Proposed Amendment to the Building Height Restriction of the "Government, Institution or Community" Zone for Permitted Social Welfare Facility at No.58 Sha Chau Lei Tsuen, Ha Tsuen, Yuen Long, New Territories (Lot No. 2273 in DD 125 and the Extension Thereto) – S12A Amendment of Plan Application

# **Appendix 7**

# Preliminary Geotechnical Appraisal and Foundation Proposal



# PRELIMINARY GEOTECHICAL APPRAISAL

# PROPOSED REDEVELOPMENT OF POK OI HOSPITAL YEUNG CHUN PUI CARE AND ATTENTION HOME

**DELIVERING THE FUTURE** 

AT

YUEN LONG, HONG KONG

Revision: -

November 2023

ASIAINFRASOLUTIONS.COM



#### CONTACTS

IOTA SIN Author



SEAN TSANG Checker



CHAN CHI KONG Approver





#### **REVISION HISTORY**

Rev.	Description of Revision	Date
-	1 <sup>st</sup> Submission for Approval	19 November 2023



#### TABLE OF CONTENT

1	INTF	RODUCTION	5
	1.1	Background	5
	1.2	Objective	5
2	SITE	GEOLOGY	6
	2.1	Site Topography	6
	2.2	Geological Map	7
	2.3	Schedule Area 2	.11
	2.4	Ground Conditions	.12
	2.5	Ground Water Record	.16
	2.6	Adjacent Nullah	.19
	2.7	Existing Adjacent Features	.20
3	GEC	TECHNICAL ASSESSMENT	.21
	3.1	Effects of Proposed Development Existing Nullah	.21
	3.2	Effects of Proposed Development on Existing Features	.21
	3.3	Monitoring	.21
4	CON	ICLUSION	.22

#### APPENDICES

An	pendix	Α –	Geo	logical	Map
<b>י</b> יי	pondix	<i>/ \</i>	000	logioui	iniap

- Appendix B Drawing of Schedule Area 2 (GS-SP/714-1)
- Appendix C Adjacent GI Record
- Appendix D Adjacent Slope Feature Record



# **1** INTRODUCTION

#### 1.1 Background

P&T Group has been appointed as the leading consultant to oversee the technical feasibility study for the proposed redevelopment of Pok Oi Hospital Yeung Chun Pui Care and Attention Home in Yuen Long.

Asia Infrastructure Solutions Limited has been appointed by P&T Group as the structural and geotechnical consultant and is responsible for structural and geotechnical feasibility study for the proposed development.

The Project comprises the demolition of existing building and construction of new block(s) with an aim to optimise the use of the site at 58 Sha Chau Lei Tsuen, Ha Tsuen, Ping Ha Road, Yuen Long at Lot No. 2273 and the Extension thereto in Demarcation District 125, and to cater for the increasing demand for elderly, rehabilitation and child care services, by providing more floor area and better and updated facilities.



#### 1.2 Objective

This report aims to provide preliminary geotechnical appraisal review to the existing premises for the proposed development.



## 2 SITE GEOLOGY

#### 2.1 Site Topography

The Site is at LOT NO. 2273 & extension in DD 125, Ping Ha Road, Ping Shan, Yuen Long, New Territories (also known as 58 Sha Chau Lei Tsuen, Ha Tsuen, Yuen Long, New Territories).

The site is relatively flat, and the ground level is around +5.0mPD to +5.7mPD.



Figure 2.1 Site Location Plan



#### 2.2 Geological Map

According to the 1:20,000 scale HGM20 Series Solid and Superficial Geology Map Sheet 06 published by the Geotechnical Engineering Office (Edition 2 – 2008), the site is underlain by Alluvium/Terraced Alluvium comprising well-sorted to semi-sorted clay/silt, sand and gravel during the Pleistocene and Holocene epoch of the Quaternary era.

From the solid geology, it is observed that the site is surrounded by metasiltstone covered in debris flow deposits from Chek Lap Kok Formation in Pleistocene epoch of the Quaternary era. The metasiltstone and phyllite with meta stone is originated from the Lok Ma Chau Formation in San Tin Group under the Carboniferous epoch of the Palaeozoic era. There is also a 65 to 68 degree joint as observed in the East side of the site. The observation matches with the GI results submitted and the GI record in 2008.



#### Detail of the geological map refers to Appendix A.



SUP	ERFICI	AL DEPC	SITS 地表沉積			
	sands		GENETIC CLASSIFICATION 成因類型		主要物質成份	PRINCIPAL MATERIALS
	D news	of of places	Fill ···································	院家	填泥和廢物	Natural earth and waste
	re of the	t and cent	Alluvium ····································	Qa	分選性良好至中等的 粘土 / 粉砂、砂和礫石	Clay/silt, sand and gravel;
	氏 ENE	d by meg	Beach deposits ···········海灘沉積	Qb	砂	Sand
	全新 全新 0100	hubern t	Raised beach deposits 高位海灘沉積	Qrb	₽	Sand
and the second	± at dylo orm en ounger	抗口組 HANG HAU FORMATION	Marine sand	QHH ms	主要深灰色海相泥〔未分〕 砂、部份粉砂質	Undivided, mainly dark grey marine mud Sand, part silty
四 采 FRNAR	当 UENE DCENE	Invest-In	heast-trending faults. North- and nor e folding to the Mesozoic volcanics in	o by nor		The structure of
彩 UAT	4010	{	Debris flow deposits ········· 坡積、洪積物	Qd	基質為粘土/粉砂	and boulders; clay/silt matrix
ð	更 PLEIS PLEIS	and epit	Talus (rockfall) deposits 岩屑( 岩崩 )堆積物	Qt	礫石、中礫和漂礫	Gravel, cobbles and boulders
	P main	(	ante plutons have resulted in the great		of hydrothermai huids (no adjacent volcanic rocks (A	stage emanations metasomatism of a
			Terraced alluvium ······ 踏地冲積物	Qpa	录質、砂質粘土/粉砂	Clay/silt, gravelly sandy, well-sorted to semi-sorted
	1 統 DCEN	žz (	Debris flow deposits ········· 坡積、洪積物	Qpd	未分選的 傑質、粘土質 粉砂/砂皮中礎至漂碟	Silt/sand, gravelly, clayey with cobblos and boulders; unsorted
	更新 PLEISTC	朱鹮角箔 CHEK LAP K(FORMATIO	ow deposits, mostly of Pleistocene age, is small deposits in hilly areas, but is g dluvium covers large areas around Kat nore within the Pleistocene Chek Lap d Hau Formation, Baech deposits of a	QCK	紅色、黃色和灰色的黏土, 粉砂,砂和檗石(未分)	Undivided; red, yellow and grey clay, silt, sand and gravel

SOLID GEOLOGY 基岩地質





MAJOR INTRUSIVE IGNEOUS ROCKS 主要侵入火成岩

Megacrystic 具大斑晶的 🚺 🔥 🔥	gf gfm gm gc gc d	細粒花崗岩,<2毫米 ····· Fine-grained granite,<2mm 中細粒花崗岩 ··· Fine- to medium-grained granite 中粒花崗岩,2 - 6毫米 ··· Medium-grained granite, 2-6mm 粗粒花崗岩,> 6毫米 ··· Coarse-grained granite, >6mm 雪英岩化細粒花崗岩 ··· Greisenized fine-grained granite 斑狀微晶花崗閃長岩 ··· Dacite
	gdf gdm	細粒花崗閃長岩、<2毫米 ······ Fine-grained granodiorite,<2mm 中粒花崗閃長岩、2-6毫米 ······ Medium-grained granodiorite,2-6mm
MINOR INTRUSIVE IGNEOU	S ROCKS	S 次要侵入火成岩(脉岩) <sup>輝錄岩</sup> Basalt <sup>閃長玢岩</sup>
	rf rq ap p	增班者 Lamprophyre 長石斑岩 Feldsparphyric rhyolite 石奕斑岩 Quartzphyric rhyolite 細晶岩 Aplite 健晶岩 Pegmatite
	Megacrystic 具大斑晶的 () () () () () () () () () () () () ()	Megacrystic 具大斑晶的 「 「 」 「 」 」 」 」 」 」 」 」 」 」 」 」 」



#### METAMORPHIC ROCKS 變質岩

	糜稜岩 ······ Mylonite
555	片岩 ······ Schist
	變質岩石 ····································

White wave ornament indicates water cover 自色波紋表示受水淹蓋

#### GEOLOGICAL LINES 地質界綫

Geological boundary, superficial deposit		
Fill boundary, with limit of	1975	填土區界綫,附填土年份
Geological boundary, solid rock	*	
Fault (crossmark indicates downthrow side)	*	
Mineral vein ·····		磺脉
Photogeological lineament		
Broken lines on map face denote	e uncertainty *	國內虛縫表示推測界綫

#### STRUCTURAL SYMBOLS 構造符號

	傾斜 垂直 Inclined Vertical	
Bedding	_20	·層理
Flow fabric		助組構
Jointing		節理
Foliation	<u></u> 20	葉理
	All dips and plunges measured in degrees from horizontal 所有倾角和倾伏角的角度均從水平位置起計	

#### MINERAL SYMBOLS 礦產符號

Mineral occurrence					• W ··					礦產
	Graphite	gr	石墨	Quartz	q	石英	Wolframite	w	黑鎢鏞	
	Galena	Pb	方鉿礦	Sphalerite	Zn	閃鋅礦				



#### 2.3 Schedule Area 2

According to PNAP APP-30, certain Mid-levels area has been designated as Area Number 1 of the Scheduled Areas (Scheduled Area No. 1) in Schedule 5 to the Buildings Ordinance (BO). The site is at mid-levels area and thus falls within Scheduled Area No. 1 as shown in figure below. The plan is attached in **Appendix B**.

According to PANP APP-61, attention should be given to logging the location and size of the cavities, the nature of the cavity wall and the infill, together with rock discontinuities. Fracture indices including total core recovery, solid core recovery, rock quality designation and fracture index should be shown on the drill logs.

The depths of drillholes should be determined by considering the depth of marble bedrock and the magnitude of the load to be applied by the structure. If marble is encountered, a minimum penetration of 20 m into sound marble rock is recommended in order to reduce the risk of existing cavities not being identified.





#### 2.4 Ground Conditions

There are numerous borehole investigations conducted near the Site, however, most of the borehole record are shallow and did not reach the rockhead level. Based on the available GI data within 500m, it is estimated that the subsoil geology is in the sequence of fill, alluvium, sandy/clayed silt layer, completely to slightly decomposed metasiltstone and fine ash tuff. The location of the drill holes and the G.I records are attached in **Appendix C** for reference.

#### **Borehole BH2A**

The first layer in BH2A is fill, which is approximately 4.5m thick. It comprises firm to stiff, yellowish brown, sandy clayey SILT with occasional angular, medium gravel of strong granite.

The layer of alluvium is approximately 17m thick in BH2A, comprising firm to stiff, light brown, dappled black and yellowish brown, clayed silt with occasional rounded, medium gravel of moderately strong silica fragments.

Clayed silt layer lying between the alluvium and bed rock comprises extremely weak, olive grey/greyish brown, completely decomposed metasiltstone.

Bedrock is found at -37.7mPD, comprising strong, grey, slightly decomposed metasiltstone and strong, grey, slightly decomposed, fine ash tuff at the bottom of drill holes.





