5．　当該国の社会・経済事情

国名	パプア・ニューギニア Papua New Guinea

一般指標					
政体	立憲君主国家	*1	首都	ポートモレスビー (Port Moresby)	*2
元首	英国女王 ／エリザベス二世	*1,3	主要都市名		*3
			雇用総数	2,154千人 (1996 年)	*6
独立年月日	1975年9月16日	*3,4	義務教育年数	年間 (1997 年)	*13
主要民族／部族名	パプア族、メラネシア族	*1,3	初等教育就学率	% (1996 年)	*6
主要言語	英語、ピジン英語	*1,3	中等教育就学率	% (1996 年)	*6
宗教	特に教徒多数、祖先崇拝等伝統的信仰	*1,3	成人非識字率	27.8 % (1995 年)	*13
国連加盟年	1975年10月10日	*12	人口密度	9.72 人/km2 (1996 年)	*6
世銀加盟年	1975年10月	*7	人口増加率	2.3 % (1996 年)	*6
IMF加盟年	1975年12月	*7	平均寿命	平均 57.53 男 56.80 女 58.30	*6
国土面積	452.86 千km2	*6	5歳児未満死亡率	85/1000 (1996 年)	*6
総人口	4,401千人 (1996 年)	*6	カロリー供給量	2,273.0cal/日/人 (1995 年)	*10

経済指標					
通貨単位	キナ (Kina)	*3	貿易量	(1996 年)	
為替レート	1 US $ = 2.90 (1999 年 9月)	*8	商品輸出	2,529.8 百万ドル	*15
会計年度	Dec. 31	*6	商品輸入	-1,513.3 百万ドル	*15
国家予算	(1994 年)		輸入カバー率	2.6 (月) (1996 年)	*14
歳入総額	1,220.53 百万キナ	*9	主要輸出品目	原油、金、銅、木材、コーヒー	*1
歳出総額	1,630.23 百万キナ	*9	主要輸入品目	機械・輸送機器、工業製品、燃料、食料	*1
総合収支	326.90 百万ドル (1996 年)	*15	日本への輸出	504.0 百万ドル (1997 年)	*16
ODA受取額	382.50 百万ドル (1996 年)	*18	日本からの輸入	157.0 百万ドル (1997 年)	*16
国内総生産(GDP)	5,165.00 百万ドル (1996 年)	*6			
一人当たりGNP	1,001.2 ドル (1996 年)	*6	相外貨準備額	607.2 百万ドル (1996 年)	*6
GDP産業別構成	農業 26.3 % (1996 年)	*6	対外債務残高	2,359.4百万ドル (1996 年)	*6
	鉱工業 40.4 % (1996 年)	*6	対外債務返済率(DSR)	12.6 % (1996 年)	*6
	サービス業 33.3 % (1996 年)	*6	インフレ率 (消費者価格物価上昇率)	7.4 % (1990-96 年)	*6
産業別雇用	農業 男 % 女 % (1996 年)	*6			
	鉱工業 % % (1996 年)	*6			
	サービス業 % % (1996 年)	*6	国家開発計画	経済開発政策 (Economic & Development Policies) (1993~97年	*11
実質GDP成長率	2.3 % (1996 年)	*6			

気象 (196 年~ 199 年平均) 観測地：ポートモレスビー (南緯9度26分、東経147度13分、標高47m) *4,5

月	1	2	3	4	5	6	7	8	9	10	11	12	平均/計
降水量	?	192.4	232.3	101.9	64.5	59.2	26.2	26.5	36.1	41.8	52.1	126.2	1,177.5 mm
平均気温	27.4	27.3	27.1	27.0	27.0	26.2	25.8	26.0	26.5	27.4	27.6	27.8	26.9 ℃

*1 各国概況 (外務省)
*2 世界の国々一覧表 (外務省)
*3 世界年鑑1998 (共同通信社)
*4 最新世界各国要覧9訂版 (東京書籍)
*5 理科年表1998 (国立天文台編)
*6 World Development Indicators1998
*7 The World Bank Public Information Center, International Financial Statistics Yearbook 1998
*8 Universal Currency Converter
*9 Government Finances Statistics Yearbook1997 (IMF)
*10 Human Development Report1998(UNDP)
*11 JCIF, JICA報告書,開発途上国国別経済協力シリーズ
*12 United Nations Member States
*13 UNESCO文化統計年鑑1997
*14 Global Development Finance1998(WB)
*15 International Finances Statistics 1998(IMF)
*16 世界各国経済情報ファイル1998(日本貿易振興会)
注：商品輸入については複式簿記の計上方式を採用しているため

国名	パプア・ニューギニア Papua New Guinea

我が国におけるODAの実績　（資金協力は約束額ベース、単位：億円）　＊17

項目＼暦年	1994	1995	1996	1997
技術協力	6.31	7.21	10.21	12.38
無償資金協力	20.18	16.46	17.90	27.06
有償資金協力	0.00	43.09	0.00	0.00
総額	26.49	66.76	28.11	39.44

当該国に対する我が国ODAの実績　（支出純額、単位：百万ドル）　＊17

項目＼暦年	1994	1995	1996	1997
技術協力	9.95	8.65	9.30	10.24
無償資金協力	14.28	28.71	14.18	16.99
有償資金協力	-2.40	8.74	72.70	21.97
総額	21.83	46.11	96.18	49.20

OECD 諸国の経済協力実績　（支出純額、単位：百万ドル）　＊18

	贈与 (1) (無償資金協力・技術協力)	有償資金協力 (2)	政府開発援助 (ODA) (1)+(2)=(3)	その他政府資金及び民間資金(4)	経済協力総額 (3)+(4)
二国間援助 (主要供与国)	283.30	67.00	350.30	-48.90	301.40
1. Australia	243.60	0.00	243.60	1.00	244.60
2. Japan	23.50	72.70	96.20	-31.00	65.20
3. New Zealand	5.50	0.00	5.50	0.00	5.50
4. Germany	7.10	-5.60	1.50	-6.50	-5.00
多国間援助 (主要援助機関)	33.90	-1.30	32.60	-15.70	16.90
1. CEC			21.30	-3.10	18.20
2. UNICEF			3.60	0.00	3.60
その他		-0.40	-0.40	0.00	-0.40
合計	317.20	65.30	382.50	-64.60	317.90

援助受入窓口機関　＊19

技術協力：開発実施省
無償　　：開発実施省
協力隊　：開発実施省

＊17　我が国の政府開発援助1998(国際協力推進協会)
＊18　Geographical Distribution of Financial Flows to Aid Recipients 1998(OECD)
＊19　JICA企画部地域課

6．　その他のデータ

GEOTECHNICAL REPORT FOR NATIONAL MEDIA CENTRE, WARD'S STRIP, GORDON, N.C.D.

GEOTECHNICAL REPORT

1. INTRODUCTION

The construction of the Centre for School Radio Programme in Port Moresby by the Government of Japan, Kume Sekkei Co. Ltd, and Local Government is proposed at Ward's Strip, Gordon. At the request of Mr. Shigeru Yasumatsu of Kume Sekkei Co. Ltd the project Architects, SMEC PNG Limited have undertaken an investigation for the project.

The project will generally comprise two storey buildings with cavity brick walls to the lower floors and timber framed, brick veneer walls to the upper floors. The roof is to be of timber trussed, steel clad construction. A suspended concrete floor at first level and concrete slab-on-ground is proposed. It is believed that shallow strip and pad footing system have been nominated by the project Engineers as the preferred footing options.

Associated works include the construction of parking areas, site profiling, and provision of services to the building and general site landscaping.

The objectives of this investigation were as follows:

- To determine the engineering properties of the subsoil profile over the construction area;
- To classify the construction area in accordance with AS 2870-1996, "Residential Slabs and Footings";
- To present recommendations on the suitable footing types for the proposed construction;
- To provide general construction recommendations relevant to the site;
- To comment on earthquake rating and liquefaction potential characteristics;
- To comment on groundwater conditions;
- To assess of the safe bearing pressure at the founding level of the proposed building.

A plan of the site was provided by Kume Sekkei Co. Ltd. to assist with the sub-surface site investigation.

The fieldwork described in this report was carried out during April and May 1999.

2. SITE DESCRIPTION

The proposed construction site is located on the northern side of Gordon suburb. The location is shown on Figure 1. (Location plan). The site comprises a rectangular shaped block, which has been partly paved and currently used as a car park. The maximum dimensions of the block are approximately 100 m wide (east west) by 170 m long (north south). On the south side the site is bounded by undeveloped land. The block to the north and east sides is bounded by existing school buildings. To the west the block is bounded by Ward's Strip Road. The allotment is fully fenced.

The site topography is close to flat with an estimated cross fall of approximately 0.5 m towards the northern (right front) property boundary. A visual inspection across the site revealed that there is poor drainage at the front boundary, due to recent heavy rain periods.

Vegetation over the site comprises a poorly to well established grass cover with some medium to large sized trees. It is understood that a number of these trees are to remain as part of the final landscaping.

From the drawing provided, the new building is to be situated at the front side of the proposed site. The schematic design, showing borehole locations, is presented in Figure 2.

3. METHOD OF INVESTIGATION

3.1 Field Investigation

The field investigation was undertaken from 27 April to 3 May 1999. All aspects of this investigation were conducted in accordance with AS 1726-1996, *"Geotechnical Site Investigations"*.

During the field investigation two (2) boreholes, labelled BH-1 and BH-2 were advanced at the proposed building area, shown on Figure 2. The boreholes were drilled to the depth ranging from 13.0 to 13.6 m and were advanced using open augering techniques in the upper part and wash boring and coring in the lower part of boreholes. Coring was not possible due to the low -medium strength and degree of weathering of the rock profile encountered. Drilling operations were carried out using a "Gemco 17601" trailer mounted drilling rig operated by a driller from Central Drilling Pty Ltd. Kume Sekkei Co. Ltd nominated borehole locations.

Standard Penetration Tests (SPT) were carried out in the boreholes at depth intervals of 1 m. The results of these tests are presented on the borelogs. The SPT tests were carried out in order to assess the insitu strength of the subsurface soil profile.

Field operations were carried out under the direction and supervision of a Geotechnical Engineer from SMEC PNG Ltd, who maintained a continuous log record of each borehole, recovered representative soil samples, recorded field test results and groundwater levels.

The boreholes are located as shown on Figure 2, Site plan. Engineering logs and test results are presented in Appendix A of this report.

3.2 Sampling and Laboratory Testing

Soil samples were recovered for visual classification and laboratory testing purposes. Undisturbed soil samples were recovered from BH-1 to BH-2 at depths ranging from 2.0 m to 8.0 m, respectively by pushing thin walled tube samplers (U-50's) with the drill rig. Disturbed soil samples were recovered from both boreholes in a depth range of 1.0 to 9.0 m respectively.

Laboratory testing for engineering properties was performed in the laboratory of SMEC-PNG Ltd and Earthtech Laboratories Brisbane, Australia. The laboratory program comprised the following tests:

- Undisturbed Samples
  - Unconfined Compressive Strength (UCS)
  - Quick Multistage Triaxial (UU)
  - One Dimensional Consolidations.
- Disturbed Samples
  - Atterberg Limits
  - Particle Size Distributions (Grading)
  - Natural Moisture Content
  - Density Test

All physical testing was undertaken in accordance with AS 1289, *Methods of Testing Soils for Engineering Purposes*. The results of the work are presented in Appendix B.

4. SUBSOIL PROFILE

The 1:50,000 scale Geological Map and Port Moresby Urban Geology (Reference 1) indicates that the site is underlain by Holocene deposits, comprising alluvial and colluvial silty clay with sand and gravel, overlying extremely weathered Dokuna tuff above slightly weathered tuff. The consistency of the clay grades from firm near the surface to stiff and hard at depth. The site investigation revealed a subsoil profile consistent with the mapped information.

In summary soil profile encountered comprises Topsoil, Alluvium and Colluvium overlying extremely weathered tuff above slightly weathered tuff.

A brief summary of the soil strata encountered is provided below in Table 1:

Table . 1 Soil strata in boreholes

Soil Type	BH – 1 (m)	BH – 2 (m)
Silty clay (Top soil)	0.00 – 1.70	0.00 - 1.10
Silty clay (Alluvium)	1.70 – 2.70	1.10 – 2.20
Silty-clayey gravel (Colluvium)	2.70 – 5.10	2.20 – 4.30
Sandy clay (Highly Weathered Tuff)	5.10 – 9.00	4.30 – 9.00
Tuff (Slightly Weathered Tuff)	9.00 – 13.0	9.00 – 13.6
Water level	7.20	7.80

Groundwater was encountered in BH1 and BH2 at depths ranging from 7.20 to 7.80 m.

5. GEOTECHNICAL EVALUATION

The engineering properties of the soil strata penetrated have been assessed through visual description, drilling penetration rates and the results of field and laboratory testing. A description of each significant soil strata encountered is presented below:

TOP SOILS

The surface soil comprises silty clay overlying alluvial soils to a depth ranging from 1.1 to 1.7m The soils were generally black in colour, high plasticity, firm consistency, with some rounded gravel with a maximum diameter of 10 mm.

Standard Penetrometer Tests carried out produced variability in results between 8 and 20 blows, per 300 mm (N values) partly due to the presence of gravel and roots in the topsoils.

ALLUVIUM

The alluvial soil comprises silty clay with some gravel overlying colluvial soils to depths ranging from 2.2 to 2.7 m. The soils were generally gray-brown in color with high plasticity (e.g.LL = 72 %), reactive and ranged in consistency from stiff to very stiff.

In situ Standard Penetrometer Tests produced N values of 15 and 28 blows, due to presence of gravel.

COLLUVIUM

Silty-clayey gravel was encountered immediately below the alluvium to the depth ranging from 4.3 to 5.1 m. is poorly graded and ranged in consistency from medium dense to dense. These materials were gray-brown in color and high plasticity (e.g. LL = 55 %).

SPT results produced N values of 23 blows, indicate that the silty-clayey gravel in BH2 is medium dense and possesses relative density of 35 – 65 % at this depth.

HIGHLY WEATHERED TUFF

Encountered in both boreholes to the depth of 9.0 m. The weathered rock in borehole BH1 and BH2 has been logged as Highly Weathered Dokuna tuff. The rock strength as defined in AS 1726 –1996, Table A8 is low to medium. The material is generally sandy clay grey-brown in colour medium to high plasticity, stiff to hard consistency.

The SPT test > 50 blow confirm that the material is well compacted.

SLIGHTLY WEATHERED DOKUNA TUFF

The tuff is generally gray-brown in color and can be described as weak to medium strong. Results of SPT tests confirmed that the rock is fine to medium grained and intensely fractured. Auger (TC Bit) refusal occurred on the weathered tuff layer in both boreholes at depth of 9.0 m.

Engineering and soil strength properties are presented below:

Table. 2 Laboratory Test Results

Borehole/ Depth (m)	Material	MC %	LL %	PI %	LS %	Fi%	BD t/m³	Triaxial UU C kN/m²	ϕ (°)	Cc
BH-1(2.0-2.5)	Silty clay									0.11
BH-1(2.3-2.5)	Silty clay							70.0	0	0.24
BH-1(3.0-3.2)	Silty-clayey gravel									0.23
BH-1(6.0-6.3)	Sandy clay									
BH-2(1.0-1.5)	Silty clay	15.0	72	50	17	2.0	2.07			
BH-2(2.0-2.5)	Silty clay	11.0				32.2				
BH-2(3.0-3.5)	Silty-clayey gravel		51	33	14	2.0	2.31			
BH-2(3.6-3.8)	Silty-clayey gravel					42.6	2.10			
BH-2(4.0-4.3)	Silty-clayey gravel									
BH-2(4.6-4.8)	Sandy clay					33.0	2.07			
BH-2(5.5-5.7)	Sandy clay	13.3	N/P	-	-	33.2	2.23			
BH-2(7.5-7.8)	Sandy clay							102.0	0	

MC - Moisture Content (%), **LL** - Liquid Limit (%), **PI** - Plasticity Index (%), **LS** - Linear Shrinkage (%), **Grading/ Fi** - Fines 75 microns (%), **N/P** - Non-plastic, **BD** – Bulk Density of soil t/m³, **USC** - Unconfined Compressive Strength (q_u = kN/m²), **UU** - Quick Multistage Triaxial Test C (kN/m2), ϕ (degrees), **Cc** – One Dimensional Consolidations – Compression Index Cc.

5.1 Summary of Soil Properties

The SPT data provide the best available means of estimating soil shear strength and various correlations have been proposed using $N1_{(60)}$ values derived from field N values (Skempton, Ref. 2). The SPT N and $N1_{(60)}$ values obtained in the granular materials have been used to estimate the peak angle of internal friction, ϕ', following the general relationship given by Peck, Hanson and Thornburn (Ref. 3), where soils were considered to be normally consolidated.

Correction factors put forward by Skempton for calculating the $N1_{(60)}$ value also include; the test depth, age and degree of over-consolidation of the soil tested. Table 3 indicates the calculations of $N1_{(60)}$.

The undrained shear strength of cohesive deposits, where considered to be over consolidated, has been estimated from the relationship;
$C_u = 5 \times N1_{(60)}$ (Stroud, Ref. 4), which is applicable to clay of intermediate plasticity.

