７－３．地盤調査報告書

KILU'UFI HOSPITAL GEOTECHNICAL INVESIGATION REPORT

Consultant: Engineering Environmental Services Limited

Client: *Joint Venture of Fukunaga Architects – Engineers, Yachiyo Engineering Co., Ltd and Binko International Ltd*

Report No: KH202205_GI_001
Report Status: FINAL

July 29, 2022

Project No: KH202205_GI_001

Kilu'ufi Hospital Improvement Project Geotechnical Investigation

Report Status: FINAL

Prepared by:

Billy Buka
Geotechnical Engineer

Checked by:

Kenneth Bulehite
Geotechnical Consultant
MSc (Wat. Res. Eng. Man.);
BEng [Civil]; ADEng [Civil]

Engineering Environmental Services Ltd
P.O Box 1424 Honiara Solomon Islands
Room A2, Supreme Plaza
Kukum Highway, Honiara

Email: ken.bulehite@gmail.com
Mobile: (+677) 7486475

Disclaimer

This report has been prepared solely for our CLIENT Joint Venture of Fukunaga Architects – Engineers, Yachiyo Engineering Co., Ltd and Binko International Ltd based on their brief and scope of works and as such reliance on the information contained herein by third party users shall be at their own risk.

Recommendations and opinions in this report are based on data from limited tests. The nature of subsoil conditions in between tests are inferred and actual conditions may vary considerably from the assumed model.

EESL should be contacted should subsoil conditions on site vary considerably from information provided in this report during the construction stage.

Table of Contents

1.0 Introduction

This report presents the results of a geotechnical site investigation undertaken by Engineering Environmental Services Limited (EESL) for the appraisal of Kilu'ufi Hospital improvement project funded by the Japanese International Cooperation Agency (JICA) through its client, Fukunaga Architects-Engineer, Yachiyo Engineering CO. Ltd and Binko International Ltd Joint Ventures. The soil investigation was carried out at the Kilu'ufi Hospital site in Central Malaita on the 10th of May 2022 to the 25th of May 2022.

The purpose of the soil investigation was to provide geotechnical information and recommendations pertaining to groundwater conditions, soil conditions and foundation design parameters for proposed buildings and facilities on the site. The soil investigation included drilling of boreholes, excavation of test pits and laboratory testing of soil samples

1.1 Scope of Works

The scope of works for the project include the following:

- Drilling of 5x boreholes at specified locations
- Conducting Standard Penetration Tests in all boreholes at every 1.0m depth interval
- Excavating 5x Excavation Pits and Soil Logging
- Soil Sampling at every borehole and excavation pits
- Groundwater observations (water level measurement)
- Laboratory Testing of soil and water samples
- Providing recommendations and foundation parameters for the design of foundations.

2.0 Project Site Information

2.1 Site Location

The project site is located within the vicinity of the existing Kilu'ufi Hospital in Central Kwara'ae, Malaita Province, approximately 2km North of Auki Town. The site covers approximately a total area of 3000 m².

The project site is adjacent to hospital buildings on the western end, along the main Kilu'ufi road and a soccer field on the east. The site is mostly covered by short grass and some trees and generally flat along the road with gentle slopes towards the building. Figure 1 shows a map of the project site.

Figure 1. Map location of project site (Google Maps)

2.2 Geology

The geology of Central and North Malaita composed of a sequence of sedimentary deposit overlying the basaltic basement termed Malaita Volcanic Group (MVP) which is about 3-4km thick according to Peterson (Petterson, 2004). The top 1-2km thick cover sequence comprises a monolithological Cretaceous-Pliocene pelagic sedimentary rocks. Drilling at the Kilu'ufi site uncovered cherts and sandstones of the sedimentary formation that is consistent with the geology.

2.3 Rainfall & Temperature

Meteorological data from Auki Station was evaluated. Rainfall in Auki has similar pattern with elsewhere in the country. Highest rainfall period occurs between the months of November and March each year with an average monthly rainfall ranging between 291mm and 395mm. Low rainfall typically occurs between the months of May and July each year at around 100mm/month. However, the trend shown in Figure 2 shows a general increase in rainfall from 2019 to 2021. Following the trend, a projected increase is expected for the next decade or so. While seasonal wetting and drying has impacts on the soil conditions, construction of foundation and filling works should be carried out during dry the dry months.

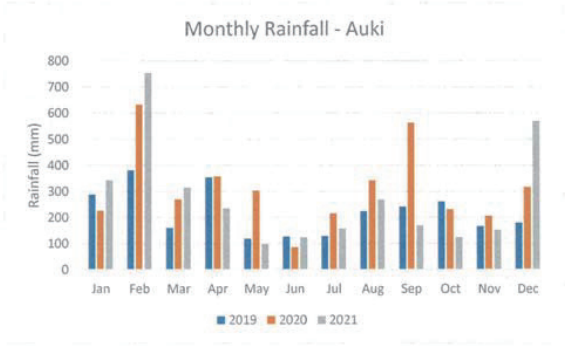


Figure 2. Monthly rainfall data for Auki (SI Met Service)

Temperature for Auki typically stays constant during the months of February to June at an average temperature of 27.7°C. Lower temperatures occur between July and September with temperatures averaging at 27.2 °C. Seasonal variation in temperature is likely to impact volume changes in subsurface soils.

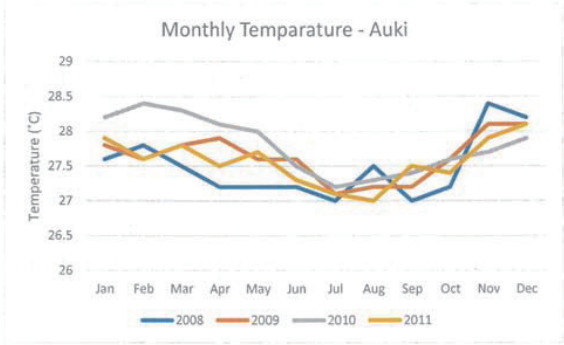


Figure 3. Average monthly temperature for Auki (SI Met Service)

3.0 Methodology

Prior to field testing, a site walkover was conducted to ascertain general field topography, location of buried services, if any, and vegetation cover. Coordinates of boreholes and test pits are located using a handheld GPS. Test locations are then marked with paints for successive intrusive investigation.

3.1 Standard Penetration Testing

A rotary drilling rig [GY 150] was used to retrieve soil samples using a standard spoon sampler. Standard Penetration Tests (SPT) were conducted using SPT tube with 63.5 kg automatic donut hammer dropping at 760 mm height. SPT was carried out on all boreholes at 1.0m depth interval for the entire hole depth. Refusal at blow counts greater than 50 for 150mm penetration is assumed to indicate competent rock. Core drilling is attempted where rock material is intercepted Rock and soil samples are logged, bagged/trayed, and labelled by on-site geotechnical engineer for QA & QC.