									DRILLHOLE RECORD						HOLE No.		BH2A	
¥		$\approx$		GEO	VIC	CHN ES			CON	TRACT No.	TRACT No.: GE/2008/04					5	of	5
PROJECT: PWP Item No. 7811TH, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)																		
METHOD: Rotary Drilling									c	O-ORDINATE	ES:			V	VORKS ORDER No.	GE/2	008/04.	4
MAC	HINE (	& No.:	FC	DR-12	2				1	E 817 N 834	690.40 103.84	0 4		C	ATE from: 18/10	2008	to	27/10/2008
FLUS	HING	MEDI	UM:	w	later				0	RIENTATION	: v	ertical	1	(	ROUND LEVEL	+ 6.50		mPD
Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Vister Return %	TCR%	scr%	RQD%	FI	Tests		Samples	6 Reduced	8 Depth (m)	Legend	Grade		Descriptic	'n	
41 42		end 0.75m 31 18:000 4.55m 31 00:50						12, 23, 55, 45 / 25mm 100 bis / 100e	5 1871						As sheet 4 of 5.			
43	1997.							1 50 / 40mm, 100 / 25mm 100 bis / 20m	m \$		-35.90			V	Weak, grey, highly METASILTSTONE to coarse gravel)	decomp (Recov	osed cak ered as a	careous ingular, fine
45	44.24		70		41	0	10.7			THE 44,30				u	Strong, grey, spott decomposed, calc with occasional ma 30mm). Joints are very clo planar, extremely r 25° - 35° and subv	ed white, areous M arble and sely to clo narrow, in vertical.	slightly METASIL slica cla osely spi on staine	TSTONE sts (10mm - wed, rough ed, dipping a
46			78	18	79	50				7301	-40.04	48,54	4	-1	Strong, grey, sligh METASILTSTONE	tly decorr	posed	
47		1.20%	20		69	42					-41.70	48.2			Joints are dosely extremely narrow, Strong, grey, spot decomposed, tuffs Joints are closely extremely narrow, 45°.	spaced, s clean, di led white, aceous M spaced, r iron stair	stightly ETASIL ough pla ed, dipp	lanar, 45° - 55°. ISTONE. Inar, ing at 35° -
49		4.30m 4.30m at 08.00 0.90m	70		32	0	19.4	5		T264	1 -43.04	495			Strong, grey, sligh TUFF, Joints are very clo planar, extremely and chlorite coate - 45°.	tly decon sely to d narrow, c d, dipping	nposed, osely sp dean, loc g at 15" -	fine ash aced, rough ally kaolin 25° and 35°
50		12:00										F 50.0			End of investigation	on hole a	49.54m	
	Smell Dis Naton san J76 Undi J100 Unx Vazier St SPT Line Nater Sa	harbed Si mple sturbed S disturbed simple r Sample rriple	ampk Samp I Sam	h ha pře	↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	Stat In-si Pen Acc Pac Pac Stat	ndand itu Var meabl kustic R dear Te comet ndpipe	Penetration Te ne Shear Test Barehole Telev bst er Tip	est éever	LOGGED <u>V</u> DATE <u>2</u> CHECKED <u>4</u> DATE <u>3</u>	N. 10/20 8/10/20 LB-Holli	inshead,	REN	MAR	KS		506	h bla - 67 63 44



#### Borehole DH168

The first layer in BH168 is fill, which is approximately 3m thick. It comprises firm, brown sandy silt with some to many angular to subangular medium to coarse gravel sizes moderately weak rock fragments.

The layer of alluvium is approximately 5m thick in BH168 comprising firm to stiff, yellowish brown and light grey mottled light pink clayed very sandy silt, fine coarse sand with zone subangular fine to medium quartz gravel.

Sany and clayed silt layer lying between the alluvium and bed rock comprises extremely weak, olive grey/greyish brown, completely decomposed metasiltstone.

Bedrock is found at -45.65mPD, comprising continuous strong, grey, locally spotted and dapped white slightly decomposed fine ash tuff with medium spaced, smooth, planar, calcite coated, occasionally clean joints sipping at 60deg to 70deg at the bottom of drill holes.





5	Geotechnical Contrac								ting	De	part	tme	nt TS200/DH/168 SHEET 5 of 6	
DRILLHOLE									LE		R E	CORD		
ROJECT	ĸ	CRC	West	Rail T	S-200 We	stern	Sect	ion, P	hase 3	3 Grou	and In	vestig	pation	
IETHOD IP+	WB+	RC				CO-	ORD	NATE	s	CONTRACT No. TS-200				
ACHINE & No	. Toh	0 (D2	3		=	E N	1	81754	07.46			DAT	TE from 12/03/1998 to 19/03/1998	
LUSHING MED	NUM	Wat	er			ORI	ENTA	ATION	v	ertical	12.1	GRO	DUND LEVEL 5.60 mPD	
Progress Casing depth/size (ui)	TCR %	SCR %	ROD %	H	Tests	No	Samp	Depth	é Reduced & Level	6 Depth 8 (m)	Legend	Grade	Description	
arae 2.00					50 26,174.50rw N= 200/125mm	20	U	40.00		o consectores			As sheet 4 of 6.	
					8.5 12.20,20,50 15-102	72	0	42.00 42.45		and a second				
					8.13 200726mm N=200726mm	74 75		44.00 44.25	-38.40	44.00		>	Extremely weak, brownish grey completely decomposed fine ash TUFF (Very stiff, clayey SILT with some subangular fine to medium gravel sized moderately weak rock fragments).	
HX					( 112,86(25mm N+85(25mm	76		45.00 45.10	-40.40	45.00	101000000000000000000000000000000000000		Very weak, grey completely to highly decomposed fine ash TUFF (Angular to subangular medium to coarse GRAVEL sized moderately weak rock fragments).	
47.07 Cores	100	66	51	>20			1201	43.07	41,47	-47,67	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	010711	Moderately weak to moderately strong, grey highly to moderately decomposed fine ash TUFF with closely spaced, smooth and rough, planar, clean joints, dipping at 40°.60°. 47.07-47.20m: Highly fractured.	
	X	86	80	6.0			T201	43.17	-42.10		*****	=	Moderately strong, gray moderately decomposed fine ash TUFF with closely spaced, smooth and rough, planar, calcite costed, occasionally iron stained joints, dipping at 50°-70° and with some voids (1-6 cm).	



#### 2.5 Ground Water Record

According to the groundwater records cited in the GI report of BH2A, which is approximately 60 meters beyond the site, the water level fluctuations for the period between October 31, 2008, and November 6, 2008, have been documented. The report states that the water level of BH2A (upper) ranged from +2.91mPG to +2.94mPD, while the water level of BH2A (lower) fluctuated between from +3.04mPG to +3.06mPD.







\* AGMD = Automatic groundwater monitoring device





\* AGMD = Automatic groundwater monitoring device



#### 2.6 Adjacent Nullah

The nullah with the designation SCP1009082 is a water channel located along Sha Chau Road, with a distance of approximately 30 meters from the site. It is characterized by a trapezoidal shape, which means it has a base width that is different from its top width, resulting in sloping sides.

The nullah has a width of 28000mm, indicating its capacity to carry a significant volume of water during periods of rainfall or runoff. The wider base of the trapezoidal shape helps to accommodate higher flow rates, reducing the risk of overflowing or flooding in the surrounding area.

Understanding its characteristics and proximity to the site is essential for ensuring proper planning and implementation of construction activities while preserving the integrity and functionality of the nullah.





#### 2.7 Existing Adjacent Features



Figure 2.2 Existing Features Location Plan

#### 6NW-A/R 90

The feature 6NW-A/R 9 is a concrete retaining wall with a level platform, standing tall with a maximum height of 3 meters. The structure spans a length of 78.3 meters along Ping Ha Road. Its face angle of 90 degrees creates a vertical face. The retaining wall is approximately 120 meters away from the site.

#### 6NW-A/FR 66

Another feature 6NW-A/FR 66 contains slope part and the wall part. The slope height is 2.8m and the length is 225m. The average angle of the slope is 30degree.

The wall part has three retaining wall structures in total. Maximum height of Wall 1 is 0.6m and the length is 45.5m. Maximum height of Wall 2 is 2.2m and the length is 44.4m. Maximum height of Wall 3 is 2.0m and the length is 45.5m.

This feature locates on the opposite of the existing nullah from 100m to 300m away from the site.



## **3 GEOTECHNICAL ASSESSMENT**

Refer to the existing ground investigation reports, the bedrock level is around -40mPD. A comprehensive soil investigation to understand the properties and behaviour of the soil within the site shall be carried out. This investigation should include testing for soil composition, strength, permeability, and potential for settlement. The results will help determine the appropriate foundation design and construction methods. Detail proposal may refer to the **Ground Investigation Report**.

The following geotechnical concerns require assessment for the proposed development:

- The suitable foundation type for the proposed development, particular its impact onto the adjacent ground and nullah. Detail refers to the **Foundation Proposal Report**.
- Effect of construction to adjacent feature, nullah, ground and structures.

#### 3.1 Effects of Proposed Development Existing Nullah

The existing nullah is approximately 30m beyond the site boundary. The nullah serves as a drainage channel, carrying water runoff during rainfall events. Excavation works near the nullah shall consider the natural flow of water and potential flooding or redirection of water towards undesired locations. Since the proposed development has no basement and the nullah is over 30m from the site, only shallow excavation works will be carried out for pile cap construction, the impact shall be relatively insignificant.

Deep foundation is proposed for the development, such that the building will sit on bedrock. There is no adverse effect nor additional surcharge applied on the existing nullah.

#### 3.2 Effects of Proposed Development on Existing Features

Two registered features are more than 100m away from the site location. The proposed development has no basement, but only shallow excavation works for pile cap construction, there is no adverse effect of the adjacent features.

#### 3.3 Monitoring

Monitoring should be set up when commence site work including ground investigation, excavation works and foundation works. This involves monitoring the ground settlement, adjacent building settlement and tiling, vibration check, groundwater level.



## 4 CONCLUSION

Having reviewed the regional ground geology based on the existing available ground condition and investigation records, it is concluded that proposed development is structurally and geotechnically sound.

The evaluations stated in this report were based on observations which limits to only those areas accessible for observation and the information downloaded from Building Department's Online BRAVO system, Ginfo and Geoinf Map by CEDD. No destructive inspection or testing of materials was performed.



Appendix A – Geological Map



Appendix B – Drawing of Schedule Area 2 (GS-SP/714-1)



Appendix C – Adjacent GI Record



Appendix D – Adjacent Slope Feature Record



# **DELIVERING THE FUTURE**

For more details, contact us: lota SIN | Principal Engineer E: <u>iota.sin@asiainfrasolutions.com</u> T: +852 3619 9449

Follow us on our social networks.





