Appendix 7

Preliminary Geotechnical Appraisal and Foundation Proposal

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PRELIMINARY GEOTECHICAL APPRAISAL

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

AT

YUEN LONG, HONG KONG

Revision: -

November 2023

asia infrastructure solutions

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REVISION HISTORY

Rev.	Description of Revision	Date
-	1st Submission for Approval	19 November 2023

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APPENDICES

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.

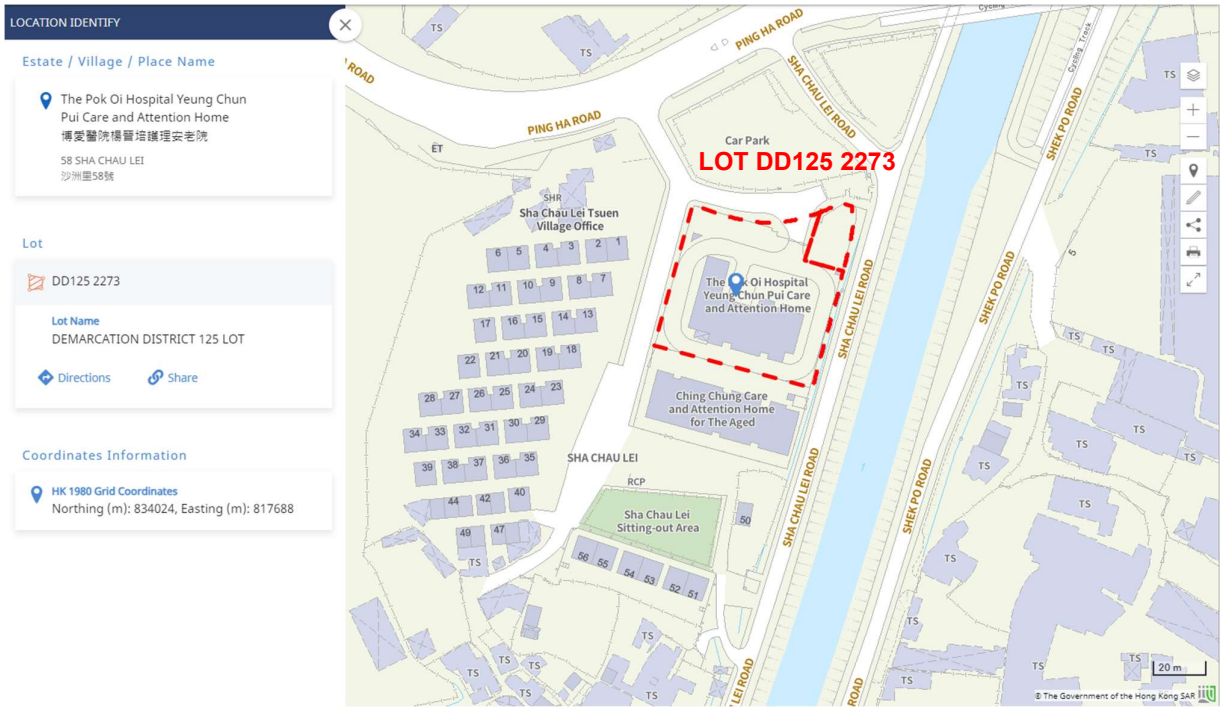


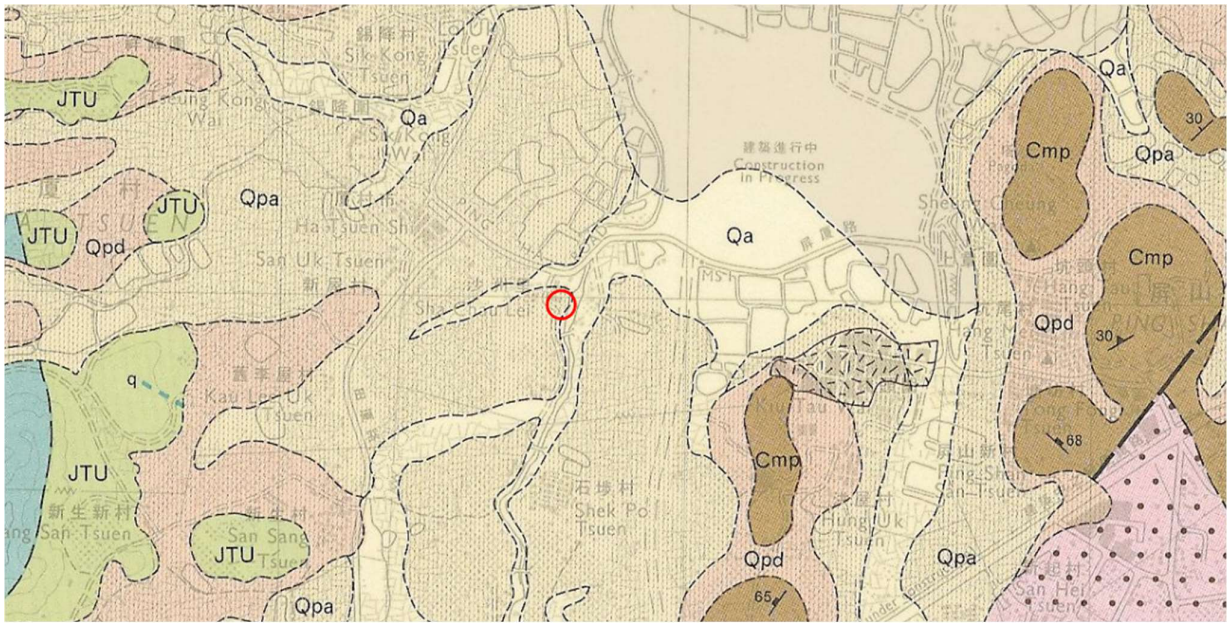
Figure 2.1 Site Location Plan

2.2 Geological Map

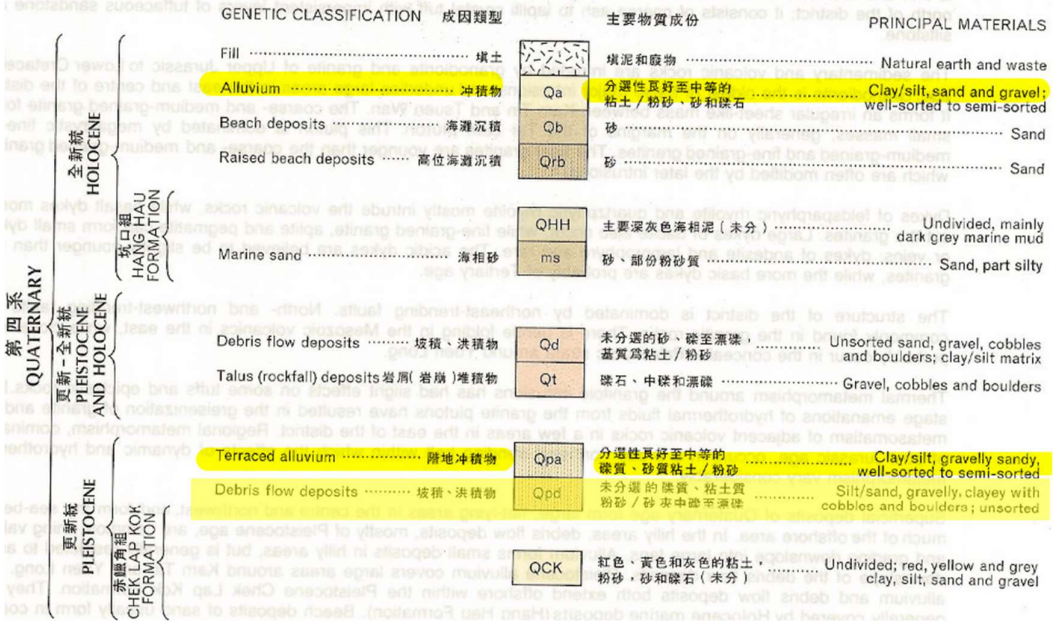
According to the 1:20,000 scale HGM20 Series Solid and Superficial Geology Map Sheet 06 published by the Geotechnical Engineering Office (Edition 2 – 2008), the site is underlain by Alluvium/Terraced Alluvium comprising well-sorted to semi-sorted clay/silt, sand and gravel during the Pleistocene and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

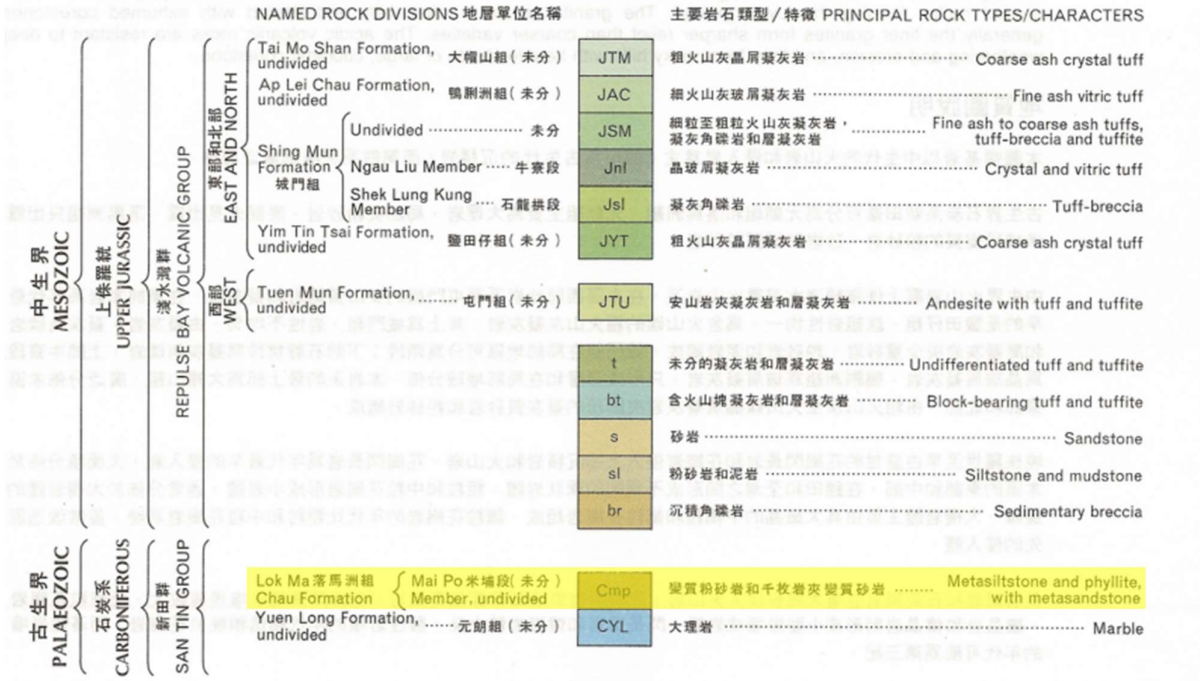


SUPERFICIAL DEPOSITS 地表沉積



SOLID GEOLOGY 基岩地質

SEDIMENTARY AND VOLCANIC ROCKS 沉積岩和火山岩




MAJOR INTRUSIVE IGNEOUS ROCKS 主要侵入火成岩
中生代 MESOZOIC
侏羅 - 白堊紀 JURASSIC-CRETACEOUS
Megacrystic 具大斑晶的
gf 細粒花崗岩，< 2 毫米 Fine-grained granite, < 2mm
gfm 中細粒花崗岩 Fine- to medium-grained granite
gm 中粒花崗岩，2 – 6 毫米 Medium-grained granite, 2-6mm
gc 粗粒花崗岩，> 6 毫米 Coarse-grained granite, > 6mm
gfg 雲英岩化細粒花崗岩 Greisenized fine-grained granite
d 斑狀微晶花崗閃長岩 Dacite
gdf 細粒花崗閃長岩，< 2 毫米 Fine-grained granodiorite, < 2mm
gdm 中粒花崗閃長岩，2 – 6 毫米 Medium-grained granodiorite, 2-6mm
MINOR INTRUSIVE IGNEOUS ROCKS 次要侵入火成岩（脉岩）
TERTIARY 第三紀
b 綠岩 Basalt
a 閃長玢岩 Andesite
l 煌斑岩 Lamprophyre
中生代 MESOZOIC
侏羅 - 白堊紀 JURASSIC-CRETACEOUS
rf 長石斑岩 Feldsparphyric rhyolite
rq 石英斑岩 Quartzphyric rhyolite
ap 細晶岩 Aplite
p 偉晶岩 Pegmatite
q 石英脉 Quartz vein

METAMORPHIC ROCKS 變質岩

糜稜岩 ..... Mylonite

片岩 ..... Schist

變質岩石 ..... Metamorphosed

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

GEOLOGICAL LINES 地質界綫

Geological boundary, superficial deposit ..... 地表沉積地質界綫

Fill boundary, with limit of reclamation at date shown ..... 1975 ..... 填土區界綫，附填土年份

Geological boundary, solid rock ..... * ..... 基岩地質界綫

Fault (crossmark indicates downthrow side) ..... * ..... 斷裂（短劃指向下降盤）

Mineral vein ..... 礦脉

Photogeological lineament ..... 航攝地質綫性影像

Broken lines on map face denote uncertainty * 圖內虛綫表示推測界綫

STRUCTURAL SYMBOLS 構造符號

	傾斜 Inclined	垂直 Vertical	
Bedding	20		層理
Flow fabric	20		流動組構
Jointing	20		節理
Foliation	20		葉理

All dips and plunges measured in degrees from horizontal 所有傾角和傾伏角的角度均從水平位置起計

MINERAL SYMBOLS 礦產符號

Mineral occurrence ..... • W ..... 礦產

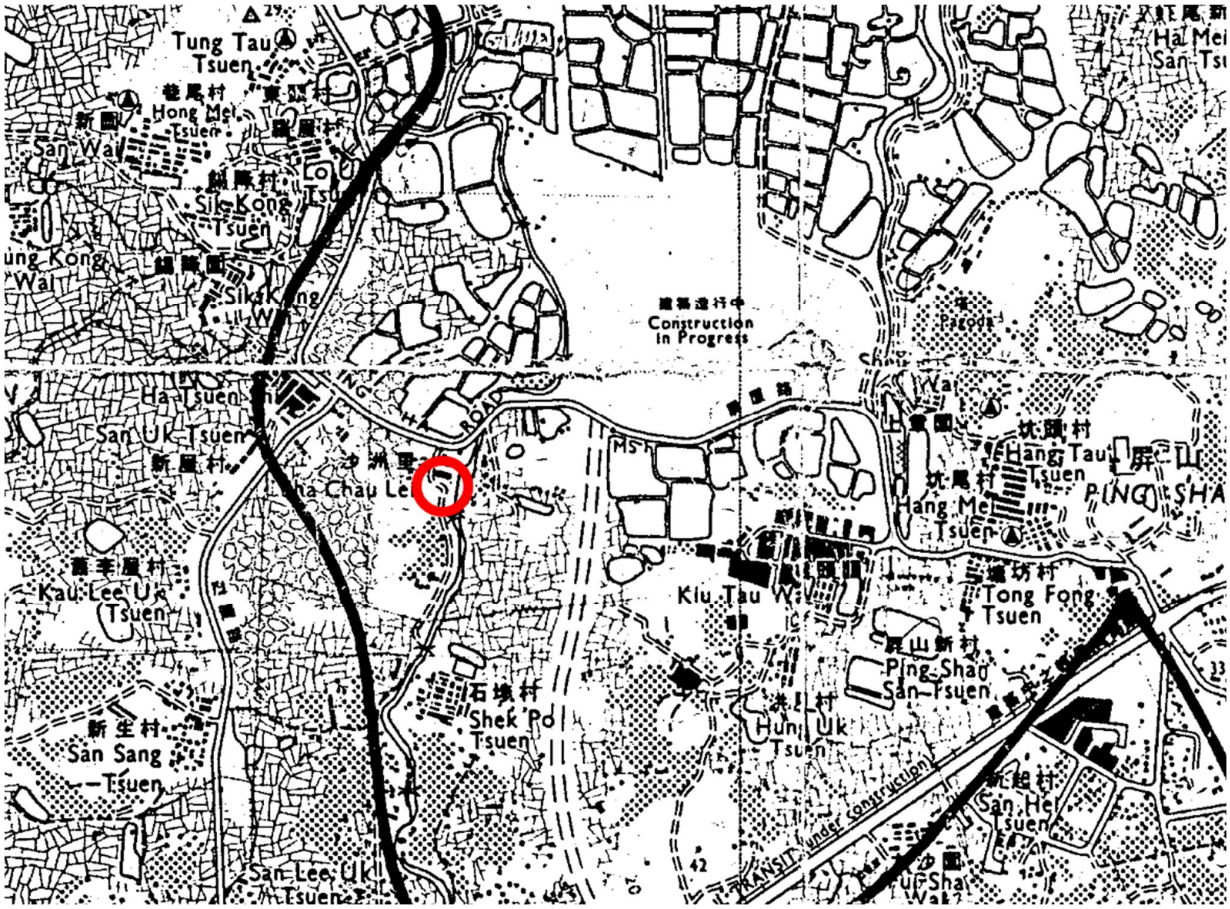
Graphite	gr	石墨	Quartz	q	石英	Wolframite	W	黑鎢鑛
Galena	Pb	方鉛礦	Sphalerite	Zn	閃鋅礦			

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.