SPT results are graphed as "SPT vs Depth" as seen in Figure 4.

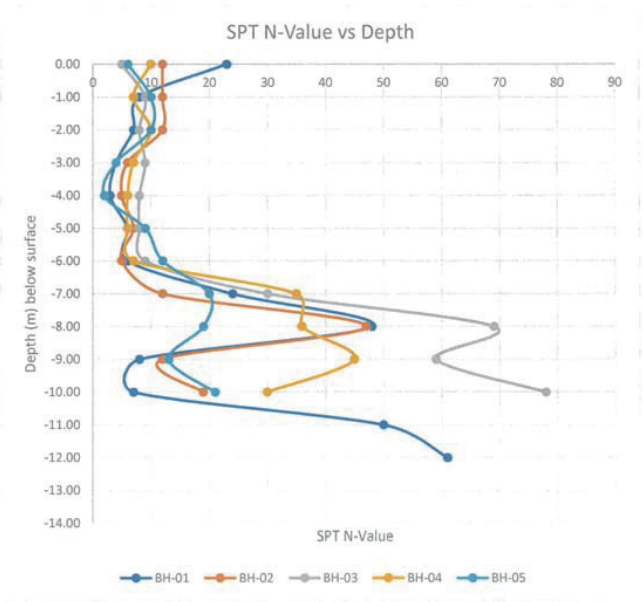


Figure 4. SPT vs Depth graph of boreholes

Results from the SPT clearly identify difference in material properties below the surface. The clay layer generally from 0 – 6m depth with an average N-value of 8 while the Alluvial gravel below the clay tends to show increasing N-value with depth, with an average N = 33. Footing shall be considered for depths between 1m and 2m.

3.2 Test Pitting

A total of 5 test pits have been excavated using an Excavator with bucket width of 1m. Excavated soil is logged, photographed and representative samples collected for laboratory testing.

3.3 Sampling

Disturbed samples from sampler tubes and test pits are logged, photographed, bagged and sealed. Representative samples are sent for testing at the Ministry of Infrastructure Development (MID) Materials Laboratory in Honiara.

3.4 Laboratory Testing

The following laboratory testing was conducted:

- Particle Size Distribution (PSD)
- Atterberg Limits (Plasticity Index & Liquid Limit)
- Moisture Content (Water Content)

A summary of laboratory testing of samples is provided in Table 1.

Table 1. Summary of Results of Laboratory testing

Borehole ID	Depth bgl (m)	Sample Description	Moisture Content (%)	Liquid Limit (%)	Plastic Index	Linear Shrinkage (%)
BH-01	1-3	Gravelly CLAY, brownish red, moist, trace fine sand, high plasticity	49.1	94	63	18
BH-01	2	CLAY, brownish red, moist, trace fine sand, high plasticity	83			23
BH-01	5	Sandy GRAVEL, red fine to coarse sand, fine to coarse gravel, trace silt, non-plastic	26.6			
BH-01	7	Sandy GRAVEL, red, fine to coarse sand, with fine gravel, trace clay	11.7			
BH-02	1-4	Gravelly CLAY, red-white, fine to coarse sand, with fine to medium gravel, high plasticity	57	109	75	23
BH-02	5	Gravelly CLAY, red-white, fine to coarse sand, with fine to medium gravel, high plasticity	40.1			
BH-02	8-13	Sandy GRAVEL, brown, fine to coarse sand, fine to medium gravel, non-plastic	10.5			

BH-03	2-5	Gravelly CLAY, brownish red, fine to coarse sand, fine to medium gravel, high plasticity	63.2			
BH-03	6-10	Sandy GRAVEL, brown, fine to coarse sand, with fine to medium gravel, trace clay, non-plastic	17.9			4
BH-04	7-9	Gravelly SAND, brownish red, fine to coarse sand, fine to medium gravel, trace clay, low plasticity	13.9			
BH-05	7	Gravelly SAND, brownish, fine to coarse sand with fine gravel, trace clay, non-plastic	28.6			

Laboratory results of the clay soil shown in Table 1 shows high liquid limits and plasticity indices more than 40 and 15 respectively. This indicate soil behavior that is expansive and likely to swell and shrink considerably. Detail explanation is given section 4.4.1.

The particle size distribution results is consistent with field observations. Below 6m depth, the soil strata transitioned from gravelly clay to Gravel and Sand.

3.5 Ground Water Observation

Groundwater observations were undertaken a day after completion of drilling at each boreholes. Measured depth of water table is shown in Table 2.

Table 2. Ground Water Levels observed in boreholes following completion of drilling

Borehole ID	Ground Water Level (m)
BH-01	4.36
BH-02	5.00
BH-03	4.87
BH-04	5.10
BH-05	4.65

3.6 Boreholes & Excavation Pits Location

A topographical survey was carried out by Azimuth Survey to determine location and height datum of boreholes and excavation pits on the project site. The coordinates and RL of boreholes and excavation pits are appended at the back of the report under Annex D – Coordinates of Test locations

4.0 Engineering Discussion

4.1 Subsurface Soil Conditions

The sub-surface soil condition on site comprises of a clay layer generally at depths of 0m to 6m below ground level (bgl) underlain by a mixture of gravels and sand (alluvial) of the Cretaceous-Pliocene pelagic sedimentation geology of the area. Table 3 shows the typical soil profile encountered during the soil investigation. Refer to borehole logs for detail lithology.

Table 3. General soil profile of the site

Layer	Depth (m) bgl	Typical Lithology	Thickness (m)
1	0.0 – 6.00	CLAY (red brown), soft to firm, medium to high plasticity	4.0 – 6.0
2	6.00– 13.00	Sandy/Clayey GRAVEL Mixtures; medium to coarse gravel, loose, sub-rounded to sub-angular to angular grains (typical of alluvial origin)	7+

4.2 Site Classification

Classification of the site is based on Australian Standard Residential slabs and footings, AS2870-2011 (Standards Australia, 2011). The site is classified as **Class M** ('moderately reactive clay or silt sites, which may experience moderate ground movement from moisture changes'). The classification of the site was determined in conjunction with observed structural integrity of existing buildings on the site also built on the same clay soil. Existing buildings on site which are mostly single-story concrete structures have been observed to have little or no structural damage or excessive settlement due to soil reactivity.