ASIAINFRASOLUTIONS.COM



# **FOUNDATION PROPOSAL**

# PROPOSED REDEVELOPMENT OF POK OI HOSPITAL YEUNG CHUN PUI CARE AND ATTENTION HOME

AT

YUEN LONG, HONG KONG

**Revision: 1** 

May 2024

ASIAINFRASOLUTIONS.COM

# **DELIVERING THE FUTURE**



## CONTACTS

IOTA SIN Author



SEAN TSANG Checker



CHAN CHI KONG Approver





#### **REVISION HISTORY**

Rev.	Description of Revision	Date
-	1 <sup>st</sup> Submission for Approval	24 November 2023
1	2 <sup>nd</sup> Submission for Approval	6 May 2024



#### TABLE OF CONTENT

1	INTRODUCTION		
	1.1	Background	5
	1.2	Objective	5
2	SITE GEOLOGY		
	2.1	Site Topography	6
	2.2	Schedule Area 2	7
	2.3	Ground Conditions	8
	2.4	Ground Water Record	12
	2.5	Adjacent Nullah	15
3	FOUNDATION PROPOSAL		16
	3.1	Design Code/ Reference	16
	3.2	The Proposed Foundation Scheme	16
	3.3	Load Transfer Mechanism	18
	3.4	Effect to Adjacent Nullah	18
4	MON	MONITORING INSTRUMENTATION1	
5	CON	ICLUSION	19

#### APPENDICES

- Appendix A Adjacent GI Record
- Appendix B Drawing of Schedule Area 2 (GS-SP/714-1)
- Appendix C Preliminary Foundation Schemes



# **1** INTRODUCTION

#### 1.1 Background

P&T Group has been appointed as the leading consultant to oversee the technical feasibility study for the proposed redevelopment of Pok Oi Hospital Yeung Chun Pui Care and Attention Home in Yuen Long.

Asia Infrastructure Solutions Limited has been appointed by P&T Group as the structural and geotechnical consultant and is responsible for structural and geotechnical feasibility study for the proposed development.

The Project comprises the demolition of existing building and construction of new block(s) with an aim to optimise the use of the site at 58 Sha Chau Lei Tsuen, Ha Tsuen, Ping Ha Road, Yuen Long at Lot No. 2273 and the Extension thereto in Demarcation District 125, and to cater for the increasing demand for elderly, rehabilitation and child care services, by providing more floor area and better and updated facilities.



### 1.2 Objective

This report aims to provide a preliminary foundation proposal for the proposed development.



# 2 SITE GEOLOGY

#### 2.1 Site Topography

The Site is at LOT NO. 2273 & extension in DD 125, Ping Ha Road, Ping Shan, Yuen Long, New Territories (also known as 58 Sha Chau Lei Tsuen, Ha Tsuen, Yuen Long, New Territories).

The site is relatively flat, and the ground level is around +5.0mPD to +5.7mPD.



Figure 2.1 Site Location Plan



#### 2.2 Schedule Area 2

According to PNAP APP-61, North-Western Part of the New Territories area has been designated as Area Number 2 of the Scheduled Areas (Scheduled Area No. 2) in Schedule 5 to the Buildings Ordinance (BO). The site is at North-Western Part of the New Territories area and thus falls within Scheduled Area No. 2 as shown in figure below. The plan is attached in **Appendix B**.

Refers to PANP APP-61, attention should be given to logging the location and size of the cavities, the nature of the cavity wall and the infill, together with rock discontinuities. Fracture indices including total core recovery, solid core recovery, rock quality designation and fracture index should be shown on the drill logs.

The depths of drillholes should be determined by considering the depth of marble bedrock and the magnitude of the load to be applied by the structure. If marble is encountered, a minimum penetration of 20 m into sound marble rock is recommended in order to reduce the risk of existing cavities not being identified.





#### 2.3 Ground Conditions

There are numerous borehole investigations conducted near the Site, however, most of the borehole record are shallow and did not reach the rockhead level. Based on the available GI data within 500m, it is estimated that the subsoil geology is in the sequence of fill, alluvium, sandy/clayed silt layer, completely to slightly decomposed metasiltstone and fine ash tuff. The location of the drill holes and the G.I records are attached in **Appendix C** for reference.

#### Borehole BH2A

The first layer in BH2A is fill, which is approximately 4.5m thick. It comprises firm to stiff, yellowish brown, sandy clayey SILT with occasional angular, medium gravel of strong granite.

The layer of alluvium is approximately 17m thick in BH2A, comprising firm to stiff, light brown, dappled black and yellowish brown, clayed silt with occasional rounded, medium gravel of moderately strong silica fragments.

Clayed silt layer lying between the alluvium and bed rock comprises extremely weak, olive grey/greyish brown, completely decomposed metasiltstone.

Bedrock is found at -37.7mPD, comprising strong, grey, slightly decomposed metasiltstone and strong, grey, slightly decomposed, fine ash tuff at the bottom of drill holes.




Ē	JG	R			PO				DR	ILLHOL	E F	REC	ORI	)	HOLE No.		BH2A	
V		$\approx$		GEO	TEO	CHN ES	IIC.		CON	TRACT No.	GE/	2008/	04		SHEET:	5	of	5
PRO	JECT:	PW	P Ite	m No	. 781	1TH,	Pin	g Ha Road	i Imp	rovement - F	emair	ning W	orks ()	la T	suen Section)			
MET	HOD:	Ro	tary	Drill	ing				c	O-ORDINATE	ES:			v	VORKS ORDER No	GE/2	008/04.	4
MAC	HINE	& No.:	FC	DR-12	2				1	E 817 N 834	690.40 103.84	0 4		C	ATE from: 18/10	0/2008	to	27/10/2008
FLU	HING	MEDI	UM:	w	later				0	RIENTATION	: V	ertical	1	0	ROUND LEVEL	+ 6.50		mPD
Driling Progress	Casing depth/size	Water Level (m) Shift start/	Vister Return %	TCR%	SCR%	RQD%	FI	Tests		Semples	6 Reduced 8 Level	8 Depth (m)	Legend	Grade		Descriptic	'n	
41		end 0.75e 31 18:00 4.55m 31 08:50		798				12, 23, 55, 45 / 25m 190 bis / 100e	8 BIT1	100 Type Central 10 Ty					As sheet 4 of 5.			
43	1997.							1 50 / 40mm, 100 / 20mm 100 bis / 20m	m <b>å</b>		47.74			V	Weak, grey, highly METASILTSTONE to coarse gravel)	decompo E. (Recove	osed cak ared as a	careous angular, fine
45	44.24		70	19	44	0	10.7			100 100 100 100 100 100 100 100 100 100					Strong, grey, spot decomposed, calo with occasional m 30mm). Joints are very clo planar, extremely 25° - 35° and sub	ted white, areous M arble and sely to ck narrow, in vertical.	slightly IETASIL slica cla osely spa on staine	TSTONE sts (10mm - eced, rough ed, dipping at
46			78		79	58	7.7			T201	-40.04	48,54		-11	Strong, grey, sligh METASILTSTON	By decom E.	posed mooth o	lanar.
48		120%	20		69	42				T===	-41.70	46.2			extremely narrow, Strong, grey, spot decomposed, tuff Joints are closely extremely narrow, 45°.	clean, di ted white, aceous M spaced, r iron stair	slightly ETASIL1 ough pla ed, dipp	45° - 55°. ISTONE. ing at 35° -
49		18:00 4.30m at 08:00 0.90m	70		32	0	19.4	6			1 -43.04	49.5			Strong, grey, sligh TUFF. Joints are very ck planar, extremely and chlorite coate - 45°.	ntly decom osely to cli narrow, c ed, dipping	nposed, f osely spo lean, loc j at 15" -	fine ash aced, rough ally kaolin 25° and 35°
E 50		12:00										F 20.0			End of investigation	on hole at	49.54m	
	Smell Dis Naton sa 176 Und 100 Un Mazler Si SPT Line Nater Sa	harbed S mple starbed S distarbed smple r Sample rrple	ample Samp I Sam	h ha ple	↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	Star In-si Pen Acco Pac Piec Star	ndand itu Va meatii xustic i xustic i	Penetration T4 no Shoar Test Illy Test Borehole Telev ast ar Tip 9	est viewer	LOGGED V DATE 2 CHECKED 2 DATE 3	8/10/200	18 inshead	REA	(AR)	KS			



#### Borehole DH168

The first layer in BH168 is fill, which is approximately 3m thick. It comprises firm, brown sandy silt with some to many angular to subangular medium to coarse gravel sizes moderately weak rock fragments.

The layer of alluvium is approximately 5m thick in BH168 comprising firm to stiff, yellowish brown and light grey mottled light pink clayed very sandy silt, fine coarse sand with zone subangular fine to medium quartz gravel.

Sany and clayed silt layer lying between the alluvium and bed rock comprises extremely weak, olive grey/greyish brown, completely decomposed metasiltstone.

Bedrock is found at -45.65mPD, comprising continuous strong, grey, locally spotted and dapped white slightly decomposed fine ash tuff with medium spaced, smooth, planar, calcite coated, occasionally clean joints sipping at 60deg to 70deg at the bottom of drill holes.





1					G	an	mon echnic	Co	ons	tru	ctio	De	Lin	tme	ed DRILLHOLE No. TS200/DH/168
				-	1			D	RI	LL	но	LE		RE	CORD
PRO.	ECT		ĸ	CRC	West	Rail T	S-200 We	stern	Sect	ion, P	hase 3	Grou	and In	vestig	gation
MET	HOD	IP+	WB+	RC		-		co	ORD	NATE	s			CO	NTRACT No. TS-200
MAC	HINE	8 No.	Toh	0 (D2	2)		-	E		81754	5.47			DA	TE from 12/03/1998 to 19/03/1998
						-	-	0.00	THE	3300	1.40			0.00	
rus	minio	MEDI		veat		_		Un	ENT		_	eruca	_	Grit	SOND LEVEL 5.00 INPD
Progress	Casing depth/size	Water Depth (m)	TCR %	SCR %	ROD %	н	Tests	No	Samp	Depth	& Reduced	(uu) 00.00	Legend	Grade	Description
COVER		2.00					8.4 12450ver No. 2007135mm 92.00, 20.50 No. 192	70 71 72 73 74	0.0	40.00 45.26 42.00 42.45	-38.40	44.00	و مواد از مدار است. از مدار است از مدار است. از مدار است از مدار است از مدار است. از مدار است از مدار است از م هوا است از مدار است. است از مدار است از مدار است. از مدار است از مدار است از مدار است از مدار است از م هوا است از مدار است از مدار است از مدار است. از مدار است از مدار است از مدار است از مدار		As sheet 4 of 6.
							8 = 200/75mm ( 112,46/26mm N = 85/25mm	75		41.00	-40.40	46.00		20 0 0 - 1 1	decomposed fine ash TUFF (Very stiff, clayey SILT with some subangular fine to medium gravel sized moderately weak rock fragments). Very weak, grey completely to highly decomposed fine ash TUFF (Angular to subangular medium to coarse GRAVEL sized
	HX 47.07			11	1.						41.47	E-0.01	000	0	moderately week rock fragments).
100/98		2.00	100	66	51	>20			120	40.07	-42.80	48.40	2222222	CIONII	Moderately weak to moderately strong, grey highly to moderately decomposed fine ash TUFF with closely spaced, amooth and rough, planar, clean joints, dipping at 40°-60°, 47.07-47.20m: Highly fractured.
			A	86	80	6.0			12004 12004 12004	43.17			*****		Moderately strong, grey moderately decomposed fine ash TUFF with closely spaced, smooth and rough, planar, calcite costed, occasionally iron stained joints, dipping at 50°-70° and with some voids (1-6 cm).
	mail dist rege dist PT liner 76 undi 100 undi lazier sa lazier sa	urbed sa urbed sa sample sturbed s Saturbed mple	emple emple serrple serrple	And the second second	Ver	ter sam rometer ndard p ssurativ meabilit pression itu varv	ple to enetration test top Test y test pscker test a shear test		LOGG DATE CHEC DATE	ED 11	03/195	10	REMA	RKS	



#### 2.4 Ground Water Record

According to the groundwater records cited in the GI report of BH2A, which is approximately 60 meters beyond the site, the water level fluctuations for the period between October 31, 2008, and November 6, 2008, have been documented. The report states that the water level of BH2A (upper) ranged from +2.91mPG to +2.94mPD, while the water level of BH2A (lower) fluctuated between from +3.04mPG to +3.06mPD













#### 2.5 Adjacent Nullah

The nullah with the designation SCP1009082 is a water channel located along Sha Chau Road, with a distance of approximately 30 meters from the site. It is characterized by a trapezoidal shape, which means it has a base width that is different from its top width, resulting in sloping sides.