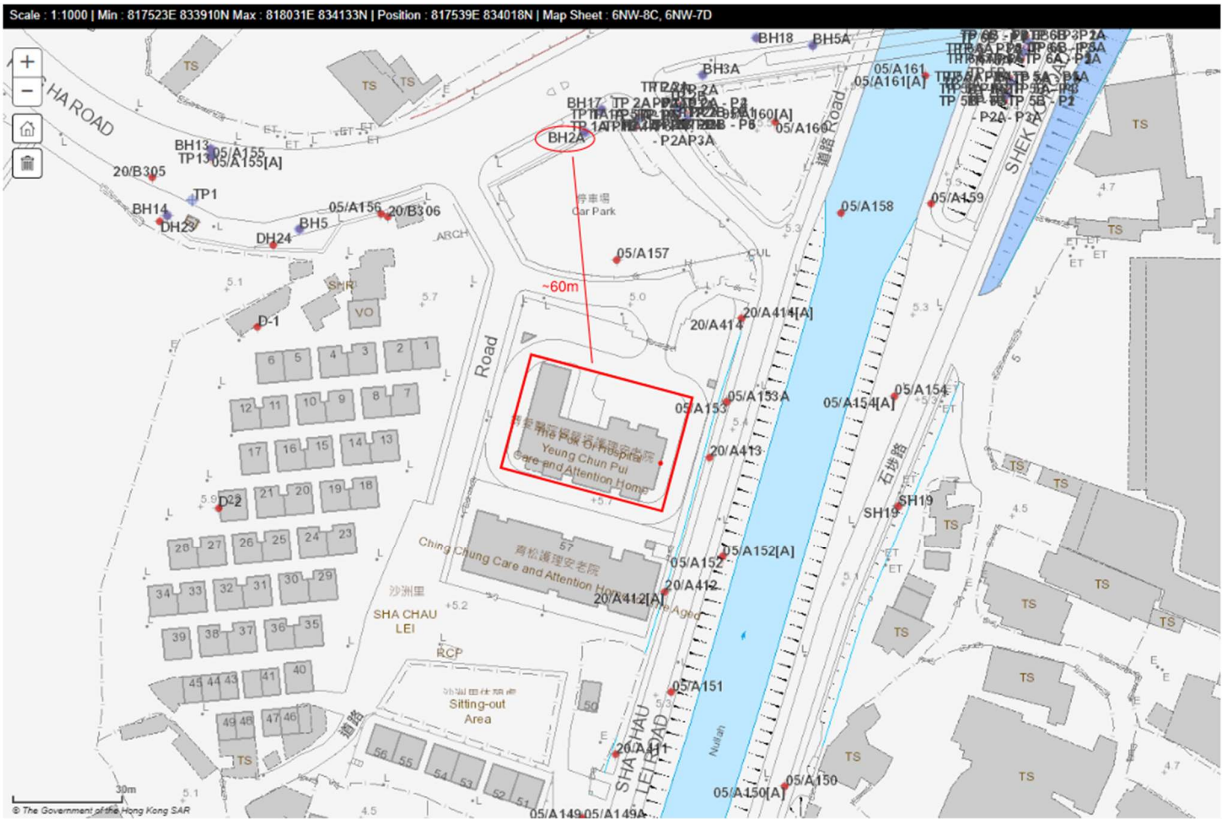
Borehole BH2A

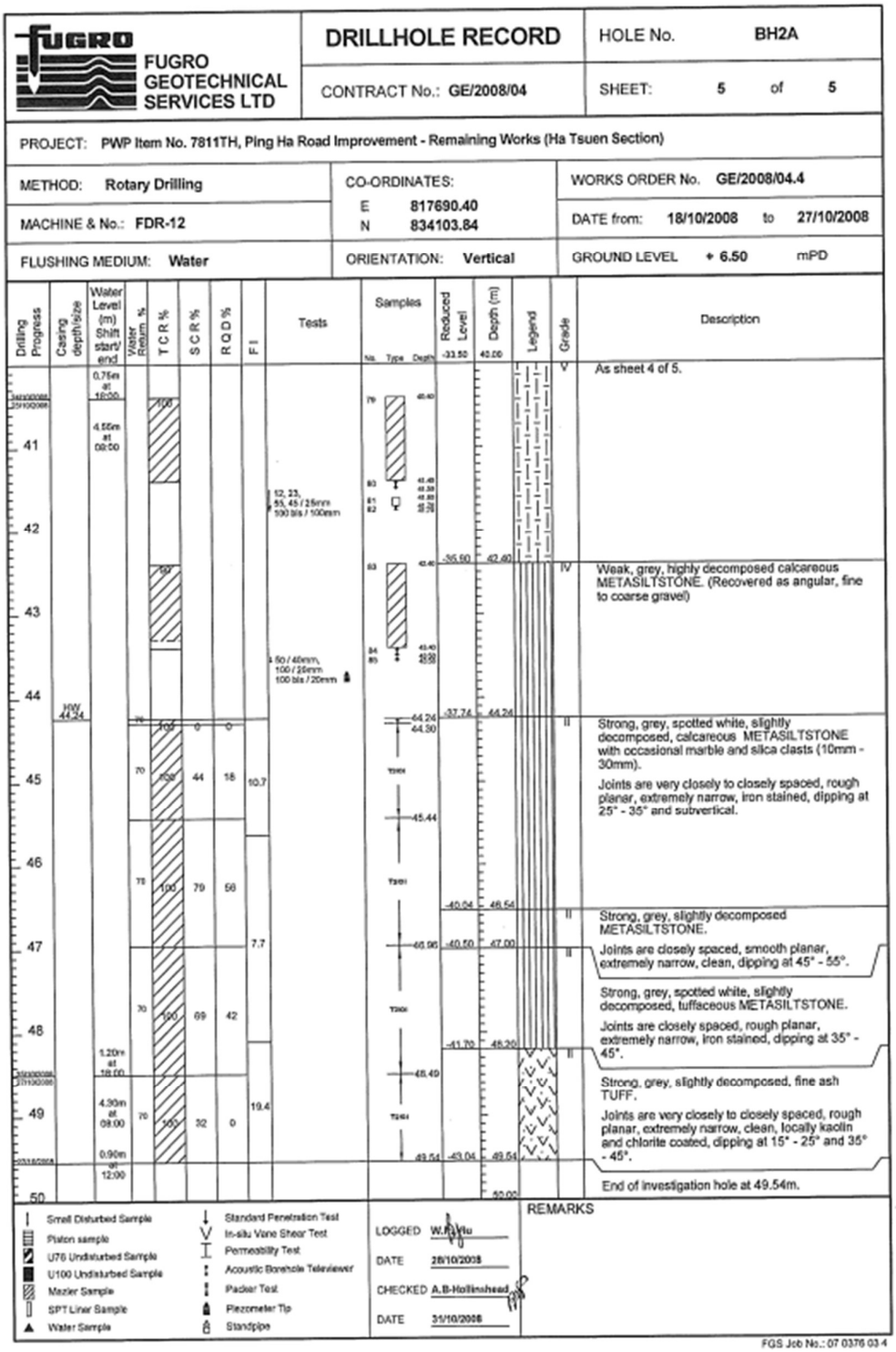
The first layer in BH2A is fill, which is approximately 4.5m thick. It comprises firm to stiff, yellowish brown, sandy clayey SILT with occasional angular, medium gravel of strong granite.

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.





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DRILLHOLE RECORD | HOLE No. BH2A | SHEET: 5 of 5

CONTRACT No.: GE/2008/04

PROJECT: PWP Item No. 7811TH, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)

METHOD: Rotary Drilling | CO-ORDINATES: E 817690.40, N 834103.84 | WORKS ORDER No. GE/2008/04.4

MACHINE & No.: FDR-12 | DATE from: 18/10/2008 to 27/10/2008

FLUSHING MEDIUM: Water | ORIENTATION: Vertical | GROUND LEVEL + 6.50 mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	TCR %	SCR %	RQD %	FI	Tests	Samples No. Type Depth	Reduced Level -33.50	Depth (m) 40.00	Legend	Grade	Description
41		0.75m at 18:00		100									V	As sheet 4 of 5.
		4.55m at 08:00												
42								12, 23, 55, 45 / 25mm 100 bls / 100mm						
				97									IV	Weak, grey, highly decomposed calcareous METASILTSTONE. (Recovered as angular, fine to coarse gravel)
43														
								50 / 40mm, 100 / 20mm 100 bls / 20mm						
44	100 44.24		70	100	0	0				-37.74	44.24		II	Strong, grey, spotted white, slightly decomposed, calcareous METASILTSTONE with occasional marble and silica clasts (10mm - 30mm).
45			70	100	44	18	10.7							Joints are very closely to closely spaced, rough planar, extremely narrow, iron stained, dipping at 25° - 35° and subvertical.
46			75	100	79	56				-40.04	46.54		II	Strong, grey, slightly decomposed METASILTSTONE.
47							7.7			-40.50	47.00		II	Joints are closely spaced, smooth planar, extremely narrow, clean, dipping at 45° - 55°.
48		1.20m at 18:00	70	100	69	42				-41.70	48.20		II	Strong, grey, spotted white, slightly decomposed, tuffaceous METASILTSTONE. Joints are closely spaced, rough planar, extremely narrow, iron stained, dipping at 35° - 45°.
49		4.90m at 08:00	70	100	32	0	19.4			-43.04	49.54		II	Strong, grey, slightly decomposed, fine ash TUFF. Joints are very closely to closely spaced, rough planar, extremely narrow, clean, locally kaolin and chlorite coated, dipping at 15° - 25° and 35° - 45°.
		0.90m at 12:00									50.00			End of investigation hole at 49.54m.
50														

Small Disturbed Sample; Piston sample; U76 Undisturbed Sample; U100 Undisturbed Sample; Mazier Sample; SPT Liner Sample; Water Sample

Standard Penetration Test; In-situ Vane Shear Test; Permeability Test; Acoustic Borehole Televiewer; Packer Test; Piezometer Tip; Standpipe

LOGGED W.P. Wu
DATE 28/10/2008
CHECKED A.B-Hollinshead
DATE 31/10/2008

REMARKS

FGS Job No.: 07 0376 03 4

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.

Gammon Construction Limited

Geotechnical Contracting Department

DRILLHOLE No. TS200/DH/168

SHEET 5 of 6

DRILLHOLE RECORD

PROJECT: KCRC West Rail TS-200 Western Section, Phase 3 Ground Investigation		
METHOD: IP + WB + RC	CO-ORDINATES: E 817545.47, N 833607.46	CONTRACT No.: TS-200
MACHINE & No.: Toho (D2)		DATE: from 12/03/1998 to 19/03/1998
FLUSHING MEDIUM: Water	ORIENTATION: Vertical	GROUND LEVEL: 5.60 mPD

Drilling Progress	Casing depth/size	Water Depth (m)	TCR %	SCR %	RQD %	FI	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
17/03/98		2.00						70		40.00					As sheet 4 of 6.
								71		40.28					
								72		42.00					
								73		42.45					
								74		44.00	-38.40	44.00		V	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).
								75		44.25					
								76		46.00 46.10	-40.40	46.00		V/IV	Very weak, grey completely to highly decomposed fine ash TUFF (Angular to subangular medium to coarse GRAVEL sized moderately weak rock fragments).
	HX 47.07		100	66	51	>20 10.0			T2/01	47.07	-41.47	47.07		IV/III	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°-80°. 47.07-47.20m: Highly fractured.
17/03/98 18/03/98		2.00	100	64	56	6.0			T2/01	48.15	-42.80	48.40		III	Moderately strong, grey moderately decomposed fine ash TUFF with closely spaced, smooth and rough, planar, calcite coated, occasionally iron stained joints, dipping at 50°-70° and with some voids (1-6 cm).
			93	86	80				T2/01	48.17					

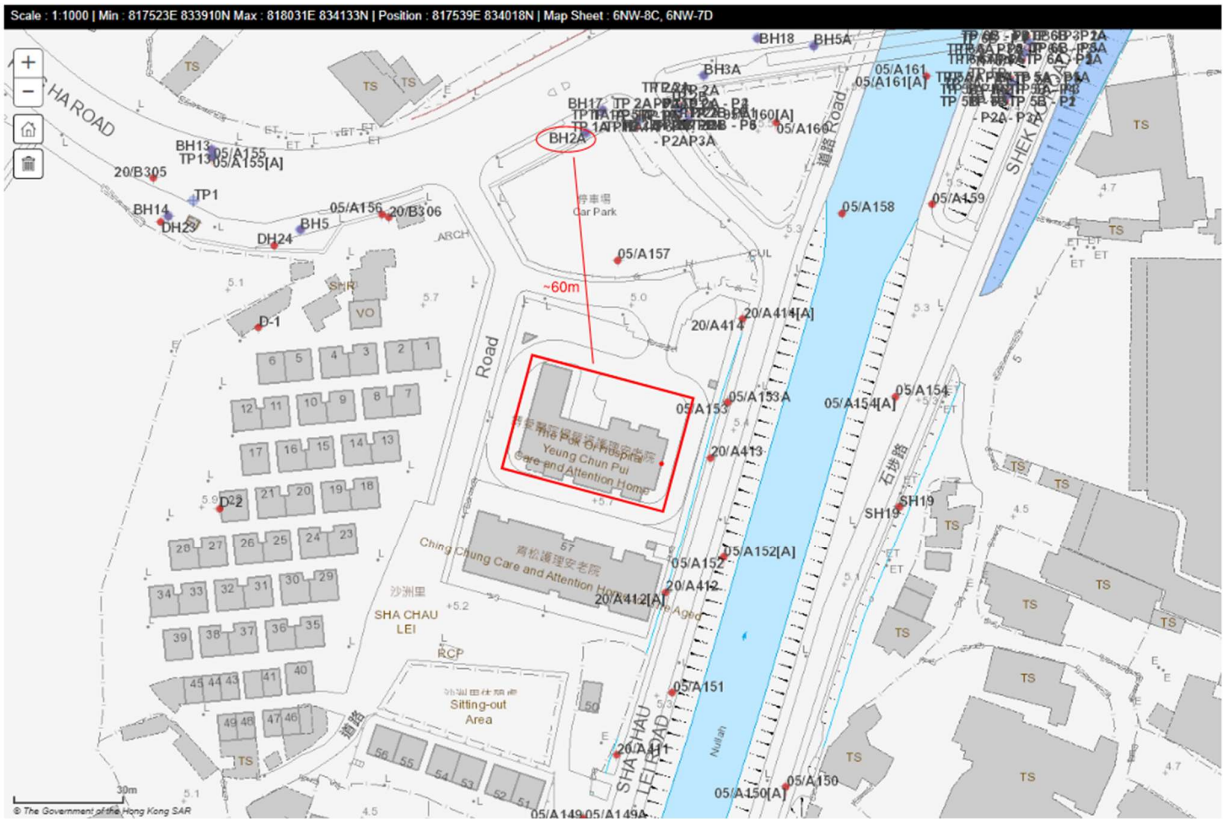
Small disturbed sample
Large disturbed sample
SPT liner sample
U76 undisturbed sample
U100 undisturbed sample
Mazier sample
Piston sample
Water sample
Piezometer tip
Standard penetration test
Pressuremeter Test
Permeability test
Impression packer test
In-situ vane shear test

LOGGED J Lau
DATE 20/03/1998
CHECKED B Shepstone
DATE 20/03/1998

REMARKS

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.