4.3 Ground Water Conditions

The general ground water level measured is below 4m from the surface at an RL approximately 16.9m above sea level. Our assessment indicates little or no effect of the groundwater condition on the proposed foundation at a depth of 1.5m to 2m bgl. Typical single story masonry structures seldom require footings to be founded below 4m depth.

4.4 Foundation System

Based on the soil profile encountered and the proposed structure, spread footings present a cost-effective option for the foundation. Where building loads are excessive, a combination of spread footings and piling may also be employed. However, this will have to be confirmed when design loads are finalized by the structural engineer.

Two options of footing design are recommended.

1. Isolated Pad with Plinth Beams
2. Raft Foundation

A combination of isolated pad footings connected to a system of plinth beams would provide significant rigidity against differential settlement typical in clay soils. Alternatively, a raft foundation may be employed. However, footing shall be placed over compacted engineered fill material at a minimum thickness of 0.5m (See section 4.4.3 for details) to improve the bearing capacity of the underlying soil.

4.4.1 Bearing Capacity

The assessment of spread footings was evaluated for the clay layer where the footings is anticipated to be founded. Bearing capacity of the Clay layer is determined from SPT test results and empirical correlations of soil cohesion (*c'*) to be 49.7kPa and friction (ϕ°) of 0° for undrained condition. The general bearing capacity equation by Meyerhof was used to determine the ultimate bearing capacity. A geotechnical strength reduction factor (ϕ_g) of 0.5 adopted for design following NZS1170.5.2004.

Our assessment indicate likelihood of foundation failure will be governed by bearing capacity as opposed to settlement for footing width <3.0m.

Table 4 shows the Ultimate and Allowable bearing capacity of the clay layer at 1.0m to 2.0m depths. The bearing capacity provided has taken into consideration a tolerable settlement of 25mm.

Table 4. Net Allowable Bearing Pressure of Clay Layer based on SPT results

Lithology	RL (m above sea level)	Average SPT N-value	Q_{ult} (kPa)	Q_{all} (kPa)
Clay	19.884 – 19.058	8	281.8	128

The foundation subsoil would require engineered fill to increase the bearing resistance, should the building loads exceed the soil allowable bearing capacity. Details on Fill requirement is discussed in section 4.4.3

4.4.1 Swell Potential

Assessment of laboratory test results indicate marginal swell potential (%) of 0.51 – 0.65 of the clay layer following an empirical relation by Vijayvirgia and Ghazzaly (1973) using liquid limit (LL) and moisture content (MC) as inputs. This means that the clay subsoil is likely to swell and shrink considerably when the soil is wet or dry. This can cause cracking in slab on grade if placed directly on the clay as well as soil heaving.

To mitigate risk of structural damage on slabs and footings due to swelling and shrinking, the clay layer shall be excavated and removed to a depth of 1m below surface. Engineered or controlled fill material shall replace the clay and compacted to the design level for all footing works to be founded on.

4.4.2 Settlement

Settlement analysis was carried out for the clay layer using Settle3D. Both elastic settlement and primary consolidation were evaluated based on the bearing capacity determined in section 4.4.1 and shear parameters. Result of the settlement analysis are shown below

- Immediate Settlement – 16mm -20mm
- Consolidation Settlement – 16mm to 96mm after year 10 of building service life

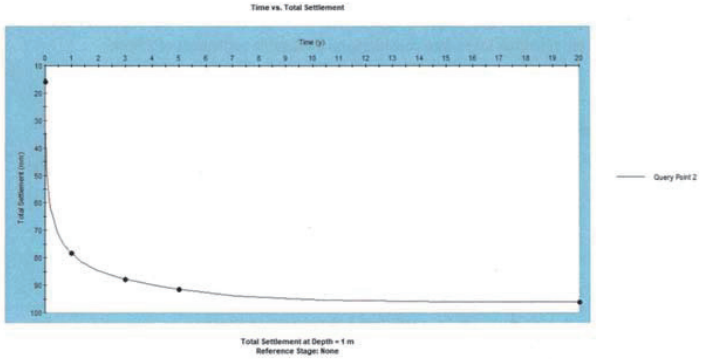


Figure 5. Graph of time vs consolidation settlement

Final settlement estimates will be evaluated once building loads are determined.

4.4.3 Engineered FILL

To increase the foundation bearing capacity, engineered fill shall be used below the footing depth. Limestone is available locally and can be sourced for use as fill material. Local quarries in Auki have been producing limestone for road construction and construction fill for many projects around Auki and Malaita. The strength of the engineered fill can be increase by blending limestone and river gravel at a ratio of 2:1. The river gravel tends to have very high frictional resistance, thus increasing the c-ϕ strength parameters. Our experience with other projects indicates a value of 600 – 620 kPa of allowable bearing capacity can be achieved using blended limestone and river gravel. However, for this project, a 200kPa bearing capacity is sufficient. River gravel in Central Malaita tend to have a lot of high strength rock such as chert which is useful to increase the stiffness of the mixture.

Fill shall be placed and compacted at 150mm lifts or increment to a minimum thickness of 0.5m below the design footing depth (1m). Conventional plate compactors or where available, a roller compactor can be utilized for the process of compaction. The Fill material shall be compacted to a minimum of 95% Maximum Dry Density (MDD). A dynamic cone penetration test (DCP) can be used to determine the bearing capacity of the fill material once placement and compacting of fill is complete.

Fill shall be placed such that design level of foundation is relatively higher than surrounding soil to enable drainage away from the building's foundation, thus keeping the foundation subsoil dry.

A geotechnical engineer is recommended to be present on site for inspection and supervision of backfilling work to ensure work is carried out according to design requirements.

4.4.4 Drainage

Proper drainage is required to limit access of storm water run-off to soil below foundation. The foundation soil needs to be dry to prevent shrinking of soil during seasonal moisture variations. Therefore, perimeter drains with granular infill may be used to allow storm water draining out of building perimeter. Alternatively, concrete drains may need to be designed for storm water run-off.

All building pavements shall be constructed to slope at a minimum grade of 2% away from the foundation of the structure. It is recommended that cast in place concrete pavement be placed around the perimeter of the building at a minimum of 1m width. Paved areas would provide cover from storm water to percolate through to the foundation depth, thus reducing seasonal wetting of the subsoil.

4.5 Earthworks

Excavation works at the site shall be carried out with conventional tracked excavator or backhoe. The soft clay can be excavated with ease. Excavated topsoil material may be reused for landscaping.

All utility underground service lines will have to be identified prior to any excavation work on site.

Seasonal rainfall should be considered to schedule earthworks during the dry season as it can very muddy during the rainy season.

4.6 Ground Contamination

No indication of ground contamination has been observed at the site.