The stiffness of the soils was not measured directly. Consequently, values of the vertical shear modulus have also been derived from $N1_{(60)}$ values in granular deposits, and from estimated undrained shear strengths in cohesive materials. The relationship proposed by Bowles (Ref. 5) of $G_s = E_s/4$ where $E_s = 600 * (N + 6) + 2000$ has been adopted for the silty sandy and silty sandy gravely units. For cohesive materials, deformations have been determined (Ref. 5) taking shear moduli of:

$G = 250 * C_u$ under axial loading

$G = 150 * C_u$ under lateral loadings,

The SPT $N1_{(60)}$, estimated friction angle in granular soils, estimated undrained shear strength and estimated shear moduli for all materials are presented in Table 4.

Table 3. Calculation of SPT results and correlations

Material Type	NATIONAL MEDIA CENTRE SITE			N	N60	Effective Overburden Pressure (kPa)	C_N	$N(1)_{60}$	
	BH	DEPTH 1	DEPTH 2					BH-1	BH-2
Silty clay (Top soil)	BH-1	1.00	1.45	8	6.8	18	1.35	9	
Silty clay (Alluvium)	BH-1	2.00	2.45	15	12.75	36	1.14	15	
Silty-clayey gravel (Colluvium)	BH-1	3.00	3.45	30	28.5	54	1.00	29	
Silty-clayey gravel (Colluvium)	BH-1	4.00	4.45	36	34.2	72	0.90	31	
Silty-clayey gravel (Colluvium)	BH-1	5.00	5.45	38	38	90	0.80	30	
Sandy clay (Weathered tuff)	BH-1	6.00	6.45	85	85	108	0.75	64	
Sandy clay (Weathered tuff)	BH-1	7.00	7.45	65	65	126	0.75	49	
Sandy clay (Weathered tuff)	BH-1	8.00	8.15	52	52	144	0.70	36	
Diorite (Slightly weathered tuff)	BH-1	9.00	9.30	100	100	162	0.65	65	
Diorite (Slightly weathered tuff)	BH-1	10.00	10.15	100	100	180	0.65	65	
Diorite (Slightly weathered tuff)	BH-1	11.00	11.15	100	100	198	0.60	60	
Diorite (Slightly weathered tuff)	BH-1	12.00	12.15	100	100	216	0.60	60	
Diorite (Slightly weathered tuff)	BH-1	13.00	13.00	100	100	234	0.55	55	
Silty clay (Top soil)	BH-2	1.00	1.45	20	17	18	1.35		23
Silty clay (Alluvium)	BH-2	2.00	2.45	28	23.8	36	1.14		27
Silty-clayey gravel (Colluvium)	BH-2	3.00	3.45	23	21.85	54	1.00		22
Silty-clayey gravel (Colluvium)	BH-2	4.00	4.45		PUSH	TUBE			
Sandy clay (Weathered tuff)	BH-2	5.00	5.45	41	41	90	0.80		33
Sandy clay (Weathered tuff)	BH-2	6.00	6.45	47	47	108	0.75		35
Sandy clay (Weathered tuff)	BH-2	7.00	7.45	55	55	126	0.75		41
Sandy clay (Weathered tuff)	BH-2	8.00	8.00	55	55	144	0.70		39
Sandy clay (Weathered tuff)	BH-2	9.00	9.45	29	29	162	0.65		19
Diorite (Slightly weathered tuff)	BH-2	10.00	10.30	100	100	180	0.65		65
Diorite (Slightly weathered tuff)	BH-2	11.00	11.15	100	100	198	0.60		60
Diorite (Slightly weathered tuff)	BH-2	12.00	12.15	100	100	216	0.60		60
Diorite (Slightly weathered tuff)	BH-2	13.00	13.00	100	100	234	0.55		55

FOR ROD LENGTH (N60) AND OVERBURDEN (N(1) 60)
N60 corrections: 0.75 to 3m; 0.85 to 5m; 0.95 to 9m; 1 below 9m. Skempton 1986 (GT008) - assuming 1m of rods above GL.
C_N Values:adjustment for effective overburden pressure Based on Peck, Hanson & Thornburn (1974) and Liao and Whitman (1986).
N(1)60: Adjusted N using the subscript for the Standard Energy Ratio.

Standing Water Levels

BH-1 7.20 m
BH-2 7.80 m

Table. 4 ENGINEERING PROPERTIES OF SUB-SURFACE SOILS IN BOREHOLES

BH No.	Depth (m)		Field SPT N Value (Blows/ 300mm)	SPT N'_{60} Value	Soil Classification	Assigned		Cons. Status	Estimated Angle of Friction (deg)	Estimated Shear Modulus (MN/m^2) ($G_{no\,\phi}$)
	From	To				PI	$\sigma'v$			
bh 1	1.00	1.45	8	9.0	Silty clay (Top Soil)	50	18.0	normal	29	3
	2.00	2.45	15	15.0	Silty clay (Alluvium)	50	36.0	normal	31	4
	3.00	3.45	30	29.0	Silty-clayey gravel(Colluviu	32	54.0	normal	36	6
	4.00	4.45	36	31.0	Silty-clayey gravel(Colluviu	32	72.0	normal	36	6
	5.00	5.45	38	30.0	Silty-clayey gravel(Colluviu	32	90.0	normal	36	6
	6.00	6.45	85	64.0	Sandy clay (Weathered tuff	0	108.0	normal	41	11
	7.00	7.45	65	49.0	Sandy clay (Weathered tuff	0	126.0	normal	41	9
	8.00	8.15	52	36.0	Sandy clay (Weathered tuff	0	144.0	normal	41	7
	9.00	9.30	100	65.0	Tuff (Slightly weathered)	0	162.0	normal	41	11
	10.00	10.15	100	65.0	Tuff (Slightly weathered)	0	180.0	normal	37	11
	11.00	11.15	100	60.0	Tuff (Slightly weathered)	0	198.0	normal	37	10
	12.00	12.15	100	60.0	Tuff (Slightly weathered)	0	216.0	normal	37	10
	13.00	13.00	100	55.0	Tuff (Slightly weathered)	0	234.0	normal	37	10
bh2	1.00	1.45	20	23	Silty clay (Top Soil)	50	18	normal	34	5
	2.00	2.45	28	27	Silty clay (Alluvium)	50	36	normal	35	5
	3.00	3.45	23	22	Silty-clayey gravel(Colluviu	32	54	normal	34	5
	4.00	4.45	-	-	Silty-clayey gravel(Colluviu	32	-	normal	push tube	
	5.00	5.45	41	33	Sandy clay (Weathered tuff	0	90	normal	31	6
	6.00	6.45	47	35	Sandy clay (Weathered tuff	0	108	normal	32	7
	7.00	7.45	55	41	Sandy clay (Weathered tuff	0	126	normal	31	8
	8.00	8.00	55	39	Sandy clay (Weathered tuff	0	144	normal	35	7
	9.00	9.45	29	19	Sandy clay (Weathered tuff	0	162	normal	33	4
	10.00	10.30	100	65	Tuff (Slightly weathered)	0	180	normal	31	11
	11.00	11.15	100	60	Tuff (Slightly weathered)	0	198	normal	31	10
	12.00	12.15	100	60	Tuff (Slightly weathered)	0	216	normal	30	10
	13.00	13.00	100	55	Tuff (Slightly weathered)	0	234	normal	31	10

0 non plastic

6.0 SEISMICITY

According to the PNG Standard 1001-1982, Part 4 Earthquake Loading (Ref. 6), Port Moresby is within Zone 4, which covers the area with low occurrences of earthquakes in PNG. In this area, it is expected that there would be an average return period of about 75 years for an earthquake of Modified Mercalli Intensity 7, which is the lowest intensity likely to cause extensive damage.

It is apparent from Clause 3.4.2 that the subsoils beneath the site can be classified as '*firm*'. The potential for liquefaction at this site is low, as the soil is generally cohesive within 1 m to 9 m of the ground surface. The soil density is sufficiently high to withstand the intensity of shaking in the silty clay deposit.

7.0 LIQUEFACTION POTENTIAL

7.1 Theory

One of the problems associated with construction in regions of seismic activity is the potential for liquefaction of the subsoils during an earthquake event. The region of Port Moresby forming the study area in Zone 4 of the PNG seismic risk classification system (Ref. 7) *i.e.* in a low to low moderate risk area. The recommended design ground acceleration for the proposed building within Zone 4 is 0.24g.

The most important of the controlling factors for liquefaction are as follows:
(i) Particle Size: medium silt and medium sand are more susceptible to liquefaction than well-graded materials or principally fine or very coarse materials. The most susceptible particle size ranges are indicated on the relevant PSD plots, Figures 4 to 6, after Lee and Fitton (Ref. 8) and are proposed as design indicators by the Japanese Ministry of Works.
(ii) Groundwater: within uniform materials, as the depth to the water table increases, so too does the depth at which liquefaction is likely to occur.
(iii) Relative density: loose materials liquefy more easily than dense materials, requiring shorter duration and lower magnitude vibrations. The potential risk in terms of relative density can be assessed from reference to the SPT $N1_{(60)}$ value, as identified in Figure 7 to 8 (After Seed, Ref. 9).
(iv) Confining pressure: liquefaction potential is reduced as confining pressure increases, i.e. susceptibility generally reduces with depth below ground level.
(v) Intensity of ground acceleration: liquefaction is more likely to occur with larger ground accelerations. Larger ground accelerations will also effect denser soils and soils at greater depths.
(vi) Duration of event: increasing stress cycles related to the magnitude of the event increase the likelihood of liquefaction, particularly within denser soils under higher confining pressures.
(vii) Age of Soil: increasing soil age reduces the probability of liquefaction for several reasons. These include densification from previous earthquakes and over consolidation, degrees of cementation or interlocking of sand particles. Generally, such modifications to soil structure would be reflected in SPT N values.

The particle size distribution of soils has been taken into account by reference to limits derived from the work of Lee and Fitton (Ref. 8). The susceptibility to liquefaction of a soil on the basis of grading has been assessed from the following classification:

>50% Sand + Silt - High Risk
30 - 50% Sand + Silt - Moderate Risk
<30% Sand + Silt - Low Risk

Particle size distribution curves are plotted in Figures 4, 5 and 6.

Simplified procedures exist for evaluating stresses induced by ground accelerations and these can be related to the stresses required to cause liquefaction if the above variables are known. These relationships have been developed on the basis of stress conditions, which either caused or were insufficient to cause liquefaction in known earthquake events. Reference has been made to the manual, "Earthquake Engineering for Bridges in Papua New Guinea, (Ref. 7)", which describes procedures for determining liquefaction potential. Both of the procedures outlined in this manual (Chinese Code and Cyclic Stress Ratio methods) have been carried out. The soil susceptibility to liquefaction has been classified as high, moderate or low according to whether the data points plotted above, close to, or below the threshold values applicable to each method, as indicated in Figures 7 and 8.

7.2 Results

The alluvial sequence under the proposed building varying in consistency from firm to stiff below 1.7 m depth. Although the grading curves indicate a potential for liquefaction, the density of the soils reduces the hazard. Reference to Figures 4 to 7 supports this assessment. For purposes of determining the seismic coefficient C value, the site can be regarded as *"firm"* because competent material occurs below depth of 9.0 m in both boreholes. This is in accordance with PNGS 1001 - 1982: Part 4, Section 3.4.2 (Ref. 6).

7.3 Summary of Liquefaction Potential

Potential for liquefaction of the soils under the construction area has been assessed on the basis of grading (Figures 4 to 6), depth, Chinese Code and Cyclic Stress Ratio analyses (Figures 7 and 8). These assessments are summarised in Table 5 below.

Table. 5 Summary of Liquefaction Potential

Borehole/ Depth (m)	Material	Liquefaction Potential
BH-1 (0.0-1.7)	Silty clay	Low Risk
BH-1 (1.7-2.7)	Silty clay	Low Risk
BH-1 (2.7-5.1)	Silty-clayey gravel	Moderate Risk
BH-1 (5.1-9.0)	Sandy clay	Low Risk
BH-1 (9.0-13.0)	Dokuna Tuff	V. Low Risk
BH-2 (0.0-1.1)	Silty clay	Low Risk
BH-2 (1.1-2.2)	Silty clay	Low Risk
BH-2 (2.2-4.3)	Silty-clayey gravel	Moderate Risk
BH-2 (4.3-9.0)	Sandy clay	Low Risk
BH-2 (9.0-13.6)	Dokuna Tuff	V. Low Risk

8.0 GROUNDWATER CONSIDERATIONS

As noted in Section 4.0 groundwater was encountered during the investigation at approximate depths of 7.2 m and 7.8 m below the existing ground level. These levels remained consistent to the completion of the site investigation. The investigations were completed at the end of a long wet season and it is considered that this level is at a seasonal high. Thus the base groundwater level is expected to be below foundation levels. It is however possible that perched water tables could occur within the gravelly colluvium unit between 2.2 m and 5.1 m depths and consideration should be given to the possibility of water ingress from these levels.

9.0 FOUNDATION DESIGN PARAMETERS

On the basis of the borehole and laboratory test data it is clear that suitable founding depths can be achieved between about 1.2 m and 5.5 m depending upon the proposed building loads. The layered sequence of alluvium overlying colluvium, and in turn overlying a weathered bedrock unit is used as a basis for the recommended allowable bearing pressures, based on a combination of SPT data, triaxial shear tests, consolidation tests and general observations of the ground conditions. Alternative footing systems for this depth range are:

- Strip and pad footings and shallow depths
- Piled footings at greater depths

Strip and Pad Footings.

The following Table 6 provides this information for both strip and pad footings. It is expected that for lightly loaded areas that a founding depth of about 1.5 m to 2.5 m is applicable. Intermediate loads are expected to be founded in the colluvial layer below 2.2 to 2.7 m depth. It should be noted that the depths to each layer varies between boreholes, there being a deepening of the bedrock from BH2 towards BH1. The design depths of foundations within each layer should be adjusted depending upon proximity to each borehole.

Table 6. Recommended Allowable Bearing Pressures for Shallow Footings

Depth Range (m)		Material Description	Allowable Bearing Pressure (kPa)	
BH 1	BH 2		Strip Footings	Pad Footings
1.0 – 1.7	1.0 – 1.2	Black Silty CLAY, high plasticity TOPSOIL	50	40
1.7 – 2.7	1.2 – 2.2	Grey silty CLAY, low plasticity ALLUVIUM	120	95
2.7 – 5.1	2.2 – 4.3	Silty-clayey GRAVEL COLLUVIUM	250	200
5.1 +	4.3 +	Completely to highly weathered TUFF BEDROCK	400	325

The uppermost topsoil layer is reactive to changes in moisture contents and any footings located within this layer should be designed on the basis of an H (Unstable) classification in accordance with Australian Standard AS2870.1 *Residential Slabs and Footings*. Standard drawings provided by the PNG Department of Transport and Works provide the typical dimensions and reinforcing for concrete footings (refer attached Appendix D).

For the recommended allowable bearing pressures, settlements are expected to be limited to 20 mm. The laboratory test data indicate low consolidation coefficients for the silty clay alluvium layer and long term settlements should be minimal, provided the bearing pressures (applied by both live and dead loads) are limited to the recommended values in Table 6.

All spread footing excavations should be backfilled with suitable granular fill, compacted in layers not exceeding 200 mm in accordance with standard practices.

Any concrete raft or slab footings should be designed for allowable bearing pressures equivalent to strip footings and the slab should be placed on a compacted granular fill material at least 200 mm in thickness, with a sub-grade reaction modulus of at least 20 MPa/m.

Piled Footings.

For major column loads a piled foundation is recommended. Either driven steel pile or bored cast in-situ reinforced concrete piles can be the adopted design, depending upon available equipment, cost and the optimum design with respect to applied loads and depths to founding levels. Whichever system is adopted all piles should be extended to at least 5.5 m depth across the site to minimise the risk of differential settlement and to withstand the lateral loadings imposed by an earthquake of magnitude MM7.

For driven piles the recommendations for foundation bearing capacity are based on steel square or H Section piles. The attached Tables 7a and 7b provide the relevant design parameters for driven piles with a width of either 0.3 m or 0.4 m for data from both BH-1 and BH-2. It is expected that pile driving conditions will be relatively easy for this site.

For bored piles the profile is a circular section and the attached Tables 7c and 7d provide the relevant design parameters for piles with a diameter of either 0.5 m or 0.75 m. It is unlikely that support will be required for the pre-drilled pile holes, provided that the reinforcing and concrete are placed on the same day that the holes are completed.

Table 8 provides a summary of Tables 7a to 7d for the recommended depth of 5.5 m. The designs have been based on a single pile action, although for the number of piles required to withstand horizontal loadings these piles may behave as a group. However, despite the reduction factors for group action, it is our opinion that the vertical capacity for the recommended piles will likely be well in excess of the design loadings.

Table 8. Recommended Allowable Loads for Piles

Borehole	Pile Width (m)	Allowable End Bearing Load (kN)	Allowable Skin Friction (kN)
BH-1 Driven Piles	0.3	580	85
	0.4	1,000	110
BH-1 Bored Piles	0.5	1,600	55
	0.75	3,600	125
BH-2 Driven Piles	0.3	390	60
	0.4	690	80
BH-2 Bored Piles	0.5	1,000	35
	0.75	2,400	85

10.0 GENERAL CONSTRUCTION RECOMMENDATIONS

A positive drainage gradient should be ensured away from the building and slab areas at all times. Paving, surface drainage and underground piping will assist in achieving this.

As directed by AS 2870.1, limitations on vegetation and gardens along the perimeter of the building should be specified, to avoid damage and blocking of surface drainage and weephole drainage systems. Trees should be located no closer to the building than a distance of ¾ times the mature height of that species. This condition should be maintained throughout the life of the structure.