The nullah has a width of 28000mm, indicating its capacity to carry a significant volume of water during periods of rainfall or runoff. The wider base of the trapezoidal shape helps to accommodate higher flow rates, reducing the risk of overflowing or flooding in the surrounding area.

Understanding its characteristics and proximity to the site is essential for ensuring proper planning and implementation of construction activities while preserving the integrity and functionality of the nullah.





# **3 FOUNDATION PROPOSAL**

## 3.1 Design Code/ Reference

The proposed design works shall comply with the following codes and standards:

- Building (Construction) Regulations, Hong Kong
- Code of Practice on Wind Effects in Hong Kong 2019
- Code of Practice for Structure Use of Concrete 2013
- Code of Practice for Foundations 2017
- Code of Practice for Dead and Imposed Loads 2011

## 3.2 The Proposed Foundation Scheme

The proposed development is approximately  $37m \times 54m$  in plan. The building consists of 9 storeys including the main roof. There is no basement of the structure. Column grid varies from 6.15m x 6.95m to 12.3m x 8.05m.

With the consideration of the structure mass, ground condition and the settlement concerns, piling foundation is proposed. Plan for two foundation schemes refer to **Appendix C**.

Bored pile/ Sicket-H pile on rock can carry large column load from the superstructure down to bed rock directly such that the settlement will be minimized and will not impose additional loading on the adjacent structure or nullah. As both piles can be operated in a reasonable quiet condition and generally no restrictions in piling hours. It is proposed for the new development. Preliminary check for the critical case for each scheme is shown below. Final pile size and design subject to detail checking.

Comparison table for two schemes are summarized below:

	Bored Pile	Socket-H Pile
Loading Bearing Capacity	Higher	Lower
Number of Pile Required	Smaller	Greater
Noise Level	Low	Low
Vibration Level	Low	Low
Time of Construction	Longer	Shorter
Working Area	Large	Relatively smaller
Loading Test	No	Yes



## **Bored Pile Scheme**

Allowable Column Load =  $12.3 \times 8.05 \times 10 \times 15kPa \times 1.25(Wind Factor) = 17711kN$ Provide 1 no. of 1.5m dia. bored pile per column. Pile Capacity =  $0.35 \times 45 \times \pi \times (\frac{1500}{2})^2 = 27832kN > 15940kN$ Bearing Capacity =  $5000kPa \times \pi \times (\frac{1500}{2})^2 = 8835kN$ Assume 3m rock shaft in Grade III Rock Rock Shaft Capacity =  $700kPa \times \pi \times 1500 \times 3 = 9896kN$ Total Capacity = 8835 + 9896 = 18731kN > 17711kN

## Socket-H Pile Scheme

For 305x305x223UB socket-H pile with 5.5m socket length

Shaft Friction Capacity =  $700kPa \times \pi \times 0.56 = 6158kN$ 

Steel Capacity =  $0.5 \times 415 \times 28400 = 6106kN$ 

 $4nos. of Socket - H Pile Capacity = 3 \times 6106 = 18318kN > 17711kN$ 



## 3.3 Load Transfer Mechanism



### **Gravity Load Resisting System**

The gravity loading and internal forces of column/shear walls due to wind loads from the superstructure are transferred to the pipe cap and piles underneath. And further transfer to the bed rock via end bearing and rock shaft friction.

### Lateral Load Resisting System

The lateral forces acting on the pile cap will be resisted by the passive soil reaction between the piles and the soil.

## 3.4 Effect to Adjacent Nullah

Since the new proposed development is sit on piling foundation, there is neglectable effect to the existing structure and foundation. While during the construction, a monitoring system is proposed in the foundation plan to gauge the effect on the adjacent structures and nullah throughout the entire site works.



# 4 MONITORING INSTRUMENTATION

Precautionary measures such as standpipe piezometer, tilting check points, ground settlement check points, vibration check points etc. will be provided when necessary in order not to impose any adverse effect on the existing structures.

Three levels of control criteria, alert, alarm, and action levels area established for monitoring during the course of foundation and ELS works (ELS works under separate submission). The following will be implemented should the control level be reached:

- Alert level The frequency of monitoring and / or monitoring stations needs to be increased.
- Alarm level Design assumptions are to be reviewed and amendment submission may be required.
- Action level Relevant works need to be suspended, backfill the site to safe level where necessary. Works can only be resumed when the migration have been approved.

# 5 CONCLUSION

Since the Site is located within Schedule Area No. 2 and maybe underlain by cavernous marble, further investigation of ground shall be carried out for more complete understanding of the ground condition. The investigation shall involve experienced geotechnical engineer in both the design and supervision of the geotechnical works required at the Site.

With the consideration of existing GI records and proposed building layout, piling works is recommended. Both bored pile and socket-H pile scheme are geotechnically and structurally feasible and would not cause any adverse effect on the adjacent structures, buildings and nullah. The proposed piling foundation are designed to take assumed vertical and lateral loads from the superstructure.

Monitoring of the adjacent structures at the specified frequency on the design drawings will be carried out to forewarn of any undue movement occurring outside the site



Appendix A – Adjacent GI Record

					G	an	nmon	Co	nst	ru	ctio	n I	lim	ite	ed	DRILL	HOL	E N 168
					Ģ	ieot	echnic	al C	ont	rac	ting	De	part	me	ent	SHEET	1 o	f (
								D	RI	LL	НO	LE	]	RE	CORD			
PRO	JECT		к	RC	Nest	Rail T	S-200 We	stern	Section	on, P	hase 3	Grou	nd Inv	esti	gation			
MET	HOD	IP+	WB+	RC				co-0	DRDI		S			CO	NTRACT No.	TS-200		
MAC	HINE	& No.	Toh	o (D2	2)			E N	8	3360	)7.46			DA	TE from 12/03	8/ <b>1998</b> to	19/0	3/19
FLUS	SHING	6 MEDI	UM	Wat	er			ORIE	NTA	TION	v	ertical		GR	OUND LEVEL	5.60	mPD	
SSS	g /size	Water	2	, 9	%		Teste		Sampl	es	luced el	th.	q		-	Description		
Drilling	Casing	(m)	TCR 9	SCR 9	ROD	E	Tests	No.	Туре	Depth	5.60	(m) 0.0	Leger	Grade		Description		
12/03/98	PX							A	ŧ	0.50					Firm, brown san angular to subar gravel sized moo fragments (FILL	idy SILT with ngular mediu derately wea ).	n some to im to coa ik rock	o man Irse
12/03/98								в	*	1.00	4.60	- 1.00		-	Brown sandy s	ity angular o		
								с	*	1.50	4.10	- 1.50			sized moderatel (FILL).	y weak rock	fragmen	ts
								D	×	200	3.60	- 2.00			Firm, brown sar	ndy silty CLA	Y (FILL).	
							1,1 2,1,1,2 N• 6	1	 *	2.45				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Soft, yellowish very sandy SILT matter (FILL/AL	brown and li with occas LUVIUM?).	ght grey ional org	claye anic
-			100				7 bis	3	m	3.00	2.60	3.00		\$	Firm vellowish	brown and li	aht arev	
								4	Ų	3.45					mottled light pir (ALLUVIUM).	nk clayey ve	ry sandy	SILT
-							4,5	5	Π	4.00		• 						
							N= 14	6	*	4.45								
			100				63 bis	8	Ą	5.00 5.45	0.80				Medium dense. fine coarse SAN to medium quar	reddish brov ND with zone rtz gravel (Al	wn claye e subang LLUVIUN	y silty ular fi I).
-							3,4 5,5,5,6 N• 21	9		6.00				والعنا المناخ	6.00-7.00m: Pt	urplish brow	n in color	J <b>r</b> .
									-	0.40			-1	1-1-				
			7100				81 bis	11 12	Ą	7.00 7.45	-1.40	- 7.00	0.000		Yellowish brow subangular med GRAVEL (ALLU	n, silty sand dium to coar IVIUM).	y angula se quarta	r to
			an an an a' a faith ann an ann an a' a' a' ann an an an				3,5 6,11,9,11 N• 37	13 14		8.00 8.45	-2.40	- 8.00	000		Extremely weal completely dec stiff, slightly sa	k, yellowish composed fin andy SILT).	brown le ash Tl	JFF (V
			100				200 bi	15	Ą	9.00 9.45		بغب بببية بدي			9.00-11.00m:	Brown in co	lour.	
Ē												<u>F</u>	REMA	RKS	<u> </u> 3			
22 4 1	Small di Large di SPT line U76 une	sturbed s sturbed s ir sample disturbed	ample ample sample		∆ W İ Piri İ St I Pr	ater san ezomete andard essuren	nple er tip penetration tes neter Test	t	LOGG DATE	ED <u>J</u>	Lau 0/03/19	98	1. Ins 2. Pie 3. Co assum	oect zom re lo ned t	tion pit excavated eter installed at 2 ss in core run from to be grade V/IV 1	to 2.00m o .00 m dept m 50.40m fine ash tuf	depth. h. - 51.25 f.	n
И	U100 u	ndisturbe	d sampi	е	T Pe	arrieadil	ny test		CHEC	KED B	Shepst	one	4. NA	- N	ot applicable.			



