3:30									
°c	17.7	17.4		17.4									d water was clear. Final 2 bailers had
mbars	1010.9	1010.8	Not	1010.4								,	and sediment content turning brown.  itting the bottom of the well.
DO%	28.2	41.5	enough	49.1									d HM100 water samples were highly
DO mg/l	2.68	3.97	sample	4.7									by the sediment/ turbidity.
μs/cm <sup>c</sup>	285.8	344.9	after 10	347.5								Impacted	by the scannerty tarbiatty.
μs/cm	332	294.8	min to	406.7								Volume of water purg	ed:
pН	7.15	6.49	collect	7.23									
ORP	-21	91.7	data.	5.7								C	ontainers collected:
Turbidity (FNU)	1984.45	12349.49		11075.77								Discolused Heaven	4-t-1- (100IV) W-tf 0i
DTW	7.46	7.94*	7.79	7.54									Metals (100ml)  Water for Organics eserved bottle (1L)   TPH (250ml)
Additional Notes	Water sam	ples were col	lected from	the 2nd and 3	rd bailer.	3 x 38mm bailer	s were extra	cted from th	e borehole.			(Soulli)   Olipie	sserved bottle (1L)   TPH (250IIII)

Well Condition	Well was developed (extracted 3 x well volume on 27th September 2024). * refers to 2x bailers extracted prior to measuring DTW.	* light colour = 2nd bailer sample		
Well Colluition	Well was clean, capped, with not evidence of tampering or external environmental influence.	* dark colour = 3rd bailer sample		

#### 521290-064 WIWQIP MOTIONS CATCHMENT IMPROVEMENTS

Multiprobe No: Date: 26-Sep-24 BH44 - Basque Park | Data collected by: T.Hill YSI ProDSS - 16E102905 (from BH44 Time: 2:50 Sample Method: 38 mm biodegradable BioBailer Well ID: NAPL Depth: DTW: 0.87 DTB: Sampled at: DTW measured from: Ground level/Top of well pipe/ Top Hat (delete as appropriate) Time (min) Groundwater Comments: (Colour, Sed, Odour, etc.) Time °c 15.5 15.4 15.5 First bailer of liquid water was slightly murky. Final 3 bailers mbars 1011.6 1011.6 1011.5 Not had increasing tubidity and sediment content turning a non D0% transparejnt, grey in colour and thickening in texture. DO mg/l 3.36 0.19 sample after 10 μs/cm<sup>c</sup> 531 543 min to Volume of water purged: μs/cm рΗ 7.57 7.83 7.65 data. 43.7 -134.2 Containers collected: Turbidity (FNU) 867.19 1180.51 721.93 Dissolved Heavy Metals (100ml)| Water for Organics DTW (500ml) | TPH (250ml)

ber 2024). \* refers to 2x bailers extracted prior to measuring DTW

521290-064 WIWQIP MOTIONS CATCHMENT IMPROVEMENTS

Well was developed (extracted 3 x well volume on 27th Septe

Well was clean, capped, with not evidence of tampering or external environmental influenc

Well Condition

BH10 - Mostyn Street | Data collected by: T.Hill Date: 26-Sep-24 Multiprobe No: YSI ProDSS - 16E102905 (from BH10 Time: 3:50 Sample Method: 38 mm biodegradable BioBailer Well ID: NAPL Depth: DTW: 0.52 DTB: Sampled at: DTW measured from: Ground level/Top of well pipe/ Top Hat (delete as appropriate) Time (min) Groundwater Comments: (Colour, Sed, Odour, etc.) Time 3:56 4:01 4:06 4:11 4:16 15.3 15.2 15.2 First bailers of liquid water was clear. Final 2-7 bailers had 1013.7 D0% increasing tubidity turning light brown DO mg/l 2.64 309.2 304.5 311.8 344 462.6 μs/cm Volume of water purged: pH ORP 6.73 Containers collected: Turbidity (FNU) Dissolved Heavy Metals (100ml)| Water for Organics DTW 1.34 (500ml) | Unpreserved bottle (1L)

Well was developed (extracted 3 x well volume on 27th September 2024). \* refers to 2x bailers extracted prior to light colour = 2nd bailer sample Well Condition \* dark colour = 3rd bailer sample

#### 521290-064 WIWQIP MOTIONS CATCHMENT IMPROVEMENTS

Date: 30-Sep	_			BH25 - Myrtl	Multiprobe No:	YSI ProDSS - 16E102905 (from					
Well ID:	BH25	Time: 8:50a	ım	NAPL Depth	n: - DT	TW: 1.92	<b>DTB:</b> 5.97		Sampled at:	Sample Method: 38 mm biodegradable Bio	
				DTV	W measured fro	m: Ground lev	el/Top of well pip	e/ Top Hat (del	ete as appropriate)		
Time (min)	0	5	10	15						Groundwater Co	mments: (Colour, Sed, Odour, etc.)
Time	8:55	9:00	9:05	9:10							
°c	15.1	15.4	15.6	15.4							
mbars	1025.6	1025.7	1025.7	1025.8						First 1-3 bailers of liq	uid water was clear. Final 3-6 Bailers ha
DO%	36	35.1	33.9	38.7						increasing	tubidity turning light brown.
DO mg/l	3.62	3.51	3.37	3.87							
μs/cm <sup>c</sup>	467.7	380.3	382.5	380.9							
μs/cm	379.4	465.3	466.1	466.1						Volume of water purg	ged:
pH	6.63	6.48	6.48	6.49							
ORP	21.4	-19.4	-16	-13.7							Containers collected:
Turbidity (FNU)	775.63	1425.78	2596.74	3248.99						Discolused Harris	Martala (100-1)   Martala for Occasion
DTW	-	2.91*	2.97	-							Metals (100ml)  Water for Organics
Additonal Notes	: Water sam	ples were col	lected from	the 2nd and 3	3rd bailer. 6 x 38	mm bailers w	ere extracted fror	n the borehole.		(500mi	)  Unpreserved bottle (1L)
	luz n				2 16 1 1	2024) * f	rs to 4x bailers ex			* light colour = 2nd b	-

Well Condition dark colour = 3rd bailer sample

> 521290-064 WIWQIP MOTIONS CATCHMENT IMPROVEMENTS BH17 - Kingsland Avenue | Data collected by: T.Hill

Date: 30-Sep-24		BH17 - Kingsland Avenue   Data collected by: T.Hill									Multiprobe No:	YSI ProDSS - 16E102905 (from	
Date: 30 3	ср 24	- Brit7 - Kingsianu Avenue   Data conecteu by. 1.mii									Waltiprobe No.	131110033 102102303 (110111	
Well ID:	BH17	Time: 10:20am		NAPL Depth: -		DTW: 0.65		DTB: 8.2		Sampled at:	Sample Method: 38 mm biodegradable Biol		
				DTV	V measured	from: Groun	d level/Top o	of well pipe/ To	p Hat (delet	te as appropriate)			
Time (min)	0	5	10								Groundwater Co	mments: (Colour, Sed, Odour, etc.)	
Time	10:26	10:31	10:36										
°c	17.3	17.4	17.5										
mbars	1025.2	1025.2	1025.3								Water was slee	Water was clear with very minor small particles.	
DO%	34.2	26.3	32.5								Water was cied	if with very minor small particles.	
DO mg/l	3.27	2.52	3.1										
μs/cm <sup>c</sup>	455.4	381.8	383.5										
μs/cm	388.8	446.9	447.3								Volume of water purg	ed:	
pН	7.7	7.64	7.59										
ORP	69.1	53.9	37.2								С	ontainers collected:	
Turbidity (FN	J) 238.86	1601.15	9046.23								Discolused Heaven	4-t-1- (4001)   M/-tf 0	
DTW	1.39*	1.78*	1.58								· · · · · · · · · · · · · · · · · · ·	Metals (100ml)   Water for Organics	
Additional Not	Water camples were collected from the 2nd and 3rd bailer 5 v 38mm bailers were extracted from the borehole								(500ml)  Unpreserved bottle (1L)				

Well was developed (extracted 3 x well volume on 12th September 2024). \* refers to 2x bailers extracted prior to measuring DTW Well Condition \* dark colour = 3rd bailer sample

#### 521290-064 WIWQIP MOTIONS CATCHMENT IMPROVEMENTS

Date: 30-Sep-24 BH38 - Gundry Street | Data collected by: T.Hill Multiprobe No: YSI ProDSS - 16E102905 (from BH38 Time: 11:10am Sample Method: 38 mm biodegradable BioBailer Well ID: NAPL Depth: DTW: 3.74 DTB: 4.55 Sampled at: DTW measured from: Ground level/Top of well pipe/ Top Hat (delete as appropriate) Groundwater Comments: (Colour, Sed, Odour, etc.) Time (min) Time °c 16.7 16.7 mbars Water was a murky light brown with increasing sediment 1021.4 1021.4 1021.4 DO% content in the final 2 bailers DO mg/l 3.46 2.99 us/cm<sup>c</sup> 282.9 288.8 292.9 Volume of water purged: μs/cm 333.8 рН 6.95 6.68 6.56 18.7 -16.4 -19.6 Containers collected: Turbidity (FNU) 1218.7 Dissolved Heavy Metals (100ml)| Water for Organics DTW (500ml)| Unpreserved bottle (1L) | TPH (250ml) Well was developed (extracted 3 x well volur ne on 26th September 2024). \* refers to 2x bailers extracted prior to measuring DTW Well Condition Vell was clean and capped. The PVC pipe was cut downon the same day as sampling \* dark colour = 4th and 5th bailer sample 521290-064 WIWQIP MOTIONS CATCHMENT IMPROVEMENTS Date: BH36 - Ophir Street | Data collected by: T.Hill Multiprobe No: YSI ProDSS - 16E102905 (from Well ID: BH36 Time: 11:40am NAPL Depth Sampled at: Sample Method: 38 mm biodegradable BioBailer DTW measured from: Ground level/Top of well pipe/ Top Hat (delete as appropriate) Time (min) Groundwater Comments: (Colour, Sed, Odour, etc.) 10 Time 11:45 11:50 11:55 °c 18.1 18 18.3 mbars 1020 3 Water was light brown and included sediment content. 37.3 42.1 DO mg/l μs/cm<sup>c</sup> 301 3 308.4 Volume of water purged: μs/cm pН 6.02 6.12 ORP Containers collected: Turbidity (FNU) 404.3 4898.82 Dissolved Heavy Metals (100ml)| Water for Organics DTW (500ml)| Unpreserved bottle (1L) | TPH (250ml) ell was developed (extracted 3 x well volume on 17th September 2024). \* refers to 4x bailers extracted prior to measuring DTW Well Condition Well was clean, capped, with not evidence of tampering or external environmental influence. \* dark colour = 4th and 5th bailer sample 521290-064 WIWQIP MOTIONS CATCHMENT IMPROVEMENTS 10-Oct-24 BH39 - Burgoyne Street | Data collected by: H.S/M.G Multiprobe No: YSI ProDSS - 16E102905 (from Date: BH39 Well ID: DTB: Time: 9:25ai NAPL Depth: DTW: 6.98 Sampled at: Sample Method: 38 mm biodegradable BioBailer DTW measured from: Ground level/Top of well pipe/ Top Hat (delete as appropriate) Time (min) Groundwater Comments: (Colour, Sed, Odour, etc.) Time 9:25 9:30 16.2 16 mbars 1011.3 Water was slightly murky. D0% DO mg/ 441.9 μs/cm μs/cm Volume of water purged: рН 18.5 19.2 Containers collected: Turbidity (FNU) 1247.76 869.23 Dissolved Heavy Metals (100ml)| Water for Organics DTW (500ml)| Unpreserved bottle (1L) | TPH (250ml) 'ell was developed (extracted 3 x well volur nber 2024). \* refers to 4x bailers extracted prior to measuring DTW Well Condition 521290-064 WIWQIP MOTIONS CATCHMENT IMPROVEMENTS 10-Oct-24 Date: BH14 - Nixon Carpark | Data collected by: H.S/M.G Multiprobe No: YSI ProDSS - 16E102905 (from BH14 Sample Method: 38 mm biodegradable BioBailer Well ID: Time: 9:40a NAPL Depth: DTW: 2.96 DTB: 5.82 Sampled at: DTW measured from: Ground level/Top of well pipe/ Top Hat (delete as appropriate) Groundwater Comments: (Colour, Sed, Odour, etc.) Time (min) Time 9.45 °c 17.7 17.5 First several Bailers of liquid water was clear. Additional mbars DO% bailers had increasing tubidity. DO mg/l 420.1 μs/cm<sup>c</sup> μs/cm 323.4 340.4 Volume of water purged:

Containers collected:

Dissolved Heavy Metals (100ml)| Water for Organics

(500ml)| Unpreserved bottle (1L) | TPH (250ml)

ORF

Turbidity (FNU)

DTW

Additonal Note

Well Condition

82.3

132.6

174

Well was developed (extracted 3 x well volume on 20th September 2024). \* refers to 4x bailers extracted prior to measuring DTW.