FUGRO GEOTECHNICAL SERVICES LTD

Groundwater Level Record Sheet

Contract No:	GE/2008/4	Works Order No :	GE/2008/4.4
Project :	PWP Item No. 7611TH, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)		

Drillhole No.	BH2A
Piezometer No.	P (Upper)
Installation Date	27/10/2008
AGMD Level (mPD)	N/A
AGMD S/N	N/A
Logger S/N	N/A
Gauge Factor (psi/Digit)	N/A
Thermal Factor (psi/°C)	N/A
R_0 ($F^2 \times 10^{-3}$)	N/A
T_0 (°C)	N/A

Co-ordinates:

Easting	(m)	817690.40
Northing	(m)	834103.84

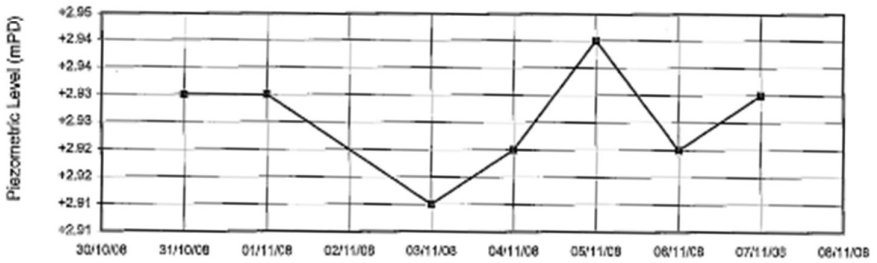
Season:

Wet	1 Apr to 31 Oct
Dry	1 Nov to 31 Mar

Standpipe Piezometer:

Top Level (mPD)	+6.50
Installed Tip Depth from Top Level (m)	7.00
Tip Level (mPD)	-0.50

Contractor: Fugro Geotechnical Services Ltd. Logged By: K.C. Ng Checked By : S.M. Pyla



(Automatic Groundwater Monitoring Device)					(Piezometer/Standpipe)			
Date / Time dd/mm/yy hh:mm	R_1 (Hz)	Temp (°C)	Pressure (mH_2O) Above	Piezometric Level (mPD)	Date Time dd/mm/yy hh:mm	Manual Dip (m below top)	Piezometric Level (mPD)	Remark
					31/10/08 09:20	3.57	2.93	
					01/11/08 09:10	3.57	2.93	
					03/11/08 09:30	3.59	2.91	
					04/11/08 10:00	3.58	2.92	
					05/11/08 09:30	3.56	2.94	
					06/11/08 09:20	3.58	2.92	
					07/11/08 09:10	3.57	2.93	

* AGMD = Automatic groundwater monitoring device

FUGRO GEOTECHNICAL SERVICES LTD

Groundwater Level Record Sheet

Contract No:	GE/2008/4	Works Order No :	GE/2008/4.4
Project :	PWP Item No. 7811TH, Ping Ha Road Improvement - Remaining Works (Ha Teuen Section)		

Drillhole No.	BH2A
Piezometer No.	P (Lower)
Installation Date	27/10/2008
AGMD Level (mPD)	N/A
AGMD S/N	N/A
Logger S/N	N/A
Gauge Factor (psi/Digit)	N/A
Thermal Factor (psi/°C)	N/A
R_0 ($F^2 \times 10^{-3}$)	N/A
T_0 (°C)	N/A

Co-ordinates:

Easting	(m)	817690.40
Northing	(m)	834103.84

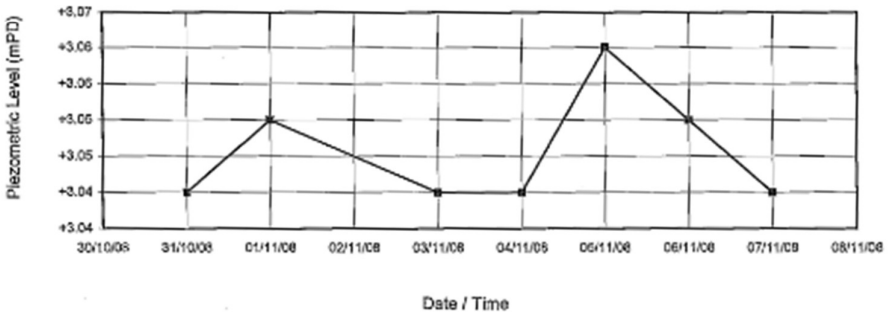
Season:

Wet	1 Apr to 31 Oct
Dry	1 Nov to 31 Mar

Standpipe Piezometer:

Top Level (mPD)	+6.50
Installed Tip Depth from Top Level (m)	43.80
Tip Level (mPD)	-37.30

Contractor: Fugro Geotechnical Services Ltd. Logged By: K.C. Ng Checked By : S.M. Pyle



(Automatic Groundwater Monitoring Device)					(Piezometer/Standpipe)			
Date / Time dd/mm/yy hh:mm	R_1 (Hz)	Temp (°C)	Pressure (mH_2O) Above	Piezometric Level (mPD)	Date Time dd/mm/yy hh:mm	Manual Dip (m below top)	Piezometric Level (mPD)	Remark
					31/10/08 09:20	3.46	3.04	
					01/11/08 09:10	3.45	3.05	
					03/11/08 09:30	3.46	3.04	
					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	
					07/11/08 09:10	3.46	3.04	

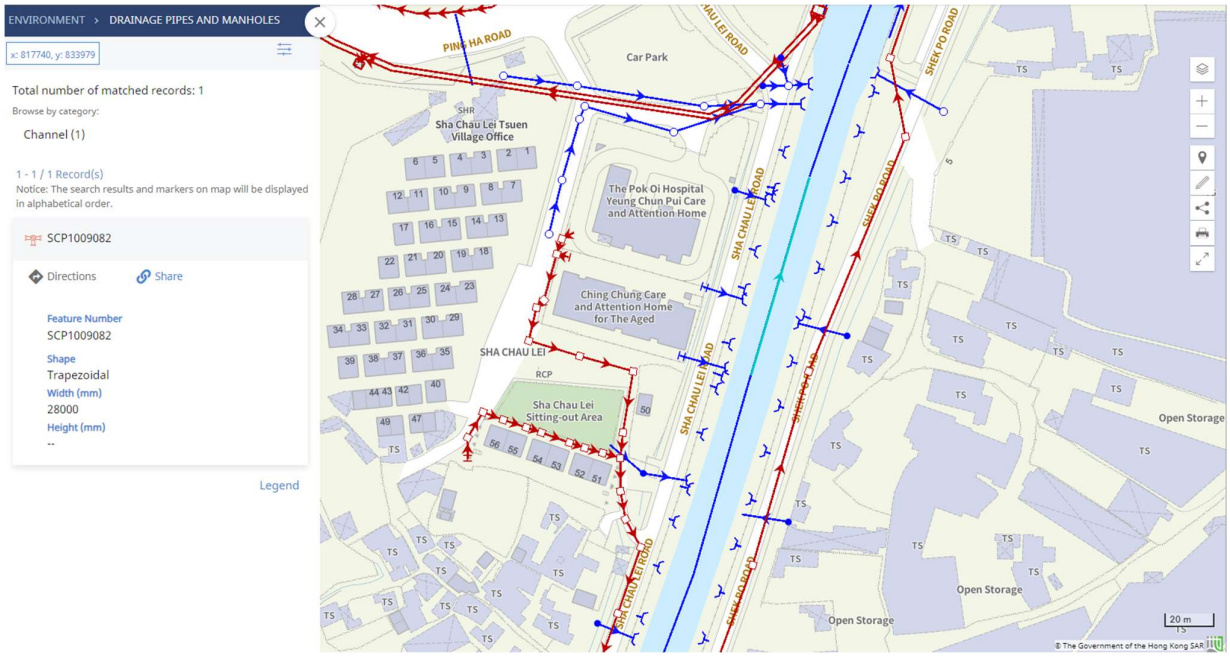
* AGMD = Automatic groundwater monitoring device

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

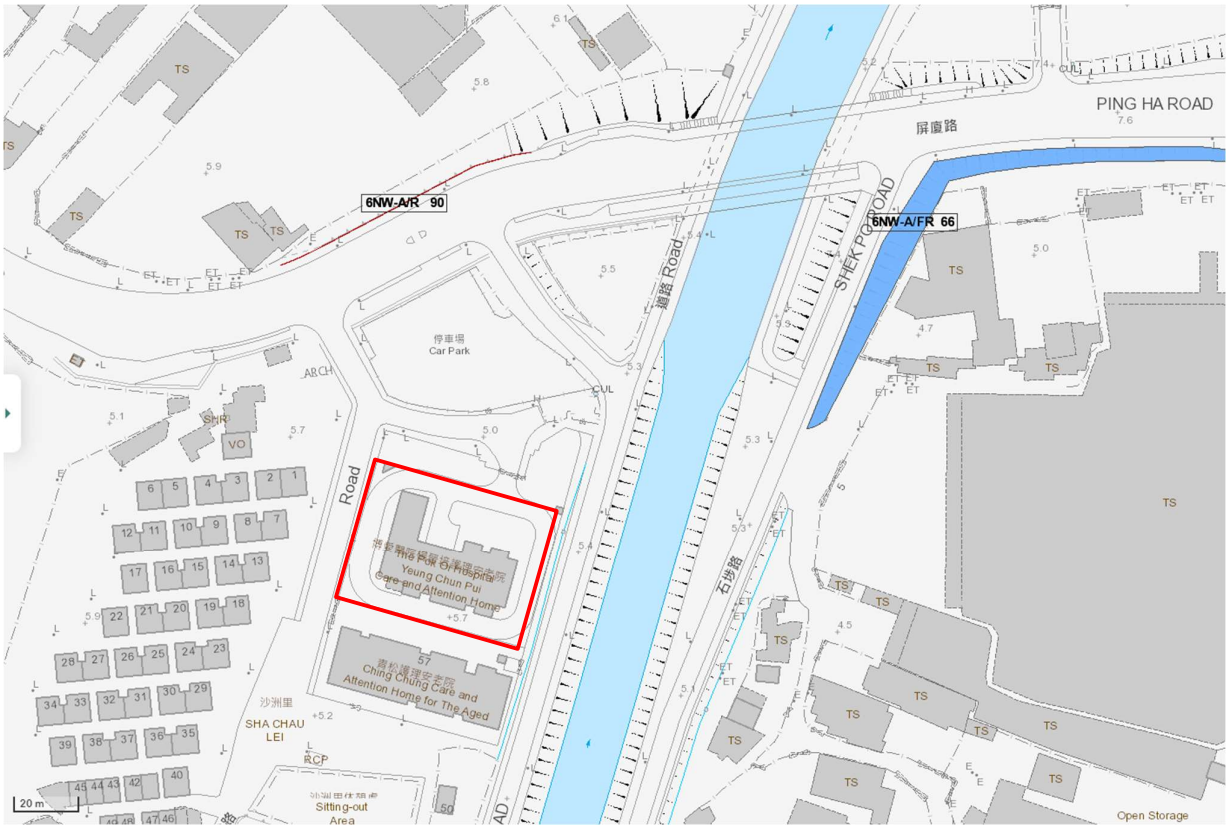


Figure 2.2 Existing Features Location Plan

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

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FOUNDATION PROPOSAL

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

AT

YUEN LONG, HONG KONG

Revision: 1

May 2024

CONTACTS

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Approver

[redacted]

REVISION HISTORY

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

asia infrastructure solutions

TABLE OF CONTENT

APPENDICES

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.

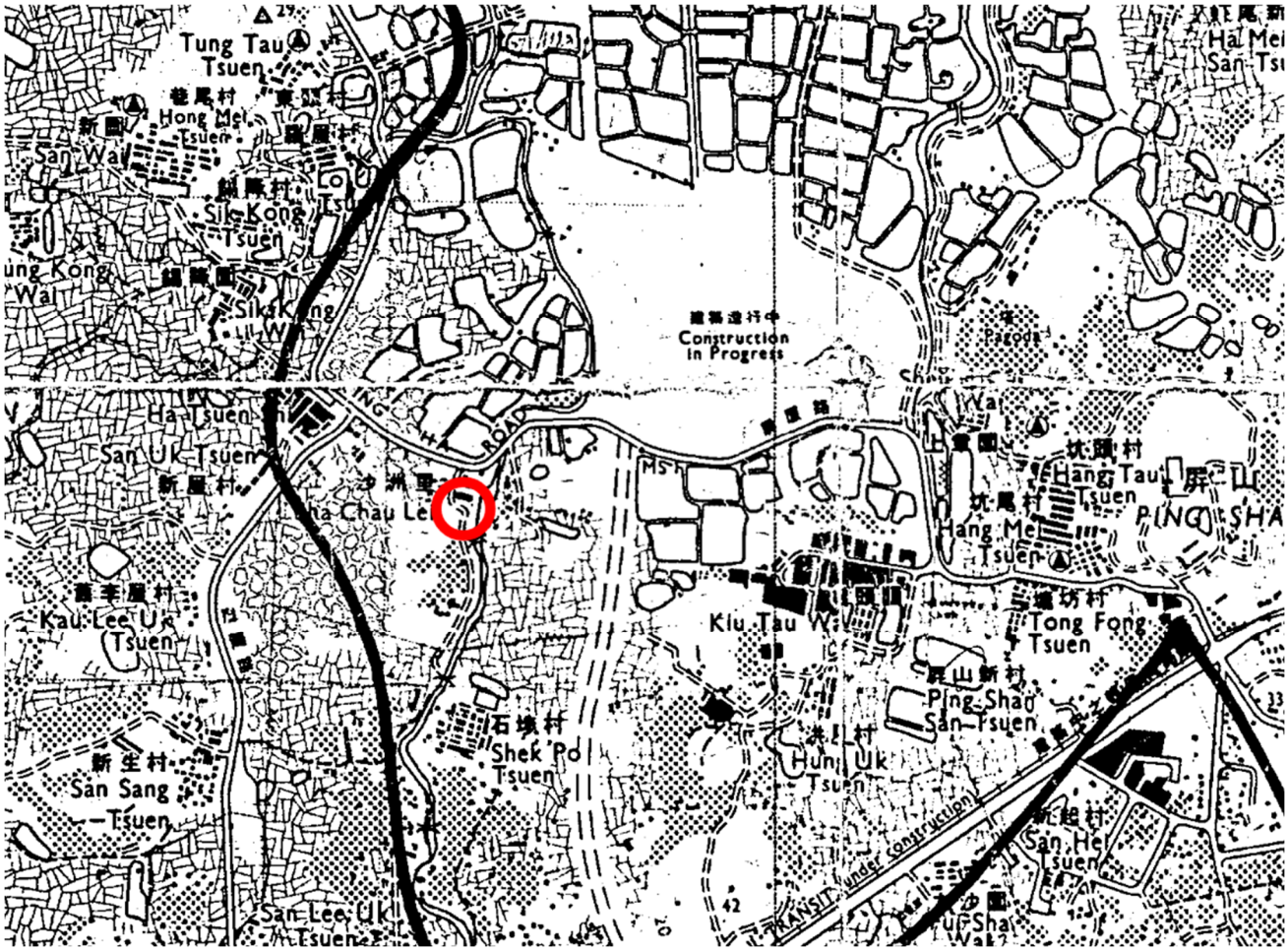
Figure 2.1 Site Location Plan

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.