					G	an Geo	nmon technic	Co al C	ons Con	t <b>ru</b>	c <b>tio</b> ting	n I De	<b>in</b>	nite tme	e <b>d</b> nt	DRILLH TS200	OLE No. /DH/168
								D	R I	LL	ΗO	LE		R E	CORD		
PROJE	ЕСТ		к	CRC	Nest	Rail	TS-200 We	stern	Secti	ion, Pł	nase 3	Grou	nd In	vestig	ation		
METH	IOD	IP+	WB+	RC				CO-	ORDI	NATE	S			CO	NTRACT No.	TS-200	
MACH	IINE	& No.	Toh	o (D2	:)			E	8	31754 33360	5.47 7.46			DA.	TE from <b>12/0</b> :	<b>3/1998</b> to	19/03/1998
FLUS	HING	MEDI	UM	Wat	er			OR	IENTA	TION	V	ertical		GR	OUND LEVEL	5.60	mPD
Drilling Progress	Casing depth/size	Water Depth (m)	TCR %	SCR %	ROD %	Ē	Tests	No	Samp	les Depth	P. Reduced	00 Depth 00 (m)	Legend	Grade		Description	
							11,15 16,32,45,60 N= 153	39 38	1   +	20.10 20.55					As sheet 2 of 6	3.	
-			1.80				13,23 24,28,32,40 N= 124	39 40 41 42		21.00 22.10 22.55	-15.40	21.00			Extremely weak decomposed fir slightly clayey s	k, brown comple ne ash TUFF (Ve sandy SILT).	etely ry stiff,
-			180				23,75 88,112/75mm N = 200/150mm	43 44 45 n 46		23.00 24.10 24.40		-	- [ ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ] ]				
-			7100				6,9 11,23,33,40 N* 107	47 48 49 50		25.00 26.10 26.55			- ] ] ] ] ] ] ] ]		26.00-27.00m subangular fine moderately we	: With some any to medium gra ak rock fragmer	gular to vel sized nts.
			100				↓ 21,179/75mm N = 179/75mm	51 52 54 54		27.00 28.10 28.25 28.40	-21.40	- 27.00			Extremely wea brown complet ash TUFF (Silty fine to coarse ( weak rock frag	k to very weak, ely to highly de v sandy angular GRAVEL sized n ments).	greyish composed fine to subangular noderately
14/03/98		1.60	100					5	5	29.00	-23.40	- 29.00	······································	· · · · · · · · · · · · · · · · · · ·	Extremely wea completely dec stiff, clayey Sl	k, light brownis composed fine a LT).	h green Ish TUFF (Very
≢ Sπ ‡ La	nall dist rge dist	turbed s	ample ample	Z	Wa Pie	ater sar azomete	nple er tip		LOGG	ED JI	au		REMA	ARKS			
SP 0	T liner	sample		-	Sta	andard essuren	penetration test	t	DATE	20	/03/19	98					
U7	100 undi	sturbed disturbe	sample 5 sampl	e -	Pe	rmeabi	lity test		CHEC	KED B	Shepsto	one					
§ Ma	azier sa	mple		-	∐ lm	pressio	n packer test		DATE	20	/03/19	98					

					G	an	<b>1mon</b> technic	Co al C	nst	t <b>ru</b> trac	ctio ting	n l De	<b>im</b> part	<b>ite</b> me	e <b>d</b> nt	DRILLH TS200 SHEET 4	IOLE No. 0/DH/168 of 6
								D	R I	LL	но	LE	]	RE	CORD		
PRO	JECT		K	CRC	West	Rail 1	S-200 We	stern	Secti	on, Pl	nase 3	Grou	nd Inv	vestig	gation	·····	
MET	HOD	IP+	WB +	RC				CO-(	ORDI 8	NATE 81754	S 5.47		-	CO	NTRACT No.	TS-200	
MAC	HINE	& No.	Toh	o (D2	2)			N	8	3360	7.46			DA	TE from <b>12/03</b>	8/ <b>1998</b> to	19/03/1998
FLU	SHING	MED	IUM	Wat	er			ORI	ENTA	TION	V	ertical		GR	OUND LEVEL	5.60	mPD
Drilling Progress	Casing depth/size	Water Depth (m)	TCR %	SCR %	ROD %	F	Tests	No.	Samp Type	les Depth	Reduced A Level	6 Depth 0 (m)	Legend	Grade		Description	
							↓ 70,130/75mm N= 130/75mm	56 57	1 =	30.10 30.25			-   -     -   -   -   -   -   -   -   -		As sheet 3 of 6.		
-			100					58		31.00	-25.40	- 31.00			Very weak, yello highly decomposisandy angular to GRAVEL sized n fragments).	owish brown c sed fine ash TI o subangular fi noderately wea	ompletely to JFF (Silty ne to coarse ik rock
-			705				↓ 60,140/75mm N = 140/75mm	60 61 62	Ţ	32.10 32.25 33.00	-26.50	32.10			Extremely weak decomposed fin slightly sandy cl	, light brown c e ash TUFF (V layey SILT).	ompletely ery stiff,
			85				7,16 24,32,56,72 N = 184	63 64 65		34.10 34.55			محمد الاعتبار النبية الاعتبار العبير الاعتبار المحمد الاعتبار المحمد المحمد الاعتبار المحمد الاعتبار العبير ال محمد العبير المحمد المحمد المحمد الاعتبار العبير المحمد المحمد المحمد المحمد المحمد المحمد الاعتبار المحمد الا محمد الاعتبار المحمد المحمد المحمد الاعتبار العبير المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحم				
							8,12 26,34,68,72 N= 200	66		36.00 36.45		, , , , , , , , , , , , , , , , , , ,	المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحم	عم ا ارجعت الحسر ا ارجعت از حسر ا	•		
							6,15 18,43,52,75 N* 188	68		38.00 38.45			و خدم فرار با الرحم ال عند و عند و المند و مند و مند و ع المنابع المند و مند و مند و المند و مند و مند و مند و مند و مند و مند و مند و مند و مند و المند و مند و مند و ال	يستع الجنب الحسم العسب الجسب الحسب الجسم	- 38.00-39.00m:	: Greyish greer	in colour.
16/03/9 <b>*</b> 1 1 1 1 1 1 1 1 1 1 1 1 1	8 Small dis Large dis SPT liner U76 und U100 un	turbed s turbed s sample isturbed isturbed	ample ample sample d sample	e -	A Wa D Pie ↓ Sta ↓ Pro	ater san zomete andard p essurem	nple rr tip penetration test neter Test ity test	t	LOGG DATE CHEC	ED <u>3</u> 20 KED <u>B</u>	Lau D/03/19 Shepsto	98 ne	REMA	RKS			



					G	an	1 <b>mon</b> technic	Construct	tion L	in Dart	nite tme	<b>d</b> nt	DRIL TS2 SHEET	LHOI 00/Di	_E   H/16	No. 6
PPO					Most	Poil 1	S-200 W	DRILL			R E					
MET	HOD	IP+	WB+	RC				CO-ORDINATES	3		C01	NTRACT No.	TS-200			
MAC	HINE	& No.	Toh	o (D2	)			E 81754 N 83360	5.47 7.46		DAT	TE from <b>12/03</b>	s/1998 t	o <b>19</b> /	/03/1	998
FLUS	HING	MEDI	UM	Wat	er			ORIENTATION	Vertical		GRO	OUND LEVEL	5.60	mP	D	
Drilling Progress	Casing depth/size	Water Depth (m)	TCR %	SCR %	ROD %	F	Tests	Samples No. Type Depth	Preduced brevel 0.05 Depth (m)	Legend	Grade		Descriptio	n		
					0	NA		T2/01 50.40	-44.80 50.40	/ 0Ph		As sheet 4 of 6.		ek grev		tted
				0	Ū	NI NR 6.9		T2IOI	-45.08 - 50.68 -45.36 - 50.96			brown complete ash TUFF (Sand fine to coarse G	ly to highly y silty angu RAVEL size	decomp lar to su d rock	bosed bang	fine ular
			100	96	96	4.1		51.25	-45.65 51.25	$\langle \vee \rangle$ $\langle \vee \rangle$		fragments). 50.54-50.68m: 50.68-50.96m:	Quartz veir	n. Non ir be grad	ntact. e V/IV	/
								T2101				fine ash tuff. Moderately wea	k to moder	ately str	ong,	grey sh
			99	95	95							TUFF with close iron stained join 60°-70°	ly spaced, ts, dipping	smooth, at 30°-4	plan 40° a	ar, nd
								J T2IO1			X.X.X	Strong, grey, log white slightly de with medium sp	cally spotte ecomposed aced, smo	d and d fine ash oth, plan	appleo TUF ar, ca	d F alcite
						1.9		53.87		/ /	ý V	coated, occasio 60°-70°.	nally clean	joints, d	ippinę	g at
			100	87	87	-	-				ý ý					
								T2101		/ /	х У У					
8/03/98 9/03/98		2.00	100	100	100			55.37	3		s s					
								T2101			2					
9/03/98								•	-50.68 - 55.28	V	Y	End of Investiga	ation hole a	t 56.28	m.	
									-							
										REM	ARKS					
* S	Small dis arge dis	turbed s	ample ample	1	∆ Wa 5 Pie ↓ Sta	ater san ezomete andard	nple er tip penetration tes		au							
	J76 und J100 un	isturbed idisturbe	sample d samp	le -	Pro	essuren rmeabil	neter Test ity test	CHECKED B	/03/1998 Shepstone							
	Mazier s Piston sa	ample ample			Í Im ∨ In-	pressio situ va	n packer test ne shear test	DATE 20	/03/1998							









Ţ,	່ນເຊ	R	D						D	RILLH	IOL	E R	EC	ORI	)	HOLE No.	E	BH2A	•
		$\approx$		GEC		CHN ES		AL D	со	NTRACT	No.	: G	E/200	8/04		SHEET: 1	1	of	5
PRC	JECT:	PW	P Ite	m No	o. 781	1TH	Pin	g Ha Ro	ad In	nproverne	nt - R	temain	ing W	orks (l	Ha Ts	suen Section)			1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -
MET	HOD:	Ro	tary	Drill	ling					CO-ORDI	NATE	ES:			N	VORKS ORDER No. (	GE/200	08/04.	.4
мас	HINE	& No.:	FD	DR-12	2					E N	817 834	690.40 103.84	) 		D	ATE from: 18/10/20	800	to	27/10/2008
FLU	SHING	MED	IUM:	N i	/ater					ORIENTA	TION	l: V	ertica	1	G	ROUND LEVEL + (	6.50		mPD
Drilling Progress	Casing depth/size	Water Level (m) Shift start/	Water Return %	TCR%	SCR%	RQD%	F1	Te	sts	Samp	les	e Reduced Level	ë Depth (m)	Legend	Grade	Des	cription		
18/10/2008       	SW	ena								1 I 2 Dispection 1 3 I	8.53 9.85 1.55				-	Firm to stiff, yellowish t clayey SILT with occas gravel of strong granite	brown (1 ional <b>a</b> n e. (FILL)	10YR/ Igular,	5/6), sandy medium
<u>18/22008</u> 22/10/2008	- -			108				2, 3, 3, 3, 4, 4 N=14 93 bls			1.95 2.00 3.00 3.10 3.20 3.59 4.00	4.50				Firm, greyish brown (10 and red, sandy clayey 5 angular, coarse gravel	0YR/5/2 SILT with of weat	2), mot th occ k phyll	ttled grey asional ite. (FILL)
				- 108				1, 1, 2, 2, 1, 2 N=7			4:50 4.60 4:99	0.50	- - - - - - - - - - - - - - - - - - -		-	Firm, olive (5Y/5/3), sa (ALLUVIUM)	andy cla		LT.
7								1, 1, 1, 1, 1, 1, 2 N=5		▲ 14 T	7.00 7.10 7.20	-0.60	- - - - - - - - - - - - - - - - - - -			ALLUVIUM) Soft, light grey (10R/7/ yellowish brown, sand	/1), mot y clayey	tled re	d and
	SW 8.00 PW			108				2, 2, 2, 3, 3, 2 N=10	2	16 <b>1</b> 7 18 <b>1</b> 9 19	7.5	-1.50	- - - - - - - - - - - - - - - - - - -	<u></u>		(ALLUVIUM) Soft to firm, light yellov mottled red, slightly sa occasional subrounde strong quartz. (ALLUV	wish bro andy, sil d to rou /IUM)	own (2 ty CLA inded,	.5Y/6/4), \Y with moderately
	Small Dis Piston sa U76 Undi U100 Und Mazier Si SPT Line	turbed S mple sturbed disturbed ample r Sample	Sample Samp J Sam	le ple		Sta In-s Per Op Pae Pie	ndard itu Va meab ical B ical B cker T	Penetration ne Shear T ility Test orehole Tele est eer Tip	n Test Test Ieviewer	LOGG DATE CHEC	ED <u>V</u> 2 KED <u>A</u>	8 -3.50 v.P. 244 8/10/200	8	1. Ins 2. Pic 3. Ha 3. Ha	MARK specti- ezome ound alcrow terval	CS on pit was excavated to dep eters were installed at 7.00n level on 27/10/2008. r buckets were installed fron s in the Upper and Lower pic	oth of 2.0 m and 43 m 0.50m ezomete	00m. 3.80m to 4.00 er.	below existing 0m at 0.50m