Well was clean, capped, with not evidence of tampering or external environmental influence.



# Attachment F - Chain of custody records



### 126272 **Quote No** 298786 Tiana Hill **Primary Contact Submitted By** Aurecon New Zealand Limited 32359 **Client Name** Te Tihi Level 3 / 110 Carlton Gore Road Address Newmarket, Auckland Postcode 1023 021 0883 4125 Mobile Phone nzenvlabs@aurecongroup.com Émail Aurecon New Zealand Limited 32359 **Charge To** 521290-064 Client Reference Order No Reports will be emailed to Primary Contact by default. **Results To** Additional Reports will be sent as specified below ☐ Email Submitter Email Other andrew.allcock@aurecongroup.com Other

Esdat files please. Please advise before disposal.

BH44-01 -> if enough sample to complete 155
analysis too please du su otherwise dat morry:)

# **ANALYSIS REQUEST**

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000

E mail@hill-labs.co.nz W www.hill-laboratories.com Job No: Date Recv. 26-Sep-24 16:51

Received by: Olivia Tod

CHAIN OF CUSTULY RECORD							
Sent to Hill Laboratories	Date & Time: 26 09 24						
Till Laboratories	Name: THILL						
Tick if you require COC to be emailed back	Signature:	_					
Received at	Date & Time:						
Hill Laboratories	Name:						
	Signature:						
Condition		Temp:					
☐ Room Temp [	☐ Chilled ☐ Frozen	12.5					
☐ Sample and Analysis details checked							
Signature:							
Priority 🗌 Low 🛗 Normal 🗹 High							
☐ <b>Urgent</b> (ASAP, extra charge applies, please contact lab first)							
Requested Reporting Da	ite:						

	No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
	1	BH06-01	26.09.24	12:40	Water	Diss HM., PAH, TSS (total saids
HA!	2	BH14-01	76.09.24	11:50	Water	Dies HMs, PAH, TPH, TSS, SVOCS
_	3	BH51-01	26.09.24	[]:w	Water	Dis HMs, TSS
	4	BH 44-01	26-09-24	2:50	Water	Diss HMs , PAH, TPH , TSS, SVOCS
`	5	BH46_02	26-09-24	2:25.	Water	Diss HMs, PAH, TPH, TSS, SVOCS
5 P	6	BH10_01	26.09.24	4:0012	Water	Dics HAC, TSS
	7	,				
	8					
	9					
	10					
	11					
	12					

Continued on next page



◆ 0508 HILL LAB (44 555 22)
 ♦ +64 7 858 2000
 ✓ mail@hill-labs.co.nz
 ♦ www.hill-labs.co.nz

# **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3680726

Date Registered: 28-Sept-2024 12:55 pm

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064

Add. Client Ref:

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited Target Date: 04-Oct-2024 4:30 pm

Samples

Saiii	Samples					
No	Sample Name	Sample Type	Containers	Tests Requested		
1	BH06_01 26-Sept-2024 12:40 pm	Ground Water	UP1L, Org500, TPH250, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq		
2	BH14_01 26-Sept-2024 11:50 am	Ground Water	UP1L, Org500, TPH250, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq, Total Petroleum Hydrocarbons in Water, Semivolatile Organic Compounds Screening in Water by GC-MS		
3	BH51_01 26-Sept-2024 11:00 am	Ground Water	UP1L, Org500, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn		
4	BH44_01 26-Sept-2024 2:50 pm	Ground Water	Org500, TPH250, UPte100	Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq, Total Petroleum Hydrocarbons in Water, Semivolatile Organic Compounds Screening in Water by GC-MS		
5	BH46_02 26-Sept-2024 2:25 pm	Ground Water	UP1L, Org500, TPH250, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq, Total Petroleum Hydrocarbons in Water, Semivolatile Organic Compounds Screening in Water by GC-MS		
6	BH10_01 26-Sept-2024 4:00 pm	Ground Water	UP1L, Org500, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn		

### **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous							
Test	Method Description	<b>Default Detection Limit</b>	Sample No				
Individual Tests							
Total Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D (modified) : Online Edition.	3 g/m <sup>3</sup>	1-3, 5-6				
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B: Online Edition.	-	1-6				
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm Filtration, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.00005 - 0.0010 g/m <sup>3</sup>	1-6				
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq	Liquid / liquid extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.00010 - 0.0005 g/m <sup>3</sup>	1-2, 4-5				
Semivolatile Organic Compounds Screening in Water by GC-MS	Liquid / liquid extraction, GC-MS analysis. In-house based on US EPA 8270.	0.003 - 0.10 g/m <sup>3</sup>	2, 4-5				
Total Petroleum Hydrocarbons in Water	r	1	1				
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.10 g/m <sup>3</sup>	2, 4-5				
C10 - C14	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.2 g/m <sup>3</sup>	2, 4-5				

**Lab No:** 3680726 Hill Labs Page 1 of 2

Sample Type: Aqueous							
Test	Method Description	<b>Default Detection Limit</b>	Sample No				
C15 - C36	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.4 g/m <sup>3</sup>	2, 4-5				
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	0.7 g/m³	2, 4-5				



Quote No	126272							
<b>Primary Contact</b>	Tiana Hill		298786					
Submitted By	Submitted By							
Client Name	Aurecon New Zea	land Limited	32359					
Address Te Tihi I	_evel 3 / 110 Carlto	n Gore Road						
Newmarket, Auckl	and	Postcode 10	23					
Phone	Mobile	021 0883 4	125					
Email nzenvlab	s@aurecongroup.c	om						
Charge To A	urecon New Zealan	d Limited	32359					
Client Reference 5	21290-064							
Order No								
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☑ Email Other and	rew.allcock@aurec	ongroup.com						
Other								
Esdat files please	. Please advise bef	ore disposal.	1					
can water be placed	and soil so I on seperate	mples h	oleave :)					

Date Recv: 30-Sep-24 18:10

0508 HILL LAB (44 555 22)

T +64 7 858 2000

E mail@hill-labs.co.nz

W www.hill-laboratories.com

Received by: Alexa Badenhorst

	FAISTON/BEHI	
Sent to Hill Laboratories	Date & Time: 30-09-72	9
/ Laboratorio	Name: T. HIM	
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Signature:		
Priority 🔲 Lo	w 🔲 Normal 🖺	High
Urgent (AS	AP, extra charge applies, please	contact lab first)
Requested Reporting D	ate:	

	No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
	1	BH17_01	30.09.24		BWater	Dissolved netals, +85 total
	2	BH25_01	30-09.24		Wafe	Dissolved metals, PAH, TSS
×	3	BH38_01	30.09.24		water	Dissolved metals, TSS
盔	4	BH36-01	30-09-24		Water	Dissolved metals, TSS
	5	BH36_5.45	12.09.24		Seril	HM(7)
	6	BH 14 - 10.0-10.1	30.09.24		Seril	HM (7)
	7	BH14-2.5-2.6	30.09.24		1102	HM (7)
	8	BH43 - 2.3	25.09.24		Soil	HM (7)
	9	BH43-0.2-0-6	24.09-24		Soil	HM(7), TPH, PAH, Asb SQ
	10					
	11					
	12					



♦ 0508 HILL LAB (44 555 22)
 ♦ +64 7 858 2000
 ★ mail@hill-labs.co.nz
 ★ www.hill-labs.co.nz

# **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3682863

Date Registered: 01-Oct-2024 1:21 pm

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064

Add. Client Ref: Sampled 24/09/24

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited Target Date: 03-Oct-2024 4:30 pm

**Samples** 

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH43_0.5-0.6	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil

### Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	<b>Default Detection Limit</b>	Sample No
New Zealand Guidelines Semi Quantita	tive Asbestos in Soil		
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1
Asbestos in ACM as % of Total Sample	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1
Asbestos as Fibrous Asbestos as % of Total Sample	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1

Sample Type: Soil							
Test	Method Description	<b>Default Detection Limit</b>	Sample No				
Weight of Asbestos as Asbestos Fines (Friable)	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1				
Asbestos as Asbestos Fines as % of Total Sample	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1				
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1				



**Quote No** 

126272

Primary Contact Tiana Hill 298786

**Submitted By** 

Client Name Aurecon New Zealand Limited 32359

Address Te Tihi Level 3 / 110 Carlton Gore Road

Newmarket, Auckland Postcode 1023

Phone Mobile 021 0883 4125

Email nzenvlabs@aurecongroup.com

Charge To Aurecon New Zealand Limited

nited 32359

Client Reference 521290-064

Order No

Results To Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.

- Email Primary Contact
- ☐ Email Submitter
- ☑ Email Client
- ☐ Other

Esdat files, please. Please advise before disposal.

can water and soil samples please be placed on seperate (00's:)

### ANALYSISIREOUESI

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand 368 3703

T 0508 HILL LAB (44 555 22)

T +64 7 858 2000

E mail@hill-labs.co.nz

W www.hill-laboratories.com

Requested Reporting Date:

Received by: Olivia Tod

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Sent to	Date & Time: 30 - 09 72 4				
Hill Laboratories	Name: T. Hill				
Tick if you require COC to be emailed back	Signature: Cerylinia				
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Hill Laboratories	Name:				
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Priority 🔲 Lo	w ☐ Normal ☑ High				

Urgent (ASAP, extra charge applies, please contact lab first)

	No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
	1	BH17_01	30.09.24		18 Water	Dissolved metals, +55 total
	2	BH25_01	30-09.24		Water	Dissolved metals, PAH, TSS
×	3	BH38_01	30-09.24		water	Dissolved metals, TSS
₩.	4	BH36-01	30-09-24		water	Dissolved metals, TSS
	5	BH36_5.45	12.09.24		Sori	HM(7)
	6	BH.14 - 10.0-10.1	30.09.24		Seil	HM (7)
	7	BH14-2.5-2.6	30.09.24		Soil	HM (7)
	8	BH43-2.3	25.09.24	***************************************	Soil	HM (7)
	9	BH43-05-06	24.09.24		Soil	HM(7), TPH, PAH, Asb SQ
	10					
	11					·
	12					



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 ♦ +64 7 858 2000
 ✓ mail@hill-labs.co.nz
 ♦ www.hill-labs.co.nz

# **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited Lab No: 3683703

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Date Registered:** | 3683703 | 02-Oct-2024 9:23 am

Priority: High

Quote No: Order No:

Client Reference: 521290-064

Add. Client Ref:

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited Target Date\*: 04-Oct-2024 4:30 pm

126272

#### **Samples**

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH36_5.45 12-Sept-2024	Soil	GSoil300	Heavy Metals, Screen Level
2	BH14_10.0-10.1 30-Sept-2024	Soil	GSoil300	Heavy Metals, Screen Level
3	BH14_2.5-2.6 30-Sept-2024	Soil	GSoil300	Heavy Metals, Screen Level
4	BH43_2.3 25-Sept-2024	Soil	GSoil300	Heavy Metals, Screen Level
5	BH43_0.5-0.6 24-Sept-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH Oil Industry Profile + PAHscreen

#### **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil				
Test	Method Description	<b>Default Detection Limit</b>	Sample No	
Individual Tests			•	
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-5	
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	5	
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. (Free water removed before analysis, nonsoil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	5	
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from; Benzo(a) anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a) pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	5	
Benzo[a]pyrene Toxic Equivalence (TEF)	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	5	
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.010 - 70 mg/kg dry wt	5	

**Lab No:** 3683703 Hill Labs Page 1 of 2

<sup>\*</sup> As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.