During landscaping operations, gravel filled drainage cut-off trenches may be employed where required to prevent surface water ponding or draining towards the perimeter footings. Trenches should be located on the high side of the proposed building and drain away from the building area.

Garden beds adjacent to the building should be avoided, and care should be taken not to over water these areas. Leaks in plumbing, including stormwater, sewerage and drainage should be repaired promptly.

11.0 SUMMARY

1. Fieldwork described in this report was carried out from 27 April to 3 May 1999;

2. Two boreholes, BH-1 and BH-2, were drilled, to depths of 13.0 m and 13.6 m respectively, at the proposed building site at Ward's Strip;

3. The site is underlain by Recent sediments, comprising alluvial silty clay and colluvial silty-clayey gravel to depths of 4.3 m to 5.1 m, overlying completely to highly weathered tuff of the Dokuna Tuff unit. Below 9 m depth the rock becomes slightly weathered;

4. According to PNG Standards 1001-1982, Part 4 the site is located within Zone 4 , with respect to Earthquake risk in PNG. This is a low risk zone and the site can be regarded as

"firm", in accordance with the definition in the Code;

5. The liquefaction potential has been classified as low risk;

6. Groundwater was encountered in both boreholes at depths of 7.2 m and 7.8 m;

7. Foundation designs are recommended for both shallow footing systems (strip and pad footings) and deeper piled footings. The shallow systems should be located in the alluvial and colluvial soils, with recommended allowable bearing pressures of between 50 kPa and 400 kPa for strip footings and 80% of these values for pad footings. Table 6 presents the detailed recommended allowable bearing pressures;

8. Piled footings can be either driven piles or cast in-situ bored piles. The recommended depth for each alternative is 5.5 m to allow for some socketing into the weathered rock to withstand lateral loads which may be applied by a magnitude MM7 earthquake. Allowable loads for driven piles of 0.3 m to 0.4 m width range between 400 kN and 1,000 kN. The allowable loads are considerable higher for bored piles, being 1,000 kN to 3,600 kN for piles of diameter 0.5 m to 0.75 m;

9. General construction recommendations emphasis the need for drainage, minimising the effects of large trees on the foundations and an awareness of ongoing maintenance.

12.0 REFERENCES

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Table 7a: NATIONAL MEDIA CENTRE SITE - FOUNDATION ALLOWABLE BEARING CAPACITY, DRIVEN PILES

BH -1

Pile Width = 0.3 m

Depth Range (m)	Level at base of layer	SPT N'_{60} (mean)	Bearing Capacity Factor Nq: Berentsev Note 1	Bearing Capacity Factor Nq: Meyerhof Note 2	Overburden Pressure sigma kN/m²	Friction Angle Tan phi	Ultimate Bearing Pressure q_f (kN/m²): Note 1	Ultimate Bearing Pressure q_f (kN/m²): Note 2 (not used)	Allowable End Bearing Load $A_b q_f$ (kN)	Allowable Friction Load $A_s f_s$ (kN)	Allowable Total Load (Ref 2) $A_b q_f + A_s f_s$ (kN)
0.0-1.7	1.7	9.0	20	80	18.00	0.5543	342	1,422	22	9	31
1.7-2.7	2.7	15.0	25	86	36.00	0.6008	864	3,060	54	19	74
2.7-5.1	5.1	31.0	60	250	72.00	0.7265	4,248	17,928	268	47	315
5.1-9.0	9	36.0	75	800	126.00	0.7536	9,324	100,674	587	85	673
9.0-13.0	13	33.0	75	320	180.00	0.7535	13,320	57,420	839	41	880

Pile Width = 0.4 m

Depth (m)	Level at base of layer	SPT N'_{60} (mean)	Bearing Capacity Factor Nq: Berentsev Note 1	Bearing Capacity Factor Nq: Meyerhof Note 2	Overburden Pressure sigma kN/m²	Friction Angle Tan phi	Ultimate Bearing Pressure q_f (kN/m²): Note 1	Ultimate Bearing Pressure q_f (kN/m²): Note 2 (not used)	Allowable End Bearing Load $A_b q_f$ (kN)	Allowable Friction Load $A_s f_s$ (kN)	Allowable Total Load (Ref 2) $A_b q_f + A_s f_s$ (kN)
0.0-1.7	1.7	9.0	20	80	18.00	0.5543	342	1,422	38	12	50
1.7-2.7	2.7	15.0	25	86	36.00	0.6008	864	3,060	97	26	123
2.7-5.1	5.1	31.0	60	250	72.00	0.7265	4,248	17,928	476	63	539
5.1-9.0	9	36.0	75	800	126.00	0.7535	9,324	100,674	1,044	114	1,158
9.0-13.0	13	33.0	75	320	180.00	0.7535	13,320	57,420	1,492	54	1,546

Notes:
1 Tomlinson (Ref 10)
2 Meyerhof (Ref 11)

Table 7b: NATIONAL MEDIA CENTRE SITE - FOUNDATION ALLOWABLE BEARING CAPACIT, DRIVEN PILES

BH - 2

Pile Width = 0.3 m

Depth Range (m)	Level at base of layer	SPT N'60 (mean)	Bearing Capacity Factor Nq: Berentsev Note 1	Bearing Capacity Factor Nq: Meyerhof Note 2	Overburden Pressure sigma kN/m²	Friction Angle Tan phi	Ultimate Bearing Pressure qf (kN/m²): Note 1	Ultimate Bearing Pressure qf (kN/m²): Note 2 (not used)	Allowable End Bearing Load Abqf (kN)	Allowable Friction Load Asfs (kN)	Allowable Total Load (Ref 2) AbqF + Asfs (kN)
0.0-1.1	1.1	23	40	200	18	0.6745	702	3,582	44	11	55
1.1-2.2	2.2	27	58	250	36	0.7000	2,052	8,964	129	23	152
2.2-4.3	4.3	22	40	200	54	0.6494	2,106	10,746	133	32	164
4.3-9.0	9	33	70	300	90	0.74	6,210	26,910	391	60	451
9.0-13.6	13.6	36	75	300	180	0.7535	13,320	53,820	839	122	961

Pile Width = 0.4 m

Depth (m)	Level at base of layer	SPT N'60 (mean)	Bearing Capacity Factor Nq: Berentsev Note 1	Bearing Capacity Factor Nq: Meyerhof Note 2	Overburden Pressure sigma kN/m²	Friction Angle Tan phi	Ultimate Bearing Pressure qf (kN/m²): Note 1	Ultimate Bearing Pressure qf (kN/m²): Note 2 (not used)	Allowable End Bearing Load Abqf (kN)	Allowable Friction Load Asfs (kN)	Allowable Total Load (Ref 2) AbqF + Asfs (kN)
0.0-1.1	1.1	23	40	200	18	0.6745	702	3,582	79	15	93
1.1-2.2	2.2	27	58	250	36	0.7000	2,052	8,964	230	30	260
2.2-4.3	4.3	22	40	200	54	0.6494	2,106	10,746	236	42	278
4.3-9.0	9	33	70	300	90	0.74	6,210	26,910	696	80	775
9.0-13.6	13.6	36	75	300	180	0.7535	13,320	53,820	1,492	163	1,655

Notes: 1 Tomlinson (Ref 10)
2 Meyerhof (Ref 11)

Table 7c: NATIONAL MEDIA CENTRE SITE - FOUNDATION ALLOWABLE BEARING CAPACIT, BORED PILES

BH -1

Pile Width = 0.5 m

Depth Range (m)	Level at base of layer	SPT N'_{60} (mean)	Bearing Capacity Factor Nq: Berentsev Note 1	Bearing Capacity Factor Nq: Meyerhof Note 2	Overburden Pressure sigma kN/m²	Friction Angle Tan phi	Ultimate Bearing Pressure q_f (kN/m²): Note 1	Ultimate Bearing Pressure q_f (kN/m²): Note 2 (not used)	Allowable End Bearing Load $A_b q_f$ (kN)	Allowable Friction Load $A_s f_s$ (kN)	Allowable Total Load (Ref 2) $A_b q_f + A_s f_s$ (kN)
0.0-1.7	1.7	9.0	20	80	18.00	0.5543	342	1,422	60	6	66
1.7-2.7	2.7	15.0	25	86	36.00	0.6008	864	3,060	151	13	164
2.7-5.1	5.1	31.0	60	250	72.00	0.7265	4,248	17,928	743	31	774
5.1-9.0	9	36.0	75	800	126.00	0.7536	9,324	100,674	1,632	56	1,688
9.0-13.0	13	33.0	75	320	180.00	0.7535	13,320	57,420	2,331	80	2,411

Pile Width = 0.75 m

Depth (m)	Level at base of layer	SPT N'_{60} (mean)	Bearing Capacity Factor Nq: Berentsev Note 1	Bearing Capacity Factor Nq: Meyerhof Note 2	Overburden Pressure sigma kN/m²	Friction Angle Tan phi	Ultimate Bearing Pressure q_f (kN/m²): Note 1	Ultimate Bearing Pressure q_f (kN/m²): Note 2 (not used)	Allowable End Bearing Load $A_b q_f$ (kN)	Allowable Friction Load $A_s f_s$ (kN)	Allowable Total Load (Ref 2) $A_b q_f + A_s f_s$ (kN)
0.0-1.7	1.7	9.0	20	80	18.00	0.5543	342	1,422	135	13	148
1.7-2.7	2.7	15.0	25	86	36.00	0.6008	864	3,060	340	29	369
2.7-5.1	5.1	31.0	60	250	72.00	0.7265	4,248	17,928	1,673	69	1,742
5.1-9.0	9	36.0	75	800	126.00	0.7535	9,324	100,674	3,671	126	3,797
9.0-13.0	13	33.0	75	320	180.00	0.7535	13,320	57,420	5,245	180	5,425

Notes:
1 Tomlinson (Ref 10)
2 Meyerhof (Ref 11)

Table 7d: NATIONAL MEDIA CENTRE SITE - FOUNDATION ALLOWABLE BEARING CAPACIT. BORED PILES

BH - 2

Pile Width = 0.5 m

Depth Range (m)	Level at base of layer	SPT N'_{60} (mean)	Bearing Capacity Factor Nq: Berentsev Note 1	Bearing Capacity Factor Nq: Meyerhof Note 2	Overburden Pressure sigma kN/m²	Friction Angle Tan phi	Ultimate Bearing Pressure q_f (kN/m²): Note 1	Ultimate Bearing Pressure q_f (kN/m²): Note 2 (not used)	Allowable End Bearing Load $A_b q_f$ (kN)	Allowable Friction Load $A_s f_s$ (kN)	Allowable Total Load (Ref 2) $A_b q_f + A_s f_s$ (kN)
0.0-1.1	1.1	23	40	200	18	0.6745	702	3,582	123	7	130
1.1-2.2	2.2	27	58	250	36	0.7000	2,052	8,964	359	15	374
2.2-4.3	4.3	22	40	200	54	0.6494	2,106	10,746	369	21	389
4.3-9.0	9	33	70	300	90	0.74	6,210	26,910	1,087	39	1,126
9.0-13.6	13.6	36	75	300	180	0.7535	13,320	53,820	2,331	80	2,411

Pile Width = 0.75 m

Depth (m)	Level at base of layer	SPT N'_{60} (mean)	Bearing Capacity Factor Nq: Berentsev Note 1	Bearing Capacity Factor Nq: Meyerhof Note 2	Overburden Pressure sigma kN/m²	Friction Angle Tan phi	Ultimate Bearing Pressure q_f (kN/m²): Note 1	Ultimate Bearing Pressure q_f (kN/m²): Note 2 (not used)	Allowable End Bearing Load $A_b q_f$ (kN)	Allowable Friction Load $A_s f_s$ (kN)	Allowable Total Load (Ref 2) $A_b q_f + A_s f_s$ (kN)
0.0-1.1	1.1	23	40	200	18	0.6745	702	3,582	276	16	293
1.1-2.2	2.2	27	58	250	36	0.7000	2,052	8,964	808	33	841
2.2-4.3	4.3	22	40	200	54	0.6494	2,106	10,746	829	46	876
4.3-9.0	9	33	70	300	90	0.74	6,210	26,910	2,445	88	2,533
9.0-13.6	13.6	36	75	300	180	0.7535	13,320	53,820	5,245	180	5,425

Notes: 1 Tomlinson (Ref 10)
2 Meyerhof (Ref 11)

SMEC

SMEC-PNG LTD

PROJECT: The Centre for School Radio Programme in PNG No: J - 147
LOCATION: Wards Strip, Gordon, N.C.D.
CLIENT: Kume Sekkei Co, Ltd Date: April 1999

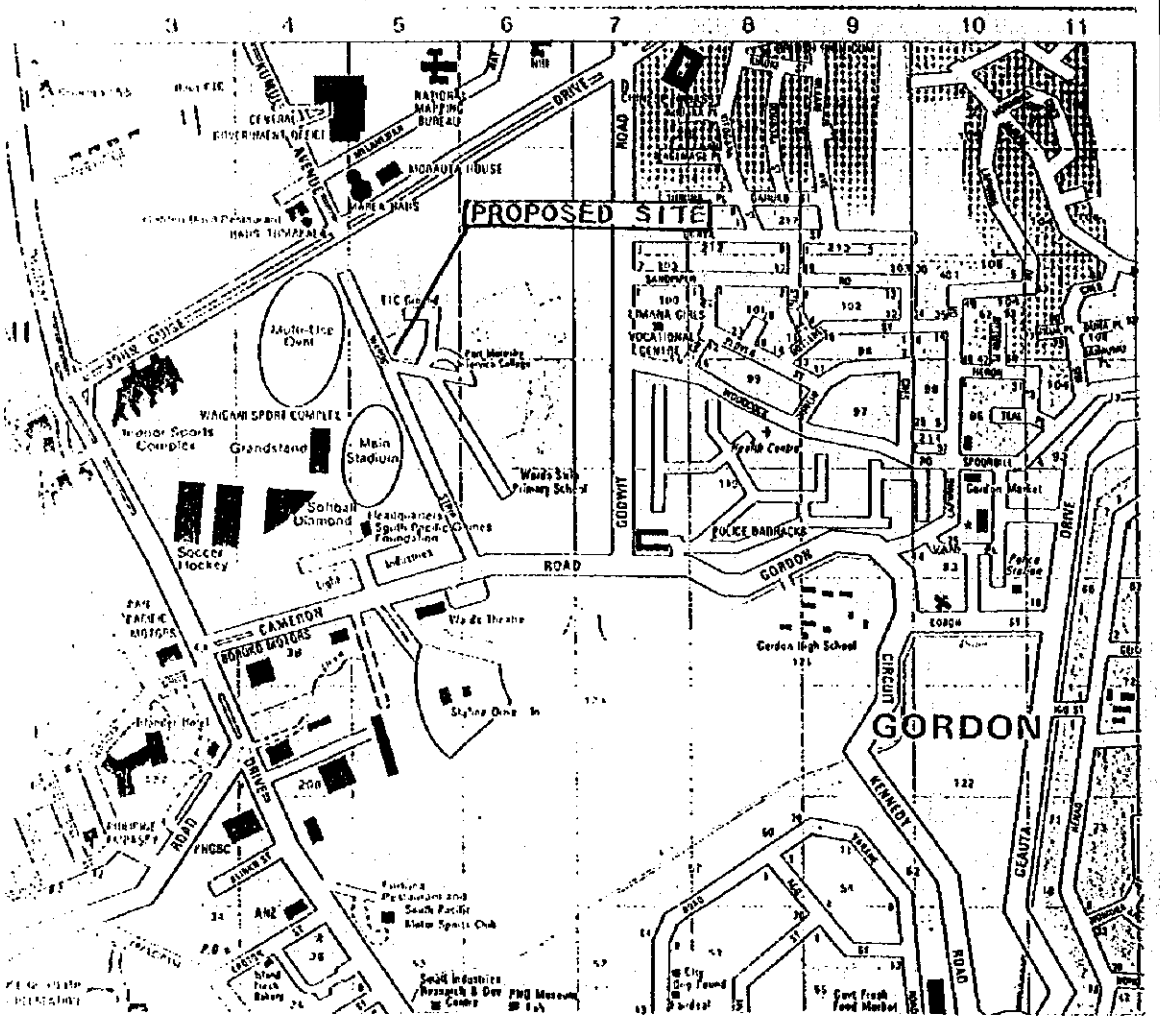

Figure 1 Location plan

SMEC

SMEC-PNG LTD

PROJECT:	The Centre for School Radio Programme in PNG	**No:**	J - 147
LOCATION:	Wards Strip, Gordon, N.C.D.		
CLIENT:	Kume sekkei Co, Ltd	**Date:**	April 1999