5.0 Conclusions

EESL has been tasked with carrying out soil investigations at Kilu'ufi Hospital for a proposed single story building facility for the hospital. The soil investigation comprised of intrusive drilling along with soil sampling and soil logging, test pitting and laboratory testing of soil samples. A total of 5 boreholes have been drilled with SPT at 1m intervals. Five pits were excavated to expose subsoil at depths of 2m.

Lithology identified on site includes a Clay layer at 0-6m depth , underlain by alluvial gravel and sand at depths from 7m to 10m bgl. The clay layer has an average SPT of 8 while the gravel layer has a higher SPT N value of 33. The SPT value of 8 in the clay layer corresponds to an allowable bearing capacity of 128kPa.

To improve the bearing resistance of foundation subsoil, engineered fill is required to be placed below footing depth at a minimum thickness of 0.5m, compacted at 150mm successive lifts. Locally available limestone blended with river gravel is recommended to be used as Fill. Use of engineered fill may significantly increase the bearing capacity to about 600kPa. However, for this project, a soil bearing capacity of 200kPa is acceptable.

We recommend conducting of dynamic cone penetration test during construction and placement of engineered fill in order to determine its CBR and bearing capacity for confirmation before footings can be constructed.

Settlement analysis indicate immediate settlement range from 16mm – 20mm with consolidation settlement reaching 96mm after 10 years of construction.

Ground water measurement indicated ground water level at depth more than 4.3m. This has been evaluated to have little or no effect on the foundation.

Two options have been proposed for the spread footings. Isolated pad footings connected with plinth beams are recommended as the first option. Secondly, a raft foundation may also be used. Both options can be evaluated based on the cost.

To reduce impact of moisture changes on soil, it is recommended that drainage shall be designed such that water flow is limited to soil mass under building's foundation and the clay subsoil to be replaced by an engineered fill. Perimeter drains with granular infill is recommended as a moisture barrier to limit foundation soil wetting during the service life of the building.

Detailed design of footings and finalized settlement calculations will be done once designed loads have been determined by the structural engineer.

We also recommend a geotechnical engineer to be present to supervise excavation and all foundation work during the construction phase

References

Braja M, D. (2011). *Principles of Foundation Engineering* (7th ed.). Stamford, USA: Global Engineering.

Ian, S. (2014). *Smith's Elements of Soil Mechanics* (9th ed.). West Sussex: Wiley Blackwell.

New Zealand Geotechnical Society (NZGS). (2021). Earthquake geotechnical engineering practice. *Module4: Earthquake resistant foundation design*. Auckland, New Zealand: New Zealand Geotechnical Society.

Petterson, M. G. (2004). *The geology of north and central Malaita, Solomon Islands: the thickest and most accessible part of the world's largest (Ontong Java) ocean plateau.* London: Geological Society.

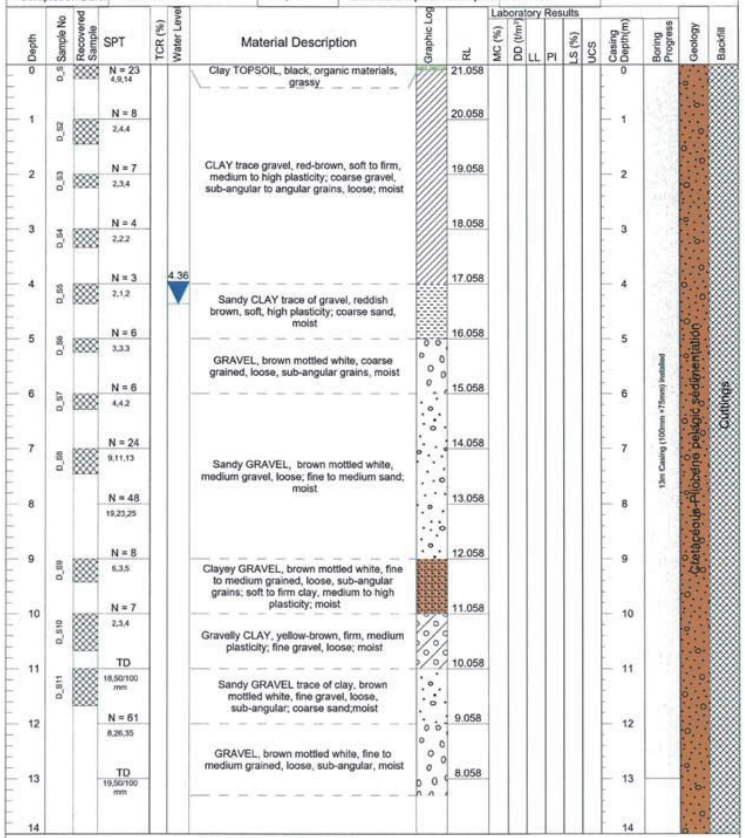
Solomon Islands Meteorological Services. (2022, May). Auki Rainfall Data. Honiara, Guadalcanal, Solomon Islands.

Standards Australia. (2011). Australian Standard, Residential Slabs and Footings. *AS 2870 - 2011*. Sydney, NSW, Australia: Standards Australia.

Page intentionally left blank

Annex A – Borehole Logs

Project:	KILU'UFI HOSPITAL	Location:	Kilu'ufi		Hole ID:	BH-01	
Job No:	202206_01	Ground Level:	21.058m		Drilling Equipment:	GY150	
Contractor:	EESL	Coordinate:	Easting:	Northing:	Drilling Method:	Rotary Drilling	
Starting Date:	22/06/22		685851.577	9033840.707	Logged By:	Billy B	
Completion Date:	23/06/22	Sampler:	Standard Spoon Sampler		Sheet No:	1	



Notes: Drilling terminated at:13m depth ()

U - Undisturbed
D - Disturbed
SPT - SPT N-value
S - Sample
TD - Test Discontinued (refusal) @N>100 or when blow count > 50 for any interval
30/60mm - 30 blows causes 60mm (<100mm) penetration (Refusal)

Project:	KILU'UFI HOSPITAL	Location:	Kilu'ufi	Hole ID:	BH-02
Job No:	202206_01	Ground Level:	21.341m	Drilling Equipment:	GY150
Contractor:	EESL	Coordinate:	Easting: Northing:	Drilling Method:	Rotary Drilling
Starting Date:	10/6/2022		685842.604 9033858.535	Logged By:	Billy B
Completion Date:	14/06/22	Sampler:	Standard Spoon Sampler	Sheet No:	2