FGS Job No.: 07 0376 03 4

	UG	RD						D	RILLF	IOL	EF	REC	ORI	5	HOLE No.		BH2/	4	
		$\hat{\approx}$	GEC SEF		CHI ES	VIC LT	AL (	СС	ONTRACT	No.	: 0	SE/200	8/04		SHEET:	2	of		5
PRC	JECT	PWF	P Item N	o <b>. 78</b> 1	1 <b>T</b> H	, Pin	g Ha Road	d l	mproveme	nt - F	Remaiı	ning W	orks (I	Ha T	suen Section)				
МЕТ	HOD:	Rot	ary Dril	lling					CO-ORDI	NATE	ES:			V	VORKS ORDER No	. GE/2	2008/04	1.4	
мас	HINE	& No.:	FDR-1	2			997 - F		E N	817 834	690.4 103.8	0 4		Ľ	DATE from: 18/10	0/2008	to	27/1	0/2008
FLU	SHING	MEDI	UM: <b>V</b>	Vater		va			ORIENTA	TION	1: V	ertica	I	0	GROUND LEVEL	+ 6.50		mPI	D
Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return % T C R %	SCR%	RQD%	-	Tests	\$	Samp	les	Pevel -3.50	0.00 Depth (m)	Legend	Grade		Descripti	on		
- 11							1, 1, 2, 3, 4, 4 N=13		21 22 1 23 24	11.00 11.10 11.20 11.59	5.50				Medium dense, ligi silty, fine SAND wi silt. (ALLUVIUM)	ht yellowi th occasio	sh browi onal piec	n (2.5 ces of	Y/6/4), f clayey
12							2, 2, 3, 5, 9, 13 N=30		25 26 27 28 1 29 30	12.00 13.00 13.10 14.20 14.30 14.59	-5.50	12.00	الا معال المعال المعال العمال المعال الم محمد المعال المعال المعال المعال المعال المعال المعال المعال المعال المعال المعال المعال المعال المعال المعال ا المعال المعال		Firm, pale brown ( purple, slightly clay	10YR/6/3 rey SILT.	), dapple (ALLU∨	ed ligi /IUM)	nt
16 17 17 18 22/10/2000 1 19		0.85m at 4.55m at 08:00					1, 2, 3, 3, 4, 6 N=16		31 32 33 34 4 35 36 4 37 38 39	16.10 17.20 17.20 17.30 17.40 17.79 18.20	-13.50		<u>1</u> <u>1</u> <u>1</u> <u>1</u> <u>1</u> <u>1</u> <u>1</u> <u>1</u> <u>1</u> <u>1</u>		Firm to stiff, light b black and yellowisl occasional rounde moderately strong	rown (7.5 h brown, d, mediur silica frag	YR/6/3) clayey S n gravel gments.	, dap ILT w I of (ALLI	oled iith UVIUM)
	Small Disi Piston sar J76 Undi J100 Und J100 Und Mazier Sa SPT Liner Vater Sa	turbed Sar nple sturbed Sa disturbed S ample Sample mple	mple ample Sample		Star In-si Perr Opti Pac Piez Star	ndard I itu Var meabil cal Bo ker Te comete ndpipe	Penetration Te he Shear Test ity Test rehole Televie st st ir Tip	est	LOGGE DATE CHECK DATE	:D <u>W</u> <u>28</u> (ED <u>A.</u> <u>31</u>	.P. 01 9/10/200 B-Hollin 1/10/200	B nsheady 8	PREM	ARK	35				

	UG	R			RO				DR		LH	OL	.E F	REC	ORI	2	HOLE N	0.		BH2A		
		$\approx$	G	EO		CHN ES		AL D	CON	TRA	АСТ	No.	: G	E/200	8/04		SHEET:		3	of	5	
PRC	JECT:	PW	P Iten	n No	. 781	1TH,	Pin	g Ha Roa	d Imp	rove	emen	nt - F	Remain	ning W	lorks (i	Haʻ	Tsuen Section)	I				
MET	HOD:	Ro	otary I	Drill	ing				с	0-0	RDIN	IATE	ES:				WORKS ORDE	ER No.	GE/2	008/04	.4	
МАС	CHINE	& No.:	: FDI	R-12	2					E N		817 834	690.4 103.8	u 4			DATE from:	18/10	/2008	to	27/10/20	08
FLU	SHING	MED	IUM:	W	ater				0	RIE	NTA	ΓΙΟΝ	1: V	ertica			GROUND LEV	EL	+ 6.50		mPD	
Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	TCR%	SCR%	RQD%	Ē	Test	3	S No.	ample	es Depth	Fevel 13.50	0.02 0.02 0.02	Legend	Grade			Descriptic	n		
21								2, 3, 6, 6, 8, 12 N=32		40 41 42	Ţ	20.30 20.40 20.50 20.89			a_1111111111111_		As sheet 2 o	ıf 5.				
_ 22				108				9, 15, 20, 28, 30, 2 100 bis / 260	2 / 35mn mm	43 44 45 46	Ţ	21.30 22.30 22.40 22.50 22.56	<u>14.80</u>	21.30	$d = \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + \frac{1}{1} + $	V	Extremely w completely c (Very stiff, c	eak, lig lecomp layey S	yht yellow bosed ME SIL⊤)	ish brow TASILT	n (2.5Y/6/4 STONE.	4),
23	PW 24.40 HW			108				9, 9, 15, 23, 42, 2 100 bis / 24(	0 / 15mr )mm	47 48 49 50	Ţ	23.30 24.30 24.40 24.50 24.50	<u>-16.80</u>	- 23.3( - 23.3) 		V	Extremely w yellowish br METASILTS	reak, lig own, co STONE	ght purple ompletely (Very st	(5R/7/2 decomp iff, claye	), striped, losed y SILT)	
25				708				1, 2, 3, 5, 8, 8 N=24		51 52 53 54	Ţ	25.30 26.30 26.40 26.50 26.50	-18.80	- 25.30		· · ·	Extremely w dappled gre METASILTS	/eak, lig y, com STONE	ght yellow pletely de (Firm to	compos scompos stiff, cla	/n (2.5Y/6/ ed syey SIL⊤)	4),
28	<u>18</u> 19	0.80m at 18:00 4:60n at 08:00						9, 9, 10, 10, 12, 1 N=46	14	55 56 57 58 59	Ţ	28.3 28.4 28.4 28.5 28.8 28.8 28.8 28.8 28.8			0 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	the second second second second second second second second second second second second second second second s						
	Small Dis Piston sa U76 Undi U100 Und Mazier Si SPT Line	turbed S mple isturbed disturbed ample r Sample	Sample Sample d Sample e	<u>/ / .</u>		Star In-s Per Opt Pac Pie:	Indard itu Va meabi ical B ker To zomet	l Penetration T ne Shear Tes lity Test prehole Televi est er Tip	est t			ED <u>4</u> ED <u>4</u> 3	_I -23.50 v.P. v. 8/10/200 	0   30.0 08 nshead		<u>-1</u> 1AF	I RKS			1.000 <u>1</u> .000  <u>1</u> .000   <u>1</u> .00000 <u>1</u> .00000 <u>1</u> .00000 <u>1</u> .0000000 <u>1</u> .000000000000000000000000000000000000		

-fi	UG	R							D	RIL	₋∟⊦	IOL	EF	REC	OR	D		HOLE No.	BH2	2A	
		$\hat{\sim}$	GE GE SE	EO R		CHI ES	VIC LT	AL D	СС	ONTF	RACT	No.	: 0	GE/200	8/04			SHEET: 4	of		5
PRC	JECT:	PW	P Item	No.	781	1TH	, Pir	ig Ha Ro	ad li	mpro	veme	nt - F	Remai	ning V	/orks	(Ha	Ts	uen Section)			
МЕТ	HOD:	Ro	otary D	rilli	ng					CO-(	ORDI	NATI	ES:			Τ	W	ORKS ORDER No. GE	/2008/0	4.4	
MAC	HINE	& No.	FDR	-12						E N		817 834	690.4 103.8	0 4			D	ATE from: 18/10/2008	to	27/	10/2008
FLU	SHING	6 MED	IUM:	Wa	ater	F				ORI	ENTA		1: V	/ertica	1		G	ROUND LEVEL + 6.5	0	mP	סי
Drilling Progress	Casing depth/size	Water Level (m) Shift start/	Water Return % T.C.R %		SCR%	RQD%	EI	Tes	sts	Nr	Samp	Depth	Peduced -23.50	00.05 Depth (m)	Legend	Grade		Descrip	ition		
31				27				7, 6, 10, 10, 10, N=41	11	61 61 62	ļ	30.30 30.40 30.50 38.89						As sheet 3 of 5.			
32				8///						6		31.30	-24.80			L - V -		Extremely weak, greyish t completely decomposed f (Stiff, sandy SILT with sor gravel)	rown (1 /IETASII ne angui	DYR/5 TSTC ar, co	/2), DNE. arse
33										6		32.40	-20,90					Extremely weak, olive gre decomposed METASILTS slightly clayey SILT)	y (5Y/5/2 TONE.	2), con (Very :	npletely stiff,
34				R.				15, 28, 45, 55 / 45 100 bis / 1	imm 20mm	6	ç Ç P	33.50 33.60 33.77									
35								20, 30 / 20	)mm,	7		35.40 35.50 25.51									
- - 36								100 bls / 6	m 60mm	,		35.655									
37								1 25, 25 / 15 100 / 50m	5mm, m	7 7 7	3 4 4	37.44 37.54 37.55									
- 38 				8						7	5	38.4	,31.90	- 38,4 -			/	Extremely weak, brown () decomposed METASILT SAND)	7.5YR/5/ STONE.	4), cor (Silty,	npletely fine
- - - 40				∠.				4, 6, 15, 25, 28 N=97	3, 29	7		39,4 39,5 39,6 39,6	-33.00 -33.50	- 39.5 - - - - 40.0			/ 7	Extremely weak, light gre decomposed METASILT; clayey SILT)	y (10R/7 STONE.	/1), cc (Very	ompletely stiff,
	Small Dis Piston sa	turbed S mple	ample		¥	Sta In-s	ndard itu Va	Penetration ne Shear Te	Test est		LOGG	ED <u>V</u>	1.P.			. e 17 XI	u V	-			
	J76 Undi J100 Und	sturbed disturbed	Sample I Sample		1	Per Opt -	ical B	my rest prehole Tele	viewe	r	DATE	2	B/10/200	. 8	0						
	Mazier Sa SPT Line Water Sa	ample r Sample mple	9		1 8 A	Pac Pie: Sta	xer To zomet ndpip	est er Tip e			CHECI DATE	KED <u>A</u>	.B-Holli 1/10/200	nshead )8	AQ.						