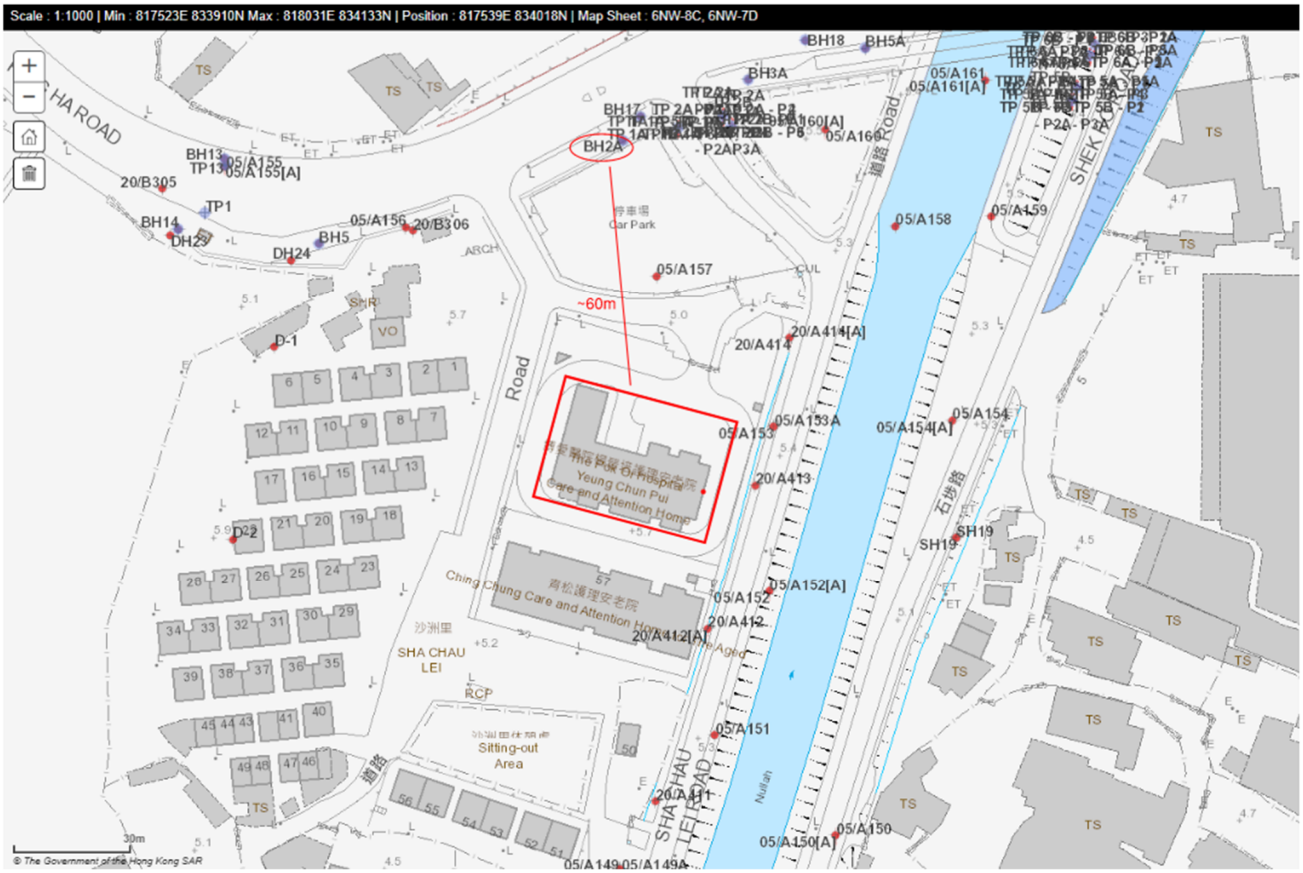
Borehole BH2A

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.



FUGRO GEOTECHNICAL SERVICES LTD

DRILLHOLE RECORD

HOLE No. BH2A

CONTRACT No.: GE/2008/04

SHEET: 5 of 5

PROJECT: PWP Item No. 7811TH, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)

METHOD: Rotary Drilling

MACHINE & No.: FDR-12

FLUSHING MEDIUM: Water

CO-ORDINATES:
E 817690.40
N 834103.84

ORIENTATION: Vertical

WORKS ORDER No. GE/2008/04.4

DATE from: 18/10/2008 to 27/10/2008

GROUND LEVEL + 6.50 mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	TCR %	SCR %	RQD %	FI	Tests	Samples No. Type Depth	Reduced Level -33.50	Depth (m) 40.00	Legend	Grade	Description
41		0.75m at 18:00		100									V	As sheet 4 of 5.
		4.55m at 08:00												
42				97				12, 23, 55, 45 / 25mm 100 blo / 100mm		-35.60	42.40		IV	Weak, grey, highly decomposed calcareous METASILTSTONE. (Recovered as angular, fine to coarse gravel)
43														
44	HW 44.24							50 / 40mm, 100 / 20mm 100 blo / 20mm		-37.74	44.24		II	Strong, grey, spotted white, slightly decomposed, calcareous METASILTSTONE with occasional marble and silica clasts (10mm - 30mm). Joints are very closely to closely spaced, rough planar, extremely narrow, iron stained, dipping at 25° - 35° and subvertical.
45			70	100	44	18	10.7							
46			75	100	79	58				-40.04	46.54		II	Strong, grey, slightly decomposed METASILTSTONE.
47							7.7			-40.50	47.00		II	Joints are closely spaced, smooth planar, extremely narrow, clean, dipping at 45° - 55°.
48		1.20m at 18:00	70	100	69	42				-41.70	48.20		II	Strong, grey, spotted white, slightly decomposed, tuffaceous METASILTSTONE. Joints are closely spaced, rough planar, extremely narrow, iron stained, dipping at 35° - 45°.
49		4.90m at 08:00	70	100	32	0	19.4			-43.04	49.54		II	Strong, grey, slightly decomposed, fine ash TUFF. Joints are very closely to closely spaced, rough planar, extremely narrow, clean, locally kaolin and chlorite coated, dipping at 15° - 25° and 35° - 45°.
		0.90m at 12:00												End of investigation hole at 49.54m.
50											50.00			

Small Disturbed Sample
Piston sample
U76 Undisturbed Sample
U100 Undisturbed Sample
Mazier Sample
SPT Liner Sample
Water Sample

Standard Penetration Test
In-situ Vane Shear Test
Permeability Test
Acoustic Borehole Televiewer
Packer Test
Piezometer Tip
Standpipe

LOGGED W.H. Liu
DATE 28/10/2008
CHECKED A.B.Hollinshead
DATE 31/10/2008

REMARKS

FGS Job No.: 07 0376 03 4

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.

Gammon Construction Limited

Geotechnical Contracting Department

DRILLHOLE No. TS200/DH/168

SHEET 5 of 6

DRILLHOLE RECORD

PROJECT: KCRC West Rail TS-200 Western Section, Phase 3 Ground Investigation		
METHOD: IP+WB+RC	CO-ORDINATES: E 817545.47, N 833607.46	CONTRACT No.: TS-200
MACHINE & No.: Toho (D2)		DATE from: 12/03/1998 to 19/03/1998
FLUSHING MEDIUM: Water	ORIENTATION: Vertical	GROUND LEVEL: 5.60 mPD

Drilling Progress	Casing depth/size	Water Depth (m)	TCR %	SCR %	RQD %	FI	Tests	Samples No.	Type	Depth	Reduced Level -34.40	Depth (m) 40.00	Legend	Grade	Description
17/03/98		2.00					N= 200/125mm	70		40.00					As sheet 4 of 6.
								71		40.28					
							8,8 12,20,20,50 N= 102	72		42.00					
								73		42.45					
							5,12 200/75mm N= 200/75mm	74		44.00	-28.40	44.00		V	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).
								75		44.25					
							112,88/25mm N=88/25mm	76		45.00 46.10	-40.40	46.00		V/IV	Very weak, grey completely to highly decomposed fine ash TUFF (Angular to subangular medium to coarse GRAVEL sized moderately weak rock fragments).
	HX 47.07		100	66	51	>20				47.07	-41.47	47.07		IV/III	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.
17/03/98						10.0			T20						
18/03/98		2.00	100	64	56				T20	48.15	-42.80	48.40		III	Moderately strong, grey moderately decomposed fine ash TUFF with closely spaced, smooth and rough, planar, calcite coated, occasionally iron stained joints, dipping at 50°-70° and with some voids (1-6 cm).
						6.0			T20						
			93	86	80				T20	49.17					
									T20						

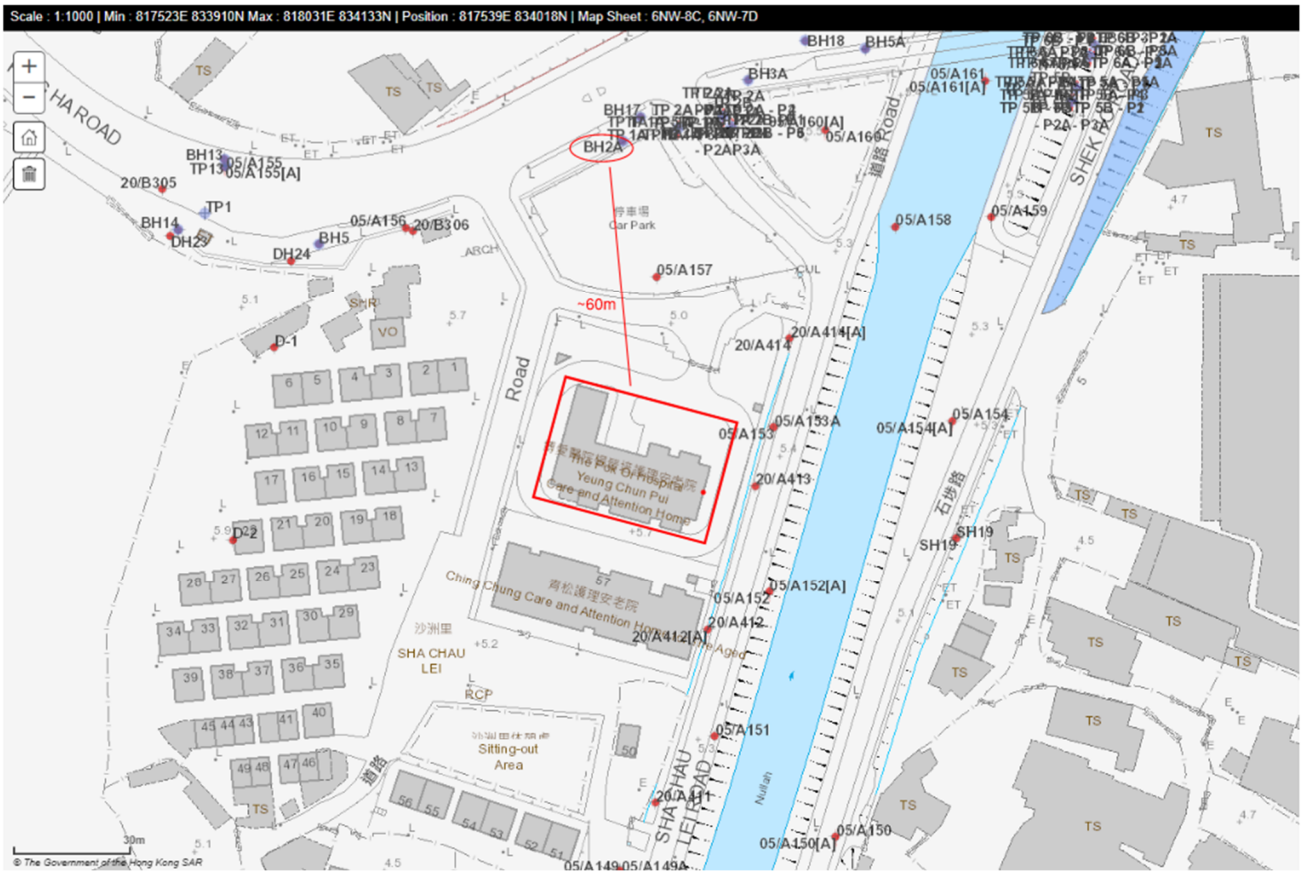
Small disturbed sample
Large disturbed sample
SPT liner sample
U76 undisturbed sample
U100 undisturbed sample
Mazier sample
Piston sample
Water sample
Piezometer tip
Standard penetration test
Pressuremeter Test
Permeability test
Impression packer test
In-situ vane shear test

LOGGED J Lau
DATE 20/03/1998
CHECKED B Shepstone
DATE 20/03/1998

REMARKS

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



FUGRO GEOTECHNICAL SERVICES LTD

Groundwater Level Record Sheet

Contract No:	GE/2008/4	Works Order No :	GE/2008/4.4
Project :	PWP Item No. 7611TH, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)		

Drillhole No.	BH2A
Piezometer No.	P (Upper)
Installation Date	27/10/2008
AGMD Level (mPD)	N/A
AGMD S/N	N/A
Logger S/N	N/A
Gauge Factor (psi/Digit)	N/A
Thermal Factor (psi/°C)	N/A
R_0 ($F^2 \times 10^{-3}$)	N/A
T_0 (°C)	N/A

Co-ordinates:

Easting	(m)	817690.40
Northing	(m)	834103.84

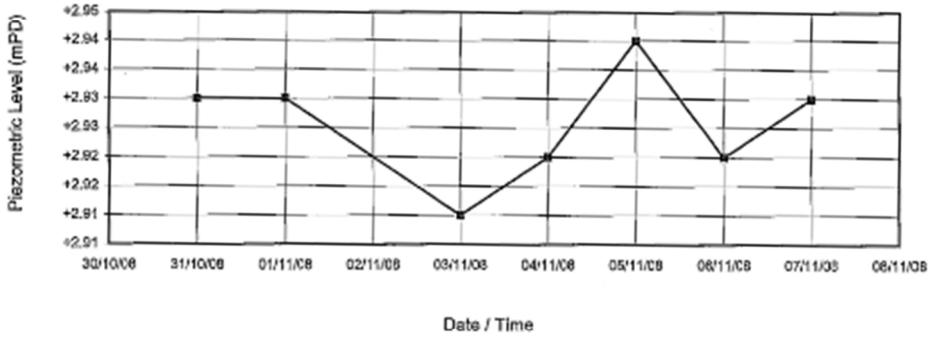
Standpipe Piezometer:

Top Level (mPD)	+6.50
Installed Tip Depth from Top Level (m)	7.00
Tip Level (mPD)	-0.50

Season:

Wet	1 Apr to 31 Oct
Dry	1 Nov to 31 Mar

Contractor: Fugro Geotechnical Services Ltd. Logged By: K.C. Ng Checked By : S.M. Pyla



(Automatic Groundwater Monitoring Device)					(Piezometer/Standpipe)			
Date / Time dd/mm/yy hh:mm	R_1 (Hz)	Temp (°C)	Pressure (mH_2O) Above	Piezometric Level (mPD)	Date Time dd/mm/yy hh:mm	Manual Dip (m below top)	Piezometric Level (mPD)	Remark
					31/10/08 09 : 20	3.57	2.93	
					01/11/08 09 : 10	3.57	2.93	
					03/11/08 09 : 30	3.59	2.91	
					04/11/08 10 : 00	3.58	2.92	
					05/11/08 09 : 30	3.56	2.94	
					06/11/08 09 : 20	3.58	2.92	
					07/11/08 09 : 10	3.57	2.93	

* AGMD = Automatic groundwater monitoring device

FUGRO GEOTECHNICAL SERVICES LTD

Groundwater Level Record Sheet

Contract No:	GE/2008/4	Works Order No :	GE/2008/4.4
Project :	PWP Item No. 7611TH, Ping Ha Road Improvement - Remaining Works (Ha Teuen Section)		

Drillhole No.	BH2A
Piezometer No.	P (Lower)
Installation Date	27/10/2008
AGMD Level (mPD)	N/A
AGMD S/N	N/A
Logger S/N	N/A
Gauge Factor (psi/Digit)	N/A
Thermal Factor (psi/°C)	N/A
R_c ($F^2 \times 10^{-3}$)	N/A
T_o (°C)	N/A

Co-ordinates:

Easting	(m)	817690.40
Northing	(m)	834103.84

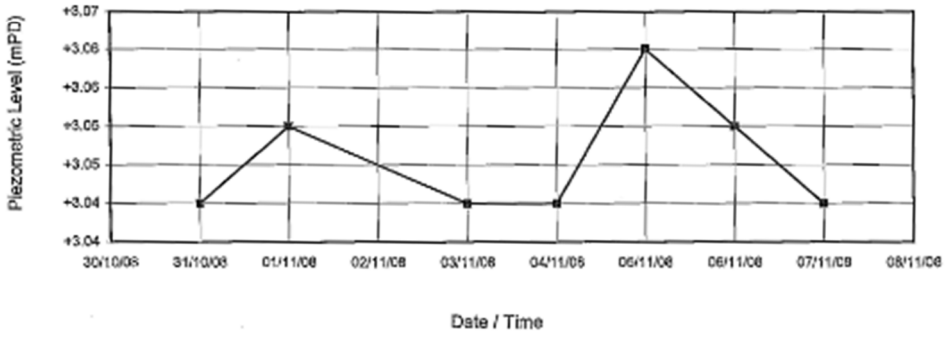
Season:

Wet	1 Apr to 31 Oct
Dry	1 Nov to 31 Mar

Standpipe Piezometer:

Top Level (mPD)	+6.50
Installed Tip Depth from Top Level (m)	43.80
Tip Level (mPD)	-37.30

Contractor: Fugro Geotechnical Services Ltd. Logged By: K.C. Ng Checked By : S.M. Pyle



(Automatic Groundwater Monitoring Device)					(Piezometer/Standpipe)			
Date / Time dd/mm/yy hh:mm	R_1 (Hz)	Temp (°C)	Pressure (mH_2O) Above	Piezometric Level (mPD)	Date Time dd/mm/yy hh:mm	Manual Dip (m below top)	Piezometric Level (mPD)	Remark
					31/10/08 09:20	3.46	3.04	
					01/11/08 09:10	3.45	3.05	
					03/11/08 09:30	3.46	3.04	
					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	
					07/11/08 09:10	3.46	3.04	