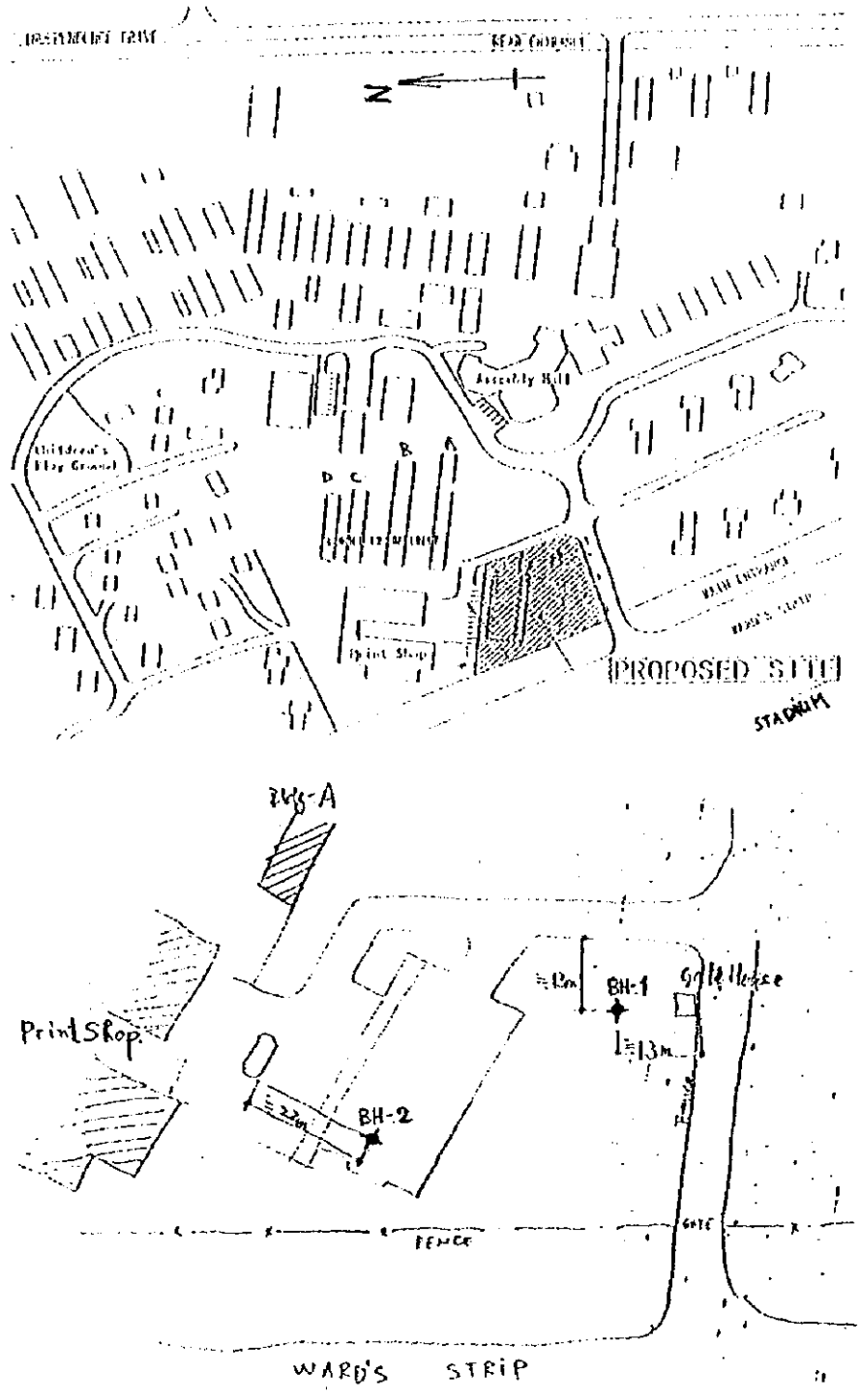

Figure 2 **Site Geomorphology Plan Showing Test Locations**

SMEC

SMEC-PNG LTD

PROJECT: The Centre for School Radio Programme in PNG No: J - 147
LOCATION: Wards Strip, Gordon, N.C.D.
CLIENT: Kume Sekkei Co, Ltd Date: April 1999

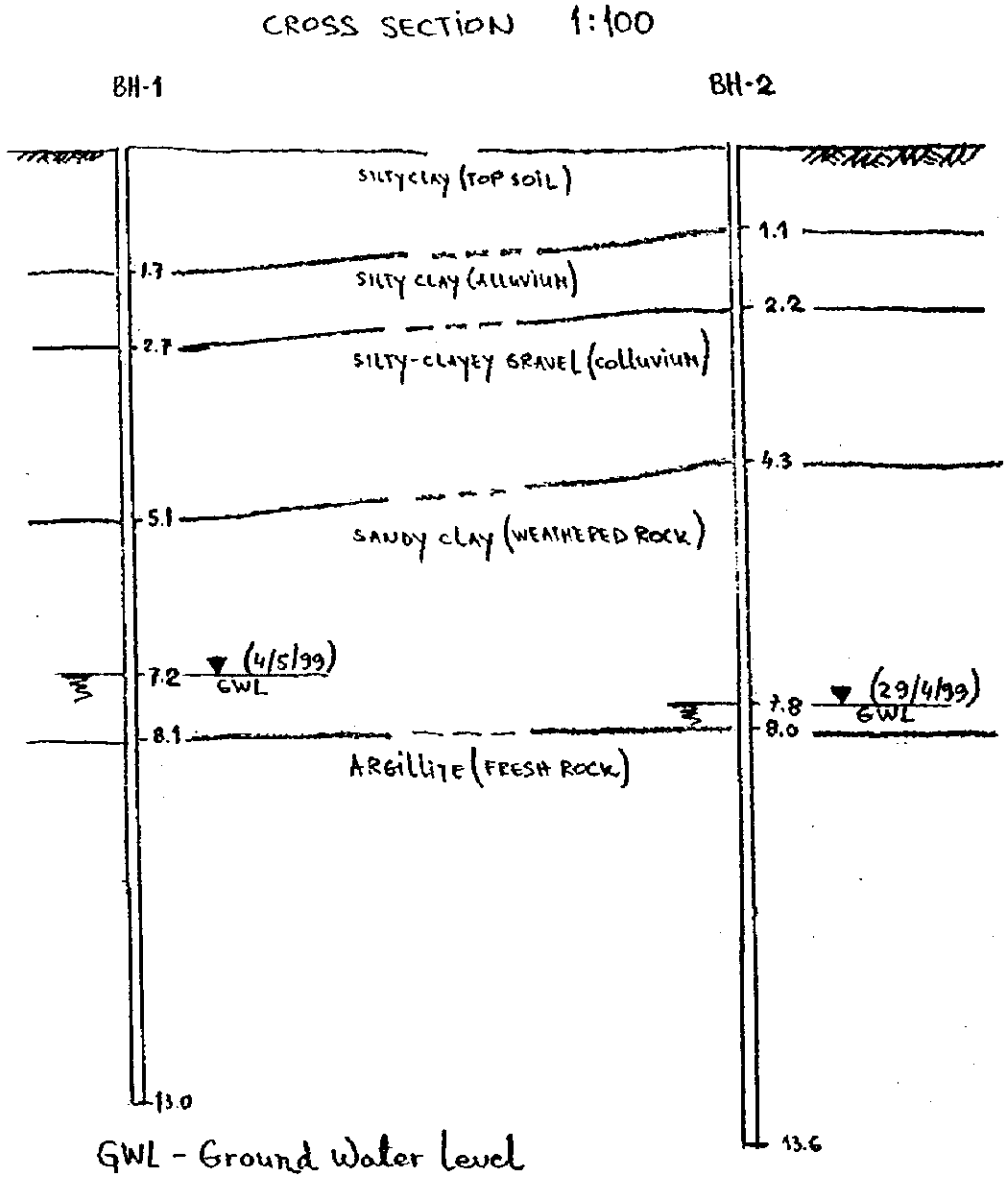

Figure 3 Borehole Site Profile

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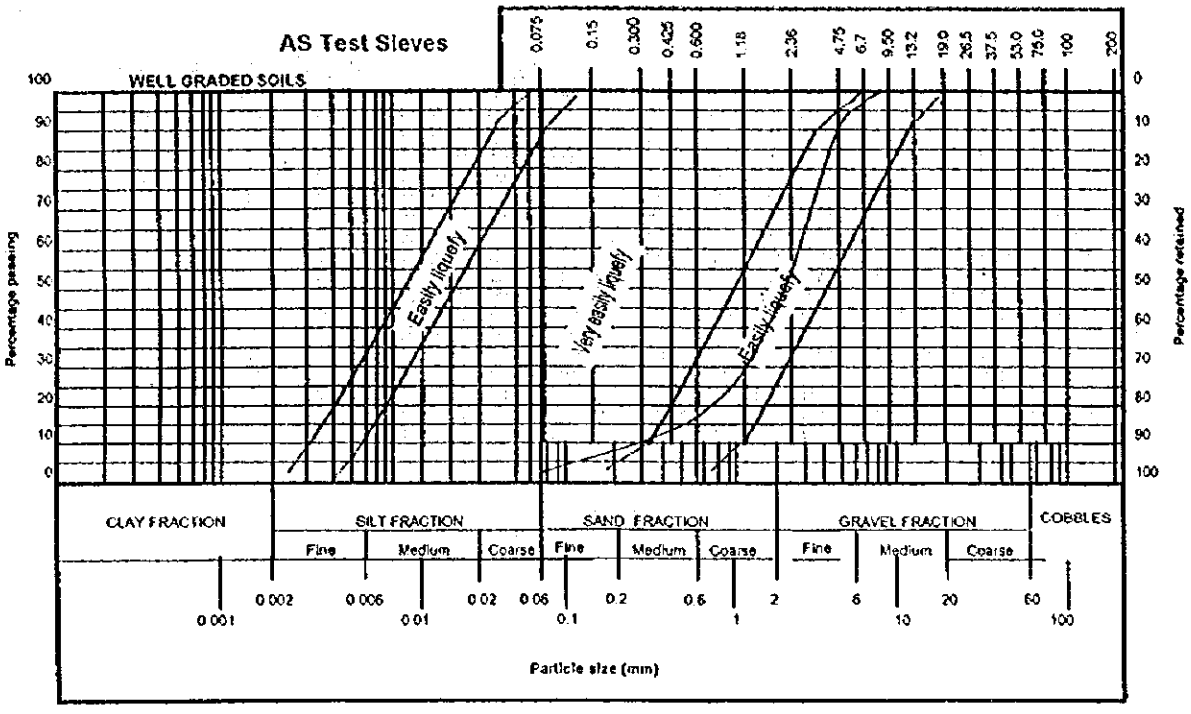
Email: smecpom@datec.com.pg

SOIL LIQUEFACTION POTENTIAL.

Client: Kume Sekkei Co, Ltd.	Project number: J - 147
Project: The Centre for School Radio Programme	Location: Ward's Strip, Gordon, N.C.D. BH-2 (1.0-1.45 m)



Client: Kume Sekkei Co, Ltd.	Project number: J - 147
Project: The Centre for School Radio Programme	Location: Ward's Strip, Gordon, N.C.D. BH-2 (2.0-2.5 m)

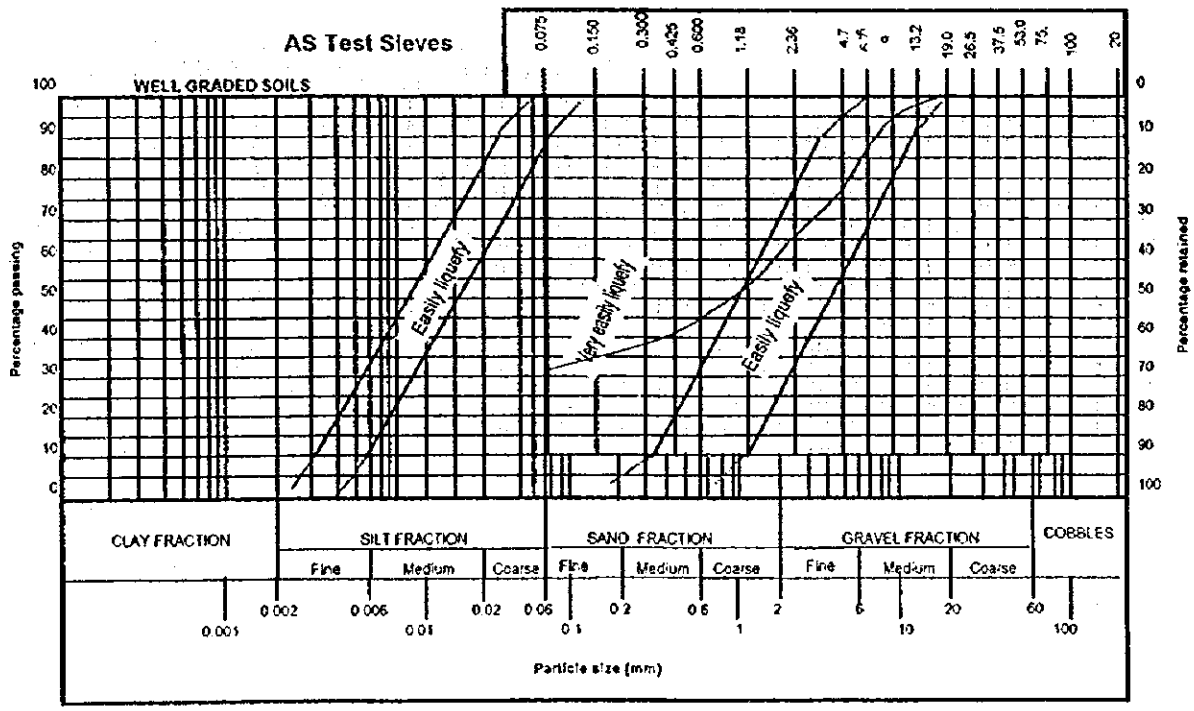
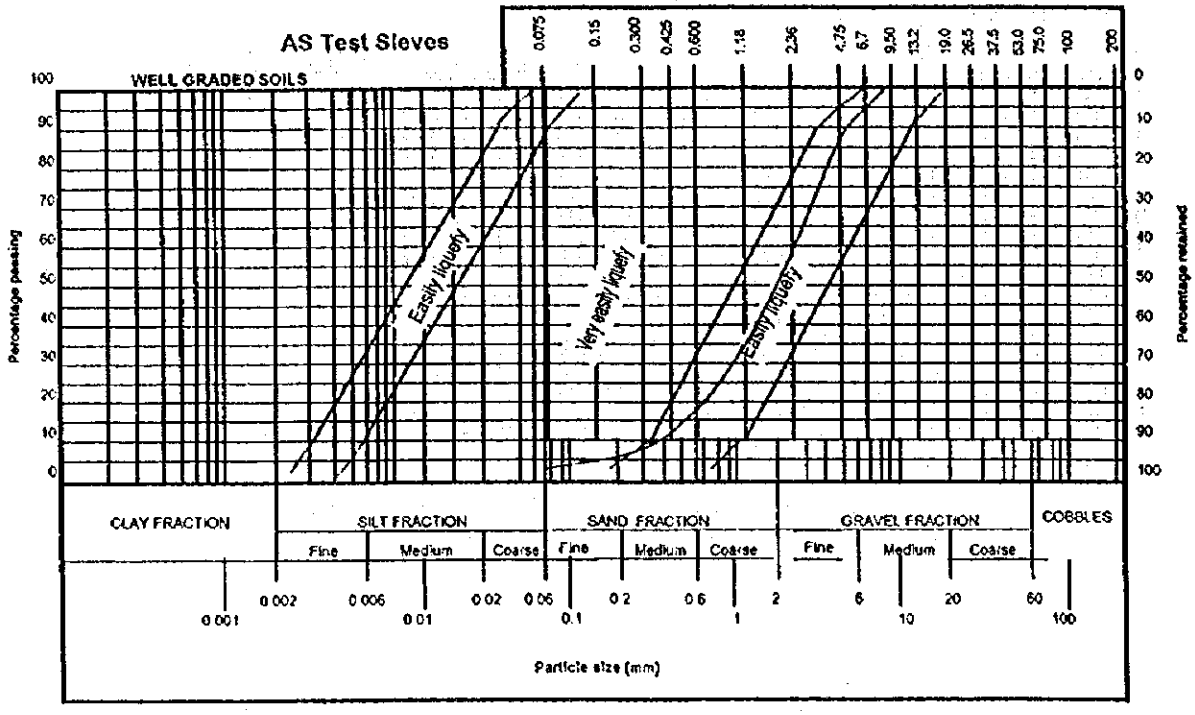


Figure 4 Iliquefaction Assessment, PSD Plots: Borehole No: 2

SMEC - Engineering Geology
Unit 5, Section 58, Lot 3, Waigani Drive, Gordons, NCD
PO Box 4468, BOROKO, NCD, Papua New Guinea
Phone: +675 325 1822 Fax: +675 325 3780
Email: smecpom@datec.com.pg

SOIL LIQUEFACTION POTENTIAL

Client: Kume Sekkei Co, Ltd.	Project number: J - 147
Project: The Centre for School Radio Programme	Location: Ward's Strip, Gordon, N.C.D. BH-2 (3.0-3.45 m)



Client: Kume Sekkei Co, Ltd.	Project number: J - 147
Project: The Centre for School Radio Programme	Location: Ward's Strip, Gordon, N.C.D. BH-2 (3.6-3.8 m)