	uœ	RO							DR		HOL	E F	REC	Or	RD		HOLE No.		BH2/	4		
		$\hat{\approx}$		GEO		CHN ES			CON	FRAC	T No.	: GE/	2008/0	04			SHEET:	5	of		5	
PRC	JECT:	PWF	o Ite	m No	. 781	1TH,	Pin	g Ha Roa	d Imp	rovem	ent - F	Remair	ning W	orks	(Ha	Ts	uen Section)					
MET	HOD:	Rot	tary	Drill	ing				c	D-ORI	DINATI	ES:				W	ORKS ORDER №.	GE/20	008/04	.4		
MAC	HINE	& No.:	FD	DR-12	2					E N	817 834	690.40 103.84	D 4			DA	TE from: 18/10/2	2008	to	27/1	0/200	)8
FLU	SHING	MEDI	UM:	w	ater				0	RIENT	ATION	1: V	ertical			GF	ROUND LEVEL +	· 6.50		mP[	2	
Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	TCR%	SCR%	RQD%	٦I	Test	S	San	nples Depth	k- Reduced 3.20 Level	00 Depth (m)	Legend	Grade	Oldade	De	escriptio	'n			
22/10/2008 25/10/2008 41 41 42 42		end 0.75m at 18:00 4.55m at 08:00		198 198				12, 23, 55, 45 / 25m 100 bis / 100	m imm	NO. 17 79 80 81 82 83	40.40 41.40 41.50 41.60 41.60 41.60 41.60 41.79	-35,90	42.40			<i>y</i>	As sheet 4 of 5. Weak, grey, highly de METASILTSTONE. ( to coarse gravel)	ecompo Recove	osed ca ered as	Icarec	ous Iar, find	e
44	HW 44.24		<del>70</del> 70 70	1 1 2 2	0 44 79	0 18 56	10.7	↓ 50 / 40mm, 100 / 20mm 100 bls / 20r	nm 🌢	84 85 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	43.40 43.80 44.24 44.30 101 45.44	-37.74	- 44.24 - 44.24 				Strong, grey, spotted decomposed, calcare with occasional marb 30mm). Joints are very close planar, extremely nai 25° - 35° and subver	white, eous M ale and s ly to clo rrow, irc tical.	slightly IETASI slica cl: osely sp on stair	LTST asts ( aced, led, d	ONE 10mm , rough ipping	- n at
- 47 - 48 48 	1 <u>8</u> 198	1.20m at 18:00 4.30m at 08:00 0.90m	70	12	69	42	19.4			 TT 	46.96	-40.50 -41.70 -41.70	- 47.00 - 47.00 			11	METASILTSTONE. Joints are closely sp extremely narrow, cli Strong, grey, spottec decomposed, tufface Joints are closely sp extremely narrow, irc 45°. Strong, grey, slightly TUFF. Joints are very close planar, extremely na and chlorite coated, - 45°.	aced, si ean, dip d white, eous ME aced, ro on stain decom	nooth pping at slightly ETASIL ough pl ed, dip posed, posely sp lean, lo l at 15°	planat 45° - TSTC anar, ping a fine a baced cally 1 - 25°	r, - 55°. DNE. at 35° - ash I, rough kaolin and 38	  h
	Small Dis Piston sa U76 Und U100 Un Mazier S SPT Line Water Sa	at 12:00 sturbed Sa inple disturbed S disturbed S disturbed ample ample	ample Sampl Samj	le ple		Star In-s Pen Aco Pac Piez Star	ndard itu Var meabi ustic I ker Te zomet	Penetration 1 ne Shear Tes lity Test Borehole Tele est er Tip	Fest at eviewer	LOG DAT CHE DAT	GGED <u>V</u> TE <u>2</u> ECKED <u>A</u> TE <u>3</u>	V.R. Yiu 88/10/200 A.B.Holl 31/10/200	28(0	RI	EMA	RK	End of investigation S	hole at	49.54n	n.		

Т

22.40 of 4 E. Fugro Geotechnical Services Ltd. m. to 22.40 Date of Photograph : 29/10/2008 Box No.: 1 95 0.00 Hole No. BH 2A Depth: Fucko CEDD Contract No.: GE/2008/04 Territories West (Term Contract) Ground Investigation - New Works Order No. : GE/2008/04.4 Ping Ha Road Improvement PWP Item No. 7811TH - Remaining Works (Ha Tsuen Section) 09 Job Title : CEDD

02:44 HE-44 Box No.: 2 of 4 m. Fugro Geotechnical Services Ltd. m. to 44.30 Date of Photograph : 29/10/2008 Hole No. BH 2A 22.40 52 Depth : 8 5 FUGRO CEDD Contract No.: GE/2008/04 Territories West (Term Contract) Ground Investigation - New Works Order No. : GE/2008/04. 4 Ping Ha Road Improvement PWP Item No. 7811TH - Remaining Works (Ha Tsuen Section) Job Title : 18 55 CEDD 22.40



END Box No.: 4 of 4 B. Fuera Fugro Geotechnical Services Ltd. m. to 49.54 Date of Photograph : 29/10/2008 46.96 Hole No. BH 2A Depth : CEDD Contract No.: GE/2008/04 Ground Investigation - New Territories West (Term Contract) Works Order No. : GE/2008/04. 4 Ping Ha Road Improvement PWP Item No. 7811TH - Remaining Works (Ha Tsuen Section) Job Title: CEDD 96.94

		PIEZOMETER DETAIL AND							
	SERVICES LTD	RESI	PONS	ΕT	EST F	RECORD S	HEEI		
Contractor	Fugro Geotechnical Ser	vices Ltd	Drillhole	No.:		BH2A (Upper	r)		
Contract No.	GE/2008/4		Date of Test:			30/10/2008			
W.O. No.	GE/2008/4.4		Ground Level:			+6.50	mP.D.		
Project:	PWP Item No. 7811TH,		Co-ordin	ates(r	n):				
	Ping Ha Road Improveme	nt -	E	817	390.40	N 834103.84	1		
	Remaining Works (Ha Tsu	uen Section)							
Initial Water Level	: 3.57 n	h below G.L.	Piezome	ter Ti	b Level:	-0.50	mP.D.		
Test/Supervised B	K.C. Ng P	)	Checked	d By:		A. Brock-Hollins	head prof		
	Depth of Water		Pipe Diameters			Conci	rete Protective		
Elapsed Time	from top of pipe		2	5mm			Cover		
Elapood					/				
		44	0.0.0.0.0		404040	<u>ě</u>			
			2. 5. 12: 5 12: 5		<u>אימימימי</u> ר <u>י</u> ן	A 4			
(minutes)	(m)				3.				
0.00	0.00	Ground level	<u>i</u> <u>F</u>		2	Top of pipe			
0.25	0.47	A.1		] [[]	Ait	4.4			
0.50	0.85	d X	ši ľ	ΪΪ	<u> </u>	Ä			
0.00	1.18	Depth below							
1.00	1.10	around level				Cement/beno	nite		
1.00	2.08	ground to the				grout			
2.00	2.00	520 m				0			
2.00	2.55		6666	8	<u> </u>				
3.00	2.00	6 20 n		Ŕ	<del></del>	Bentonite seal			
4.00	3.14	1		<b>o</b> ⊻			<b>↑</b>		
5.00	3.30								
6.00	3.39					Sand filter			
7.00	3.45					Ourid Inter			
8.00	3.48						υ		
9.00	3.50						G		
10.00	3.51						U U		
15.00	3.54						su		
20.00	3.56						da		
25.00	3.57				L.		(éé		
		<u> </u>	n	[: <b> _</b> °		Piezometer tip			
		<u> </u>	n				+		
				88		Bentonite seal			
		<u>8.50</u> r	n 🚧			0			
					IIIIA		onite		
		42.00 r	n //////	44		grout			
Material Surround	ling Response Zone:					Bentonite seal			
6.20m to 7.10m: Si	ilty SAND. (ALLUVIUM)	43.00	m		<u>accord</u>		<b></b>		
7.10m to 7.50m: S	andy clayey SILT.						u u		
(ALLUVIUM)				°			ž		
		43.80	ml	0		Piezometer tip	, se		
							īod		
						—— Sand filter	es		
		44.30	m 🔜 😳				£1		
						Bentonite sea	1		
	1	45.30	m	<del>9363</del>	22222				
Remarks:	and the second second second second second second second second second second second second second second second					Cement/benonite			
1. Halcrow buckets	s were installed from	49.54 m				grout			
0.50m to 4.00m at	0.50m intervals.	Base of drillhole							
		1							