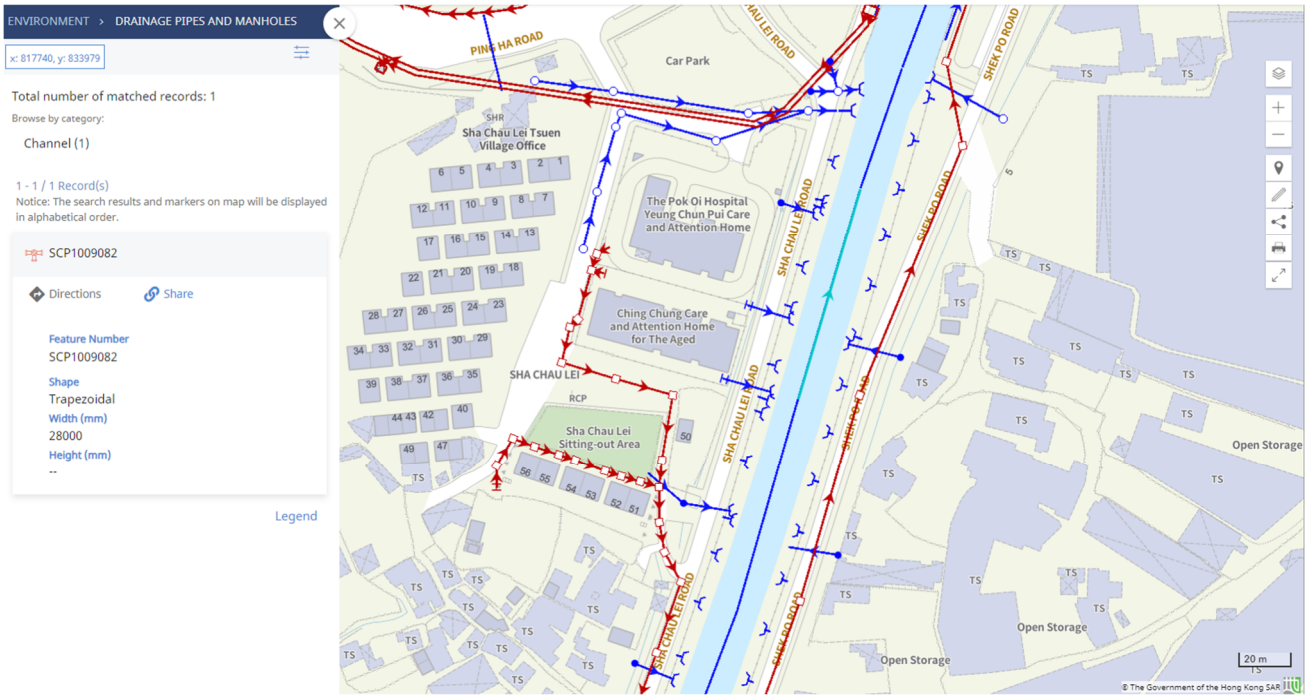
* AGMD = Automatic groundwater monitoring device

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 x 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

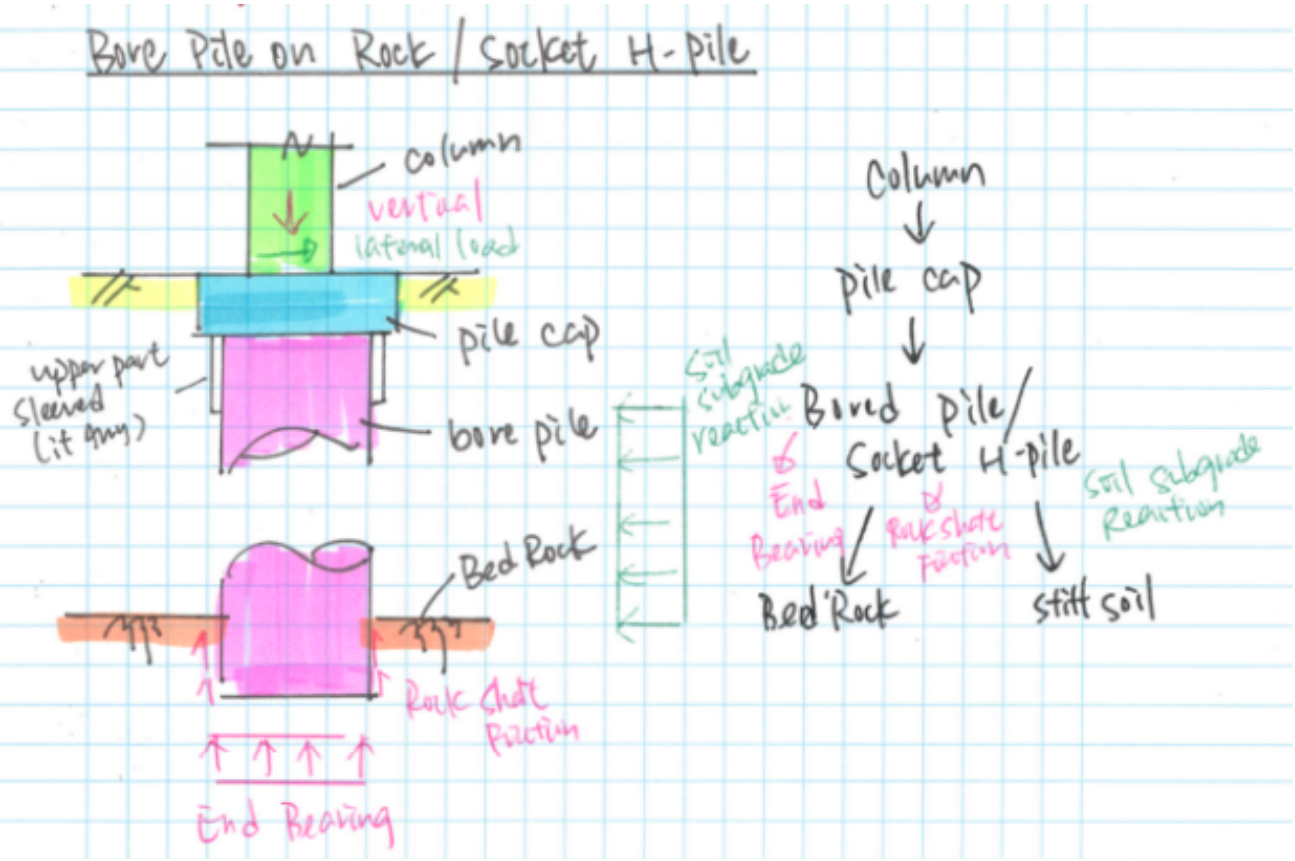
For 305x305x223UB socket-H pile with 5.5m socket length

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

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

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

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

Gammon Construction Limited

Geotechnical Contracting Department

DRILLHOLE No. TS200/DH/168

SHEET 1 of 6

DRILLHOLE RECORD

PROJECT: KCRC West Rail TS-200 Western Section, Phase 3 Ground Investigation		
METHOD: IP+WB+RC	CO-ORDINATES E 817545.47 N 833607.46	CONTRACT No.: TS-200
MACHINE & No.: Toho (D2)		DATE from: 12/03/1998 to 19/03/1998
FLUSHING MEDIUM: Water	ORIENTATION: Vertical	GROUND LEVEL: 5.60 mPD

Drilling Progress	Casing depth/size	Water Depth (m)	TCR %	SCR %	RQD %	FI	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
12/03/98	PX										5.60	0.00			
								A		0.50					Firm, brown sandy SILT with some to many angular to subangular medium to coarse gravel sized moderately weak rock fragments (FILL).
12/03/98								B		1.00	4.60	1.00			
13/02/98								C		1.50	4.10	1.50			Brown, sandy silty angular coarse GRAVEL sized moderately weak rock fragments (FILL).
								D		2.00	3.60	2.00			Firm, brown sandy silty CLAY (FILL).
							1,1 2,1,1,2 N= 6	1		2.00					Soft, yellowish brown and light grey clayey very sandy SILT with occasional organic matter (FILL/ALLUVIUM?).
								2		2.45					
								3		3.00	2.60	3.00			Firm, yellowish brown and light grey, mottled light pink clayey very sandy SILT (ALLUVIUM).
			100				7 bls	4		3.45					
							4,5 4,3,3,4 N= 14	5		4.00					
								6		4.45					
								7		5.00	0.60	5.00			Medium dense. reddish brown clayey silty fine coarse SAND with zone subangular fine to medium quartz gravel (ALLUVIUM).
			100				63 bls	8		5.45					
							3,4 5,5,5,6 N= 21	9		6.00					6.00-7.00m: Purplish brown in colour.
								10		6.45					
								11		7.00	-1.40	7.00			Yellowish brown, silty sandy angular to subangular medium to coarse quartz GRAVEL (ALLUVIUM).
			100				81 bls	12		7.45					
								13		8.00	-2.40	8.00		V	Extremely weak, yellowish brown completely decomposed fine ash TUFF (Very stiff, slightly sandy SILT).
							3,5 6,11,9,11 N= 37	14		8.45					
			100				200 bls	15		9.00					9.00-11.00m: Brown in colour.
								16		9.45					

- Small disturbed sample
- Large disturbed sample
- SPT liner sample
- U76 undisturbed sample
- U100 undisturbed sample
- Mazier sample
- Piston sample
- Water sample
- Piezometer tip
- Standard penetration test
- Pressuremeter Test
- Permeability test
- Impression packer test
- In-situ vane shear test

LOGGED J Lau

DATE 20/03/1998

CHECKED B Shepstone

DATE 20/03/1998

REMARKS

1. Insoection pit excavated to 2.00m depth.
2. Piezometer installed at 2.00 m depth.
3. Core loss in core run from 50.40m - 51.25m assumed to be grade V/IV fine ash tuff.
4. NA - Not applicable.

Gammon Construction Limited

Geotechnical Contracting Department

DRILLHOLE No. **TS200/DH/168**

SHEET 2 of 6

DRILLHOLE RECORD

PROJECT: KCRC West Rail TS-200 Western Section, Phase 3 Ground Investigation		
METHOD: IP+WB+RC	CO-ORDINATES E 817545.47 N 833607.46	CONTRACT No.: TS-200
MACHINE & No.: Toho (D2)		DATE from: 12/03/1998 to: 19/03/1998
FLUSHING MEDIUM: Water	ORIENTATION: Vertical	GROUND LEVEL: 5.60 mPD

Drilling Progress	Casing depth/size	Water Depth (m)	TCR %	SCR %	RQD %	FI	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
							2,2 3,2,3,5 N= 13	17		10.00					As sheet 1 of 6. 10.00-11.00m: Firm.
								18		10.45					
											-5.40	11.00			
			100					19		11.00				V/IV	Very weak, grey completely to highly decomposed fine ash TUFF (Sandy silty angular to subangular fine to coarse GRAVEL sized with rock fragments).
											-6.50	12.10			
							4,6 8,10,11,13 N= 42	20		12.10				V	Extremely weak, brown completely decomposed fine ash TUFF (Very stiff slightly clayey SILT).
								21							
								22		12.55					
			100					23		13.00					
								24							
							4,6 6,7,10,12 N= 35	25		14.10					14.10-15.00m: With occasional subangular fine to medium gravel sized moderately weak rock fragments.
								26		14.55					
			100					27		15.00					
13/02/98															
14/03/98		1.30						28		16.10					16.10-17.00m: Slightly sandy.
							6,7 14,20,29,32 N= 95	29							
								30		16.55					
											-11.40	17.00			
			100					31		17.00				V/IV	Very weak, grey completely to highly decomposed fine ash TUFF (Sandy silty angular to subangular fine to coarse GRAVEL sized moderately weak rock fragments).
	PX 18.10 HX										-12.50	18.10			
							6,16 20,16,17,23 N= 76	32		18.10				V	Extremely weak, brown completely decomposed fine ash TUFF (Very stiff, slightly clayey SILT)
								33							
								34		18.55					
			100					35		19.00					

- Small disturbed sample
- Large disturbed sample
- SPT liner sample
- U76 undisturbed sample
- U100 undisturbed sample
- Mazier sample
- Piston sample
- Water sample
- Piezometer tip
- Standard penetration test
- Pressuremeter Test
- Permeability test
- Impression packer test
- In-situ vane shear test

LOGGED J Lau

DATE 20/03/1998

CHECKED B Shepstone

DATE 20/03/1998

REMARKS

Gammon Construction Limited

Geotechnical Contracting Department

DRILLHOLE No. **TS200/DH/168**

SHEET 3 of 6

DRILLHOLE RECORD

PROJECT **KCRC West Rail TS-200 Western Section, Phase 3 Ground Investigation**		
METHOD **IP+WB+RC**	CO-ORDINATES E **817545.47** N **833607.46**	CONTRACT No. **TS-200**
MACHINE & No. **Toho (D2)**		DATE from **12/03/1998** to **19/03/1998**
FLUSHING MEDIUM **Water**	ORIENTATION **Vertical**	GROUND LEVEL **5.60** mPD

Drilling Progress	Casing depth/size	Water Depth (m)	TCR %	SCR %	RQD %	FI	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
							11,15 16,32,45,60 N= 153	36 37		20.10					As sheet 2 of 6.
								38		20.55					
											-15.40	21.00			
			100					39		21.00				V	Extremely weak, brown completely decomposed fine ash TUFF (Very stiff, slightly clayey sandy SILT).
								40							
							13,23 24,28,32,40 N= 124	41		22.10					
								42		22.55					
			100					43		23.00					
								44							
							23,75 88,112/75mm N= 200/150mm	45		24.10					
								46		24.40					
			100					47		25.00					
								48							26.00-27.00m: With some angular to subangular fine to medium gravel sized moderately weak rock fragments.
							6,9 11,23,33,40 N= 107	49		26.10					
								50		26.55					
											-21.40	27.00			
			100					51		27.00				V/IV	Extremely weak to very weak, greyish brown completely to highly decomposed fine ash TUFF (Silty sandy angular to subangular fine to coarse GRAVEL sized moderately weak rock fragments).
								52							
							21,179/75mm N= 179/75mm	53		28.10					
								54		28.25 28.40					
								54							
14/03/98															
16/03/98		1.60	100					55		29.00	-23.40	29.00		V	Extremely weak, light brownish green completely decomposed fine ash TUFF (Very stiff, clayey SILT).