Sample Type: Soil				
Test	Method Description	<b>Default Detection Limit</b>	Sample No	
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-5	
Total Petroleum Hydrocarbons in Soil				
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	5	
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	5	
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	5	
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	5	
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	5	



#### 126272 **Quote No** Tiana Hill **Primary Contact** 298786 Submitted By **Client Name** Aurecon New Zealand Limited 32359 Te Tihi Level 3 / 110 Carlton Gore Road Address Newmarket, Auckland Postcode 1023 021 0883 4125 Phone Mobile nzenvlabs@aurecongroup.com Email Aurecon New Zealand Limited **Charge To** 32359 521290-064 Client Reference Order No Reports will be emailed to Primary Contact by default. **Results To** Additional Reports will be sent as specified below. ☐ Email Submitter ☑ Email Other andrew.allcock@aurecongroup.com Other Esdat files please. Please advise before disposal.

can water and soil samples please

be placed on seperate COC's

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

Job No:

**0508 HILL LAB** (44 555 22)

+64 7 858 2000

mail@hill-labs.co.nz www.hill-laboratories.com

Requested Reporting Date:

١	Received by: Olivia Tod
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	No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
	1	BH17_01	30.09.24	And the second s	8 Water	Dissolved Netals, +55 total
	2	BH25-01	30-09.24		Water	Dissolved metals, PAH, TSS
×	3	BH38_01	30-69-24		water	Vissolved metals, TSS
盔	4	BH36-01	30.09.24		water	Disselved metals, TSS
	5	BH36_5.45	12.09.24		Seri	HM(7)
	6	BH.14 - 10.0-10.1	30.04.24		Seil	HM (7)
	7	BH14_2.5-2.6	30:09-24		Soil	HM (7)
	8	BH43-2.3	25.09.24		Sol	HM (7)
	9	BH43-0-5-0-6	24.09.24		Soll	HM(7), TPH, PAH, Asb SQ
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 ♦ +64 7 858 2000
 ✓ mail@hill-labs.co.nz
 ♦ www.hill-labs.co.nz

# **Job Information Summary**

Page 1 of 1

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3683704

Date Registered: 02

02-Oct-2024 10:02 am

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064

Add. Client Ref:

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited Target Date: 08-Oct-2024 4:30 pm

Samples
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	error to the contract of the c				
No	Sample Name	Sample Type	Containers	Tests Requested	
1	BH17_01 30-Sept-2024	Ground Water	UP1L, Org500, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	
2	BH25_01 30-Sept-2024	Ground Water	UP1L, Org500, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq	
3	BH38_01 30-Sept-2024	Ground Water	UP1L, Org500, TPH250, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq, Total Petroleum Hydrocarbons in Water	
4	BH36_01 30-Sept-2024	Ground Water	UP1L, Org500, TPH250, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq, Total Petroleum Hydrocarbons in Water	

## **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous					
Test	Method Description	<b>Default Detection Limit</b>	Sample No		
Individual Tests			1		
Total Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D (modified) : Online Edition.	3 g/m <sup>3</sup>	1-4		
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B: Online Edition.	-	1-4		
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm Filtration, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.00005 - 0.0010 g/m <sup>3</sup>	1-4		
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq	Liquid / liquid extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.00010 - 0.0005 g/m <sup>3</sup>	2-4		
Total Petroleum Hydrocarbons in Wate	r	1	II		
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.10 g/m <sup>3</sup>	3-4		
C10 - C14	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.2 g/m <sup>3</sup>	3-4		
C15 - C36	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.4 g/m <sup>3</sup>	3-4		
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	0.7 g/m <sup>3</sup>	3-4		

**Lab No:** 3683704 Hill Labs Page 1 of 1



126272 **Quote No** Tiana Hill **Primary Contact** 298786 **Submitted By** Aurecon New Zealand Limited **Client Name** 323 Te Tihi Level 3 / 110 Carlton Gore Road Newmarket, Auckland 1023 Postcode 021 0883 4125 Phone Mobile nzenvlabs@aurecongroup.com Email Aurecon New Zealand Limited 3235 **Charge To** 521290-064 Client Reference Order No Reports will be emailed to Primary Contact by default. **Results To** Additional Reports will be sent as specified below. ☐ Email Submitter Other

Esdat files please. Please advise before disposal.

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

Date Recv: 01-Oct-24 16:53

Received by: Olivia Tod



Т	0508	HILL	LAB	(44	555	22
Т	+64 7	858	2000			

59	T +64 7 858 2000 E mail@hill-labs.co.nz W www.hill-laboratories.co	
	- GHAN O	CUSTODY RECORD
	Hill Laboratories	Date & Time: 1 . 10 . 2024  Name: T. Hill
59	Tick if you require COC to be emailed back	Signature:
_	Received at Hill Laboratories	Date & Time: Name:
		Signature:
nt	Condition  ☐ Room Temp  ☐	Temp:  ☐ Chilled ☐ Frozen
	Sample and Analys	is details checked
	Priority Low	Normal High P, extra charge applies, please contact lab first)
	Requested Reporting Date	e:

#### Sample Sample No. Sample Name **Date** Time Sample Type Tests Required (if not as per Quote) 1 QAQC -01 HM (7) 29-08-2024 Soil 2 QAQC\_0Z HM (7) 05-07.2024 Soil 3 QAQC\_03 HM (7) 10.07.7024 500) 4 HM (7) QAQC\_04 Soil 26.08.2024 5 6 7 8 9 10 11 12



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## **Job Information Summary**

Page 1 of 1

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3684098

**Date Registered:** 02-Oct-2024 8:33 am

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064

Add. Client Ref:

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited Target Date: 08-Oct-2024 4:30 pm

Samples
---------

No	Sample Name	Sample Type	Containers	Tests Requested
1	QAQC_01 29-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level
2	QAQC_02 05-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
3	QAQC_03 10-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
4	QAQC_04 26-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level
5	QAQC_05	Soil	cGSoil	Heavy Metals, Screen Level
6	QAQC_06	Soil	cGSoil	Heavy Metals, Screen Level
7	QAQC_07	Soil	cGSoil	Heavy Metals, Screen Level
8	QAQC_08	Soil	cGSoil	Heavy Metals, Screen Level

### **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil							
Test	Method Description	<b>Default Detection Limit</b>	Sample No				
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-8				
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-8				



Quote No	126272			
Primary Contact	THE BEARING	Hanna	h	<i>2387</i> 86 <sub>i</sub>
Submitted By	Śū	issey		
Client Name	Aurecon Ne	w Zealar	nd Limite	ed 32359
Address Te Tihi L	evel 3 / 110	Carlton C	ore Ro	ad
Newmarket, Auckla	ınd	P	ostcode	1023
Phone	М	<sub>lobile</sub> 0	24/9883	24125
<sub>Email</sub> nzenvlab	s@aurecong	roup.con	า	
Charge To Au	recon New 2	Zealand l	_imited	32359
Client Reference 52	1290-064			
Order No				
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### ANALYSIS REQUEST

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

+64 7 858 2000

Requested Reporting Date:

0508 HILL LAB (44 555 22)

369 0956

Received by: Olivia Tod



<ul><li>E mail@hill-labs.co.nz</li><li>W www.hill-laboratories.</li></ul>	3136909565 com	·
: CHANC	F CUSTODY RECO	
Sent to Hill Laboratories	Date & Time: 10/10/2 Name: Hannah Su	4 55ex
Tick if you require COC to be emailed back		ol
Received at Hill Laboratories	Date & Time:  Name:  Signature:	
Condition  Room Temp	☐ Chilled ☐ Frozen	Jemp:
Sample and Analy	ysis details checked	
Priority Lo	W Normal ✓ AP, extra charge applies, please	High contact lab first)

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	BH14-01	10/10/24		water	SVOCS, TSS, Dis HM, PAH
2	BH144-02				Dis HM, TSS, PAH
3	BH14B-03			·	Dis HM, TSS, PAH
4	BH14C-04			Y	DIS HM, TSS, PAH
5	BH39-01	V		$\gamma$	SVOCS, TSS, DISHM, PAH, TPH
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## **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Hannah Sussex

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3690956

Date Registered: 11-Oct-2024 9:38 am

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064
Add. Client Ref: Sampled 10/10/24
Submitted By: Hannah Sussex

Charge To: Aurecon New Zealand Limited 17-Oct-2024 4:30 pm

Samples

	Samples S						
No	Sample Name	Sample Type	Containers	Tests Requested			
1	BH14-01 10-Oct-2024	Ground Water	UP1L, Org500, TPH250, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq, Semivolatile Organic Compounds Screening in Water by GC-MS, Total Petroleum Hydrocarbons in Water			
2	BH14A-02 10-Oct-2024	Ground Water	UP1L, Org500, TPH250, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq			
3	BH14B-03 10-Oct-2024	Ground Water	UP1L, Org500, TPH250, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq			
4	BH14C-04 10-Oct-2024	Ground Water	UP1L, Org500, TPH250, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq			
5	BH39-01 10-Oct-2024	Ground Water	UP1L, Org500, TPH250, UPte100	Total Suspended Solids, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq, Semivolatile Organic Compounds Screening in Water by GC-MS, Total Petroleum Hydrocarbons in Water			

### **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous			
Test	Method Description	<b>Default Detection Limit</b>	Sample No
Individual Tests			
Total Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D (modified) : Online Edition.	3 g/m <sup>3</sup>	1-5
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B : Online Edition.	-	1-5
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm Filtration, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.00005 - 0.0010 g/m <sup>3</sup>	1-5
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq	Liquid / liquid extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.00010 - 0.0005 g/m <sup>3</sup>	1-5
Semivolatile Organic Compounds Screening in Water by GC-MS	Liquid / liquid extraction, GC-MS analysis. In-house based on US EPA 8270.	0.003 - 0.10 g/m <sup>3</sup>	1, 5
Total Petroleum Hydrocarbons in Wate	r		
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.10 g/m <sup>3</sup>	1, 5
C10 - C14	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.2 g/m <sup>3</sup>	1, 5
C15 - C36	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.4 g/m <sup>3</sup>	1, 5

Sample Type: Aqueous			
Test	Method Description	<b>Default Detection Limit</b>	Sample No
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	0.7 g/m <sup>3</sup>	1, 5