ERVICES LTD Ugro Geotechnical Ser 5E/2008/4 5E/2008/4.4 WP Item No. 7811TH, Ping Ha Road Improvement Remaining Works (Ha Tsu 3.47 m K.C. Ng M Depth of Water from top of pipe	vices Ltd nt - en Section) , below G.L.	Drillhole Date of T Ground L Co-ordina E Piezome	<b>└──</b> No.: est: _evel: ates(r 817	<u>н):</u>	BH2A (Lower) 30/10/2008 +6.50	mP.D.		
Ugro Geotechnical Ser E/2008/4 E/2008/4.4 WP Item No. 7811TH, Ping Ha Road Improvement Remaining Works (Ha Tsu 3.47 m K.C. Ng M Depth of Water from top of pipe	vices Ltd nt - en Section) , below G.L.	Drillhole Date of T Ground L Co-ordina E Piezome	No.: fest: Level: ates(r 817	n):	BH2A (Lower) 30/10/2008 +6.50	mP.D.		
E/2008/4 E/2008/4.4 WP Item No. 7811TH, Ping Ha Road Improvement Remaining Works (Ha Tsu 3.47 m K.C. Ng m Depth of Water from top of pipe	nt - en Section) ,below G.L.	Date of T Ground L Co-ordina E Piezome	est: evel: ates(r 817	n):	30/10/2008 +6.50	mP.D.		
BE/2008/4.4 WP Item No. 7811TH, Ving Ha Road Improvement Remaining Works (Ha Tsu 3.47 m K.C. Ng M Depth of Water from top of pipe	nt - en Section) ,below G.L.	Ground L Co-ordina E Piezome	<u>evel:</u> ates(r 817	n):	+6.50	mP.D.		
WP Item No. 7811TH, Ping Ha Road Improvement Remaining Works (Ha Tsu 3.47 m K.C. Ng M Depth of Water from top of pipe	nt - en Section) ,below G.L.	Co-ordina E Piezome	ates(r 817	n):				
Ping Ha Road Improvement Remaining Works (Ha Tsu 3.47 m K.C. Ng m Depth of Water from top of pipe	nt - en Section) , below G.L.	E Piezome	817					
Remaining Works (Ha Tsu 3.47 m K.C. Ng M Depth of Water from top of pipe	en Section) ,below G.L.	Piezome		690.40	N834103.84			
3.47 m K.C. Ng m Depth of Water from top of pipe	below G.L.	Piezome						
K.C. Ng 🦛 Depth of Water from top of pipe	-	and and a stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of the stand of	ter Ti	p Level:	-37.30	<u></u>		
Depth of Water from top of pipe		Checked	By:		A. Brock-Hollinshea	id post		
from top of pipe		Pipe [	Diame	ters	Concrete	Protective		
		2	5mm		C	over		
				/	Ground	level		
	440	40404		4040404				
	4 <u>10</u> A A	20'D'D'D'D		<u>v.v.v.v.v</u> .v.v.				
(m)				3.4	Top of size			
0.00	round level		, h L					
0.37	A A A A		ŲŲĮ	3.4	Ĵ.			
0.73		<u>×</u>		<u><u>Ř</u>1</u>	뇑			
1.02	Depth below							
1.30	ground level				Cement/benonite	l.		
1.79					grout			
2.19	<u> </u>							
2.73			8		Bentonite seal			
3.07	<u>6.20</u> m		83					
3.26						Î		
3.37								
3.41					<ul> <li>Sand filter</li> </ul>			
3.44								
3.47						e		
						0 Z		
						se		
						ő		
						dse		
				7		ية		
	7.00 m	1			Piezometer tin			
					r lezonneter tip			
	7.50 m	1 <u></u>			-			
			æ		Bentonite seal			
	<u>8.50</u> m	1	₩		Demonite Sear			
					Cement/benonite	3		
	<u>42.00</u> m				grout			
g Response Zone:								
ghly decomposed	43.00_ n	n 2000	886			-		
						ne		
oderately decomposed						0 Z		
	<u> </u>	n			Piezometer tip	Ise		
						201		
					Sand filter	est		
	44.30_n	n				r l		
			<del>фЩ</del>					
	45.30 r	n			Denivinie seai			
					Cement/benonite			
ere installed from	<u> </u>	n ////////////////////////////////////			grout			
50m intervals.		Base	of dr	illhole				
	(m) 0.00 0.37 0.73 1.02 1.30 1.79 2.19 2.73 3.07 3.26 3.37 3.41 3.44 3.44 3.47 	(m)         Ground level           0.00         Ground level           0.73         Depth below           1.02         Depth below           1.79         5.20           2.19         5.20           2.73         6.20           3.07         6.20           3.37         6.20           3.41         3.44           3.41         7.00           7.00         7.50           7.50         n           8.50         n           42.00         1           3.00         1           3.41         1           3.41         1           3.41         1           3.41         1           3.41         1           3.41         1           3.41         1           3.42         1           42.00         n           42.00         n           44.30         n           44.30         n           44.30         n           44.30         1           44.30         1           45.30         1	(m)       Ground level         0.37       0.73         0.02       Depth below         1.02       Depth below         1.79       5.20 m         2.19       5.20 m         3.07       6.20 m         3.37       3.41         3.41       3.44         3.41       3.44         3.47       7.00 m         7.00 m       8.50 m         8.50 m       42.00 m         9 Response Zone:       43.00 m         ghly decomposed       43.80 m         9 derately decomposed       43.80 m         9 derately decomposed       49.54 m         8 derately decomposed       49.54 m	(m)         Ground level         P         P           0.00         Ground level         A         P         P           0.73         Depth below         A         P         P           1.02         Depth below         Ground level         A         P         P           1.02         Depth below         Ground level         A         P         P           2.19         5.20 m         Ground level         A         A         A         A           2.19         5.20 m         Ground level         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         A         <	(m)       Ground level       P       P       P         0.00       Ground level       P       P       P         1.02       Depth below       ground level       P       P         2.19       5.20 m       P       P       P         2.73       6.20 m       P       P       P         3.07       6.20 m       P       P       P         3.37       3.41       P       P       P         3.41       3.44       P       P       P         7.50 m       P       P       P       P         7.50 m       P       P       P       P         3.41       P       P       P       P         P       P <td>(m)       Ground level       P       P       Top of pipe         0.37       Depth below ground level       P       P       Top of pipe         1.02       Depth below ground level       Cement/benonite seal       Ground level       Cement/benonite seal         3.07       6.20 m       Sand filter       Sand filter         3.07       6.20 m       Sand filter       Sand filter         3.37       3.41       Sand filter       Sand filter         3.44       3.47       Sand filter       Sand filter         3.41       Sand filter       Sand filter       Sand filter         42.00 m       Sand filter       Sand filter       Sand filter         42.00 m       Sand filter       Sand filter       Sand filter         44.30 m       Sand filter       Sand filter       Sand filter         45.30 m       Sand filter       Sand filter       Sand filter</td>	(m)       Ground level       P       P       Top of pipe         0.37       Depth below ground level       P       P       Top of pipe         1.02       Depth below ground level       Cement/benonite seal       Ground level       Cement/benonite seal         3.07       6.20 m       Sand filter       Sand filter         3.07       6.20 m       Sand filter       Sand filter         3.37       3.41       Sand filter       Sand filter         3.44       3.47       Sand filter       Sand filter         3.41       Sand filter       Sand filter       Sand filter         42.00 m       Sand filter       Sand filter       Sand filter         42.00 m       Sand filter       Sand filter       Sand filter         44.30 m       Sand filter       Sand filter       Sand filter         45.30 m       Sand filter       Sand filter       Sand filter		

FUGRO GEOTECHNICAL SERVICES LTD				Groundwater Level Record Sheet										
Contract I	ntract No: GE/2008/4			Works O	rder No		GE/2	GE/2008/4.4						
Project :		F	PWP Iten	n No. 7811TH	, Ping Ha Road Ir	nproveme	nt - Remain	ing Works (Ha	Tsuen Section)					
Drillhole No. BH2.			BH2A		Co-ordin	ates:		Seas	Season:					
Piezometer No.		P (Uppe	er)	Easting	(m)	817690.4	40 Wet	1 Apr to 31	Oct					
Installation Date		27/10/20	008	Northing	(m)	1 Nov to 31	Mar							
AGMD Level (mPD) N/			N/A			Di Li Dimension								
AGMD S/N			N/A		Standpip	Standpipe Piezometer:								
Logger S	/N		N/A		Top Lev	Top Level (mPD) +6.50								
Gauge Fa	actor (psi/E	Digit)	N/A			Installed Tip Depth								
Thermal	Factor (psi	i/°C)	N/A		from To	<u>p Level (I</u>	m) - 7.0							
$R_0 (F^2 x 1)$	10 <sup>-3</sup> )		N/A		Tip Leve	el (mPD)	-0.:							
T <sub>0</sub> (°C)			N/A											
Piezometric Level (mPD)	+2.95 +2.94 +2.94 +2.93 +2.93 +2.92 +2.92 +2.92 +2.91 +2.91 30/10/	08 31/-	10/08	01/11/08 02/7	11/08 03/11/08 Date / T	04/11/08	05/11/08	06/11/08	07/11/08 08/11/	08				
							/Piozor	neter/Standn	ine) <u> </u>					
	(Automa	tic Grou	nawater 1				(Fiezol	Manual Dip	Diaganatric	Remark				
Date	e / Time	R <sub>1</sub>	Temp	°C) Above	Piezometric	Date	e lime	(m below		Romany				
dd/mm	/yy hh:mm	(Hz)	(°C)		Level (MPD)	dd/mm/yy nn:mm		top)		<u> </u>				
						31/10/0	8 09:20	3.57	2.93					
						01/11/0	8 09:10	3.57	2.93	<u> </u>				
						03/11/0	8 09:30	3.59	2.91					
						04/11/0	8 10:00	3.58	2.92					
						05/11/0	8 09:30	3.56	2.94	L				
		٩				06/11/0	8 09:20	3.58	2.92					
			1			07/11/0	8 09:10	3.57	2.93					
			1											
		+	1											
		+												
			+											
						-								
			+			-								
								<u> </u>						
					+			1						
					L		·	<u> </u>	L	<u> </u>				

		GRO OTECHI RVICES	NICAL LTD		Ground	dwater	Level	Record	Sheet			
Contract No: GE/2008/4					Works O	rder No :		GE/20	GE/2008/4.4			
Project : PWP Item No. 7811TH, Pi				Ping Ha Road In	ing Ha Road Improvement - Remaining Works (Ha Tsuen Section)							
	<u>,</u>											
Drillhole N	No.		BH2A		Co-ordin	ates:		Seas	Season:			
Piezomet	er No.		P (Lower	)	Easting	(m)	817690.4		Dry 1 Nov to 31 Mar			
Installatio	n Date		27/10/20	08	Northing	(m)	834103.8	Ury				
AGMD Level (mPD) N/A			N/A			- Dienom	otor					
AGMD S	AGMD S/N					Standpipe Piezometer.						
Logger S	/N	<u> </u>										
Gauge Fa	actor (psi/	Digit)			from Tor	n Level (m	43.8	30				
Thermal	Factor (ps	si/°C)				el (mPD)	-37.	30				
$H_0$ (F <sup>+</sup> x 1	10°)											
<u>1₀(~C)</u>						· ^				$\rho$		
Contract	or: <u>Fus</u> +3.07 +3.06 +3.06 +3.05 +3.05 +3.04 +3.04	gro Geotec						06//41/02	07/11/08 08/11/	08		
	30/10	0/08 31	1/10/08 0 <sup>-</sup>	1/11/08 02/1	Date / 1	ſime	(Piezon	neter/Standp	pe)	1		
	(Autom	atic Gro		Pressure			Time	Manual Dip	Piezometric	Remark		
Dat dd/mm	e / Time n/yy hh:mr	n (Hz)	Temp (°C)	(mH <sub>2</sub> O)	Piezometric Level (mPD)	dd/mm/yy hh:mm		(m below top)	Level (mPD)			
		_ <u>                                     </u>		- YDOVA				3.46	3.04			
<u> </u>	<u> </u>					01/11/08	09:10	3.45	3.05			
						03/11/08	09:30	3.46	3.04			
	<b></b>					04/11/08	10:00	3.46	3.04			
						05/11/08	09:30	3.44	3.06			
			_			06/11/08	09:20	3.45	3.05			
				<u>├───</u>		07/11/08	09:10	3.46	3.04			
ļ							· · · · · · · · · · · · · · · · · · ·	<u> </u>				
					<u> </u>	+		<u> </u>				
			_	<u> </u>	<u> </u>	+						
			_			+						
						+		+				
				·	<u> </u>			<u> </u>				
				<u> </u>	<u> </u>	<u> </u>		<u> </u>		-		
					<u> </u>			<u> </u>				
									<u>L</u>			



Appendix B – Drawing of Schedule Area 2 (GS-SP/714-1)




Appendix C – Preliminary Foundation Schemes







() 305x305x233UC SOCKET-H PILE
1400x1000x1500dp PILE CAP
2200x1000x1500dp PILE CAP
NOTE:
 <ol> <li>PILE CAP DEPTH TO BE 1500mm UNLESS OTHER STATED.</li> <li>SOCKET LENGTH TO BE 5.5m.</li> <li>TENTATIVE PILE FOUNDING LEVEL -44.2mPD.</li> <li>PILE CAP TO BE TIED BY GROUND BEAM 1000x1000dp BOTH DIRECTIONS.</li> <li>REINFORCEMENT QUANTITY OF PILE CAP AND GROUND BEAM TO BE 150kg/m3 AND 180kg/m3 RESPECTIVELY.</li> </ol>
G/F
Scale 1:150 @ A3 Date : 31 OCT 2023



## **DELIVERING THE FUTURE**

For more details, contact us: lota Sin | Principal Engineer

Follow us on our social networks.





ASIAINFRASOLUTIONS.COM