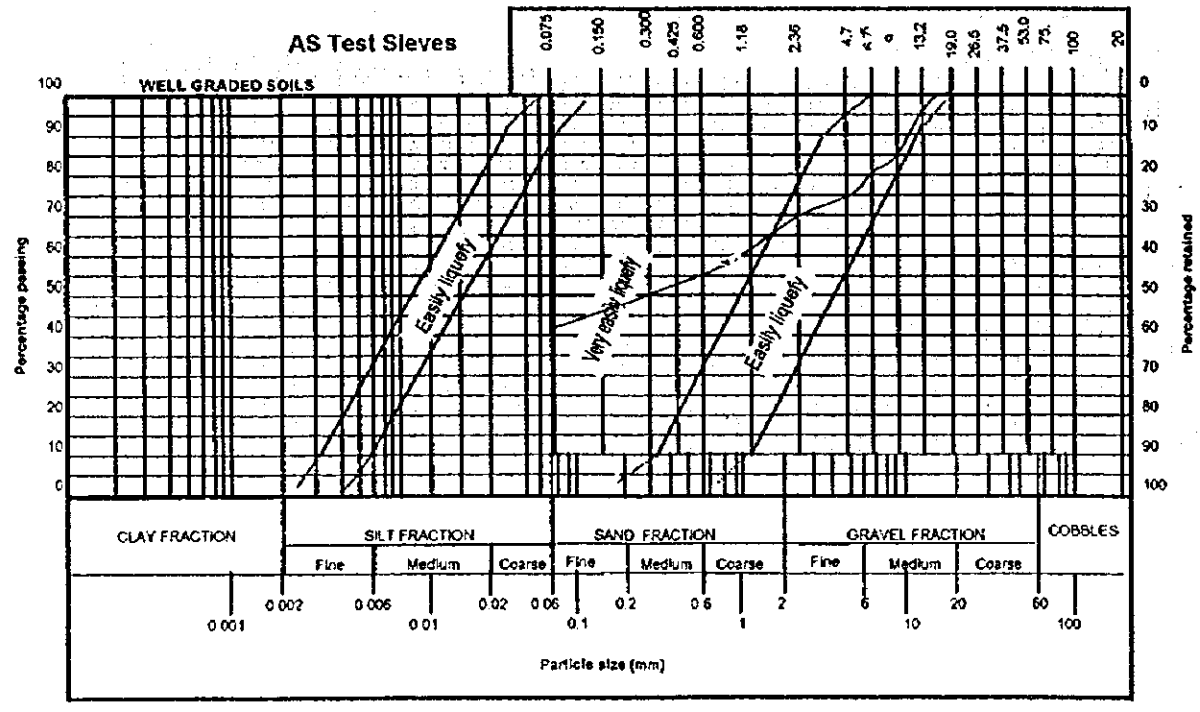
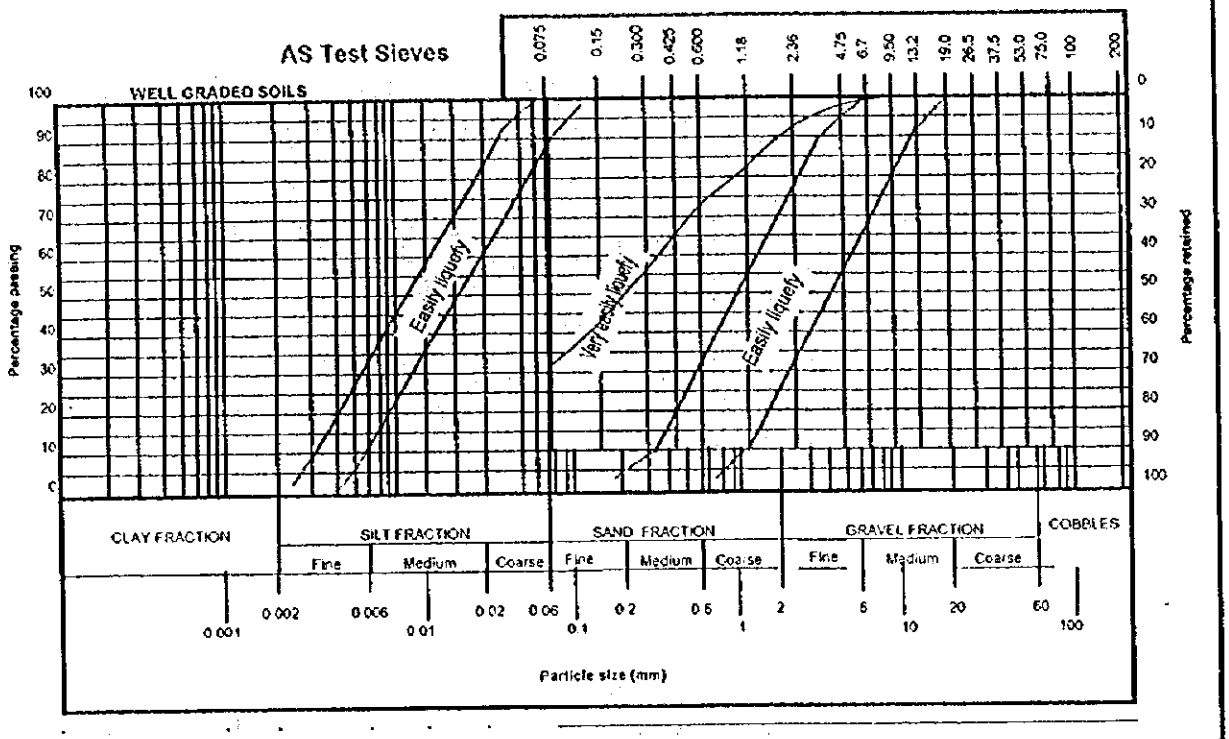


Figure 5 liquefaction Assessment, PSD Plots: Borehole No: 2

SMEC - Engineering Geology
Unit 5, Section 58, Lot 3, Walgani Drive, Gordons, NCD
PO Box 4468, BOROKO, NCD, Papua New Guinea
Phone: +675 325 1922 Fax: +675 325 3780
Email: smecpom@datec.com.pg

SOIL LIQUEFACTION POTENTIAL

Client: Kume Sekkei Co, Ltd.	Project number: J - 147
Project: The Centre for School Radio Programme	Location: Ward's Strip, Gordon, N.C.D. BH-2 (4.6-4.8 m)



Client: Kume Sekkei Co, Ltd.	Project number: J - 147
Project: The Centre for School Radio Programme	Location: Ward's Strip, Gordon, N.C.D. BH-2 (5.5-5.7 m)

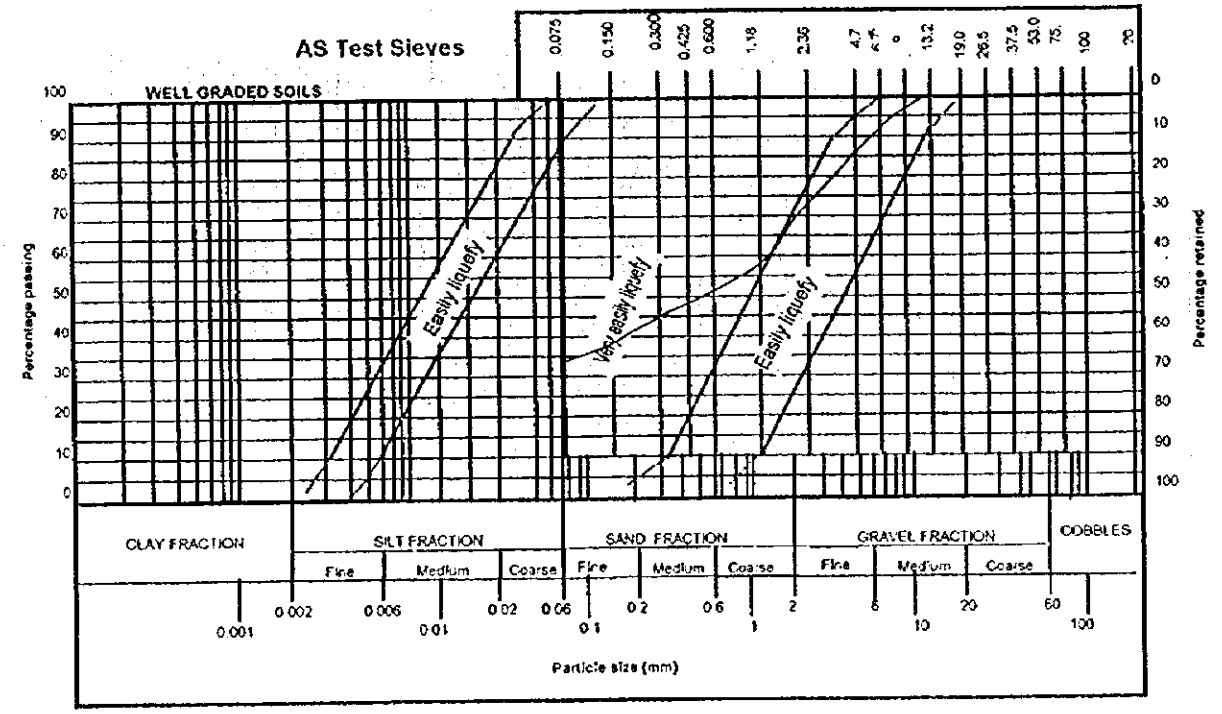


Figure 6 **liquefaction Assessment, PSD Plots: Borehole No: 2**

SMEC - Engineering Geology
Unit 5, Section 58, Lot 3, Walgani Drive, Gordon, NCD
PO Box 4468, BOROKO, NCD, Papua New Guinea
Phone: +675 325 1822 Fax: +675 325 3780
Email: smecpom@datec.com.pg

PROJECT: The Centre for School Radio Programme in PNG
LOCATION: Ward's Strip, Gordon, N. C. D.
CLIENT: Kume Sekkei Co, Ltd

No: J - 147
BOREHOLE: BH - 1
DATE: May '99

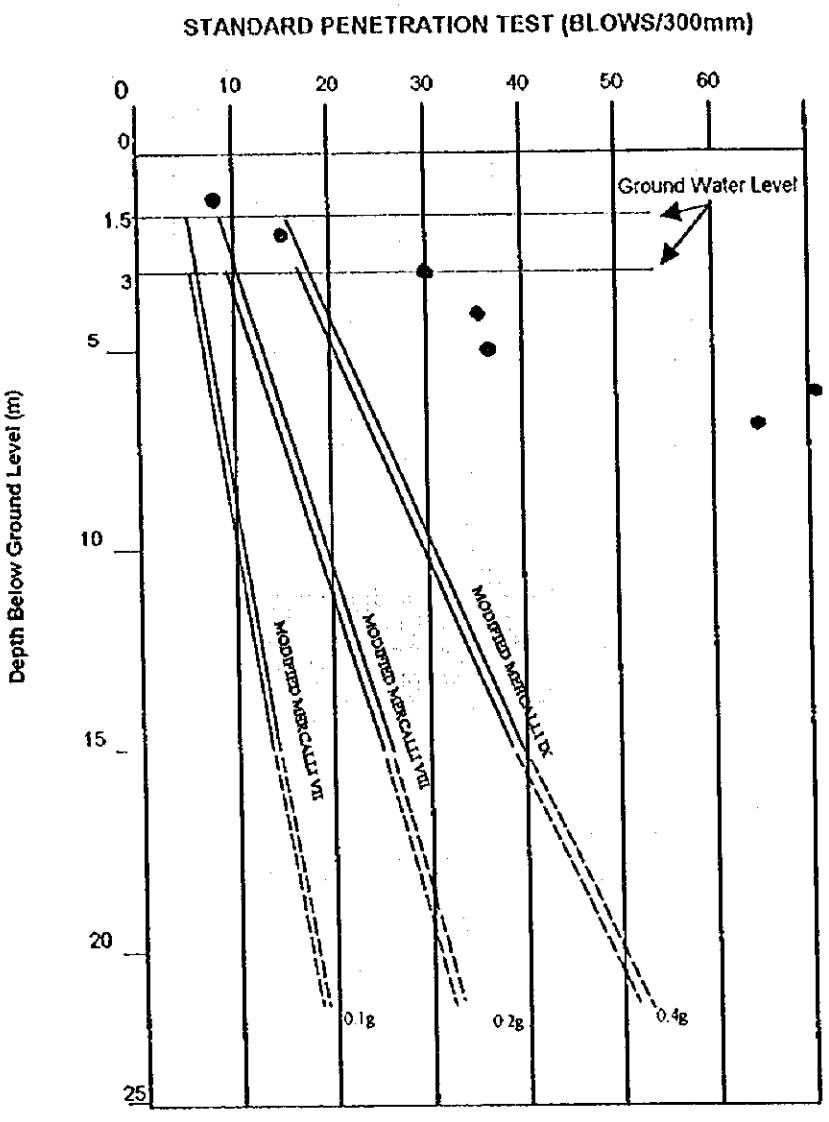


Figure 7 Liquefaction Assessment, SPT N(1)60 Plots - Borehole No: 1

SMEC - Engineering Geology
Unit 6, Section 68, Lot 3, Waigani Drive, Gordon, NCD
PO Box 4468, BOROKO, NCD, Papua New Guinea
Phone: +675 325 1822 Fax: +675 325 3780
Email: smecpom@datec.com.pg

PROJECT: The Centre for School Radio Programme in PNG
LOCATION: Ward's Strip, Gordon, N. C. D.
CLIENT: Kume Sekkei Co, Ltd

No: J - 147
BOREHOLE: BH - 2
DATE: May '99

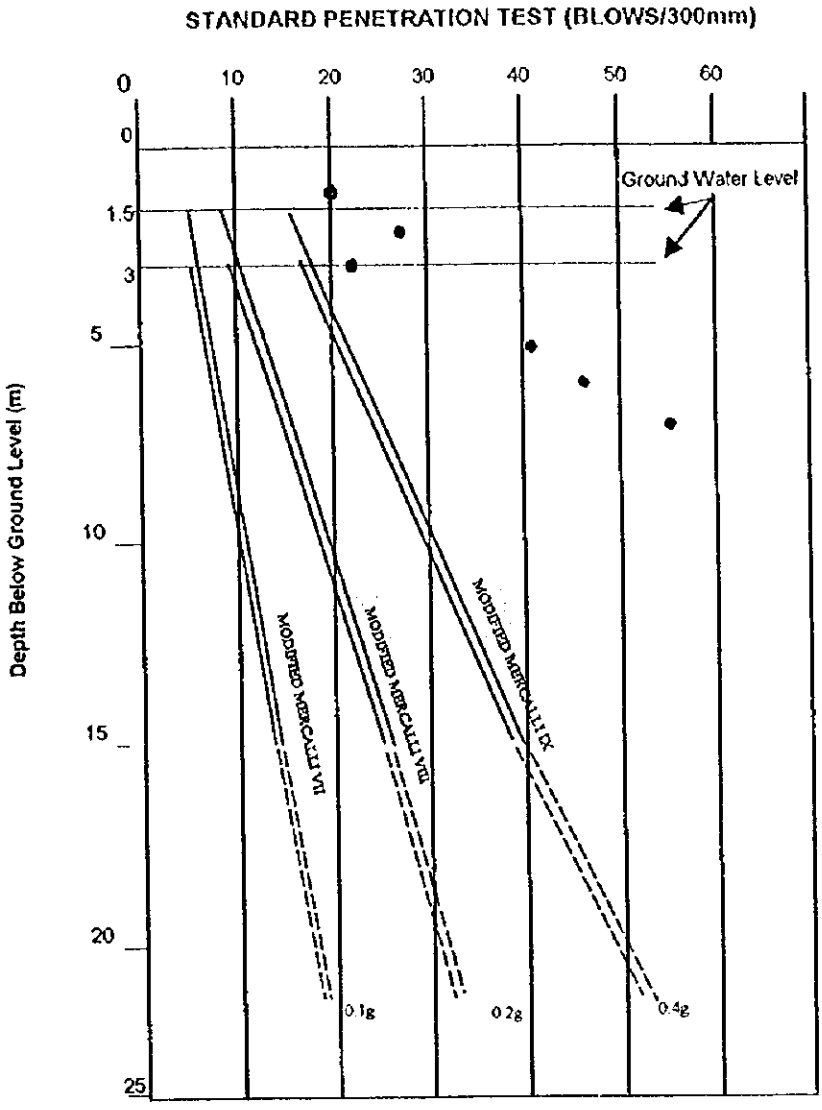


Figure 8 Liquefaction Assessment, SPT N(1)60 Plots - Borehole No: 2

APPENDIX A

ENGINEERING BOREHOLE LOGS

SMEC ENGINEERING GEOLOGY — BOREHOLE LOG

NATIONAL MEDIA CENTRE — BOREHOLE NO: BH - 1

PROJECT: NATIONAL MEDIA CENTRE
CLIENT: KUVE SEKKEI CO, LIMITED
LOCATION: Ward's Strip, Port Moresby, N.C.D.
CONTRACTOR: CENTRAL DRILLING P/L

DRILL METHOD: Auger
DRILL MODEL: Gemko 17601
HOLE SIZE: 150 mm
DEPTH: 13.0 m
CASING
SIZE:
DEPTH:

DATE COMMENCED: 01/05/1999
DATE COMPLETED: 03/05/1999
CO ORDINATES:
ELEVATION: DATUM

JOB NO: PNG J-147
LOGGED: S S D
CHECKED: J B V
APPROVED: R C G

Laboratory test results				Field test						
% fines -75um	Atterberg limits LL (%)	Atterberg limits PI(%)	moisture (%)	SPT results	water level	samples	depth (m)	log	USC	SOIL DESCRIPTION
				1.0 m (2, 3, 5) N = 8		D1 1.0-1.45 B1 1.4-1.6	1.00		CH	SILTY CLAY: Black, firm consistency, medium to high plasticity, wet, clay some rounded max. dia. 10mm SiO2 gravels, with approx. 10-15% silty fraction. TOP SOIL
				2.0 m (2, 6, 9) N = 15		D2 2.0-2.45 U-50 2.0-2.3	1.70 2.00		CL	SILTY CLAY: Grey brown firm to stiff consistency, high plasticity, wet, calcareous clay, with some angular limestone fragments max. dia. 15mm, 5-10% and approx. 15% silty fraction. ALLUVIUM
				3.0 m (8,11, 19) N = 30		U-50 2.3 - 2.5 B2 2.2 -2.3 B3 2.7-3.0	2.70 3.00		GM	SILTY-CLAYEY GRAVEL: Grey brown dense consistency medium to coarse (max. dia. 20mm) calcareous angular gravel, with approximately 10-15% silt and wet high plasticity clay. Gravel fragments comprise argillite and chert derived from Port Moresby Beds. COLLUVIUM
				4.0 m (9,13,23) N = 36		U-50 3.0-3.20 D3 3.0-3.42 D4 4.0-4.45	4.00			
				5.0 m (5,14,24) N = 38		B4 4.45-5.0 D6 5.0-5.45	5.10 6.00			SANDY CLAY: Grey brown, stiff to hard consistency, high plasticity, wet, clay, with approximately 15% fine to coarse, angular sand and <5% fine angular (max. dia. 20mm) gravel. COMPLETELY TO HIGHY WEATHERED BEDROCK POSSIBLY FROM DOKUNA TUFF
				6.0 m (20,35,50) N = 85		U-50 6.0-6.25 D6 6.0-6.45	6.00			
				7.0 m (14,29,36) N = 65	water ▼ 4/5/99	B5 7.0-8.0	7.00			
				8.0 m (52,bounce)		D7 8.0-8.15	8.00			

sampling
B bulk sample
D disturbed sample (sample number in brackets)
T tube sample (sample number in brackets)
D*, T* no recovery

field tests
permeability (cons=constant head, fall=falling head, rise=rising head test)
SPT N VALUE (blows per three lengths of 150 mm in brackets)
R=sample recovery
▼ = Water level in borehole, and date

notes

Remarks:

SHEET 1 OF 2

SMEC ENGINEERING GEOLOGY — BOREHOLE LOG

NATIONAL MEDIA CENTRE

BOREHOLE NO: BH - 1

PROJECT: NATIONAL MEDIA CENTRE	DRILL METHOD: Auger	DATE COMMENCED: 01/05/1999	JOB NO: PNG J-147
CLIENT: KUME SEKKEI CO, LIMITED	DRILL MODEL: Gemko 17601	DATE COMPLETED: 03/05/1999	LOGGED: S S D
LOCATION: Ward's Strip, Port Moresby, N.C.D.	HOLE SIZE: 150 mm	CASING	CO ORDINATES	CHECKED: J B V.
	DEPTH: 13.0 m	SIZE:		APPROVED: R C O.
CONTRACTOR: CENTRAL DRILLING P/L		DEPTH:	ELEVATION: DATUM:	

Laboratory test results				Field test						
% fines -75um	Atterberg limits LL (%)	Atterberg limits PI(%)	moisture (%)	SPT results	water level	samples	depth (m)	log	USC	SOIL DESCRIPTION
				8.0 m (52,bounce)		B6 8.0-9.0	8.10		CH	SANDY CLAY: Grey brown, stiff to hard consistency, high plasticity, wet, clat with approximately 15% fine to coarse, angular sand and < 5 % fine angular (max. dia. 20m) gravel. WEATHERED BEDROCK POSSIBLY DOKUNA TUFF
				9.0 m (24,50,Bounce)		B7 9.0-10.0	9.00		SW	BEDROCK: Grey-brown, slightly weathered rock, high strenght, fine grained, possible intrusive , intensely fractured and contained high moisture. SLIGHTLY WEATHERED BEDROCK POSSIBLY DOKUNA TUFF
				10.0 m (26,bounce)		B8 10.0-11.0	10.00			
				11.0 m (23, bounce)			11.00			
				12.0 m (66,bounce)			12.00			
				13.0 m (bounce)			13.00			Hole terminated @ 13.0 metres, Mon 3 May 1999
							14.00			
							15.00			
							18.00			

sampling
B bulk sample
D disturbed sample (sample number in brackets)
T tube sample (sample number in brackets)
D*, T* no recovery

field tests — SPT N VALUE (blows per three lengths of 150 mm in brackets)
perm=permeability
cons=constant head
fall=falling head
rise=rising head test
R=sample recovery
▼ = Water level in borehole, and date

notes

Remarks:

SHEET 2 OF 2

SMEC ENGINEERING GEOLOGY — BOREHOLE LOG

NATIONAL MEDIA CENTRE

BOREHOLE NO: BH2

PROJECT: NATIONAL MEDIA CENTRE
CLIENT: KUWE SEIKEI CO, LIMITED
LOCATION: Ward's Strip, Port Moresby, N.C.D.
CONTRACTOR: CENTRAL DRILLING P/L

DRILL METHOD: Auger
DRILL MODEL: Gemko 17601
HOLE SIZE: 150 mm
DEPTH: 13.6 m
CASING
SIZE: HQ
DEPTH: 6.5 m

DATE COMMENCED: 27/05/99
DATE COMPLETED: 30/05/99
CO-ORDINATES:
ELEVATION: DATUM

JOB NO: PNG J-147
LOGGED: S S D
CHECKED: J B V
APPROVED: R C G

Laboratory test results				field test		depth (m)	log	USC	SOIL DESCRIPTION
% fines -75um	Atterberg limits LL (%)	Atterberg limits PI(%)	moisture (%)	SPT results	water level	samples			
			Bulk Density t/m3						
				1.0 m		D1			
1.4	72.3	21.6	14.60%	(6, 6, 14)	BD2.07	1.0-1.45	1.00	CH	SILTY CLAY: Black, firm consistency, medium to high plasticity, wet clay some rounded max. dia. 10mm quartz gravel, with approx. 10-15% silty fraction.
			bulk den	N = 20			1.10		TOP SOIL
			2.07						
				2.0 m					
				(8, 13, 15)		D2	2.00	CL	SILTY CLAY: Grey brown, firm to stiff consistency, high plasticity, wet, calcareous clay, with some angular limestone fragments max. dia. 15mm, 5-10% and approx. 15% silty fraction.
32.2			11%	N = 28		2.0-2.45	2.20		ALLUVIUM
								GM	SILTY-CLAYEY GRAVEL: Grey brown dense consistency medium to coarse (max. dia. 20 mm) calcalreous angular gravel, with approxmately 10-15% silt and wet, high plasticity clay.
				3.0 m		D3			
1.3	50.5	18		(4, 7, 16)	BD2.31	3.0-3.45	3.00		COLLUVIUM
			bulk den	N = 23					
			2.31			B1			
	42.6		2.1		BD2.10	3.6-3.85			
				4.0 m		U-50	4.00		
				push tube		4.0-4.30			
							4.30		
			bulk den			B2		CH	SANDY CLAY: Grey brown, stiff to hard consistency, high plasticity, wet, clay with approximately 15% fine to coarse, angular sand and <5% angular (max. dia. 20 mm) gravel. Gravel fragments comprise argillite and chert derived from Port Moresby Beds.
	33		2.07	5.0 m	BD2.07	4.6-4.8	5.00		
				(8, 17,24)					
				N = 41		D4			
						5.0-5.45			
			bulk den						HIGHLY WEATHERED BEDROCK
			2.23	6.0 m		B3			POSSIBLY DOKUNA TUFF
	33.2	NP	13.30%	(12,19,28)	BD2.23	5.5-5.70	6.00		
				N = 47					
						D5			
						6.0-6.45			
				7.0 m					
				(40,25,30)		B4	7.00		
				N = 55		6.5-6.85			
						D6			
				8.0 m	water ▼	7.0-7.45			
				bounce	29/4/99		8.00		

sampling
B bulk sample
D disturbed sample (sample number in brackets)
T tube sample (sample number in brackets)
D*, T* no recovery

field tests
permeability
cons=constant head
fall=falling head
rise=rising head test
▼ = Water level in borehole, and date

SPT N VALUE (blows per three lengths of 150 mm in brackets)
R=sample recovery

notes
BD = Bulk Density of soil in t/m3

Remarks:
1 150mm bore auger from 0.0-8m.
2 8.0-13.0m rotary drill.

SHEET 1 OF 2

SMEC ENGINEERING GEOLOGY — BOREHOLE LOG

NATIONAL MEDIA CENTRE

BOREHOLE NO: BH2

PROJECT: NATIONAL MEDIA CENTRE	DRILL METHOD: Auger	DATE COMMENCED: 27/04/1999	JOB NO.: PNG J-147
CLIENT: KUME SEKKEI CO. LIMITED	DRILL MODEL: Geniko 17601	DATE COMPLETED: 30/04/1999	LOGGED: S S D
LOCATION: Ward's Strip, Port Moresby, N.C.D.	HOLE SIZE: 150 mm	CASING	CO-ORDINATES	CHECKED: J.B.V.
	DEPTH: 13.6 m	SIZE: HQ		APPROVED: R.C.G.
CONTRACTOR: CENTRAL DRILLING P/L		DEPTH: 8.5 m	ELEVATION: DATUM	

Laboratory test results				Field test						
% fines -75um	Atterberg limits LL (%)	Atterberg limits PI(%)	moisture (%)	SPT results	water level	samples	depth (m)	log	USC	SOIL DESCRIPTION
				8.0 m bounce		U-50 7.5-7.80	8.00		CH	SANDY CLAY: Grey brown, stiff to hard consistency, high plasticity, wet, clay with approximately 15% fine to coarse, angular sand and <5% angular (max. dia. 20 mm) gravel. HIGHLY WEATHERED BEDROCK POSSIBLY DOKUNA TUFF
				9.0 m (5, 8, 21) N = 29		B5 7.80-7.95 B6 9.0-9.30	9.00		SW	BEDROCK: Grey-brown, slightly weathered rock, high strenght, fine grained, possible intrusive , intensely fracturedand contained high moisture content. SLIGHTLY WEATHERED BEDROCK POSSIBLY DOKUNA TUFF
				10.0 m (4,41, b) bounce		B7 10.0-10.30	10.00			
				11.0 m (40 bounce bounce		B8 11.0-11.1	11.00			
				12.0 m (66, bounce bounce		B9 12.0-12.1	12.00			
				13.0 m bounce		B10 no sample	13.00			
							13.60			Hole terminated @ 13.6 metres, Fri. 30 April 1999
							14.00			
							15.00			
							16.00			

sampling
B bulk sample
D disturbed sample (sample number in brackets)
T tube sample (sample number in brackets)
D*, T* no recovery

field tests — SPT N VALUE
permeability — (blows per three
cons=constant head — lengths of 150 mm
fall=falling head — in brackets)
rise=rising head test — R=sample recovery
▼ = Water level in borehole, and date

notes

Remarks:

SHEET 2 OF 2

APPENDIX B

LABORATORY TEST RESULTS

SMEC - Engineering Geology
Unit 5, Section 68, Lot 3, Walgani Drive, Gordon, NCD
PO Box 4468, BOROKO, NCD, Papua New Guinea
Phone: +675 325 1822 Fax: +675 325 3780
Email: smecpom@datec.com.pg

SUMMARY OF LABORATORY TEST RESULTS

CLIENT: KUME SEKKEI Co, LTD DATE: 08 May 1999

PROJECT: The Centre for School Radio Programme in PNG PROJECT NO.: J 147

LOCATION: Ward's Strip, Gordon, N.C.D.

LOCATION		BH - 2	BH - 2	BH - 2	BH - 2
DEPTH (metres)		1.0 - 1.45	2.0 - 2.5	3.0 - 3.45	3.6 - 3.8
DESCRIPTION					
NATURAL MOISTURE CONTENT %		14.8	11.0		
PARTICLE SIZE DISTRIBUTION					
	75 mm				
	53 mm				
	37 mm				
	26 mm				
	19 mm		100.0		100.0
	13.2 mm		96.9		91.1
Percent	9.5 mm	100	93.5	100.0	85.6
passing	6.7 mm	96.6	86.1	93.5	82.2
A.S. sieve	4.75 mm	88.8	79.8	85.5	77.8
	2.36 mm	52.9	66.5	55.8	70.1
	0.600 µm	17.5	46.0	17.7	57.2
	0.425 µm	13.1	42.5	12.3	54.5
	0.300 µm	10.2	40.1	9.2	52.4
	0.150 µm	5.2	36.2	4.5	48.1
	0.075 µm	1.4	32.2	1.3	42.6
ATTERBERG LIMITS %					
Liquid Limit		72.3		50.5	
Plastic Limit		21.6		18.0	
LINEAR SHRINKAGE %		17.3		13.5	
MAXIMUM DRY DENSITY t/m^3					
OPTIMUM MOISTURE CONTENT %					
SOAKED C.B.R. %					
ESTIMATED C.B.R. %					
* MR 76 G.R.					
Bulk Density t/ m^3		2.07		2.31	2.10
Soil pH					

* Department of Main Roads, N.S.W. Form MR 76
ø Road Construction Authority of Victoria, Bulletin No. 31

DATE CHECKED:	REPORT NO.:	CHECKED BY:
13 May 1999	J - 147	J.Vracar

SMEC - Engineering Geology
Unit 6, Section 58, Lot 3, Walgani Drive, Gordon, NCD
PO Box 4468, BOROKO, NCD, Papua New Guinea
Phone: +675 325 1822 Fax: +675 325 3780
Email: smecpom@datec.com.pg

SUMMARY OF LABORATORY TEST RESULTS

CLIENT: KUME SEKKEI Co, LTD DATE: 08 May 1999

PROJECT: The Centre for School Radio Programme in PNG PROJECT NO.: J 147

LOCATION: Ward's Strip, Gordon, N.C.D.

LOCATION		BH - 2	BH - 2		
DEPTH (metres)		4.6 - 4.8	5.5 - 5.7		
DESCRIPTION			13.3		
NATURAL MOISTURE CONTENT %					
PARTICLE SIZE DISTRIBUTION					
Percent passing A.S. sieve	75 mm				
	53 mm				
	37 mm				
	26 mm				
	19 mm				
	13.2 mm		100.0		
	9.5 mm	100.0	96.6		
	6.7 mm	99.7	90.7		
	4.75 mm	98.8	83.5		
	2.36 mm	93.4	70.4		
	0.600 µm	72.1	51.2		
	0.425 µm	64.2	47.7		
	0.300 µm	56.9	44.9		
	0.150 µm	42.8	38.4		
	0.075 µm	33.0	33.2		
ATTERBERG LIMITS %					
Liquid Limit			Non Plastic		
Plastic Limit					
LINEAR SHRINKAGE %					
MAXIMUM DRY DENSITY t/m^3					
OPTIMUM MOISTURE CONTENT %					
SOAKED C.B.R. %					
Electrical conductivity (nS/cm)					
Bulk Density t/ m^3		2.07	2.23		
water pH					

★ Department of Main Roads, N.S.W. Form MR 76
ø Road Construction Authority of Victoria, Bulletin No. 31

DATE CHECKED:	REPORT NO.:	CHECKED BY:
13 May 1999	J - 147	J.Vracar

AUSTRALIAN SOIL TESTING PTY LTD.

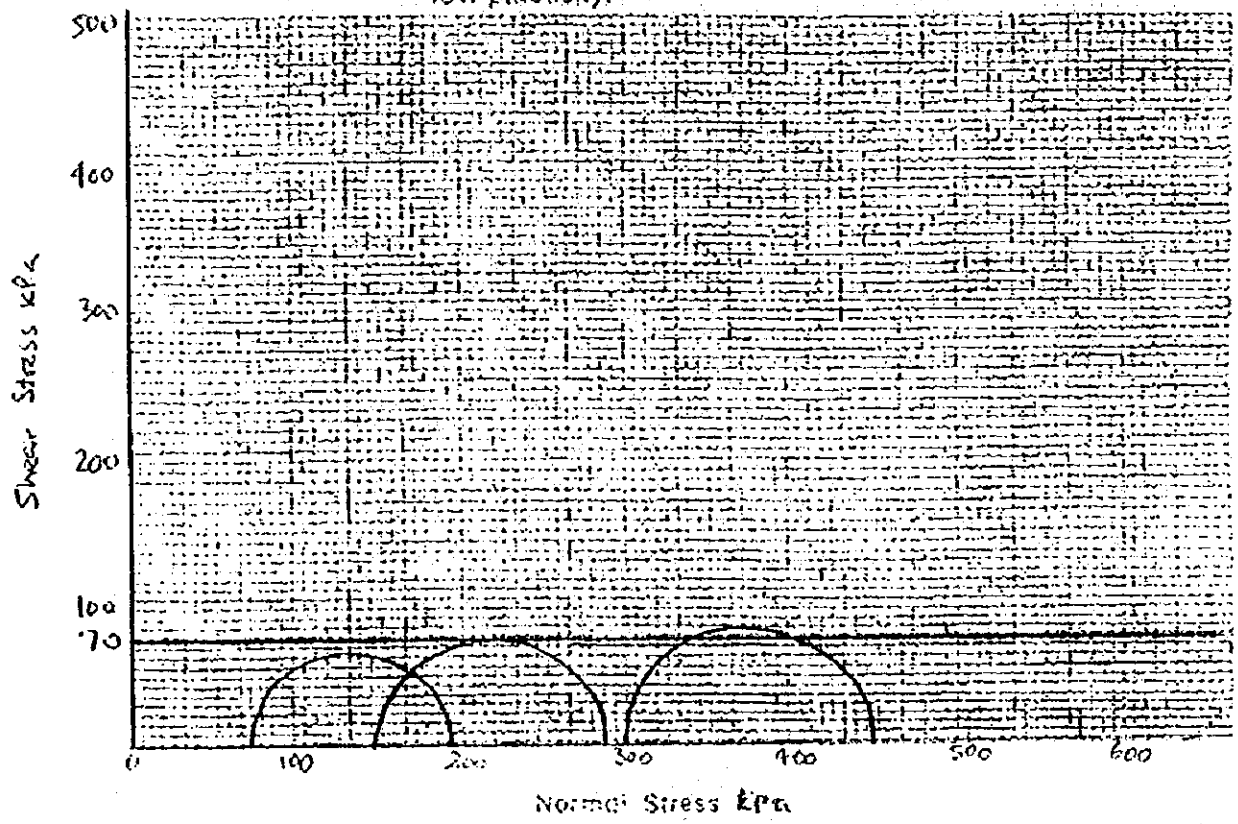
SATURATED UNDRAINED TRIAXIAL TEST REPORT

CLIENT: EARTHTECH LABORATORIES

PROJECT: SMEC - PNG LTD. National Media Centre Project PNG

SAMPLE SOURCE: 134/99, BH 1: 2.30 -2.50m LABORATORY NO: 20986

SAMPLE DESCRIPTION: CLAYEY SILTY SAND: grey, fine to medium sand, low plasticity.