Date Recv: 15-Oct-24 14:37 28 Duke Street Frankton 3204 Private Bag 3205 **Quote No** 126272 Hamilton 3240 New Zealand Primary Contact Hannah Sussex **© 0508 HILL LAB (44** 555 22) 308625 Received by: Sanaya Hansotia & +64 7 858 2000 Submitted By Hannah Sussex 308625  $\bigoplus$ www.hill-labs.co.nz **Client Name** Aurecon New Zealand Limited 32359 Address PO Box 2292, Tauranga 3140 Sent to Hill Labs 07 578 6183 Phone Mobile Tick if you require COC nzenvlabs@aurecongroup.com Email to be emailed back Signature: Charge To Aurecon New Zealand Limited 32359 Received at Date & Time Client Reference Hill Labs Name: Order No Reports will be emailed to Primary Contact by default. Results To Signature: Additional Reports will be sent as specified below. Email Primary Contact 💟 Email Submitter 🗌 Email Client Condition Temp: Email Other Room Temp Chilled Frozen Other Dates of testing are not routinely included in the Certificates of Analysis Sample & Analysis details checked Please inform the laboratory if you would like this information reported. ADDITONA INFORMATION AKODUR HAZAROS Signature: **Priority** Low Normal **▼** High Urgent (ASAP, extra charge applies, please contact lab first) NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 10 working days following the day of receipt of the samples at the laboratory. Requested Reporting Date: **Quoted Sample Types** Soil (Soil), Ground Water (GW) No. Sample Name Sample Date/Time Sample Type Tests Required 3 1 15,10.24 ( ; ن ح BH38 - 6.9-7.0 2 3 4 5 6 7 8 9 ; 10

R J Hill Laboratories Limited



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# **Job Information Summary**

Page 1 of 1

Client: Aurecon New Zealand Limited

Contact: Hannah Sussex

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3694107

Date Registered: 16-Oct-2024 8:00 am

Priority: High Quote No: 126272

Order No:

Client Reference: Add. Client Ref:

Submitted By: Hannah Sussex

Charge To: Aurecon New Zealand Limited 18-Oct-2024 4:30 pm

10 Oct 2021 1.00 pt

#### **Samples**

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH38_6.9-7.0 15-Oct-2024	Soil	GSoil300	Heavy Metals, Screen Level

#### **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil							
Test	Method Description	<b>Default Detection Limit</b>	Sample No				
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1				
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1				

**Lab No:** 3694107 Hill Labs Page 1 of 1

<sup>\*</sup> As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.



126272 **Quote No** Tiana Hill 298786 **Primary Contact Submitted By** 32359 Aurecon New Zealand Limited **Client Name** Te Tihi Level 3 / 110 Carlton Gore Road Address Newmarket, Auckland Postcode 021 0883 4125 Phone Mobile

Aurecon New Zealand Limited **Charge To** 521290-064 Client Reference

Order No

Email

Reports will be emailed to Primary Contact by default. **Results To** Additional Reports will be sent as specified below.

☑ Email Primary Contact ☐ Email Submitter

nzenvlabs@aurecongroup.com

Other

Esdat files please. Please advise before disposal.

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

**0508 HILL LAB** (44 555 22)

+64 7 858 2000 Е mail@hill-labs.co.nz

32359

Received by: Sanaya Hansotia

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Sent to Hill Laboratories	Date & Time:				
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☐ Sample and Analy	sis details checked				
Signature:					
Priority					
Requested Reporting Date:					

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	BH30_0.23m	13/05/2024		Soil	HMsSoil, PAH, ASB(SQ), OCP
2	BH30_0.62m	13/05/2024		Soil	HMsSoil, PAH, ASB(SQ)
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# **Job Information Summary**

Page 1 of 1

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3582989

Date Registered: 17-May-2024 9:50 am

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064

Add. Client Ref:

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited 21-May-2024 4:30 pm

\* As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.

#### **Samples**

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH30_0.23m 13-May-2024	Soil	cGSoil	Heavy Metals, Screen Level, Organochlorine Pesticides Screening in Soil, Polycyclic Aromatic Hydrocarbons Screening in Soil
2	BH30_0.62m 13-May-2024	Soil	cGSoil	Heavy Metals, Screen Level, Polycyclic Aromatic Hydrocarbons Screening in Soil

### Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil					
Test	Method Description	<b>Default Detection Limit</b>	Sample No		
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-2		
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-2		
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-2		
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	1		
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-2		
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. (Free water removed before analysis, nonsoil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-2		
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from; Benzo(a) anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j) fluoranthene x 0.1 + Benzo(a) pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	1-2		
Benzo[a]pyrene Toxic Equivalence (TEF)	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	1-2		

Lab No: 3582989 Hill Labs Page 1 of 1



Quote No	126272	
Primary Contact	Tiana Hill	298786
Submitted By		-
Client Name	Aurecon New Zea	aland Limited 32359
Address Te Tihi L	evel 3 / 110 Carlto	n Gore Road
Newmarket, Auckla	and	Postcode 1023
Phone	Mobile	021 0883 4125
Email nzenvlab	s@aurecongroup.d	com
Charge To Au	ırecon New Zealar	nd Limited 32359
Client Reference 52	1290-064	
Order No		
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mail@hill-labs.co.nz www.hill-laboratories.com

Received by: Sanaya Hansotia 0508 HILL LAB (44 555 22) +64 7 858 2000

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CHANO	FCUSTODY RECORD
Sent to	Date & Time:
Hill Laboratories	Name:
Tick if you require COC to be emailed back	Signature:
Received at	Date & Time:
Hill Laboratories	Name:
	Signature:
Condition	Temp:
☐ Room Temp [	□ Chilled □ Frozen: 13.4
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Signature:	
Priority Lov	w ☐ Normal ☑ High
Urgent (ASA	P, extra charge applies, please contact lab first)
Requested Reporting Da	te:

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	BH30_0.23m	13/05/2024		Soil	HMsSoil, PAH, ASB(SQ), OCP
2	BH30_0.62m	13/05/2024		Soil	HMsSoil, PAH, ASB(SQ)
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 ⊕ www.hill-labs.co.nz

## **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3583099

Date Registered: 16-May-2024 1:58 pm

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064

Add. Client Ref: Sampled: 13/05/24

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited 20-May-2024 4:30 pm

#### Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH30_0.23m	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil, Asbestos in Soil ESdat Electronic Transfer
2	BH30_0.62m	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil, Asbestos in Soil ESdat Electronic Transfer

#### **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil						
Test	Method Description	<b>Default Detection Limit</b>	Sample No			
New Zealand Guidelines Semi Quant	itative Asbestos in Soil					
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1-2			
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1-2			
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-2			
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-2			
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-2			
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-2			
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-2			
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-2			
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2			
Asbestos in ACM as % of Total Sample	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2			
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2			

**Lab No:** 3583099 Hill Labs Page 1 of 2

Sample Type: Soil						
Test	Method Description	Default Detection Limit	Sample No			
Asbestos as Fibrous Asbestos as % of Total Sample	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2			
Weight of Asbestos as Asbestos Fines (Friable)	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2			
Asbestos as Asbestos Fines as % of Total Sample	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2			
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample	0.001 % w/w	1-2				
Asbestos in Soil ESdat Electronic Trans	sfer					
Amosite	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0 Detect	1-2			
Chrysotile	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0 Detect	1-2			
Crocidolite	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0 Detect	1-2			



**Quote No** 

**Primary Contact** 

126272

Tiana Hill

Submitted By	ANDREW ALCCOCK	DEN ALLCOCK		
Client Name	Aurecon New Zealand Limited			

Te Tihi Level 3 / 110 Carlton Gore Road

Newmarket, Auckland Postcode

Phone

021 0883 4125

Mobile nzenvlabs@aurecongroup.com

Email Charge To Aurecon New Zealand Limited

521290-064

Client Reference

Order No

Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below. Results To

☑ Email Primary Contact

Sample Name

BH22\_0.2-0.3m

BH22-0.6m

☐ Email Submitter

Sample

Date

1023

298786

Email Other andrew.allcock@aurecongroup.com

Other

No.

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Esdat files please. Please advise before disposal.

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

Received by: Alexa Badenhorst 0508 HILL LAB (44 555 22)



+64 7 858 2000 mail@hill-labs.co.nz www.hill-laboratories.com	3135908574
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		SOIL	HMsSoil
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 ♦ +64 7 858 2000
 ☑ mail@hill-labs.co.nz
 ⊕ www.hill-labs.co.nz

# **Job Information Summary**

Page 1 of 1

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3590857

Date Registered: 25-May-2024 10:12 am

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064

Add. Client Ref:

Submitted By: Andrew Allcock

Charge To: Aurecon New Zealand Limited 29-May-2024 4:30 pm

#### **Samples**

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH22_0.2-0.3m 22-May-2024	Soil	GSoil300	Heavy Metals, Screen Level
2	BH22_0.6m 22-May-2024	Soil	cGSoil	Heavy Metals, Screen Level

## Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil					
Test	Method Description	<b>Default Detection Limit</b>	Sample No		
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-2		
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-2		

**Lab No:** 3590857 Hill Labs Page 1 of 1

<sup>\*</sup> As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.



126272 **Quote No** Tiana Hill 298786 **Primary Contact** THILL Submitted By Aurecon New Zealand Limited 32359 **Client Name** Te Tihi Level 3 / 110 Carlton Gore Road Address Newmarket, Auckland Postcode 1023 021 0883 4125 Phone Mobile nzenvlabs@aurecongroup.com Email Aurecon New Zealand Limited 32359 **Charge To** 521290-064 Client Reference Order No Reports will be emailed to Primary Contact by default. **Results To** Additional Reports will be sent as specified below. ☐ Email Submitter ☐ Other ADD TONAL NEOR MAT ON

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# ANALYSIS REQUEST

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

mail@hill-labs.co.nz

Requested Reporting Date:

T E 361 0977

0508 HILL LAB (44 555 22) Received by: Sanaya Hansotia

3136109772

W www.hill-laboratories.	com 3136109772				
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Sent to	Date & Time: . 20 - 06 - 202 4				
Hill Laboratories	Name: Tiana Hill				
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Hill Laboratories	Name:				
	Signature:				
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☐ Sample and Analysis details checked					
Signature:					
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Sample Sample Sample Name Date Sample Type No. Time Tests Required (if not as per Quote) 1 BH15\_01. 1:00pm 20.06.24 water cold Hold 2 3 4 5 6 7 8 9 10 11 12



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 ♦ +64 7 858 2000
 ★ mail@hill-labs.co.nz
 ★ www.hill-labs.co.nz

# **Job Information Summary**

Page 1 of 1

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3610977

Date Registered: 21-Jun-2024 9:59 am

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064

Add. Client Ref:

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited 27-Jun-2024 4:30 pm

**Samples** 

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH15_01 20-Jun-2024	Ground Water	Org500, Org500, TPH250, TOC125, UPte100, VOC40, VOC40, VOC40, VOC40, cUPte100	Dissolved Mercury, Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn

#### **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous							
Test	Method Description	<b>Default Detection Limit</b>	Sample No				
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm Filtration, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.00005 - 0.0010 g/m <sup>3</sup>	1				
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B : Online Edition.	-	1				
Filtration for dissolved metals analysis - Misc	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B : Online Edition.	-	1				
Dissolved Mercury	0.45µm filtration, bromine oxidation followed by atomic fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m <sup>3</sup>	1				

**Lab No:** 3610977 Hill Labs Page 1 of 1



126272 **Quote No** Tiana Hill 298786 **Primary Contact Submitted By** Aurecon New Zealand Limited 32359 **Client Name** Te Tihi Level 3 / 110 Carlton Gore Road Address Newmarket, Auckland 1023 Postcode 021 0883 4125 Phone Mobile nzenvlabs@aurecongroup.com Email **Charge To** Aurecon New Zealand Limited 32359 521290-064 Client Reference Order No Reports will be emailed to Primary Contact by default. **Results To** Additional Reports will be sent as specified below. ☑ Email Primary Contact ☐ Email Submitter ☐ Other

Esdat files please. Please advise before disposal. Will send updated CCC via email.