- Small disturbed sample
- Large disturbed sample
- SPT liner sample
- U76 undisturbed sample
- U100 undisturbed sample
- Mazier sample
- Piston sample
- Water sample
- Piezometer tip
- Standard penetration test
- Pressuremeter Test
- Permeability test
- Impression packer test
- In-situ vane shear test

LOGGED **J Lau**

DATE **20/03/1998**

CHECKED **B Shepstone**

DATE **20/03/1998**

REMARKS

Gammon Construction Limited

Geotechnical Contracting Department

DRILLHOLE No. **TS200/DH/168**

SHEET 4 of 6

DRILLHOLE RECORD

PROJECT: **KCRC West Rail TS-200 Western Section, Phase 3 Ground Investigation**		
METHOD: **IP+WB+RC**	CO-ORDINATES E **817545.47** N **833607.46**	CONTRACT No. **TS-200**
MACHINE & No. **Toho (D2)**		DATE from **12/03/1998** to **19/03/1998**
FLUSHING MEDIUM: **Water**	ORIENTATION: **Vertical**	GROUND LEVEL **5.60** mPD

Drilling Progress	Casing depth/size	Water Depth (m)	TCR %	SCR %	RQD %	FI	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
							70,130/75mm N=130/75mm	56		30.10					As sheet 3 of 6.
								57		30.25					
											-25.40	31.00			
			100					58		31.00				V/IV	Very weak, yellowish brown completely to highly decomposed fine ash TUFF (Silty sandy angular to subangular fine to coarse GRAVEL sized moderately weak rock fragments).
								59		32.10	-26.50	32.10			
							60,140/75mm N=140/75mm	60		32.25				V	Extremely weak, light brown completely decomposed fine ash TUFF (Very stiff, slightly sandy clayey SILT).
								61							
			85					62		33.00					
								63							
							7,16 24,32,56,72 N=184	64		34.10					
								65		34.55					
							8,12 26,34,68,72 N=200	66		36.00					
								67		36.45					
							6,15 18,43,52,75 N=188	68		38.00					38.00-39.00m: Greyish green in colour.
								69		38.45					

16/03/98

- Small disturbed sample
- Large disturbed sample
- SPT liner sample
- U76 undisturbed sample
- U100 undisturbed sample
- Mazier sample
- Piston sample
- Water sample
- Piezometer tip
- Standard penetration test
- Pressuremeter Test
- Permeability test
- Impression packer test
- In-situ vane shear test

LOGGED **J Lau**

DATE **20/03/1998**

CHECKED **B Shepstone**

DATE **20/03/1998**

REMARKS

Gammon Construction Limited

Geotechnical Contracting Department

DRILLHOLE No. **TS200/DH/168**

SHEET 5 of 6

DRILLHOLE RECORD

PROJECT: **KCRC West Rail TS-200 Western Section, Phase 3 Ground Investigation**		
METHOD: **IP+WB+RC**	CO-ORDINATES: E **817545.47** N **833607.46**	CONTRACT No.: **TS-200**
MACHINE & No.: **Toho (D2)**		DATE from **12/03/1998** to **19/03/1998**
FLUSHING MEDIUM: **Water**	ORIENTATION: **Vertical**	GROUND LEVEL: **5.60** mPD

Drilling Progress	Casing depth/size	Water Depth (m)	TCR %	SCR %	RQD %	FI	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
17/03/98		2.00					5,7 26,174/50mm N=200/125mm	70 71		40.00 40.28					As sheet 4 of 6.
							9,9 12,20,20,50 N=102	72 73		42.00 42.45					
							6,12 200/75mm N=200/75mm	74 75		44.00 44.25	-38.40	44.00		V	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).
							112,88/25mm N=88/25mm	76		46.00 46.10	-40.40	46.00		V/IV	Very weak, grey completely to highly decomposed fine ash TUFF (Angular to subangular medium to coarse GRAVEL sized moderately weak rock fragments).
	HX 47.07		100	66	51	>20 10.0			T2101	47.07	-41.47	47.07		IV/III	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.
17/03/98 18/03/98		2.00	100	64	56	6.0			T2101	48.15	-42.80	48.40		III	Moderately strong, grey moderately decomposed fine ash TUFF with closely spaced, smooth and rough, planar, calcite coated, occasionally iron stained joints, dipping at 50°-70° and with some voids (1-6 cm).
			93	86	80				T2101	49.17					

Small disturbed sample
Large disturbed sample
SPT liner sample
U76 undisturbed sample
U100 undisturbed sample
Mazier sample
Piston sample
Water sample
Piezometer tip
Standard penetration test
Pressuremeter Test
Permeability test
Impression packer test
In-situ vane shear test

LOGGED **J Lau**

DATE **20/03/1998**

CHECKED **B Shepstone**

DATE **20/03/1998**

REMARKS

Gammon Construction Limited

Geotechnical Contracting Department

DRILLHOLE No. **TS200/DH/168**

SHEET 6 of 6

DRILLHOLE RECORD

PROJECT: **KCRC West Rail TS-200 Western Section, Phase 3 Ground Investigation**		
METHOD: **IP+WB+RC**	CO-ORDINATES E **817545.47** N **833607.46**	CONTRACT No.: **TS-200**
MACHINE & No.: **Toho (D2)**		DATE from **12/03/1998** to **19/03/1998**
FLUSHING MEDIUM: **Water**	ORIENTATION: **Vertical**	GROUND LEVEL: **5.60** mPD

Drilling Progress	Casing depth/size	Water Depth (m)	TCR %	SCR %	RQD %	FI	Tests	Samples No. Type Depth	Reduced Level	Depth (m)	Legend	Grade	Description
									-44.40	50.00			As sheet 4 of 6.
								T2IOI 50.40	-44.80	50.40			
			67	0	0	NA NI NR			-44.94	50.54		V/IV	Extremely weak to very weak, grey, spotted brown completely to highly decomposed fine ash TUFF (Sandy silty angular to subangular fine to coarse GRAVEL sized rock fragments).
									-45.08	50.68		III	50.54-50.68m: Quartz vein. Non intact.
								T2IOI	-45.36	50.96		V/IV	50.68-50.96m: Inferred to be grade V/IV fine ash tuff.
						6.9			-45.65	51.25		IV/III	
			100	96	96	4.1		51.25				II	
								T2IOI					Moderately weak to moderately strong, grey highly to moderately decomposed fine ash TUFF with closely spaced, smooth, planar, iron stained joints, dipping at 30°-40° and 60°-70°
			99	95	95			52.33					
								T2IOI					Strong, grey, locally spotted and dappled white slightly decomposed fine ash TUFF with medium spaced, smooth, planar, calcite coated, occasionally clean joints, dipping at 60°-70°.
						1.9		53.87					
			100	87	87								
18/03/98								T2IOI					
19/03/98		2.00	100	100	100			55.37					
								T2IOI					
19/03/98									-50.68	56.28			End of Investigation hole at 56.28m.

- Small disturbed sample
- Large disturbed sample
- SPT liner sample
- U76 undisturbed sample
- U100 undisturbed sample
- Mazier sample
- Piston sample
- Water sample
- Piezometer tip
- Standard penetration test
- Pressuremeter Test
- Permeability test
- Impression packer test
- In-situ vane shear test

LOGGED **J Lau**

DATE **20/03/1998**

CHECKED **B Shepstone**

DATE **20/03/1998**

REMARKS


CLIENT:KOWLOON CANTON RAILWAY CORPORATION
CONTRACTOR: GAMMON CONSTRUCTION LTD.
PROJECT: K C R C WEST RAIL TS200 WESTERN SECTION,
PHASE 3 GROUND INVESTIGATION
HOLE NO. TS200/DH/168
BOX 1 OF 4
DEPTH : 0.00 m. TO 47.07 m.
0.M
0.5M
1M
0.00
47.07

CLIENT: KOWLOON CANTON RAILWAY CORPORATION

CONTRACTOR: GAMMON CONSTRUCTION LTD.

PROJECT: K C R C WEST RAIL TS200 WESTERN SECTION, PHASE 3 GROUND INVESTIGATION

HOLE NO. TS200/DH/168 BOX 2 OF 4

DEPTH : 47.07 m. TO 50.40 m.

CLIENT:KOWLOON CANTON RAILWAY CORPORATION

CONTRACTOR: GAMMON CONSTRUCTION LTD.

PROJECT: K C R C WEST RAIL TS200 WESTERN SECTION, PHASE 3 GROUND INVESTIGATION

HOLE NO. TS200/DH/168 BOX 3 OF 4

DEPTH : 50.40m. TO 53.87m.


CLIENT:KOWLOON CANTON RAILWAY CORPORATION
CONTRACTOR: GAMMON CONSTRUCTION LTD.
PROJECT: K C R C WEST RAIL TS200 WESTERN SECTION,
PHASE 3 GROUND INVESTIGATION
HOLE NO. TS200/DH/168
BOX 4 OF 4
DEPTH : 53.87 m. TO 56.28 m.
0.M
0.5M
1M
53.87
55.37
56.28
END

FUGRO GEOTECHNICAL SERVICES LTD

DRILLHOLE RECORD

HOLE No. **BH2A**

CONTRACT No.: **GE/2008/04**

SHEET: **1** of **5**

PROJECT: **PWP Item No. 7811TH, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)**

METHOD: **Rotary Drilling**

MACHINE & No.: **FDR-12**

FLUSHING MEDIUM: **Water**

CO-ORDINATES:
E **817690.40**
N **834103.84**

ORIENTATION: **Vertical**

WORKS ORDER No. **GE/2008/04.4**

DATE from: **18/10/2008** to **27/10/2008**

GROUND LEVEL **+ 6.50** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	T C R %	S C R %	R Q D %	F I	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
18/10/2008	SW											6.50	0.00			
									1		0.45 0.50					Firm to stiff, yellowish brown (10YR/5/6), sandy clayey SILT with occasional angular, medium gravel of strong granite. (FILL)
1									2	INSPECTION PIT	0.95 1.00					
									3		1.45 1.50					
2									4		1.95	4.50	2.00			
18/10/2008 22/10/2008				100					5		2.00					Firm, greyish brown (10YR/5/2), mottled grey and red, sandy clayey SILT with occasional angular, coarse gravel of weak phyllite. (FILL)
3								2, 3, 3, 3, 4, 4 N=14	6		3.00					
									7		3.10 3.20					
									8		3.50 3.55					
4				100				93 bls	9		4.00					
									10		4.45 4.50	2.00	4.50			
								1, 1, 2, 2, 1, 2 N=7	11		4.60					Firm, olive (5Y/5/3), sandy clayey SILT. (ALLUVIUM)
5									12		4.90 4.95					
6				100					13		6.00	0.50	6.00			Light grey (10R/7/1), silty, fine SAND. (ALLUVIUM)
7								1, 1, 1, 1, 1, 2 N=5	14		7.00 7.10	-0.60	7.10			Soft, light grey (10R/7/1), mottled red and yellowish brown, sandy clayey SILT. (ALLUVIUM)
									15		7.20					
8	SW 8.00 PW			100					16		7.50 7.55					
									17		8.00	-1.50	8.00			Soft to firm, light yellowish brown (2.5Y/6/4), mottled red, slightly sandy, silty CLAY with occasional subrounded to rounded, moderately strong quartz. (ALLUVIUM)
9								2, 2, 2, 3, 3, 2 N=10	18		9.00 9.10					
									19		9.20					
									20		9.50 9.55					
10												-3.50	10.00			

Small Disturbed Sample	Standard Penetration Test
Piston sample	In-situ Vane Shear Test
U76 Undisturbed Sample	Permeability Test
U100 Undisturbed Sample	Optical Borehole Televiewer
Mazier Sample	Packer Test
SPT Liner Sample	Piezometer Tip
Water Sample	Standpipe

LOGGED W.P. Au

DATE 28/10/2008

CHECKED A.B-Hollinshead

DATE 31/10/2008

REMARKS

1. Inspection pit was excavated to depth of 2.00m.
2. Piezometers were installed at 7.00m and 43.80m below existing ground level on 27/10/2008.
3. Halcrow buckets were installed from 0.50m to 4.00m at 0.50m intervals in the Upper and Lower piezometer.

FGS Job No.: 07 0376 03 4

FUGRO GEOTECHNICAL SERVICES LTD

DRILLHOLE RECORD

HOLE No. **BH2A**

CONTRACT No.: **GE/2008/04**

SHEET: **2** of **5**

PROJECT: **PWP Item No. 7811TH, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)**

METHOD: **Rotary Drilling**

CO-ORDINATES:
E **817690.40**
N **834103.84**

WORKS ORDER No. **GE/2008/04.4**

MACHINE & No.: **FDR-12**

DATE from: **18/10/2008** to **27/10/2008**

FLUSHING MEDIUM: **Water**

ORIENTATION: **Vertical**

GROUND LEVEL **+ 6.50** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	TCR %	SCR %	RQD %	FI	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
				85					21		10.00	-3.50	10.00			Medium dense, light yellowish brown (2.5Y/6/4), silty, fine SAND with occasional pieces of clayey silt. (ALLUVIUM)
11								1, 1, 2, 3, 4, 4 N=13	22		11.00 11.10 11.20					
									23							
									24		11.50 11.65					
12				60					25		12.00	-5.50	12.00			Firm, pale brown (10YR/6/3), dappled light purple, slightly clayey SILT. (ALLUVIUM)
									26		13.00 13.10					
13				100					27							
									28		14.10 14.20 14.30					
14								2, 2, 3, 5, 9, 13 N=30	29							
									30		14.60 14.65					
15				70					31		15.10	-8.60	15.10			Firm to stiff, light brown (7.5YR/6/3), dappled black and yellowish brown, clayey SILT with occasional rounded, medium gravel of moderately strong silica fragments. (ALLUVIUM)
									32		16.10 16.20					
16				85					33							
17								1, 2, 3, 3, 4, 6 N=16	34		17.20 17.30 17.40					
									35							
									36		17.70 17.75					
18		0.85m at 18:00														
22/10/2008 23/10/2008		4.55m at 08:00		55					37		18.20					
19																
				50					38		19.20					
									39		19.30					
20												-13.50	20.00			

- Small Disturbed Sample
- Piston sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- SPT Liner Sample
- Water Sample
- Standard Penetration Test
- In-situ Vane Shear Test
- Permeability Test
- Optical Borehole Televiewer
- Packer Test
- Piezometer Tip
- Standpipe

LOGGED W.P.

DATE 28/10/2008

CHECKED A.B-Hollinshead

DATE 31/10/2008

REMARKS

FGS Job No.: 07 0376 03 4

FUGRO GEOTECHNICAL SERVICES LTD

DRILLHOLE RECORD

HOLE No. **BH2A**

CONTRACT No.: **GE/2008/04**

SHEET: **3** of **5**

PROJECT: **PWP Item No. 7811TH, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)**

METHOD: **Rotary Drilling**

MACHINE & No.: **FDR-12**

FLUSHING MEDIUM: **Water**

CO-ORDINATES:
E **817690.40**
N **834103.84**

ORIENTATION: **Vertical**

WORKS ORDER No. **GE/2008/04.4**

DATE from: **18/10/2008** to **27/10/2008**

GROUND LEVEL **+ 6.50** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	T C R %	S C R %	R Q D %	F I	Tests	Samples No. Type Depth	Reduced Level -13.50	Depth (m) 20.00	Legend	Grade	Description
21								2, 3, 6, 6, 8, 12 N=32	40 20.30 20.40 20.50 41 42 20.80 20.85					As sheet 2 of 5.
				100					43 21.30	-14.80	21.30		V	Extremely weak, light yellowish brown (2.5Y/6/4), completely decomposed METASILTSTONE. (Very stiff, clayey SILT)
22								9, 15, 20, 28, 30, 22 / 35mm 100 blows / 260mm	44 22.30 22.40 22.50 45 46 22.76 22.81					
23									47 23.30	-16.80	23.30		V	Extremely weak, light purple (5R/7/2), striped, yellowish brown, completely decomposed METASILTSTONE. (Very stiff, clayey SILT)
				100										
24	PW 24.40 HW								48 24.30 24.40 24.50 49 50 24.74 24.79					
25								9, 9, 15, 23, 42, 20 / 15mm 100 blows / 240mm						
				100					51 25.30	-18.80	25.30		V	Extremely weak, light yellowish brown (2.5Y/6/4), dappled grey, completely decomposed METASILTSTONE. (Firm to stiff, clayey SILT)
26									52 26.30 26.40 26.50 53 54 26.80 26.85					
27								1, 2, 3, 5, 8, 8 N=24						
				85					55 27.30					
28									56 28.30 28.40 28.50 57 58 28.80 28.85					
29		0.80m at 18:00						9, 9, 10, 10, 12, 14 N=46						
23/10/2008 24/10/2008		4.60m at 08:00		80					59 29.30	-23.50	30.00			
30														

- Small Disturbed Sample
- Piston sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- SPT Liner Sample
- Water Sample
- Standard Penetration Test
- In-situ Vane Shear Test
- Permeability Test
- Optical Borehole Televiewer
- Packer Test
- Piezometer Tip
- Standpipe

LOGGED W.P. Yiu

DATE 28/10/2008

CHECKED A.B-Hollinshead

DATE 31/10/2008

REMARKS

FGS Job No.: 07 0376 03 4

FUGRO GEOTECHNICAL SERVICES LTD

DRILLHOLE RECORD

HOLE No. **BH2A**

CONTRACT No.: **GE/2008/04**

SHEET: **4** of **5**

PROJECT: **PWP Item No. 7811TH, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)**

METHOD: **Rotary Drilling**

MACHINE & No.: **FDR-12**

FLUSHING MEDIUM: **Water**

CO-ORDINATES:
E **817690.40**
N **834103.84**

ORIENTATION: **Vertical**

WORKS ORDER No. **GE/2008/04.4**

DATE from: **18/10/2008** to **27/10/2008**

GROUND LEVEL **+ 6.50** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	T C R %	S C R %	R Q D %	F I	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
												-23.50	30.00		V	As sheet 3 of 5.
								7, 6, 10, 10, 10, 11 N=41	60		30.30 30.40					
									61		30.50					
									62		30.80 30.85					
31												-24.80	31.30		V	Extremely weak, greyish brown (10YR/5/2), completely decomposed METASILTSTONE. (Stiff, sandy SILT with some angular, coarse gravel)
				60					63		31.30					
32									64		32.30	-25.90	32.40		V	Extremely weak, olive grey (5Y/5/2), completely decomposed METASILTSTONE. (Very stiff, slightly clayey SILT)
				85					65		32.40					
33																
									66		33.40 33.50					
								15, 28, 45, 55 / 45mm 100 bls / 120mm	67		33.60					
34									68		33.72 33.77					
									69		34.40					
				100												
35									70		35.40 35.50					
								20, 30 / 20mm, 100 / 60mm 100 bls / 60mm	71		35.61 35.655					
36																
									72		36.40					
				90												
37									73		37.40 37.50					
								25, 25 / 15mm, 100 / 50mm 100 bls / 50mm	74		37.59 37.64					
38																
									75		38.40	-31.90	38.40		V	Extremely weak, brown (7.5YR/5/4), completely decomposed METASILTSTONE. (Silty, fine SAND)
				80												
39									76		39.40 39.50	-33.00	39.50		V	Extremely weak, light grey (10R/7/1), completely decomposed METASILTSTONE. (Very stiff, clayey SILT)
									77		39.60					
								4, 6, 15, 25, 28, 29 N=97								
40									78		39.90 39.95	-33.50	40.00			