COHESION (kPa)	70	FRICTION (deg)			0.0
MOISTURE CONTENT (%)	N/A	DRY DENSITY (t / c.m.)			N/A
SAMPLE DIMENSIONS	Diameter(mm)	47.7		Length (mm)	99.8
CONFINING PRESSURE (kPa)	75	150	300		
PRINCIPAL DEVIATOR STRESS (kPa)	118	135	150		
STRAIN AT FAILURE (%)	4.5	7.0	9.0		
FAILURE MODE	Plastic			Rate of strain (mm/min)	1.0
DESCRIPTION OF FAILURE	-				
DATE SAMPLED	Unknown	DATE TESTED		26/5/99	
SAMPLING METHOD	U50 Push Tube				
FAILURE CRITERIA	Drop in max principle stress / less than 1% increase over 0.5% strain				

TEST METHOD: AS1289 6.4.1

Form: TX01-1: Issue 2: Nov 1998

SIGNED DATE

AUSTRALIAN SOIL TESTING PTY LTD. [illegible]
[illegible] Rockdale NSW 2216 Tel 9597 5599, 9597 3236 Fax 9597 3642
[illegible]@bigpond.com

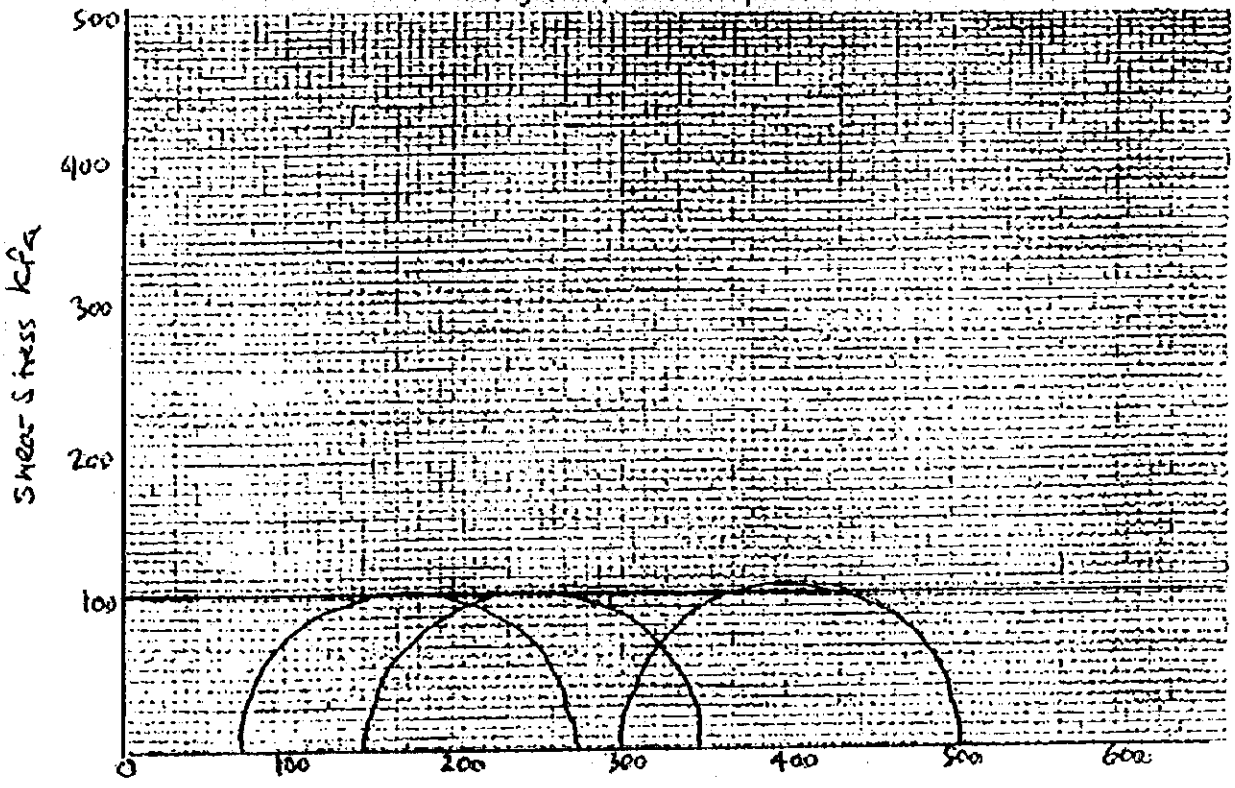
SATURATED UNDRAINED TRIAXIAL TEST REPORT

CLIENT: EARTHTECH LABORATORIES

PROJECT: SMEC - PNG LTD, National Media Centre Project PNG

SAMPLE SOURCE: 138/99, BH 2: 8.00 -8.50m LABORATORY NO: 20987

SAMPLE DESCRIPTION: GRAVELLY SAND, brown, fine to coarse sand, fine gravel, with non-plastic silt.



COHESION (kPa)	102	FRICTION (deg)			0.0
MOISTURE CONTENT (%)	33.1	DRY DENSITY (t / c.m.)			1.53
SAMPLE DIMENSIONS	Diameter (mm)	48.0		Length (mm)	100.0
CONFINING PRESSURE (kPa)	75	150	300		
PEAK DEVIATOR STRESS (kPa)	200	202	211		
STRAIN AT FAILURE (%)	17.5	18.5	22		
FAILURE MODE	Plastic		Rate of strain (mm/min)		1.0
LOCATION OF FAILURE	-				
TYPE SAMPLED	Unknown	DATE TESTED		20/5/99	
SAMPLING METHOD	U50 Push Tube				
FAILURE CRITERIA	Drop in max principle stress / less than 1% increase over 0.5% strain.				

Test Method: AS1289 6.4.1

Form TXC1-1 Issue 2: Nov 1998

SIGNED

20/5/99
DATE

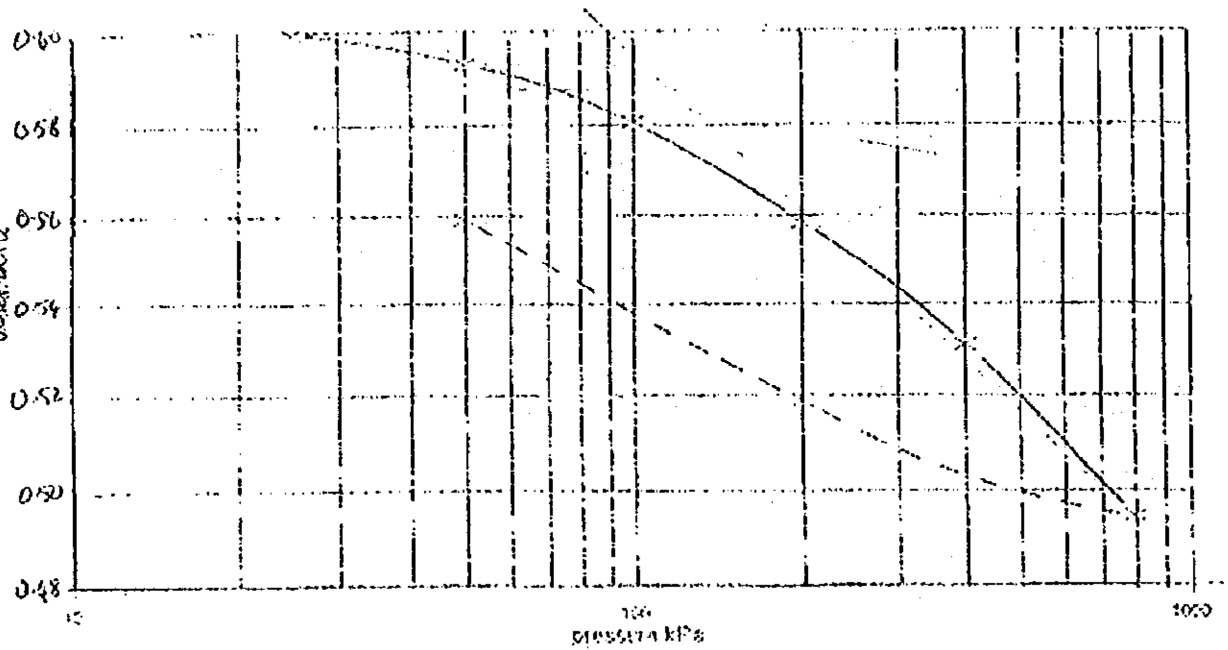
TOTAL P.02

EARTHTECH LABORATORIES (NQ)
Soils and Engineering Materials Testing

t/a Earthtech Laboratories (NQ)
P.O. Box 7759
Cairns, Q. 4870
Telephone: (07) 4035 2190
Facsimile: (07) 4035 2174

Client	SMEC - PNG	Report No:	DU
Project	National Media Centre PNG	Job No:	1(4)
Date sampled	delivered 6/5/99	Date tested:	8/5/99
Sampled by	client	Tested by:	AF
		Checked by:	AF

ONE DIMENSIONAL CONSOLIDATION TEST REPORT AS 1289 6.6.1 - 1998



Sample No:	133/99	Source:	BH 1 2.00 to 2.25 m			
Description	CLAY (CH): dark grey, high plasticity, trace of fine sand, some fine gravel					
Initial Moisture Content	21.2 %	Initial Dry Density:	1.654 t/m3			
Assumed Particle Density	2.65 g/cc	Initial Voids Ratio:	0.602			
Initial Degree of Saturation	68 %	Sample Condition:	inundated			
Load at Inundation	12.5 kPa					

Pressure kPa	25	50	100	200	400	800
Void Ratio e	0.609	0.593	0.581	0.558	0.531	0.494
Cv m2/yr	1.69	2.10	1.55	0.81	0.41	0.26
Mv m2/kN	5.76E-05	1.13E-04	1.33E-04	1.36E-04	1.11E-04	8.39E-05
Kr/γ	9.56E-04	2.33E-03	2.41E-03	1.08E-03	4.51E-04	2.14E-04

Remarks: Sample swelled at 12.5kPa loading.

Preliminary results issued: 19/5/99 $C_c = 0.11$ Page 1 of 7

FILE: CPRGRPT5283651 issue 11/93

Date: 19.5.99

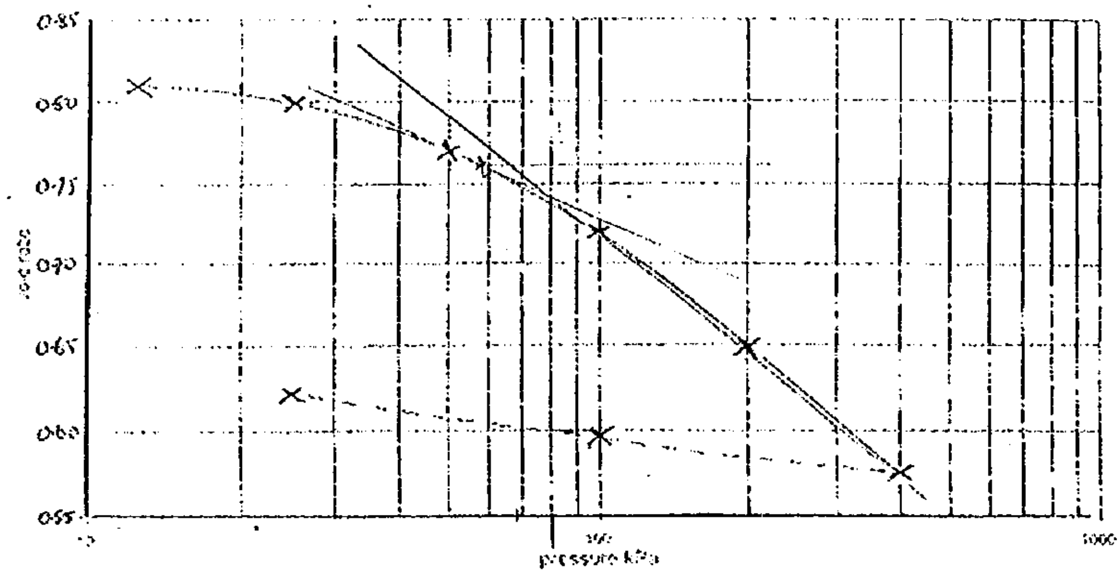
Authorised Signature: [signature]

via Earthtech Laboratories (NQ)
P.O. Box 7759
Cairns, Q. 4870
Telephone: (07) 4035 2190
Facsimile: (07) 4035 2174

EARTHTECH LABORATORIES (NQ)
Soils and Engineering Materials Testing

Client	SMEC - PNG	Report No:	DV
Project	National Media Centre PNG	Job No:	1(4)
Date sampled	delivered 6/5/99	Date tested:	8/5/99
Sampled by	client	Tested by:	AF
		Checked by:	AF

ONE DIMENSIONAL CONSOLIDATION TEST REPORT AS 1289 6.6.1 - 1998



Sample No.	134/99	Source.	BH 1 (2.30 to 2.50 m)

Description: Gravely sandy CLAY (CH) yellow brown, high plasticity, fine to coarse sand, some fine to medium sub angular gravel.

Initial Moisture Content:	31.6 %	Initial Dry Density	1.458	t/m3
Assumed Particle Density:	2.65 g/cc	Initial Voids Ratio	0.817	
Initial Degree of Saturation:	66 %	Sample Condition:	inundated	
Load at Inundation	12.5 kPa			

Pressure kPa	12.5	25	50	100	200	400
Void Ratio e	0.809	0.798	0.770	0.720	0.649	0.575
Cv m²/yr	0.89	2.22	0.43	0.69	0.43	0.27
Mv m²/kN	3.55E-04	4.08E-04	5.14E-04	5.32E-04	4.63E-04	3.33E-04
k calculated (m/hr)	3.09E-03	8.90E-03	2.17E-03	3.13E-03	1.94E-03	8.70E-04

Remarks:

Preliminary results issued

$C_c = 0.24$

File: [illegible]

issue 11/92

Date: 17-5-99

Authorised Signature: [signature]

A.S.T. (Qld) Pty. Ltd. ...
t/a Earthtech Laboratories (NQ)
P.O. Box 7759
Cairns, Q. 4870
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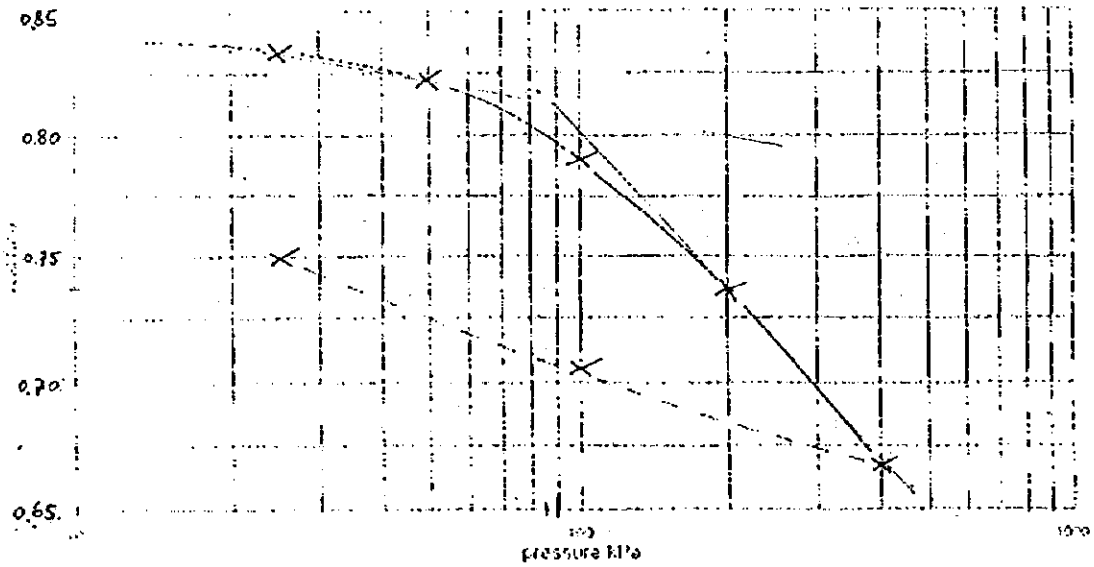
Facsimile: (07) 4035 2174

EARTHTECH LABORATORIES (NQ)

Soils and Engineering Materials Testing

Client:	SMEC - PNG	Report No:	DX
Project:	National Media Centre PNG	Job No:	J(4)
Date sampled:	delivered 6/5/99	Date tested:	18/5/99
Sampled by:	client	Tested by:	AF
		Checked by:	AF

ONE DIMENSIONAL CONSOLIDATION TEST REPORT AS 1289 6.6.1 - 1998



Sample No: 135/99 Source: BH 1 3.00 to 3.20 m

Description: CLAY (CH) dark grey brown and grey mottled, high plasticity, some fine to coarse sand, some fine gravel

Initial Moisture Content:	29.2 %	Initial Dry Density:	1.436	t/m3	
Assumed Particle Density:	2.63 g/cc	Initial Voids Ratio:	0.845		
Initial Degree of Saturation:	58 %	Sample Condition:	inundated		
Load at Inundation:	12.5 kPa				

Pressure kPa	12.5	25	50	100	200	40
Voids Ratio	0.839	0.834	0.822	0.790	0.737	0.66
Cv m2/yr	2.41	0.42	3.33	1.16	0.37	0.1
mv m2/kN	2.66E-01	2.48E-04	2.50E-04	3.00E-01	2.91E-04	2.40E-0
k m/s-yr	6.29E-03	1.01E-03	8.17E-03	3.41E-03	1.06E-03	3.62E-0

Remarks:

Permission required for reproduction of this report

$C_c = 0.23$

Issue 1.0

Date: 21/5/99

Authorised Signatory: ...