### MABABREUESI

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand 362 0390

T 0508 HILL LAB (44 555 22) T +64 7 858 2000 E mail@hill-labs.co.nz

+64 / 858 2000 mail@hill-labs.co.nz www.hill-laboratories.com

Received by: Sanaya Hansotia

- CHINOCOUSTODY RECORD							
Hill Laboratories	Date & Time: 4.7.24						
Tick if you require COC	Name: T. Hill						
Received at	Signature: Confidence of the C						
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No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	BH29_005-02	4.7.24		Soil	Hold Cold
2	BH48_0.05-0.2	4.7.24		Soil	
3	BH10-0.05-0-2	4.7.24		Soil	
4	BH10-0.4-0.5	4.7.29		Soil	
5	BH 10 _ 1-0-1-1	4.7.24		50.1	
6	BH10-1-4-1-5	4.7.24		Soil	<b>\</b>
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# **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3620390

Date Registered: 06-Jul-2024 10:48 am

Priority: High 126272

Order No:

Client Reference: 521290-064

Add. Client Ref:

Submitted By: Andrew Allcock

Charge To: Aurecon New Zealand Limited 14-Aug-2024 4:30 pm

Samples

	·						
No	Sample Name	Sample Type	Containers	Tests Requested			
1	BH29_0.05-0.2 04-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level			
2	BH48_0.05-0.2 04-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level, TCLP Profile			
3	BH10_0.05-0.2 04-Jul-2024	Soil	GSoil300	Hold Cold			
4	BH10_0.4-0.5 04-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH + PAH + BTEX profile			
5	BH10_1.0-1.1 04-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH + PAH + BTEX profile			
6	BH10_1.4-1.5 04-Jul-2024	Soil	GSoil300	Hold Cold			
7	BH48_0.05-0.2 [TCLP Extract]	TCLP Extract	TCLPext	Total Lead			

#### **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil						
Test	Method Description	<b>Default Detection Limit</b>	Sample No			
Individual Tests						
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-2, 4-5			
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	4-5			
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. (Free water removed before analysis, nonsoil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	4-5			
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from; Benzo(a) anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j) fluoranthene x 0.1 + Benzo(a) pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	4-5			
Benzo[a]pyrene Toxic Equivalence (TEF)	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	4-5			
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-2, 4-5			

Lab No: 3620390 Hill Labs Page 1 of 2

Sample Type: Soil			
Test	Method Description	<b>Default Detection Limit</b>	Sample No
BTEX in Soil by Headspace GC-MS	Soil by Headspace GC-MS Solvent extraction, Headspace GC-MS analysis. Tested on as received sample. In-house based on US EPA 8260 and 5021.		4-5
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	4-5
TCLP Profile	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1311.	-	2
Total Petroleum Hydrocarbons in Soil			
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	4-5
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	4-5
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	4-5
Total hydrocarbons (C7 - C36)  Calculation: Sum of carbon bands from C7 to based on US EPA 8015.		70 mg/kg dry wt	4-5
TCLP Profile			
TCLP Weight of Sample Taken	Gravimetric. US EPA 1311.	0.1 g	2
TCLP Initial Sample pH	pH meter. US EPA 1311.	0.1 pH Units	2
TCLP Acid Adjusted Sample pH	pH meter. US EPA 1311.	0.1 pH Units	2
TCLP Extractant Type	US EPA 1311.	-	2
TCLP Extraction Fluid pH	pH meter. US EPA 1311.	0.1 pH Units	2
TCLP Post Extraction Sample pH	pH meter. US EPA 1311.	0.1 pH Units	2
Sample Type: Aqueous			
Test	Method Description	<b>Default Detection Limit</b>	Sample No
Individual Tests			
Total Digestion of Extracted Samples Nitric acid digestion. APHA 3030 E (modified) : Online Edition.		-	7
Total Lead	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B: Online Edition.	0.0021 g/m <sup>3</sup>	7



TRIED, TESTED AND TRUSTED 126272 **Quote No** Tiana Hill 298786 **Primary Contact** Submitted By Aurecon New Zealand Limited **Client Name** 32359 Te Tihi Level 3 / 110 Carlton Gore Road Address Newmarket, Auckland 1023 Postcode 021 0883 4125 Phone Mobile nzenvlabs@aurecongroup.com Email Aurecon New Zealand Limited 32359 **Charge To** 521290-064 Client Reference Order No Reports will be emailed to Primary Contact by default. **Results To** Additional Reports will be sent as specified below. ☐ Email Submitter Other 

Esdat files please. Please advise before disposal. will send updated coc via email.

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

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Received by: Sanaya Hansotia



<b>0508 HILL LAB</b> (44 555 22) +64 7 858 2000	
mail@hill-labs.co.nz www.hill-laboratories.com	3136212869

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No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	BH29_005-02	4.7.24		Soil	Hold Gld
2	BH48_0.05-0.2	4.7.24		Soil	
3	BH10-0.05-0-2	4.7.24		Seil	
4	BH10-0-4-0-5	4.7.24		Soil	
5	BH10_1.0-1.1	4.7.24		50.1	
6	BH 10 - 1-4-1-5	4-7.24		Scil	<b>1</b>
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 ⊕ www.hill-labs.co.nz

# **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3621286

Date Registered: 05-Jul-2024 5:21 pm

Priority: High 126272

Order No:

Client Reference: 521290-064

Add. Client Ref: Sampled: 04/07/24

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited

**Target Date:** 11-Jul-2024 4:30 pm

### Samples

No	Sample Name	Sample Type	Containers	Tests Requested		
1	BH29_0.05-0.2	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil		
2	BH48_0.05-0.2	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil		
3	BH10_0.05-0.2	Soil	PSoil500Asb	Hold		
4	BH10_0.4-0.5	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil		
5	BH10_1.0-1.1	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil		
6	BH10_1.4-1.5	Soil	PSoil500Asb	Hold		

### **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Test	Method Description	<b>Default Detection Limit</b>	Sample No
New Zealand Guidelines Semi Quant	itative Asbestos in Soil		
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1-2, 4-5
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1-2, 4-5
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-2, 4-5
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-2, 4-5
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-2, 4-5
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-2, 4-5
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-2, 4-5
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-2, 4-5
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2, 4-5

**Lab No:** 3621286 Hill Labs Page 1 of 2

Sample Type: Soil					
Test	Method Description	<b>Default Detection Limit</b>	Sample No		
Asbestos in ACM as % of Total Sample	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2, 4-5		
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2, 4-5		
Asbestos as Fibrous Asbestos as % of Total Sample	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2, 4-5		
Weight of Asbestos as Asbestos Fines (Friable)	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2, 4-5		
Asbestos as Asbestos Fines as % of Total Sample	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2, 4-5		
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2, 4-5		



126272 **Quote No Primary Contact** Tiana Hill 298786 Submitted By Aurecon New Zealand Limited 32359 **Client Name** Te Tihi Level 3 / 110 Carlton Gore Road Address Newmarket, Auckland 1023 Postcode 021 0883 4125 Phone Mobile nzenvlabs@aurecongroup.com Email Aurecon New Zealand Limited 32359 Charge To 521290-064 Client Reference Order No Reports will be emailed to Primary Contact by default. Results To Additional Reports will be sent as specified below. ☐ Email Submitter ✓ Email Client Email Other andrew.allcock@aurecongroup.com Other Esdat files please. Please advise before disposal.

### ANALYSIS REQUEST

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand 362 4078

0508 HILL LAB (44 555 22) Received by: Alisha Poipoi

T +64 7 858 2000 `

E mail@hill-labs.co.nz

W www.hill-laboratories.com

Requested Reporting Date:



#### Sent to 09/07/2024 Date & Time: **Hill Laboratories** Tiana H Name: jick if you require COC to be emailed back TH Signature: Received at Date & Time: **Hill Laboratories** Name: Signature: Condition Temp: 9.40 ☐ Room Temp ☐ Chilled ☐ Frozen ☐ Sample and Analysis details checked Signature: **Priority** Low ☐ Normal High Urgent (ASAP, extra charge applies, please contact lab first)

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	BH49_0.05-0.2	08.07.2024	T\$/F	Soil	TPBXp, HMsSoil, AsbSoil
2	BH49_0.3-0.4	08.07.2024	F (ASB)	Soil	TPBXp, HMsSoil, AsbSoil
_3_	BH49_0.5-0.6	08:07:2024	-	Soil	Disregard - T
4	BH49_1.0-1.1	08.07.2024	N/F	Soil	Hold Cold
5	BH49_1.4-1.5	08.07.2024	N	Soil	Hold Cold
6	BH49_B1 0.35 m	08.07.2024	A\$B	Bulk	ASB P/A
7	BH10_1.8-1.9	05.07.2024	AL	Soil	HMsSoil
8	BH10_3.3-3.4	05.07.2024	A	Soil	HMsSoil
9	BH10_5.9-6.0	05.07.2024	AL	Soil	HMsSoil
10	BH10_9.4-9.5	05.07.2024	Ed	Soil	HMsSoil
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12			Columbia		



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## **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3624078

Date Registered: 11-Jul-2024 9:33 am

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064

Add. Client Ref:

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited 15-Jul-2024 4:30 pm

\* As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.

#### **Samples**

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH49_0.05-0.2 08-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH + PAH + BTEX profile
2	BH49_0.3-0.4 08-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH + PAH + BTEX profile
3	BH49_1.0-1.1 08-Jul-2024	Soil	GSoil300	Hold Cold
4	BH49_1.4-1.5 08-Jul-2024	Soil	GSoil300	Hold Cold
5	BH10_1.8-1.9 05-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
6	BH10_3.3-3.4 05-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
7	BH10_5.9-6.0 05-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
8	BH10_9.4-9.5 05-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level

#### **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil					
Test	Method Description	<b>Default Detection Limit</b>	Sample No		
Individual Tests		•			
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-2, 5-8		
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-2		
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. (Free water removed before analysis, nonsoil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-2		
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from; Benzo(a) anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j) fluoranthene x 0.1 + Benzo(a) pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	1-2		
Benzo[a]pyrene Toxic Equivalence (TEF)	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(b)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	1-2		

**Lab No:** 3624078 Hill Labs Page 1 of 2

Sample Type: Soil					
Test	Method Description	<b>Default Detection Limit</b>	Sample No		
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-2, 5-8		
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis. Tested on as received sample. In-house based on US EPA 8260 and 5021.	0.05 - 0.10 mg/kg dry wt	1-2		
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-2		
Total Petroleum Hydrocarbons in Soil					
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	1		
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	1-2		
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-2		
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1-2		
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1-2		



**Quote No** 

126272

Tiana Hill 298786 **Primary Contact Submitted By** 

Aurecon New Zealand Limited **Client Name** 

Te Tihi Level 3 / 110 Carlton Gore Road Address

Newmarket, Auckland 1023 Postcode

021 0883 4125 Phone Mobile

nzenvlabs@aurecongroup.com Email

Aurecon New Zealand Limited **Charge To** 

521290-064 Client Reference

Order No

Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below. Results To

☑ Email Primary Contact

☐ Email Submitter

32359

32359

Email Other andrew.allcock@aurecongroup.com

Other

Esdat files please. Please advise before disposal.