Depth	Sample No	Recovered Sample	SPT	TCR (%)	Water Level	Material Description	Graphic Log	RL	Laboratory Results: MC (%)	DD (t/m³)	LL	PI	LS (%)	UCS	Casing Depth(m)	Boring Progress	Geology	Backfill
0	D_S1		N = 12 6,6,6			Coronas FILL intermixed with clay, chalk white, medium dense, dry		21.341										
1	D_S2		N = 12 4,5,7					20.241										
						CLAY, red-brown, soft to firm, medium to high plasticity, moist												
2	D_S3		N = 12 3,5,7					19.241										
3	D_S4		N = 6 6,3,3					18.241										
4	D_S5		N = 5 2,2,3			CLAY with some gravel, red-brown, soft to firm, medium to high plasticity, moist		17.241										
					5.00													
5	D_S6		N = 7 2,3,4					16.241										
						Sandy CLAY trace of gravel, reddish brown, soft, high plasticity; coarse sand, moist												
6			N = 5 5,2,3					15.241										
						LOSS (inferred: Sandy Clay)												
7			N = 12 3,6,6					14.241										
						LOSS (inferred: Gravel)												
8	D_S9		N = 47 15,25,22					13.241										
9	D_S10		N = 12 6,6,6			GRAVEL trace of sand, brown mottled white, sub-angular to angular, loose; fine sand; moist,		12.241										
10	D_S11		N = 19 8,8,11					11.241										
						LOSS (inferred: Gravel)												
11	D_S12		TD 27,31/60mm					10.241										
						GRAVEL trace of sand, brown mottled white, coarse grained, sub-angular to angular, loose; fine sand; moist,												
12	D_S13		TD 23,50,52					9.241										
						GRAVEL with some sand, trace of clay, brown mottled white, medium to coarse grained, angular to subangular, loose; coarse sand, moist												
13	D_S14		TD 14,48,30/90mm					8.241										
14			TD 15,43,51					7.241										
15																		

Drilling terminated at:14m depth (hole collapse)

Notes:
U - Undisturbed
D - Disturbed
SPT - SPT N value
S - Sample
TD - Test Discontinued (refusal) @N>100 or when blow count > 50 for any interval
30/60mm - 30 blows causes 60mm (<100mm) penetration (Refusal)

Project:	KILU'UFI HOSPITAL	Location:	Kilu'ufi	Hole ID:	BH-03
Job No:	202206_01	Ground Level:	21.821m	Drilling Equipment:	GY150
Contractor:	EESL	Coordinate:	Easting: Northing:	Drilling Method:	Rotary Drilling
Starting Date:	17/06/22		685853.909 9033869.246	Logged By:	Billy B
Completion Date:	19/06/22	Sampler:	Standard Spoon Sampler	Sheet No:	3

Depth	Sample No	Recovered Sample	SPT	TCR (%)	Water Level	Material Description	Graphic Log	RL	Laboratory Results: MC (%)	DD (t/m³)	LL	PI	LS (%)	UCS	Casing Depth(m)	Boring Progress	Geology	Backfill
0	D_S1		N = 5 2,2,3			Clay TOPSOIL, black, organic materials, grassy		21.821										
0.5																		
1	D_S2		N = 9 3,4,5					20.821										
1.5																		
2	D_S3		N = 8 3,3,5					19.821										
2.5																		
3	D_S4		N = 9 2,4,5			CLAY, red-brown, soft to firm, medium to high plasticity, moist		18.821										
3.5																		
4	D_S5		N = 8 3,4,4					17.821										
4.5					4.87													
5	D_S6		N = 8 3,4,4					16.821										
5.5																		
6	D_S7		N = 9 6,5,4			Sandy GRAVEL with some clay, brown mottled white, medium to coarse gravel, loose, sub-rounded to sub-angular; medium to coarse sand; highly plastic clay; moist		15.821										
6.5																		
7	D_S8		N = 30 8,16,14			GRAVEL, brown mottled white, medium to coarse grained, sub-angular to angular, loose, moist		14.821										
7.5																		
8			N = 69 22,33,36			LOSS (inferred: Gravel)		13.821										
8.5																		
9	D_S9		N = 59 13,26,33			GRAVEL with sand trace of clay, brown mottled white, medium to coarse grained, loose; coarse sand; medium to high plasticity; moist		12.821										
9.5																		
10	D_S10		N = 78 11,26,50					11.821										
10.5																		

Drilling terminated at:10m depth (reach target)

Notes:
U - Undisturbed
D - Disturbed
SPT - SPT N value
S - Sample
TD - Test Discontinued (refusal) @N>100 or when blow count > 50 for any interval
30/60mm - 30 blows causes 60mm (<100mm) penetration (Refusal)

Project:	KILU'UFI HOSPITAL	Location:	Kilu'ufi	Hole ID:	BH-04
Job No:	202206_01	Ground Level:	21.984m	Drilling Equipment:	GY150
Contractor:	EESL	Coordinate:	Easting: 685866.701 Northing: 9033853.781	Drilling Method:	Rotary Drilling
Starting Date:	20/06/22			Logged By:	Billy B
Completion Date:	21/06/22	Sampler:	Standard Spoon Sampler	Sheet No:	4

Depth	Sample No	Recovered Sample	SPT	TCR (%)	Water Level	Material Description	Graphic Log	RL	Laboratory Results: MC (%)	DD (t/m³)	LL	PI	LS (%)	UCS	Casing Depth(m)	Boring Progress	Geology	Backfill
0	D_S1		N = 10 (4,6,4)			Clay TOPSOIL, black, organic materials, grassy		21.984							0			
1	D_S2		N = 7 (2,3,4)					20.884							1			
2	D_S3		N = 10 (3,4,6)			CLAY trace gravel, red-brown, soft to firm, medium to high plasticity; coarse gravel, sub-angular to angular grains, loose; moist		19.884							2			
3	D_S4		N = 7 (2,3,4)					18.884							3			
4	D_S5		N = 6 (4,3,3)					17.884							4	5m Casing (100mm) installed	Cretaceous-Pliocene pelagic sedimentation	
5	D_S6		N = 6 (7,1,5)		5.10	CLAY trace gravel, red-brown, soft to firm, medium to high plasticity; coarse gravel, sub-angular to angular grains, loose; moist		16.884							5			
6			N = 7 (4,3,4)			LOSS (inferred: Gravelly CLAY)		15.884							6			
7	D_S7		N = 35 (10,17,18)			Gravelly SAND, brown mottled white, fine to medium grained, medium dense; coarse sand, loose; coarse gravel, sub-angular to angular grained;moist		14.884							7			
8	D_S8		N = 36 (17,20,16)			Gravelly SAND trace of clay, brown mottled white, fine to medium grained, medium dense; coarse sand, loose; coarse gravel, sub-angular to angular grained;moist		13.884							8			
9	D_S9		N = 45 (9,22,23)			Sandy GRAVEL trace of clay, brown mottled white, coarse grained, sub-angular, loose; coarse sand;moist		12.884							9			
10	D_S10		N = 30 (10,15,15)					11.884							10			
10.5						Drilling terminated at:10m depth (reach target)												