The Measurement proof book

No. W-91066
Date : 24, May 1999

Messrs. The stock company
The design office KUME

We report the result of the measurement on the following street.

Tokyo Technical Service Corp.
6-7-6 Nakakasai Edogawa-ku
Tokyo
Tel: 03-3688-3281

The environment measurement man :
Tsutomu Masuko

The analysis taking charge person :
Yuzou Fujii

The gathering taking charge :
The receipt

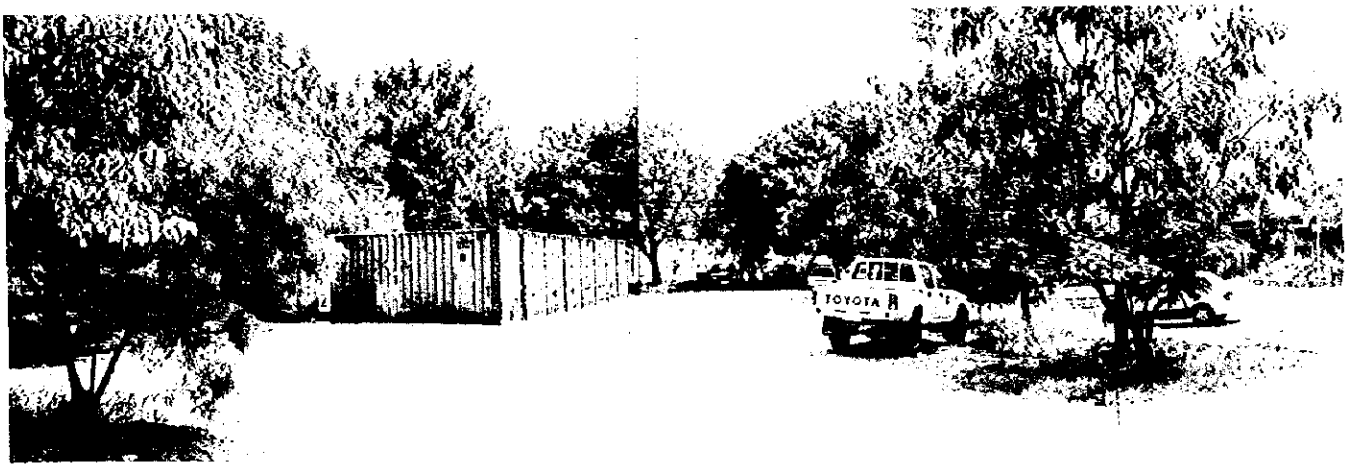
Sample Name	The water supply bureau in Port-Moresby of PAPUA NEW GUINEA
Sampling Date	13, May 1999
Examination purpose	Propriety of a water quality standard in water supply law at JAPAN
The examination classification	Drink water

No	The object of the measurement	The unit	Results	The way of measuring	Regulative Standard
1	The hydrogen ion concentration (pH)	—	7.3	JIS K 0101-11.1	5.8～8.6
2	Turbidity Standard Solution	°	Below 1°	JIS K 0101-9.1	2 Below
3	The electricity's transmission	μS/cm	76	JIS K 0101-12.	—
4	All the hardness (CaCO3)	mg/l	31	JIS K 0101-15. 1	300 Below
5	The calcium hardness	mg/l	16	JIS K 0101-15. 2	—
6	Iron	mg/l	0.03 Under	JIS K 0101-60. 2	0.3 Below
7	Manganese	mg/l	0.005 Under	JIS K 0101-58. 2	0.05 Below
8	The acid consumption quantity	mg/l	26	JIS K 0101-13. 1	—
9	The chlorination ion	mg/l	1.7	JIS K 0101-32. 5	200 Below
10	Nitric acid ion	mg/l	7.0	JIS K 0101-37. 2	10 Below
11	Silica (SiO2)	mg/l	14	JIS K 0101-44. 3	—
12	Color Standard Solution	°	Below 1°	JIS K 0101-10. 1	5 Below

Method of Analysis are based on The Ministry of Health and Welfare Oder No.69

7．　現場状況写真

(写真-1) 建設予定地全景(北側)



(写真-2) 建設予定地全景(東側)

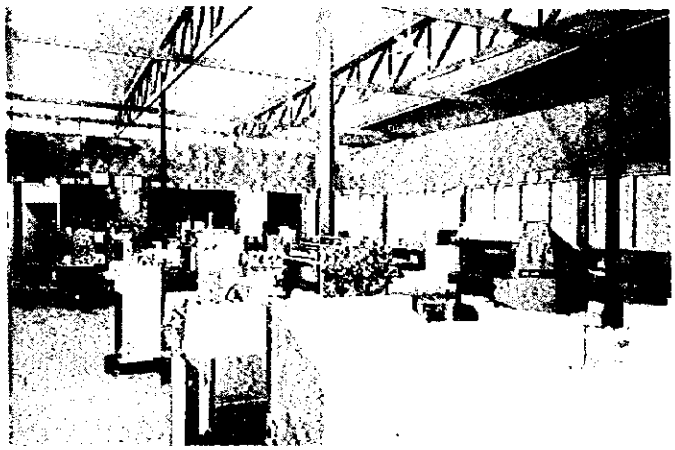
(写真-3) CDD 入り口

(写真-4) メディア課施設

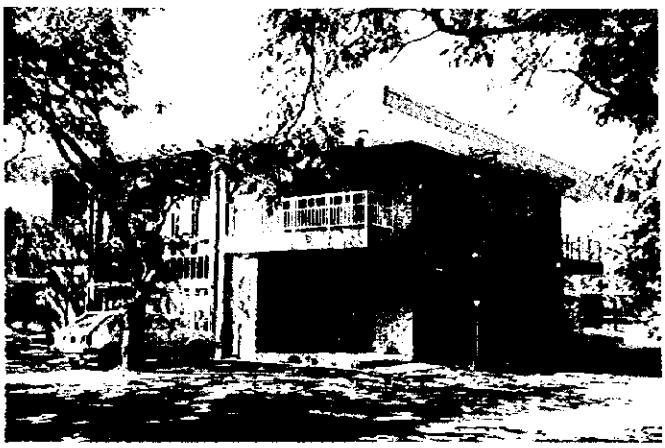
(写真-5) カリキュラムユニット施設(B 棟, C 棟)

(写真-6) 分電盤室

(写真-7) プリントショップ



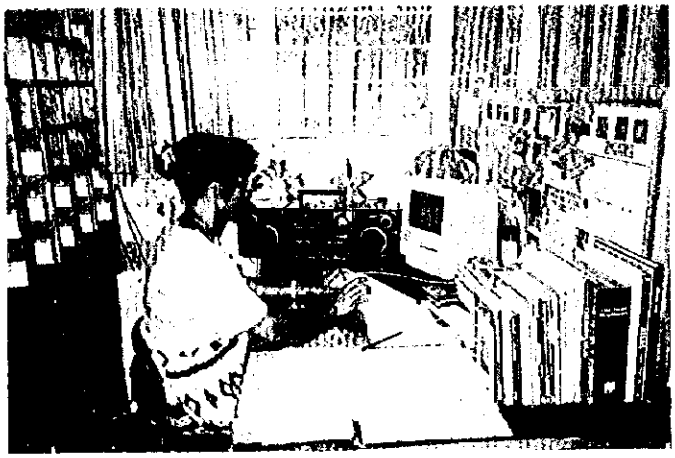
(写真-8) プリントショップ内部



(写真-9) 統一試験ユニット棟

(写真-10) 統一試験ユニット棟内部

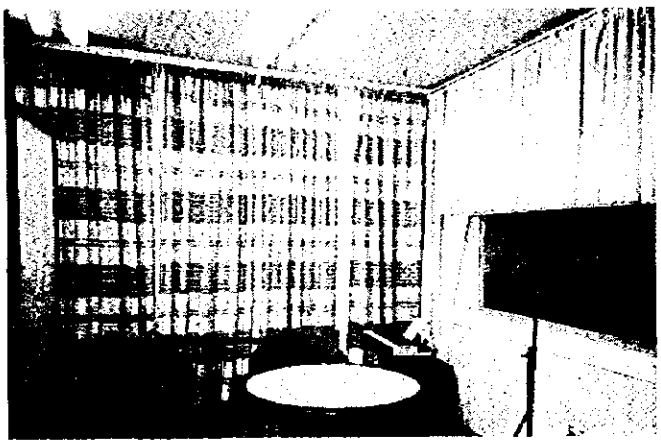
(写真-11) ラジオ・テレビユニット事務室(録音教材見直し中)



(写真-12) ラジオ・テレビユニット事務室(脚本制作)

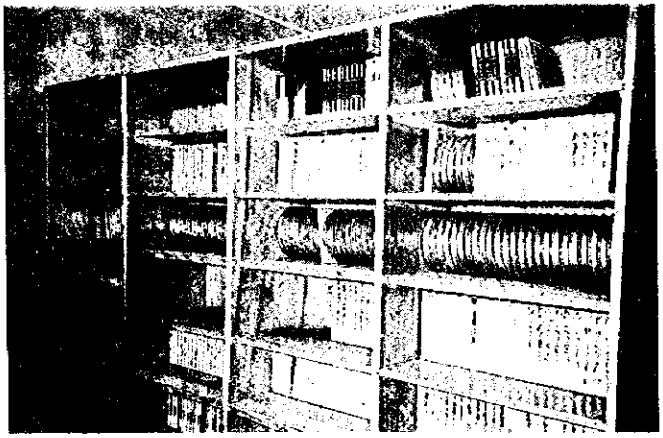
(写真-13) ラジオ・テレビユニット課長室

(写真-14) ラジオ・テレビユニット事務室



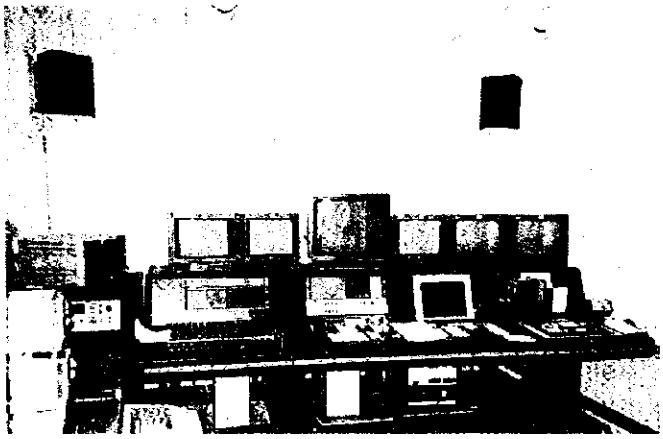
(写真-15) オーディオスタジオ

(写真-16) コントロールルーム



(写真-17) ラジオ教材マスターテープ保管庫

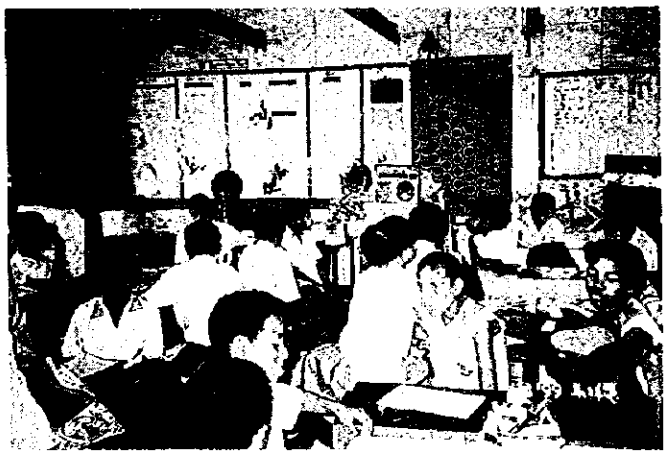
(写真-18) ビデオライブラリー



(写真-19) ビデオ・オンライン編集室
(1997 年文化無償機材)

(写真-20) ビデオ・オフライン編集室
(1996 年文化無償機材)

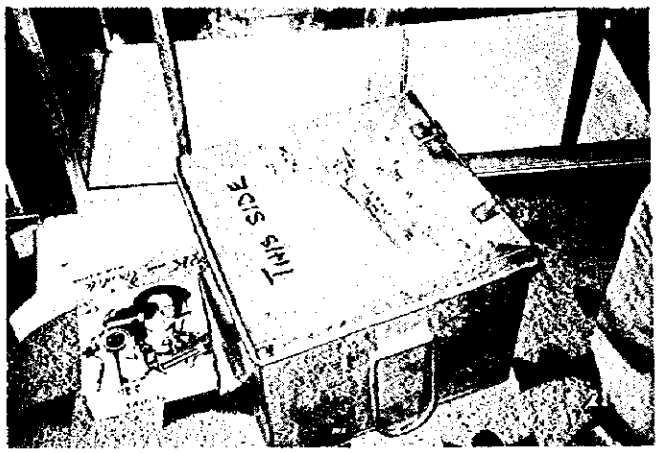
(写真-21) ゴロカ Sacred Heart Primary School
ラジオ教育放送授業



(写真-22) Wardstrip Primary School
ラジオ教育放送授業

(写真-23) NBC ラジオ放送局

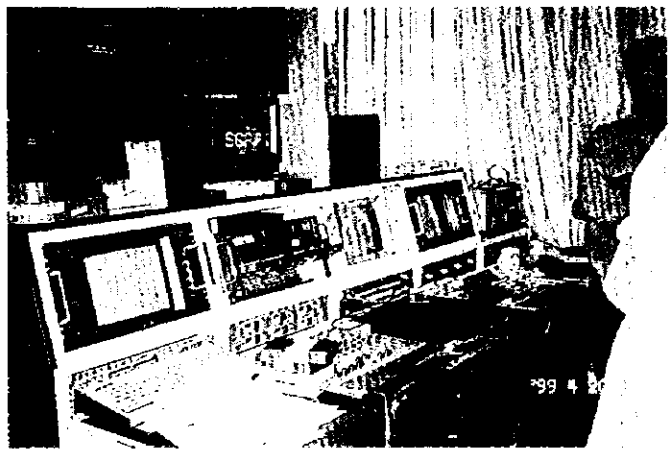
(写真-24) NBC ラジオ放送局編集スタジオ



(写真-25) NBC ラジオ放送局
放送教材搬送用キャビネット

(写真-26) NBC ラジオ放送局事務室

(写真-27) EMTV 放送スタジオ



(写真-28) EMTV 編集スタジオ

8. 参考資料リスト

8. 参考資料リスト

	発行	資料名	出版年次
1	DOE	School Broadcast Schedule 1999	1998
2	DOE	National Education Plan Volume A 1995-2004	1995
3	DOE	A Handbook for Elementary Education	1997
4	DOE	The Primary Curriculum in Papua New Guinea	1997
5	World Bank	Papua New Guinea Education Project World Bank Review Mission , March - April 1998	1998
6	DOE	Let's Use English English Radio Magazine Teachers Notes	1983
7	DOE	English Radio Time Teachers Guide Grade One	1997
8	DOE	English Radio Magazine Grade Six Teachers' Book	1983
9	DOE	The State of Education in PNG	1999
10	DOE	The Education Reform	1990
11	DOE	School Age Population Statistics	1997
12	DOE	Enrolment and Staffing Statistics	1996
13	DOE	The National Education Plan and Implementation of The Education Reform	1998
14	DOE	Radio Science Grade Four - Six	1996
15	DOE	KIPA The Dreamer Teachers Notes for Grade 6	1983
16	DOE	Listening Time Standard Two	
17	DOE	School Broadcasts Health Education for Grade 5 Teachers Notes	1985
18	DOE	School Broadcasts Let's Use English Grade 5 Teachers Notes	1983
19	DOE	Christian Education Grade 6 Teachers Notes	1989
20	DOE	Radio Magazine for Standard III Teachers' Notes	
21	DOE	Community Life Teaching Notes Grade Four - Six Term One - Three	1994
22	DOE	Community Life Handbook Grade 4 Terms 3 & 4	1990
23	DOE	School Broadcasts Dr. Kanini Health Education for Grade 5, Teachers Notes	
24	DOE	Radio Science Grade Four Children's Science Book	1996
25	DOE	Curriculum Materials Handbook Education Television 1998-1999	1998
26	DOE	Teachers' Notes Science Series I,II, Kisim Save	1997
27	DOE	Lower Primary Grade 3-5, Language Syllabus	1998
28	DOE	Lower Primary Grade 3-5, Mathematics Syllabus	1998
29	DOE	Lower Primary Grade 3-5, Community Living Syllabus	1998
30	DOE	Lower Primary Grade 3-5, Environmental Studies Syllabus	1998
31	National Statistical Office	Report on the 1990 National Population and Housing Census in Papua New Guinea	1994
32	National Statistical Office	Consumer Price Index December Quarter 1998	1998