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

0508 HILL LAB (44 555 22)

+64 7 858 2000

mail@hill-labs.co.nz

www.hill-laboratories.com

received by:	May Aifante
3136243268	

#### STATE BILL AND A STEEL

Sent to	Date & Time:	09/07/2024
Hill Laboratories	Name:	Tiana H
jick if you require COC to be emailed back	Signature:	ТН
Received at	Date & Time:	
Hill Laboratories	Name:	
	Signature:	
Condition		-¶emp:
☐ Room Temp	☐ Chilled	□ Frozen 9.4°C
☐ Sample and Analy	sis details che	cked
Signature:		
Priority 🗌 Lo	w 🗆 No	ormal (P) High

					_		
☐ Urgent	(ASAP,	extra	charge	applies,	please	contact	lab first

Requested Reporting Date:

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	BH49_0.05-0.2	08.07.2024	T\$/F	Soil	TPBXp, HMsSoil, AsbSoil
2	BH49_0.3-0.4	08.07.2024	F (ASB)	Soil	TPBXp, HMsSoil, AsbSoil
_3_	BH49_0.5-0.6	08.07.2024		Soil	Disregard - T
4	BH49_1.0-1.1	08.07.2024	N/F	Soil	Hold Cold
5	BH49_1.4-1.5	08.07.2024	N	Soil	Hold Cold
6	BH49_B1 0.35 m	08.07.2024	A\$B	Bulk	ASB P/A
7	BH10_1.8-1.9	05.07.2024	AL	Soil	HMsSoil
8	BH10_3.3-3.4	05.07.2024	A	Soil	HMsSoil
9	BH10_5.9-6.0	05.07.2024	AL	Soil	HMsSoil
10	BH10_9.4-9.5	05.07.2024	EG	Soil	HMsSoil
11			Disregard		
12			Columber		



**55 0508 HILL LAB** (44 555 22) **\( \sigma +64 7 858 2000 \)** mail@hill-labs.co.nz www.hill-labs.co.nz

## **Job Information Summary**

Page 1 of 1

Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 Lab No: 3624326

**Date Registered:** 11-Jul-2024 9:46 am

**Priority:** High **Quote No:** 126272

Order No:

Client Reference: 521290-064 Add. Client Ref: Sampled: 8/07/24

Submitted By: Tiana Hill

**Charge To:** Aurecon New Zealand Limited

**Target Date:** 

12-Jul-2024 4:30 pm

**Samples** 

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH49_B1 0.35m / BH49	Building Material	cpzBag2	Asbestos in Bulk Material

### Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Building Mater	ial		
Test	Method Description	<b>Default Detection Limit</b>	Sample No
Asbestos in Bulk Material			
Sample Category	Assessment of sample type. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	-	1
Sample Weight on receipt	Sample weight (approximate). Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.01 g	1
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1
Description of Asbestos in Non Homogeneous Samples	Form, dimensions and/or weight of asbestos fibres present. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	1



126272 **Quote No Primary Contact** Tiana Hill 298786 **Submitted By** Aurecon New Zealand Limited **Client Name** 32359 Te Tihi Level 3 / 110 Carlton Gore Road Address Newmarket, Auckland 1023 Postcode 021 0883 4125 Phone Mobile nzenvlabs@aurecongroup.com Email Aurecon New Zealand Limited 32359 **Charge To** 

Reports will be emailed to Primary Contact by default.

Additional Reports will be sent as specified below.

Contact Email Submitter E

Esdat files please. Please advise before disposal.

Email Other andrew.allcock@aurecongroup.com

521290-064

Client Reference

**Results To** 

Order No

Other

# ANALYSIS REQUEST

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand Date Recv: 10-Jul-2414:41 362 4327

T 0508 HILL LAB (44 555 22)

T +64 7 858 2000

**Priority** 

Requested Reporting Date:

Low

E mail@hill-labs.co.nz

Www.hill-laboratories.com



Sent to Hill Laboratories	Date & Time:	09/07/2024	
inii Laboratories	Name:	Tiana H	
jick if you require COC to be emailed back	Signature:	тн	
Received at	Date & Time:		
Hill Laboratories	Name:		
	Signature:		
Condition			-¶emp:
☐ Room Temp [	Chilled	☐ Frozen	9 40

Normal

Urgent (ASAP, extra charge applies, please contact lab first)

☑ High

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	BH49_0.05-0.2	08.07.2024	T\$/F	Soil	TPBXp, HMsSoil, AsbSoil
2	BH49_0.3-0.4	08.07.2024	F (ASB)	Soil	TPBXp, HMsSoil, AsbSoil
_3_	BH49_0.5-0.6	08.07.2024	-	Soil	Disregard Sample
4	BH49_1.0-1.1	08.07.2024	N/F	Soil	Hold Cold
5	BH49_1.4-1.5	08.07.2024	N	Soil	Hold Cold
6	BH49_B1 0.35 m	08.07.2024	A\$B	Bulk	ASB P/A
7	BH10_1.8-1.9	05.07.2024	AL	Soil	HMsSoil
8	BH10_3.3-3.4	05.07.2024	AL	Soil	HMsSoil
9	BH10_5.9-6.0	05.07.2024	AL	Soil	HMsSoil
10	BH10_9.4-9.5	05.07.2024	EC	Soil	HMsSoil
11			Disregard Column		
12			Colarate	Ň	



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 ♦ +64 7 858 2000
 ✓ mail@hill-labs.co.nz
 ♦ www.hill-labs.co.nz

## **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No**: 3624327

Date Registered:

10-Jul-2024 5:49 pm

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064
Add. Client Ref: Sampled: 8/07/24

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited

**Target Date:** 12-Jul-2024 4:30 pm

#### Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH49_0.05-0.2	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil
2	BH49_0.3-0.4	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil

### **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	<b>Default Detection Limit</b>	Sample No
New Zealand Guidelines Semi Quant	itative Asbestos in Soil		
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1-2
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1-2
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-2
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-2
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-2
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-2
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-2
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-2
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2
Asbestos in ACM as % of Total Sample	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2

Sample Type: Soil			
Test	Method Description	<b>Default Detection Limit</b>	Sample No
Asbestos as Fibrous Asbestos as % of Total Sample	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2
Weight of Asbestos as Asbestos Fines (Friable)	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2
Asbestos as Asbestos Fines as % of Total Sample	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2



#### 126272 **Quote No** Tiana Hill 298786 **Primary Contact Submitted By** Aurecon New Zealand Limited 32359 **Client Name** Te Tihi Level 3 / 110 Carlton Gore Road Address Newmarket, Auckland 1023 Postcode 021 0883 4125 Phone Mobile nzenvlabs@aurecongroup.com Email Aurecon New Zealand Limited 32359 **Charge To** 521290-064 Client Reference Order No Reports will be emailed to Primary Contact by default. Results To Additional Reports will be sent as specified below. Email Primary Contact ☐ Email Submitter Email Client Email Other andrew.allcock@aurecongroup.com ☐ Other

Esdat files please. Please advise before disposal.

# **ANALYSIS REQUEST**

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

+64 7 858 2000 mail@hill-labs.co.nz

Requested Reporting Date:

362 5593

0508 HILL LAB (44 555 22)

Received by: Sanaya Hansotia



W www.hill-laboratories.d	5135255934				
CHAIN O	F CUSTODY RECORD				
Sent to	Date & Time: 11/07/2024				
Hill Laboratories	Name: A Allcock T. Hill				
Tick if you require COC to be emailed back	Signature: At each b				
Received at	Date & Time:				
Hill Laboratories	Name:				
	Signature:				
Condition	Temp:				
☐ Room Temp [	$\Box$ Chilled $\Box$ Frozen $ \mathcal{U}.\mathcal{Z} $				
☐ Sample and Analy	sis details checked				
Signature:					
Priority   Lov	v ☐ Normal ☑ High				
Urgent (ASA	P, extra charge applies, please contact lab first)				

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	BH13_0.05-0.2	10.07.2024		Soil	Hold Cold
2	BH13_0.4-0.5	10.07.2024		Soil	HM(7), ASB (SQ), TPH, PAH
3	BH13_1.0-1.1	10.07.2024		Soil	Hold Cold
4	BH13_1.4-1.5	10.07.2024		Soil	HM(7), TPH, PAH
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12					



◆ 0508 HILL LAB (44 555 22)
 ♦ +64 7 858 2000
 ✓ mail@hill-labs.co.nz
 ♦ www.hill-labs.co.nz

## **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited Lab No: 3625593

Contact: Tiana Hill

Tiana Hill

C/- Aurecon New Zealand Limited

Date Registered: 13-Jul-2024 11:17 am

Priority: High

PO Box 9762 Newmarket Auckland 1149

Order No: Client Reference: 521290-064

Add. Client Ref:

**Quote No:** 

Submitted By: Andrew Allcock

Charge To: Aurecon New Zealand Limited 17-Jul-2024 4:30 pm

126272

\* As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.

#### **Samples**

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH13_0.05-0.2 10-Jul-2024	Soil	cGSoil	Hold Cold
2	BH13_0.4-0.5 10-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH Oil Industry Profile + PAHscreen
3	BH13_1.0-1.1 10-Jul-2024	Soil	GSoil300	Hold Cold
4	BH13_1.4-1.5 10-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH Oil Industry Profile + PAHscreen

# Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	<b>Default Detection Limit</b>	Sample No
Individual Tests			
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	2, 4
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	2, 4
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. (Free water removed before analysis, nonsoil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	2, 4
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from; Benzo(a) anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j) fluoranthene x 0.1 + Benzo(a) pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	2, 4
Benzo[a]pyrene Toxic Equivalence (TEF)	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	2, 4
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.010 - 70 mg/kg dry wt	2, 4
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	2, 4
L - L N	11:01		D 4 - 4 O

**Lab No:** 3625593 Hill Labs Page 1 of 2

Sample Type: Soil							
Test	Method Description	<b>Default Detection Limit</b>	Sample No				
Total Petroleum Hydrocarbons in Soil	Total Petroleum Hydrocarbons in Soil						
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	2, 4				
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	2, 4				
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	2, 4				
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	2, 4				



126272

Quote N	· ·	120212		
Primary Contact		Tiana Hill		298786
Submitt	ed By			
Client Name Aur		Aurecon New 2	Zealand Limited	32359
Address Te Tihi Level 3 / 110 Carlton Go			rlton Gore Road	1
Newmarket, Auckland		and	Postcode 1	023

Email

Phone

nzenvlabs@aurecongroup.com

Aurecon New Zealand Limited **Charge To** Client Reference

521290-064

Order No

**Results To** 

Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.

Mobile

- Email Submitter
- ☑ Email Client

021 0883 4125

- Other

Esdat files please. Please advise before disposal.