Small Disturbed Sample
Piston sample
U76 Undisturbed Sample
U100 Undisturbed Sample
Mazier Sample
SPT Liner Sample
Water Sample

Standard Penetration Test
In-situ Vane Shear Test
Permeability Test
Optical Borehole Televiewer
Packer Test
Piezometer Tip
Standpipe

LOGGED W.P.Yiu
DATE 28/10/2008
CHECKED A.B-Hollinshead
DATE 31/10/2008

REMARKS

FGS Job No.: 07 0376 03 4

FUGRO GEOTECHNICAL SERVICES LTD

DRILLHOLE RECORD

HOLE No. **BH2A**

CONTRACT No.: **GE/2008/04**

SHEET: **5** of **5**

PROJECT: **PWP Item No. 7811TH, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)**

METHOD: **Rotary Drilling**

MACHINE & No.: **FDR-12**

FLUSHING MEDIUM: **Water**

CO-ORDINATES:
E **817690.40**
N **834103.84**

ORIENTATION: **Vertical**

WORKS ORDER No. **GE/2008/04.4**

DATE from: **18/10/2008** to **27/10/2008**

GROUND LEVEL **+ 6.50** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	TCR %	SCR %	RQD %	FI	Tests	Samples No. Type Depth	Reduced Level	Depth (m)	Legend	Grade	Description
										-33.50	40.00		V	As sheet 4 of 5.
24/10/2008 25/10/2008		0.75m at 18:00		100					79 40.40					
41		4.55m at 08:00						12, 23, 55, 45 / 25mm 100 bls / 100mm	80 41.40 41.50 81 41.60 82 41.70 41.75					
42				90					83 42.40	-35.90	42.40		IV	Weak, grey, highly decomposed calcareous METASILTSTONE. (Recovered as angular, fine to coarse gravel)
43								50 / 40mm, 100 / 20mm 100 bls / 20mm	84 43.40 85 43.50 43.56					
44	HW 44.24		70	100	0	0			44.24 44.30	-37.74	44.24		II	Strong, grey, spotted white, slightly decomposed, calcareous METASILTSTONE with occasional marble and slica clasts (10mm - 30mm). Joints are very closely to closely spaced, rough planar, extremely narrow, iron stained, dipping at 25° - 35° and subvertical.
45			70	100	44	18	10.7		T2I01 45.44					
46			70	100	79	56			T2I01	-40.04	46.54		II	Strong, grey, slightly decomposed METASILTSTONE.
47							7.7		46.96	-40.50	47.00		II	Joints are closely spaced, smooth planar, extremely narrow, clean, dipping at 45° - 55°.
48			70	100	69	42			T2I01					Strong, grey, spotted white, slightly decomposed, tuffaceous METASILTSTONE. Joints are closely spaced, rough planar, extremely narrow, iron stained, dipping at 35° - 45°.
25/10/2008 27/10/2008		1.20m at 18:00								-41.70	48.20		II	
49		4.30m at 08:00	70	100	32	0	19.4		48.49 T2I01					Strong, grey, slightly decomposed, fine ash TUFF. Joints are very closely to closely spaced, rough planar, extremely narrow, clean, locally kaolin and chlorite coated, dipping at 15° - 25° and 35° - 45°.
27/10/2008		0.90m at 12:00							49.54	-43.04	49.54			
50											50.00			End of investigation hole at 49.54m.

Small Disturbed Sample
Piston sample
U76 Undisturbed Sample
U100 Undisturbed Sample
Mazier Sample
SPT Liner Sample
Water Sample
Standard Penetration Test
In-situ Vane Shear Test
Permeability Test
Acoustic Borehole Televiewer
Packer Test
Piezometer Tip
Standpipe

LOGGED W.P. Yiu
DATE 28/10/2008
CHECKED A.B-Hollinshead
DATE 31/10/2008

REMARKS

FGS Job No.: 07 0376 03 4

CEDD Contract No.: GE/2008/04
Ground Investigation - New Territories West (Term Contract)

Fugro Geotechnical Services Ltd.

Hole No. BH2A Box No. : 1 of 4

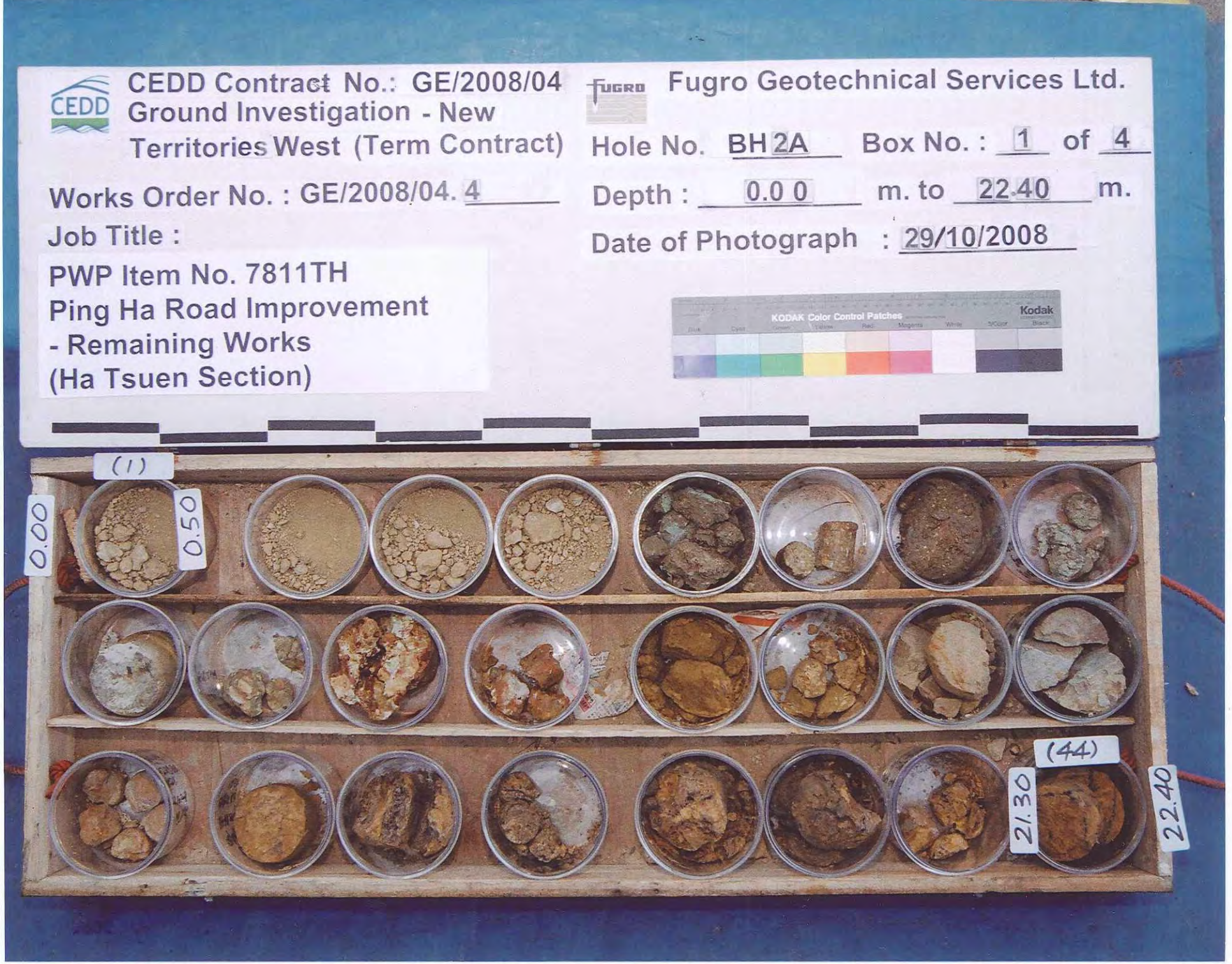
Works Order No. : GE/2008/04. 4

Depth : 0.00 m. to 22.40 m.

Job Title :

PWP Item No. 7811TH
Ping Ha Road Improvement
- Remaining Works
(Ha Tsuen Section)

Date of Photograph : 29/10/2008



CEDD Contract No.: GE/2008/04
Ground Investigation - New Territories West (Term Contract)

Works Order No. : GE/2008/04. 4

Job Title :

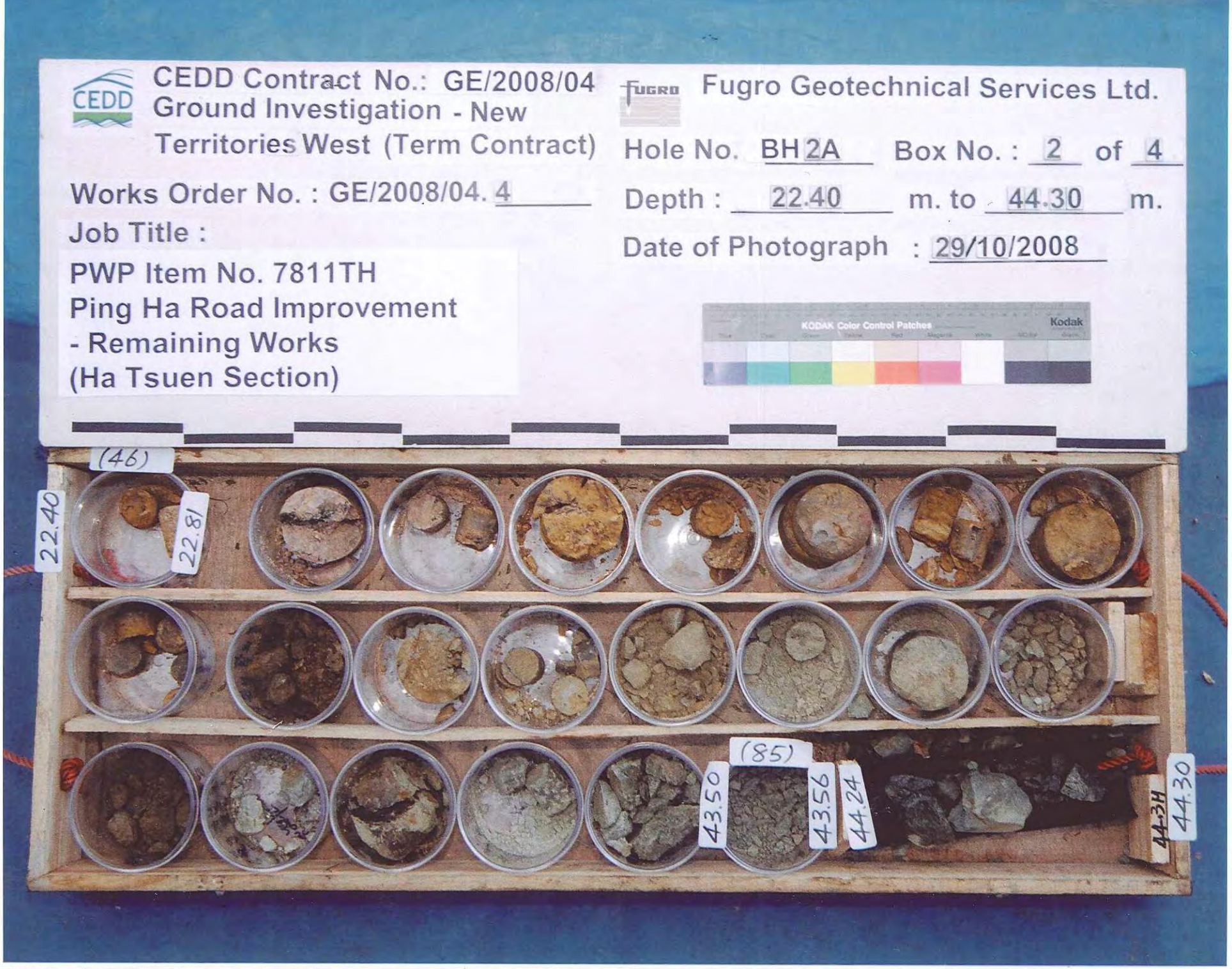
PWP Item No. 7811TH
Ping Ha Road Improvement
- Remaining Works
(Ha Tsuen Section)

Fugro Geotechnical Services Ltd.

Hole No. BH 2A Box No. : 2 of 4

Depth : 22.40 m. to 44.30 m.

Date of Photograph : 29/10/2008



CEDD Contract No.: GE/2008/04
Ground Investigation - New Territories West (Term Contract)

Fugro Geotechnical Services Ltd.

Works Order No. : GE/2008/04. 4

Hole No. BH2A Box No. : 3 of 4

Depth : 44.30 m. to 46.96 m.

Job Title :

PWP Item No. 7811TH
Ping Ha Road Improvement
- Remaining Works
(Ha Tsuen Section)

Date of Photograph : 29/10/2008

CEDD Contract No.: GE/2008/04
Ground Investigation - New Territories West (Term Contract)

Fugro Geotechnical Services Ltd.

Hole No. BH2A Box No. : 4 of 4

Works Order No. : GE/2008/04. 4

Depth : 46.96 m. to 49.54 m.

Job Title :

PWP Item No. 7811TH
Ping Ha Road Improvement
- Remaining Works
(Ha Tsuen Section)

Date of Photograph : 29/10/2008

FUGRO GEOTECHNICAL SERVICES LTD

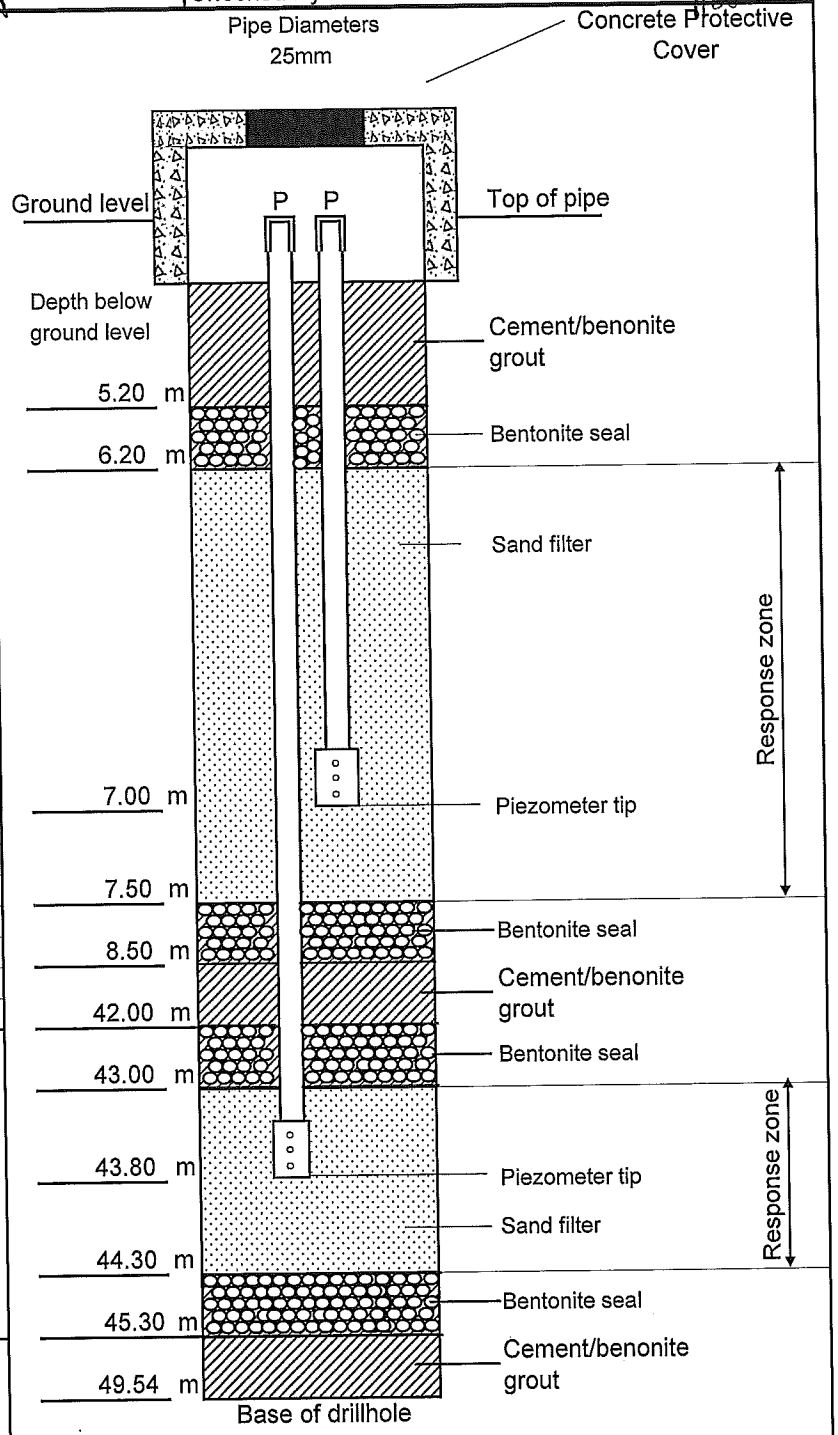
PIEZOMETER DETAIL AND RESPONSE TEST RECORD SHEET