Notes:
U - Undisturbed
D - Disturbed
SPT - SPT N value
S - Sample
TD - Test Discontinued (refusal) @N>100 or when blow count > 50 for any interval
30/60mm - 30 blows causes 60mm (<100mm) penetration (Refusal)

Project:	KILU'UFI HOSPITAL	Location:	Kilu'ufi	Hole ID:	BH-05
Job No:	202206_01	Ground Level:	21.704m	Drilling Equipment:	GY150
Contractor:	EESL	Coordinate:	Easting: 685850.436 Northing: 9033886.705	Drilling Method:	Rotary Drilling
Starting Date:	14/06/22			Logged By:	Billy B
Completion Date:	16/06/22	Sampler:	Standard Spoon Sampler	Sheet No:	5

Depth	Sample No	Recovered Sample	SPT	TCR (%)	Water Level	Material Description	Graphic Log	RL	Laboratory Results: MC (%)	DD (t/m³)	LL	PI	LS (%)	UCS	Casing Depth(m)	Boring Progress	Geology	Backfill
0	D_S1		N = 6 (2,3,3)			Clay TOPSOIL, black, organic materials, grassy		21.704							0			
1	D_S2		N = 10 (3,4,6)			CLAY, red-brown, soft to firm, medium to high plasticity, moist		20.604							1	Initial 3m casing installed (and removed)		
2	D_S3		N = 10 (3,4,6)					19.604							2			
3	D_S4		N = 14 (5,5,9)					18.604							3			
4	D_S5		N = 2 (3,1,1)		4.65	Sandy GRAVEL with some clay, red-brown, coarse grained, loose, rounded to sub-angular; medium to coarse sand; highly plastic clay; moist		17.604							4			
5	D_S6		N = 9 (5,3,6)					16.604							5	5m Casing later installed		
6	D_S7		N = 12 (10,6,6)					15.604							6			
7	D_S8		N = 20 (7,7,13)			SAND with some gravel trace of clay, brown mottled white, fine to medium grained; medium gravel, sub-rounded to sub-angular; high plastic clay; moist		14.604							7			
8	D_S9		N = 19 (10,11,8			GRAVEL, brown mottled white, medium to coarse grained, sub-angular to angular, loose, moist		13.604							8			
9	D_S10		N = 13 (9,7,6			Sandy GRAVEL with some clay, brown mottled white, medium to coarse gravel, loose, sub-rounded to sub-angular; medium to coarse sand; highly plastic clay; moist		12.604							9	3m additional casing installed; Wash Boring conducted		
10			N = 21 (11,11,10			LOSS (inferred: Gravel)		11.604							10			
10.5						Drilling terminated at:10m depth (reach target)												

Notes:
U - Undisturbed
D - Disturbed
SPT - SPT N value
S - Sample
TD - Test Discontinued (refusal) @N>100 or when blow count > 50 for any interval
30/60mm - 30 blows causes 60mm (<100mm) penetration (Refusal)

Annex B – Excavation Pits Log

ENGINEERING ENVIRONMENTAL SERVICES LTD

PROJECT: Kilu'ufi Hospital
CLIENT: JICA
LOCATION: Kilu'ufi Hospital
JOB NO.: 202206_1
GROUND SURFACE (RL): 20.934

EASTING: 685847.25
NORTHING: 9033842.659

TESTPIT NO: EP1
DATE EXCAVATED: 14/06/22
Equipment Type: CAT 318C Excavator
LOGGED BY: Billy B

DEPTH (m)	DESCRIPTION OF STRATA	USCS	DEPTH (m)	RL (m)	SAMPLES
0 – 0.1	TOPSOIL, black, firm, highly plastic, moist, contains rootlests, grasses	OH	0.0	20.934	
0.1 – 0.6	CLAY, brown, soft to firm, medium to high plasticity, moist	CH		20.834	
0.6 – 0.7	GRAVEL, black-white, coarse gravel, medium dense, rounded, moist, alluvial	GP	0.5	20.334	
0.7 – 1.9	CLAY, red-brown, soft to firm, medium to high plasticity, moist	CH	1.0	20.184	EP1_S1
			1.5	18.934	

DCP blows/100mm: 0 5 10 15 20

GROUNDWATER: Groundwater not encountered

PAGE 1

ENGINEERING ENVIRONMENTAL SERVICES LTD

PROJECT: Kilu'ufi Hospital
CLIENT: JICA
LOCATION: Kilu'ufi Hospital
JOB NO.: 202206_1
GROUND SURFACE (RL): 21.211

EASTING: 685842.008
NORTHING: 9033854.554

TESTPIT NO: EP2
DATE EXCAVATED: 14/06/22
Equipment Type: CAT 318C Excavator
LOGGED BY: Billy B

DEPTH (m)	DESCRIPTION OF STRATA	USCS	DEPTH (m)	RL (m)	SAMPLES
0 – 0.3	TOPSOIL, black, firm, highly plastic, moist, contains rootlests, grasses	OH	0.0	21.211	
0.3 – 1.9	CLAY, red-brown, high plasticity, firm, moist	CH		20.861	
			0.5		EP2_S1
			1.0		
			1.5	19.211	

DCP blows/100mm: 0 5 10 15 20

GROUNDWATER: Groundwater not encountered

PAGE 2

ENGINEERING ENVIRONMENTAL SERVICES LTD

PROJECT: Kilu'ufi Hospital
CLIENT: JICA
LOCATION: Kilu'ufi Hospital
JOB NO.: 202206_1
GROUND SURFACE (RL): 21.846

EASTING: 685855.461
NORTHING: 9033867.611

TESTPIT NO: EP3
DATE EXCAVATED: 14/06/22
Equipment Type: CAT 318C Excavator
LOGGED BY: Billy B

DEPTH (m)	DESCRIPTION OF STRATA	USCS	DEPTH (m)	RL (m)	SAMPLES
0	TOPSOIL, black, firm, highly plastic, moist, contains rootlests, grasses	OH	0.0	21.846	
0.1	GRAVEL, black-white, coarse gravel, medium dense, rounded, moist, alluvial	GP		21.746	
0.2				19.646	EP3_S1
0.3					
0.4					
0.5			0.5		
0.6					
0.7					
0.8					
0.9					
1			1.0		
1.1	CLAY, red-brown, high plasticity, firm, moist	CH			
1.2					
1.3					
1.4					
1.5			1.5		
1.6					
1.7					
1.8					
1.9					
				19.846	