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

Received by: Sanaya Hansotia 0508 HILL LAB (44 555 22) +64 7 858 2000

32359	E mail@hill-labs.co.nz  W www.hill-laboratories.com	
3	CIANOFOIS ON REORD	
25	Sent to Hill Laboratories  Date & Time: 11/07/2024  Name: A Allcock T. Hill	•
32359	Tick if you require COC to be emailed back Signature:	
	Received at Hill Laboratories  Date & Time:  Name:	
il Client	Signature:  Condition   Femp:   Room Temp   Chilled   Frozen   \( \mathcal{U} \) . \( \alpha \)	<b>&gt;</b>
	Sample and Analysis details checked Signature:	
	Priority Low Normal High Urgent (ASAP, extra charge applies, please contact lab f	irst)
	Requested Reporting Date:	

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	BH13_0.05-0.2	10.07.2024		Soil	Hold Cold
2	BH13_0.4-0.5	10.07.2024		Soil	HM(7), ASB (SQ), TPH, PAH
3	BH13_1.0-1.1	10.07.2024		Soil	Hold Cold
4	BH13_1.4-1.5	10.07.2024		Soil	HM(7), TPH, PAH
5					
6					
7			:		
8					
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10					
11					***
12					



◆ 0508 HILL LAB (44 555 22)
 ♦ +64 7 858 2000
 ✓ mail@hill-labs.co.nz
 ♦ www.hill-labs.co.nz

# **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3626399

Date Registered: 12-Jul-2024 4:49 pm

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064

Add. Client Ref: Sampled: 10/07/24

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited

**Target Date:** 16-Jul-2024 4:30 pm

### Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH13_0.05-0.2	Soil	PSoil500Asb	Hold
2	BH13_0.4-0.5	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil
3	BH13_1.0-1.1	Soil	PSoil500Asb	Hold

### Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Test	Method Description	<b>Default Detection Limit</b>	Sample No
New Zealand Guidelines Semi Quant	<u>'</u>	Dolaan Doloanon Emme	Campio II
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	2
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	2
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	2
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	2
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	2
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	2
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	2
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	2
Weight of Asbestos in ACM (Non- Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2
Asbestos in ACM as % of Total Sample	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2

**Lab No:** 3626399 Hill Labs Page 1 of 2

Sample Type: Soil			
Test	Method Description	<b>Default Detection Limit</b>	Sample No
Asbestos as Fibrous Asbestos as % of Total Sample	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2
Weight of Asbestos as Asbestos Fines (Friable)	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2
Asbestos as Asbestos Fines as % of Total Sample	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2



126272 **Quote No** Tiana Hill 298786 **Primary Contact Submitted By** Aurecon New Zealand Limited 32359 **Client Name** Te Tihi Level 3 / 110 Carlton Gore Road Address Newmarket, Auckland Postcode 021 0883 4125 Phone Mobile nzenvlabs@aurecongroup.com Email Aurecon New Zealand Limited 32359 **Charge To** 521290-064 Client Reference Order No Reports will be emailed to Primary Contact by default. **Results To** Additional Reports will be sent as specified below. ☑ Email Primary Contact ☐ Email Submitter andrew.allcock@aurecongroup.com Other

Esdat files, please. Please advise before disposal.

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

www.hill-laboratories.com

Received by: Sanaya Hansotia

0508 HILL LAB (44 555 22 +64 7 858 2000 mail@hill-labs.co.nz

Sent to	Date & Time:	
Hill Laboratories	Name:	
Tick if you require COC to be emailed back	Signature:	
Received at	Date & Time:	
Hill Laboratories	Name:	
	Signature:	
Condition		Temp:
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No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1 -	BH39_0.2-0.3	16.07.2024		Soil	- ZCACRE MA
2	BH39_0.5-0.6	16.07.2024	1	Soil	Asb(SQ), HM(7), PAH TPH BTEX
3	BH39_1.0-1.1	16.07.2024	2	Soil	Hold cold
4	BH39_1.5-1.6	16.07.2024	N	Soil	HM(7)
_5	BH39 1.9-2.0	16.07.2024	N	Soil	- IGNURE AA
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## **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3629193

Date Registered: 18-Jul-2024 8:47 am

Priority: High 126272

Order No:

Client Reference: 521290 - 064

Add. Client Ref:

Submitted By: Andrew Allcock

Charge To: Aurecon New Zealand Limited 12-Aug-2024 4:30 pm

#### Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH39_0.5-0.6 16-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH + PAH + BTEX profile
2	BH39_1.0-1.1 16-Jul-2024	Soil	GSoil300	Total Recoverable Arsenic
3	BH39_1.5-1.6 16-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level

### **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample N
Individual Tests			
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-2
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	2
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. (Free water removed before analysis, nonsoil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	2
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	2
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from; Benzo(a) anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j) fluoranthene x 0.1 + Benzo(a) pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	1
Benzo[a]pyrene Toxic Equivalence (TEF)	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	1

Sample Type: Soil			
Test	Method Description	<b>Default Detection Limit</b>	Sample No
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1, 3
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis. Tested on as received sample. In-house based on US EPA 8260 and 5021.	0.05 - 0.10 mg/kg dry wt	1
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1
Total Petroleum Hydrocarbons in Soil			-
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	1
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1



**Quote No** 

**Client Name** 

126272

<b>Primary Contact</b>	Tiana Hill	298786
Submitted By		

Address

Aurecon New Zealand Limited Te Tihi Level 3 / 110 Carlton Gore Road

Newmarket, Auckland

1023 Postcode

021 0883 4125

Phone Email

nzenvlabs@aurecongroup.com

Charge To

Aurecon New Zealand Limited

Mobile

32359

32359

Client Reference

521290-064

Order No

**Results To** 

Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.

- Email Primary Contact
- ☐ Email Submitter
- ☑ Email Client

Other

Esdat files please. Please advise before disposal.

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

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Received by: Sanaya Hansotia

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No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1.	BH39_0.2-0.3	16.07.2024	- 1/6	Soil	- Tipure MA
2	BH39_0.5-0.6	16.07.2024		Soil	Asb(SQ), HM(7), PAH TPH BTEX
3	BH39_1.0-1.1	16.07.2024	2	Soil	Hold cold
4	BH39_1.5-1.6	16.07.2024	N	Soil	HM(7)
_5_	BH39_1.9-2.0	16.07.2024	N	Soil	- Leone an
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# **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3629428

Date Registered: 17-Jul-2024 4:27 pm

Priority: High Quote No: 126272

Order No:

Client Reference: 521290 - 064 Add. Client Ref: Sampled: 16/07/24

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited

Target Date:

19-Jul-2024 4:30 pm

#### **Samples**

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH39_0.5-0.6	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil

### **Summary of Methods**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	<b>Default Detection Limit</b>	Sample N
New Zealand Guidelines Semi Quantita	ative Asbestos in Soil		
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1
Asbestos in ACM as % of Total Sample	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1
Asbestos as Fibrous Asbestos as % of Total Sample	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1

**Lab No:** 3629428 Hill Labs Page 1 of 2

Sample Type: Soil						
Test	Method Description	<b>Default Detection Limit</b>	Sample No			
Weight of Asbestos as Asbestos Fines (Friable)	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1			
Asbestos as Asbestos Fines as % of Total Sample	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1			
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1			



**Quote No** 

126272

Tiana Hill **Primary Contact** 298786 Submitted By

**Client Name** Te Tihi Level 3 / 110 Carlton Gore Road Address

Aurecon New Zealand Limited 32359

Newmarket, Auckland

Postcode

021 0883 4125 Mobile

Phone Email

nzenvlabs@aurecongroup.com

**Charge To** 

Aurecon New Zealand Limited

32359

Client Reference

521290-064

Order No

Results To

Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.

- Email Submitter

1023

- ☐ Other

Esdat files please. Please advise before disposal.

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

+64 7 858 2000

mail@hill-labs.co.nz

Received by: Sanaya Hansotia 0508 HILL LAB (44 555 22)

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N	lo.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
ir _	1	BH21_5.4-5.5	22.07.2024		SOIL	НМ7
	2	BH21_6.6-6.7	22.07.2024		SOIL	
, .	3	BH21_11.0-11.1	22.07.2024		SOIL	HM7
	4	BH21_16.4-16.5	22.07.2024		SOIL	НМ7
	5	BH35_3.4-3.5	22.07.2024		SOIL	HMsSoil, PAH, ♣♣♣♠♠), TPH
. (	6	BH35_4.0-4.1	22.07.2024		SOIL	HM7
	7	BH35_5.3-5.4	22.07.2024		SOIL =	AA
1	В	BH35_7.4-7.5	22.07.2024		SOIL	
9	9	BH39_3.0-3.45	22.07.2024		SOIL	НМ7
1	0	BH39_4.5-4.95	22.07.2024		SOIL®	
1	1	BH39_6.0-6.45	22.07.2024		SOIL	HM7
1	2	BH39_7.5-7.95	22.07.2024		SOIL	

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
13	BH39_9.0-9.45	22.07.2024		SOIL	HM7
14	BH39_10.5-10.95	22.07.2024		SOIL	
15	BH39_12.0-12.45	22.07.2024		SOIL	HM7
16	BH48_3.0-3.1	22.07.2024		SOIL	НМ7
17	BH48_6.5-6.7	22.07.2024		SOIL	HM7
18	BH49_2.7-2.8	22.07.2024		SOIL	HM7
19	BH49_5.0-5.1	22.07.2024		SOIL	HM7
20	BH49_5.9-6.0	22.07.2024		SOIL	HM7
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## **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3634409

Date Registered: 25-Jul-2024 10:51 am

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064

Add. Client Ref:

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited

**Target Date\*:** 29-Jul-2024 4:30 pm

#### **Samples**

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH21_5.4-5.5 22-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
2	BH21_11.0-11.1 22-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
3	BH21_16.4-16.5 22-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
4	BH35_3.4-3.5 22-Jul-2024	Soil	GSoil300 Heavy Metals, Screen Level, TPH Oil Industry I + PAHscreen	
5	BH35_4.0-4.1 22-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
6	BH39_3.0-3.45 22-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
7	BH39_6.0-6.45 22-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
8	BH39_9.0-9.45 22-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
9	BH39_12.0-12.45 22-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
10	BH48_3.0-3.1 22-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
11	BH48_6.5-6.7 22-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
12	BH49_2.7-2.8 22-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
13	BH49_5.0-5.1 22-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level
14	BH49_5.9-6.0 22-Jul-2024	Soil	GSoil300	Heavy Metals, Screen Level

### Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	<b>Default Detection Limit</b>	Sample No
Individual Tests			
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-14
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	4
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. (Free water removed before analysis, nonsoil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	4
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from; Benzo(a) anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j) fluoranthene x 0.1 + Benzo(a) pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	4

<sup>\*</sup> As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.