Contractor	Fugro Geotechnical Services Ltd	Drillhole No.:	BH2A (Upper)
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, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)	Co-ordinates(m): E 817690.40 N 834103.84	
Initial Water Level:	3.57 m below G.L.	Piezometer Tip Level:	-0.50 mP.D.
Test/Supervised By:	K.C. Ng	Checked By:	A. Brock-Hollinshead

Elapsed Time (minutes)	Depth of Water from top of pipe (m)
0.00	0.00
0.25	0.47
0.50	0.85
0.75	1.18
1.00	1.55
1.50	2.08
2.00	2.33
3.00	2.85
4.00	3.14
5.00	3.30
6.00	3.39
7.00	3.45
8.00	3.48
9.00	3.50
10.00	3.51
15.00	3.54
20.00	3.56
25.00	3.57

Material Surrounding Response Zone:
6.20m to 7.10m: Silty SAND. (ALLUVIUM)
7.10m to 7.50m: Sandy clayey SILT. (ALLUVIUM)

Remarks:
1. Halcrow buckets were installed from 0.50m to 4.00m at 0.50m intervals.



FUGRO GEOTECHNICAL SERVICES LTD

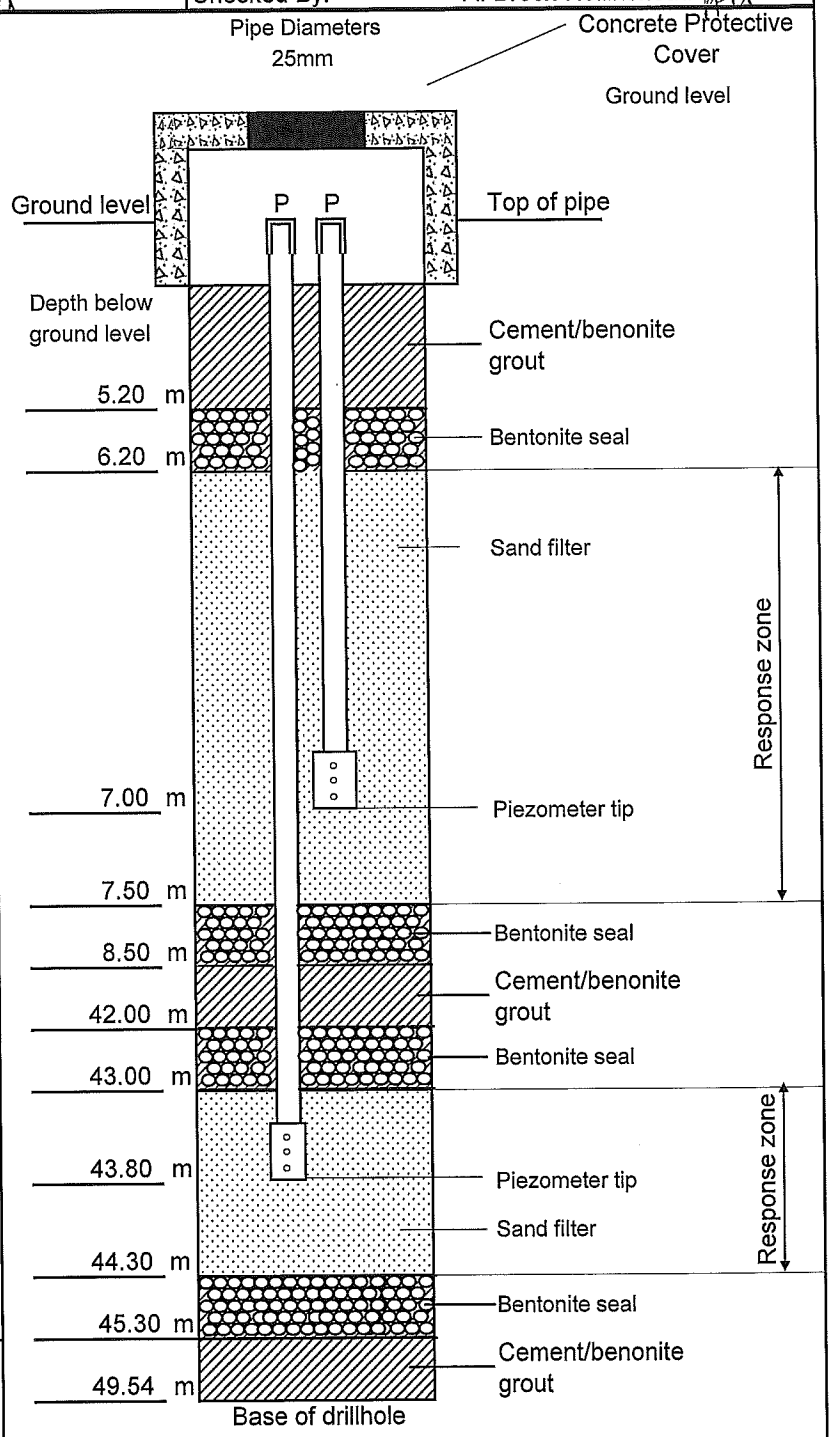
PIEZOMETER DETAIL AND RESPONSE TEST RECORD SHEET

Contractor	Fugro Geotechnical Services Ltd	Drillhole No.:	BH2A (Lower)
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, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)	Co-ordinates(m): E 817690.40 N 834103.84	
Initial Water Level:	3.47 m below G.L.	Piezometer Tip Level:	-37.30 mP.D.
Test/Supervised By:	K.C. Ng	Checked By:	A. Brock-Hollinshead

Elapsed Time (minutes)	Depth of Water from top of pipe (m)
0.00	0.00
0.25	0.37
0.50	0.73
0.75	1.02
1.00	1.30
1.50	1.79
2.00	2.19
3.00	2.73
4.00	3.07
5.00	3.26
6.00	3.37
7.00	3.41
8.00	3.44
9.00	3.47

Material Surrounding Response Zone:
43.00m to 44.24m: Highly decomposed METASILTSTONE
44.24m to 44.30m: Moderately decomposed METASILTSTONE

Remarks:
1. Halcrow buckets were installed from 0.50m to 4.00m at 0.50m intervals.



FUGRO GEOTECHNICAL SERVICES LTD

Groundwater Level Record Sheet

Contract No:	GE/2008/4	Works Order No :	GE/2008/4.4
Project :	PWP Item No. 7811TH, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)		

Drillhole No.	BH2A
Piezometer No.	P (Upper)
Installation Date	27/10/2008
AGMD Level (mPD)	N/A
AGMD S/N	N/A
Logger S/N	N/A
Gauge Factor (psi/Digit)	N/A
Thermal Factor (psi/°C)	N/A
R_0 ($F^2 \times 10^{-3}$)	N/A
T_0 (°C)	N/A

Co-ordinates:

Easting	(m)	817690.40
Northing	(m)	834103.84

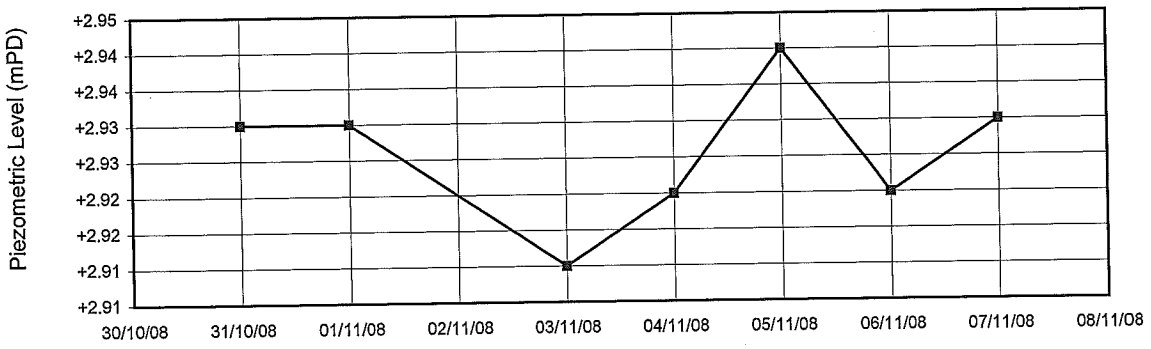
Season:

Wet	1 Apr to 31 Oct
Dry	1 Nov to 31 Mar

Standpipe Piezometer:

Top Level (mPD)	+6.50
Installed Tip Depth from Top Level (m)	7.00
Tip Level (mPD)	-0.50

Contractor: Fugro Geotechnical Services Ltd. Logged By: K.C. Ng Checked By : S.M. Pyle



(Automatic Groundwater Monitoring Device)					(Piezometer/Standpipe)			
Date / Time dd/mm/yy hh:mm	R_1 (Hz)	Temp (°C)	Pressure (mH_2O) Above	Piezometric Level (mPD)	Date Time dd/mm/yy hh:mm	Manual Dip (m below top)	Piezometric Level (mPD)	Remark
					31/10/08 09:20	3.57	2.93	
					01/11/08 09:10	3.57	2.93	
					03/11/08 09:30	3.59	2.91	
					04/11/08 10:00	3.58	2.92	
					05/11/08 09:30	3.56	2.94	
					06/11/08 09:20	3.58	2.92	
					07/11/08 09:10	3.57	2.93	

* AGMD = Automatic groundwater monitoring device

FUGRO GEOTECHNICAL SERVICES LTD

Groundwater Level Record Sheet

Contract No:	GE/2008/4	Works Order No :	GE/2008/4.4
Project :	PWP Item No. 7811TH, Ping Ha Road Improvement - Remaining Works (Ha Tsuen Section)		

Drillhole No.	BH2A
Piezometer No.	P (Lower)
Installation Date	27/10/2008
AGMD Level (mPD)	N/A
AGMD S/N	N/A
Logger S/N	N/A
Gauge Factor (psi/Digit)	N/A
Thermal Factor (psi/°C)	N/A
R_0 ($F^2 \times 10^{-3}$)	N/A
T_0 (°C)	N/A

Co-ordinates:

Easting	(m)	817690.40
Northing	(m)	834103.84

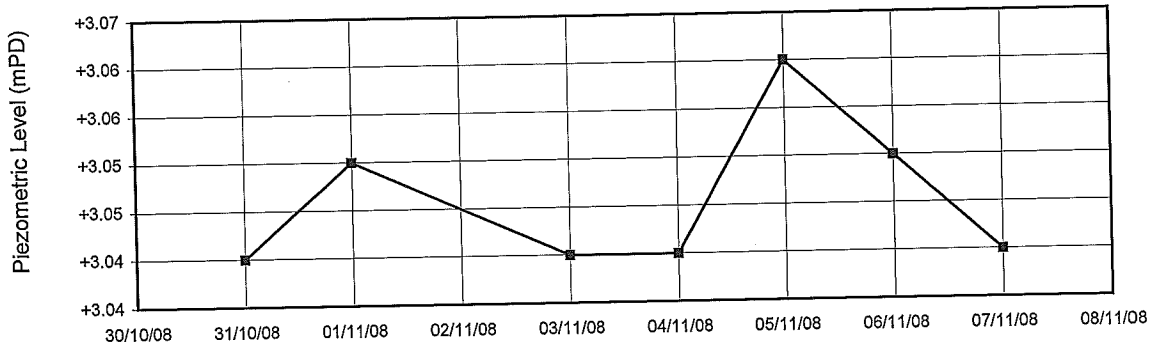
Season:

Wet	1 Apr to 31 Oct
Dry	1 Nov to 31 Mar

Standpipe Piezometer:

Top Level (mPD)	+6.50
Installed Tip Depth from Top Level (m)	43.80
Tip Level (mPD)	-37.30

Contractor: Fugro Geotechnical Services Ltd. Logged By: K.C. Ng Checked By : S.M. Pyle



(Automatic Groundwater Monitoring Device)					(Piezometer/Standpipe)			
Date / Time dd/mm/yy hh:mm	R_1 (Hz)	Temp (°C)	Pressure (mH_2O) Above	Piezometric Level (mPD)	Date Time dd/mm/yy hh:mm	Manual Dip (m below top)	Piezometric Level (mPD)	Remark
					31/10/08 09:20	3.46	3.04	
					01/11/08 09:10	3.45	3.05	
					03/11/08 09:30	3.46	3.04	
					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	
					07/11/08 09:10	3.46	3.04	

* AGMD = Automatic groundwater monitoring device

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

HONG KONG 1:20 000

香港 1:20 000

后 海 灣

HAU HOI WAN

(DEEP BAY)

FSWTL 2B

BOUNDARY OF AREA NUMBER 2 OF THE SCHEDULED AREAS

BOUNDARY OF AREA NUMBER 2 OF THE SCHEDULED AREAS

Signed :

(G. Barnes)

Secretary for Planning, Environment and Lands

Dated : 8th of June 1990

	initial	name	date
drawn		C. C. MAK	30-10-1989
checked		P. J. STRANGE	30-10-1989

drawing title

AREA NUMBER 2 OF THE SCHEDULED AREAS

drawing no.

GS-SP/714-1

scale

1:20 000

office

PLANNING DIVISION
GEOTECHNICAL CONTROL OFFICE

CIVIL ENGINEERING SERVICES DEPARTMENT HONG KONG

Appendix C – Preliminary Foundation Schemes

PLAN VIEW
(N.T.S.)

600mm DIA. BORED PILE
1000x1000x1500dp PILE CAP

1000mm DIA. BORED PILE
1400x1400x1500dp PILE CAP

1500mm DIA. BORED PILE
2000x2000x1500dp PILE CAP

NOTE:

1. PILE CAP DEPTH TO BE 1500mm UON.
2. SOCKET LENGTH TO BE 3m.
3. TENTATIVE PILE FOUNDING LEVEL -41.7mPD.
4. PILE CAP TO BE TIED BY GROUND BEAM 1000x1000dp BOTH DIRECTIONS.
5. REINFORCEMENT QUANTITY OF PILE CAP AND GROUND BEAM TO BE 150kg/m3 AND 180kg/m3 RESPECTIVELY.

BORED PILE FOUNDATION PROPOSAL

G/F

Scale 1:150 @ A3

Date : 31 OCT 2023

PLAN VIEW
(N.T.S.)

SOCKET-H PILE FOUNDATION PROPOSAL

305x305x233UC SOCKET-H PILE

1400x1000x1500dp PILE CAP

2200x1000x1500dp PILE CAP

NOTE:

1. PILE CAP DEPTH TO BE 1500mm UNLESS OTHER STATED.
2. SOCKET LENGTH TO BE 5.5m.
3. TENTATIVE PILE FOUNDING LEVEL -44.2mPD.
4. PILE CAP TO BE TIED BY GROUND BEAM 1000x1000dp BOTH DIRECTIONS.
5. REINFORCEMENT QUANTITY OF PILE CAP AND GROUND BEAM TO BE 150kg/m3 AND 180kg/m3 RESPECTIVELY.

G/F

Scale 1:150 @ A3

Date : 31 OCT 2023

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For more details, contact us:
Iota Sin | Principal Engineer
[redacted]

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