Sample Type: Soil	Sample Type: Soil						
Test	Method Description	<b>Default Detection Limit</b>	Sample No				
Benzo[a]pyrene Toxic Equivalence (TEF)	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	4				
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.010 - 70 mg/kg dry wt	4				
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-14				
Total Petroleum Hydrocarbons in Soil							
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	4				
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	4				
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	4				
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	4				



126272 **Quote No** Tiana Hill 298786 **Primary Contact Submitted By** Aurecon New Zealand Limited 32359 **Client Name** Te Tihi Level 3 / 110 Carlton Gore Road Address Newmarket, Auckland 1023 Postcode 021 0883 4125 Phone Mobile nzenvlabs@aurecongroup.com Email 32359 Aurecon New Zealand Limited **Charge To** 521290-064 Client Reference Order No Reports will be emailed to Primary Contact by default. **Results To** Additional Reports will be sent as specified below. ☐ Email Submitter **☑** Email Primary Contact Email Other andrew.allcock@aurecongroup.com Other

Esdat files please. Please advise before disposal.

crossed out

Please diregard items

## ANALYSIS REQU

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

0508 HILL LAB (44 555 22)

+64 7 858 2000

mail@hill-labs.co.nz

Received by: Olivia Tod

W www.hill-laboratories.c	om 3136514821
CHAIN O	F CUSTODY RECORD
Sent to Hill Laboratories	Date & Time: 16-08-24
	Name: Tiana Hill
Tick if you require COC to be emailed back	Signature: Craft
Received at	Date & Time:
Hill Laboratories	Name:
	Signature:
Condition	Temp:
☐ Room Temp [	☐ Chilled ☐ Frozen
☐ Sample and Analys	sis details checked
Signature:	
Priority   Lov	v 🔲 Normal 🗹 High
Urgent (ASA	P, extra charge applies, please contact lab first)
Requested Reporting Dat	te·

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1_	BH44_005-02	\$14 08 ZY	Topson	50.1	TH
2	BH44 _ 0-3-04	14.08.24	£. 11	Soil	HM(7), TPH, PAH, Asb
3	BH44-05-06	14 68 24		80.1	
_4_	BH44 _ 0 8-0 9	19 08 29		Sert	
5	BH44-11-1-2	14.08.24		Sc.1	HM(7), TPH, PAH, AGB
6	BH44_14-15	14:08:24		Sc.l.	- tH
7	BH44 _ 20-24	15-08-24		Soil	
8	BH44_ 3.0-3.4	15.08.24	Interface	Soil	"HM(7), TPH, PAH, Asb
9	BH44-6.0-6.3	15-08-24	clayey ster	Siil	HM (7)
10	BH44_10.5-10.6	15.08.24.	sundature	Soil	HM (7)
11	BH 51 _ 0.5-0.6	15.08.24		Soil	HM (7), TAH, PAH, ASD
12	BH51_2.0-2.45	15.08.24		Soil	HM(7), TPH, PAH



♦ 0508 HILL LAB (44 555 22)
 ♦ +64 7 858 2000
 ☑ mail@hill-labs.co.nz
 ⊕ www.hill-labs.co.nz

## **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3651482

Date Registered: 17-Aug-2024 11:51 am

Priority: High Quote No: 126272

Order No:

Client Reference: 521290-064

Add. Client Ref:

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited 22-Aug-2024 4:30 pm

#### **Samples**

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH44_0.3-0.4 14-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH Oil Industry Profile + PAHscreen
2	BH44_1.1-1.2 14-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH Oil Industry Profile + PAHscreen
3	BH44_3.0-3.4 15-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH Oil Industry Profile + PAHscreen
4	BH44_6.0-6.3 15-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level
5	BH44_10.5-10.6 15-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level
6	BH51_0.5-0.6 15-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH Oil Industry Profile + PAHscreen
7	BH51_2.0-2.45 15-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH Oil Industry Profile + PAHscreen

### Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil	Sample Type: Soil					
Test	Method Description	<b>Default Detection Limit</b>	Sample No			
Individual Tests		•	•			
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-7			
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-3, 6-7			
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. (Free water removed before analysis, nonsoil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-3, 6-7			
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from; Benzo(a) anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j) fluoranthene x 0.1 + Benzo(a) pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	1-3, 6-7			
Benzo[a]pyrene Toxic Equivalence (TEF)	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	1-3, 6-7			

**Lab No:** 3651482 Hill Labs Page 1 of 2

<sup>\*</sup> As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.

Sample Type: Soil							
Test	Method Description	<b>Default Detection Limit</b>	Sample No				
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.010 - 70 mg/kg dry wt	1-3, 6-7				
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-7				
Total Petroleum Hydrocarbons in Soil							
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	1-3, 6-7				
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-3, 6-7				
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1-3, 6-7				
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1-3, 6-7				



**Quote No** 

126272

**Primary Contact** Tiana Hill 298786

Submitted By

**Client Name** 

Aurecon New Zealand Limited 32359

Address

Te Tihi Level 3 / 110 Carlton Gore Road

Newmarket, Auckland

1023 Postcode

Phone

021 0883 4125 Mobile

Email

nzenvlabs@aurecongroup.com

Charge To

Aurecon New Zealand Limited

32359

Client Reference

521290-064

Order No

**Results To** 

Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.

☑ Email Primary Contact

☐ Email Submitter

☐ Other

Esdat files please. Please advise before disposal. please disregard items crossed out

R J Hill Laboratories Limited 28 Duke Street, Hamilton 3204 Private Bag 3205 Hamilton 3240, New Zealand

Date Recv. 16-Aug-24 16:43

0508 HILL LAB (44 555 22)

+64 7 858 2000

mail@hill-labs.co.nz

www.hill-laboratories.com

Received by: Olivia Tod

Sent to Hill Laboratories	Date & Time: 16-08-24
	Name: Tiana Hill
Tick if you require COC to be emailed back	
Received at Hill Laboratories	Date & Time:
illi Laboratories	Name:
	Signature:
Condition ☐ Room Temp	☐ Chilled ☐ Frozen ☐ ☐
Sample and Anal	ysis details checked
Priority   Lo	w 🔲 Normal 🗹 High

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1_	BH44_0.05-0.2	214.08.24	Teyson	50.1	14
2	BH44 _ 0-3-0-4.	14.08-24	Fill	Soil	HM(7), TPH, PAH, Asb
3_	BH44-05-06	14 08-24-		\{\sigma_i\}	TH!
4	BH44-8-8-0-9	14-08-24		Soil	₹ TH
5	BH44-1-1-1-2	14.08.24		Soil	HM (7), TPH, PAH, ASB
6	BH44_14-15	14 08.24		-Sul-	# + tH
7	B444 _ 20-24	15-08-24		Soil	
8	BH44_ 3.0-3.4	15-08-24	interface	Soil	"HM(7), TPH, PAH, Asb
9	BH44-6.0-6.3	15-08-24	clayeyster	Seil	HM (7)
10	BH44_10.5-10-6	15.08.24.	sanditire	Soil	HM (7)
11	BH 51 _ 0.5-0.6	15.08-24		Soil	HM (7), TRI, PAH, Asb
12	BH51-2-0-2-45	15-08-24		Soil	HM(7), TPH, PAH



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 ♦ +64 7 858 2000
 ✓ mail@hill-labs.co.nz
 ♦ www.hill-labs.co.nz

## **Job Information Summary**

Page 1 of 2

Client: Aurecon New Zealand Limited

Contact: Tiana Hill

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 **Lab No:** 3651494

**Date Registered:** 16-Aug-2024 4:59 pm

Priority: High 126272

Order No:

Client Reference: 521290-064

Add. Client Ref: Sampled: 14-15/08/24

Submitted By: Tiana Hill

Charge To: Aurecon New Zealand Limited 21-Aug-2024 4:30 pm

Samples

1				
No	Sample Name	Sample Type	Containers	Tests Requested
1	BH44_0.3-0.4	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil
2	BH44_1.1-1.2	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil
3	BH44_3.0-3.4	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil
4	BH51_0.5-0.6	Soil	PSoil500Asb	New Zealand Guidelines Semi Quantitative Asbestos in Soil

### Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Test	Method Description	<b>Default Detection Limit</b>	Sample No
New Zealand Guidelines Semi Quant	itative Asbestos in Soil		-
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1-4
Dry Weight	0.1 g	1-4	
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-4
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-4
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-4
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-4
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-4
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-4
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-4
Asbestos in ACM as % of Total Sample	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4

**Lab No:** 3651494 Hill Labs Page 1 of 2

Sample Type: Soil							
Test	Method Description	<b>Default Detection Limit</b>	Sample No				
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-4				
Asbestos as Fibrous Asbestos as % of Total Sample	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4				
Weight of Asbestos as Asbestos Fines (Friable)	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-4				
Asbestos as Asbestos Fines as % of Total Sample	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4				
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4				



Client		<b>TILL LO</b> RIED, TES		Prator		R J Hill Laboratorles Limited 28 Duke Street, Hamilton 32 Private Bag 3205 Hamilton 3240, New Zealan	Job No. Date Recv. 22-Aug-24 17:59 204 365 5466	
Name A		NZ limited level 3 / 11	0 (a	- Hon Gen po	ad.	T 0508 HILL LAB (44 555 T +64 7 858 2000 E mail@hill-labs.co.nz W www.hitl-laboratories.com	m   318554662	
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Client Refe	erence 5	21290-0	64			Hill Laboratories	Name:	
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Sample	Types							
Waters	E	Effluent	G	Geothermal	Pot1	Potable Water (LAS/EU)	Pot2 Potable Water (NZDWS)	
	GW	Ground Water	L	Leachate		Audit Monitoring	Pot3 Potable Water (other)	
	SW	Surface Water	S	Saline		Check Monitoring	Pool Swimming/Spa Pool	
Solids	TW	Trade Waste Soil	SE	Sediment	SL	Sludge	PL Plant	
Other	0	O Oil	M	Miscellaneous	FS	FS_Fish/shellfish/biota	BM BM Biological Material	

Solids	ES Soil SE	E Sediment	SL	Sludge PL Plant				
Other	O O O O I M	Miscellaneous	FS	FS Fish/shellfish/biota BM Biological Material				
No.	Sample Name	Sample Date & Time	Sample Type	Tests Required				
1	BH46_0-050-4-0-5	19-08-2024	So ( )	HM(7), TPH, PAH, ASb				
2	BH46-1-4-1-6	19-08-2024	Seil	HM (7), TPH, PAH, ASB				
3	BH45-0.8-1.0	19-08-2024	Soil	IdM (7), tri-1, PAH, ASb				
4	BH51_5.0-5.45	15-08-2024	Soil	HM(7)				
5	BHS1-8-0-8-45	15-08-2024	Soil	HM (7)				
6	BH51-12-0-12-33	15-08-2024	Soil	tim(7)				
7				<i>P</i>				
8								
9	And the second s	6.						
10								
Continued on next page								



**55 0508 HILL LAB** (44 555 22) **\( \sigma +64 7 858 2000 \)** mail@hill-labs.co.nz www.hill-labs.co.nz

# **Job Information Summary**

Page 1 of 2

Aurecon New Zealand Limited

Contact: Andrew Allcock

C/- Aurecon New Zealand Limited

PO Box 9762 Newmarket Auckland 1149 Lab No: 3655466

**Date Registered:** 

24-Aug-2024 10:40 am

**Priority:** High **Quote No:** 

126272 126272

Client Reference: 521290-064

Add. Client Ref: Submitted By:

Order No:

Tiana Hill

**Charge To:** 

Aurecon New Zealand Limited

Target Date\*: 28-Aug-2024 4:30 pm

#### **Samples**

No	Sample Name	Sample Type	Containers	Tests Requested
1	BH46_0.4-0.5 19-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH Oil Industry Profile + PAHscreen
2	BH46_1.4-1.6 19-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH Oil Industry Profile + PAHscreen
3	BH45_0.8-1.0 19-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level, TPH Oil Industry Profile + PAHscreen
4	BH51_5.0-5.45 15-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level
5	BH51_8.0-8.45 15-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level
6	BH51_12.0-12.33 15-Aug-2024	Soil	GSoil300	Heavy Metals, Screen Level

### Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil						
Test	Method Description	Default Detection Limit	Sample N			
Individual Tests						
Environmental Solids Sample Drying  Air dried at 35°C Used for sample preparation.  May contain a residual moisture content of 2-5%.  (Free water removed before analysis, non-soil objects as sticks, leaves, grass and stones also removed).		-	1-6			
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-3			
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-3			
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from; Benzo(a) anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j) fluoranthene x 0.1 + Benzo(a) pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	1-3			
Benzo[a]pyrene Toxic Equivalence (TEF)	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	1-3			
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.010 - 70 mg/kg dry wt	1-3			

Lab No: 3655466 Hill Labs Page 1 of 2

<sup>\*</sup> As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.

Sample Type: Soil						
Test	Method Description	<b>Default Detection Limit</b>	Sample No			
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-6			
Total Petroleum Hydrocarbons in Soil						
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	1-3			
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-3			
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1-3			
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1-3			