DCP blows/100mm: 0 5 10 15 20

GROUNDWATER: Groundwater not encountered

PAGE 3

ENGINEERING ENVIRONMENTAL SERVICES LTD

PROJECT: Kilu'ufi Hospital
CLIENT: JICA
LOCATION: Kilu'ufi Hospital
JOB NO.: 202206_1
GROUND SURFACE (RL): 21.71

EASTING: 685863.474
NORTHING: 9033850.943

TESTPIT NO: EP4
DATE EXCAVATED: 14/06/22
Equipment Type: CAT 318C Excavator
LOGGED BY: Billy B

DEPTH (m)	DESCRIPTION OF STRATA	USCS	DEPTH (m)	RL (m)	SAMPLES
0	TOPSOIL, black, firm, highly plastic, moist, contains rootlests, grasses	OH	0.0	21.71	
0.1	GRAVEL, black-white, coarse gravel, medium dense, rounded, moist, alluvial	GP		21.61	
0.2				21.51	EP4_S1
0.3					
0.4					
0.5			0.5		
0.6					
0.7					
0.8					
0.9					
1			1.0		
1.1	CLAY, red-brown, high plasticity, firm, moist	CH			
1.2					
1.3					
1.4					
1.5			1.5		
1.6					
1.7					
1.8					
1.9					
				19.71	

DCP blows/100mm: 0 5 10 15 20

GROUNDWATER: Groundwater not encountered

PAGE 4

ENGINEERING ENVIRONMENTAL SERVICES LTD

PROJECT: Kilu'ufi Hospital
CLIENT: JICA
LOCATION: Kilu'ufi Hospital
JOB NO.: 202206_1
GROUND SURFACE (RL): 21.873

EASTING: 685848.139
NORTHING: 9033885.155

TESTPIT NO: EP5
DATE EXCAVATED: 14/06/22
Equipment Type: CAT 318C Excavator
LOGGED BY: Billy B

DEPTH (m)	DESCRIPTION OF STRATA	LEGEND	USCS	DEPTH (m)	RL (m)	SAMPLES	DCP blows/100mm
0	TOPSOIL, black, firm, highly plastic, moist, contains rootlests, grasses		OH	0.0	21.873		
0.1					21.773		
0.2	CLAY, red-brown, high plasticity, firm, moist		CH			EP5_S1	
0.3					21.573		
0.4	Gravelly SAND, fine to medium grained, loose; coarse gravel, rounded;moist		SP				
0.5				0.5	21.373		
0.6							
0.7							
0.8							
0.9							
1				1.0			
1.1							
1.2							
1.3	CLAY, red-brown, high plasticity, firm, moist		CH				
1.4							
1.5				1.5			
1.6							
1.7							
1.8							
1.9					19.873		

GROUNDWATER: Groundwater not encountered

PAGE 5

Annex C- Laboratory Test Results

Moisture Content

Solomon Islands Government
Ministry of Infrastructure Development
MID- Construction Materials Laboratory (MID-COMLAB)

File No.	MID-CML-R23-4
Date issued	09-Sep-15
Version No/Authorised	V1/ IA
Laboratory Form No.	LF-WS03A

MOISTURE CONTENT TEST REPORT

CLIENT: EESL
Honiara
PROJECT: Kilu'ufi Hospital, Malaita
JOB NUMBER: 041-013

JOB NO.	SAMPLE SOURCE	SAMPLE DESCRIPTION	MOISTURE CONTENT (%)
041-013	BH 1 1m - 3 m	Gravelly CLAY	49.1
041-013	BH 1 2 m	CLAY	83.3
041-013	BH 1 5 m	Sandy GRAVEL	26.6
041-013	BH 1 7 m	Sandy GRAVEL	11.7
041-013	BH 2 1 m - 4 m	Gravelly CLAY	57.4
041-013	BH 2 5 m	Gravelly CLAY	40.1
041-013	BH 2 8 m - 13 m	Sandy GRAVEL	10.5
041-013	BH 3 2 m - 5 m	Gravelly CLAY	63.2
041-013	BH 3 6 m - 10 m	Sandy GRAVEL	17.9
041-013	BH 4 7 m - 9 m	Gravelly SAND	13.9
041-013	BH 5 7 m	SAND	28.6

NOTES TO TESTING

1 Test Method: AS 1289 2.1.1 Note; See PSD report for full sample description
Sampled by: Client
Job Number: 041-013
Date Tested: 25.07.2022
Signature:
Name:

Atterberg Limits

Solomon Islands Government Ministry of Infrastructure Development MID- Construction Materials Laboratory (MID-COMLAB)	File No.	MID-CML-R25-4
	Date issued	09-Sep-15
	Version No/ Authorised	V1/ IA
	Laboratory Form No.	LF-WS03A

SOIL CLASSIFICATION TEST REPORT

CLIENT: EESL
Honiara
PROJECT: Kilu'ufi Hospital, Malaita
JOB NUMBER: 041-013

JOB NO.	SAMPLE SOURCE	SAMPLE DESCRIPTION	MOISTURE CONTENT (%) 1	DRY DENSITY (t/m³)	LIQUID LIMIT 2	PLASTIC INDEX 3	LINEAR SHRINKAGE (%) 4
041-013	BH 1 - 1 m & 4 m	Gravelly CLAY; Brownish red, moist, trace fine sand, high plasticity	49.1		94 a	63	18.0
041-013	BH 1 - 2 m	CLAY; Brownish red, moist, trace fine sand, high plasticity	83.0				23.0
041-013	BH 2 - 1 m - 4 m	Gravelly CLAY; Red white, fine to coarse sand, with fine to medium gravel, high plasticity	57.4		109	75	23.0
041-013	BH 3 - 2 m - 5 m	Gravelly CLAY; Brownish red, fine to coarse sand, fine to medium gravel, high plasticity	63.2		95	59	22.0
041-013	BH 3 - 6 m	Sandy GRAVEL; Brown, fine to coarse sand, with fine to medium gravel, trace clay, non plasticity	17.9				4.0

NOTES TO TESTING

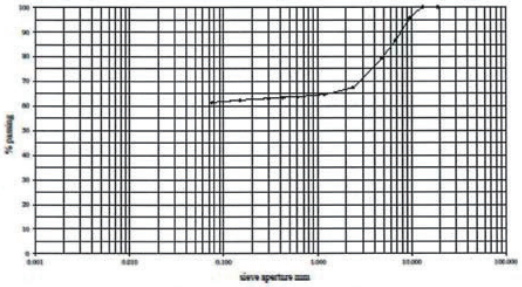
1 Test Method: AS 1289 2.1.1
2 Test Method: AS 1289 3.1.2
Preparation:
Sample History:
3 Test Method: AS 1289 3.2.1, 3.3.1
Preparation
Sample History:
4 Test Method: AS 1289 3.4.1
Preparation:
Sample History:
Mould Size:
Dry State:

Sampled by: Client
Job Number: 041-013
Date Tested: 25.07.2022
Signature:
Name:

Particle Size Distribution

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client: EESL
Address: Honiara
Project: Kilu ufi Hospital
Test Method: AS 1289 3.6.1 / 2
Job Number: 041 - 013 **Lab Number:**
Sample Source: BH 1 - 1 m - 3 m **Date Tested:** 20.07.2022
Sampled by: Client **Checked By:**



Clay	Silt	Sand	Gravel

Sample Description: Gravelly CLAY: Brown, moist, trace fine sand, high plasticity

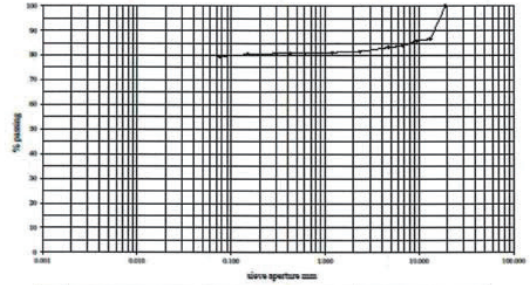
Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0		1.18	65
75.0		0.600	64
63.0		0.425	63
53.0		0.300	63
37.5		0.150	62
26.5		0.075	61
19.0	100	0.050	
13.2	100	0.020	
9.5	96	0.010	
6.7	87	0.005	
4.75	79	0.002	
2.36	67		

Hydrometer Type: ASTM 152H / N/A
Dispersant Type: Sodium Hexametaphosphate / N/A
Pretreatment: RTA T102 / RTA T103 / None
Loss on Pretreatment: None
Remarks:

Form CO6 File C:\Excel Reports\CO6 Particle Size Distribution -19mm One Riffle Issue 2 June 2008 CL

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client:	EESL		
Address:	Honiara		
Project:	Kilu ufi Hospital		
Test Method:	AS 1289 3.6.1 / 2		
Job Number:	041 - 013	**Lab Number:**	
Sample Source:	BH 1 - 2 m	**Date Tested:**	20.07.2022
Sampled by:	Client	**Checked By:**	



Sample Description: CLAY: Brownish red, moist, trace sand with some gravel, high plasticity.

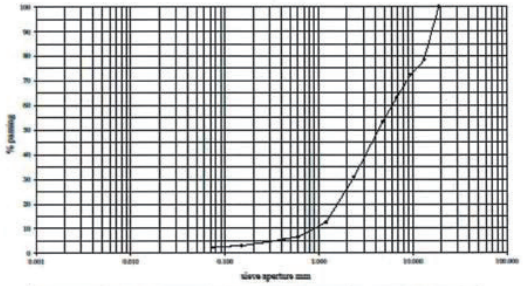
Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0		1.18	91
75.0		0.600	91
63.0		0.425	91
53.0		0.300	91
37.5		0.150	90
26.5		0.075	90
19.0	100	0.050	
13.2	97	0.020	
9.5	96	0.010	
6.7	94	0.005	
4.75	93	0.002	
2.36	92		

Hydrometer Type:	ASTM 152H / N/A
Dispersant Type:	Sodium Hexametaphosphate / N/A
Pretreatment:	RTA T102 / RTA T103 / None
Loss on Pretreatment:	None
Remarks:	

Form C06 File C:\Excel Reports\C06 Particle Size Distribution -19mm One Riffle Issue 2 June 2008 CL

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client:	EESL		
Address:	Honiara		
Project:	Kilu ufi Hospital		
Test Method:	AS 1289 3.6.1 / 2		
Job Number:	041 - 013	**Lab Number:**	
Sample Source:	BH 1 - 5 m	**Date Tested:**	20.07.2022
Sampled by:	Client	**Checked By:**	



Sample Description: Sandy GRAVEL: Red, Fine to coarse sand, fine to coarse gravel, trace silt, non plasticity.

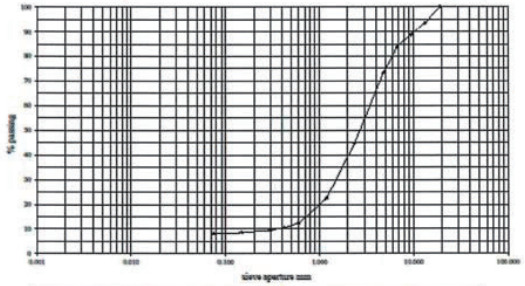
Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0		1.18	12
75.0		0.600	7
63.0		0.425	6
53.0		0.300	5
37.5		0.150	3
26.5		0.075	2
19.0	100	0.050	
13.2	78	0.020	
9.5	73	0.010	
6.7	63	0.005	
4.75	53	0.002	
2.36	31		

Hydrometer Type:	ASTM 152H / N/A
Dispersant Type:	Sodium Hexametaphosphate / N/A
Pretreatment:	RTA T102 / RTA T103 / None
Loss on Pretreatment:	None
Remarks:	

Form C06 File C:\Excel Reports\C06 Particle Size Distribution -19mm One Riffle Issue 2 June 2008 CL

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client:	EESL		
Address:	Honiara		
Project:	Kilu ufi Hospital		
Test Method:	AS 1289 3.6.1 / 2		
Job Number:	041 - 013	**Lab Number:**	
Sample Source:	BH 1 - 7 m	**Date Tested:**	20.07.2022
Sampled by:	Client	**Checked By:**	



Clay	Silt	Sand	Gravel

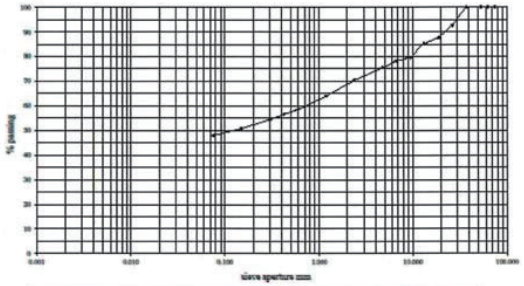
Sample Description: Sandy GRAVEL: Red, Fine to coarse sand, with fine gravel, trace clay.

Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0		1.18	23
75.0		0.600	13
63.0		0.425	11
53.0		0.300	10
37.5		0.150	9
26.5		0.075	8
19.0	100	0.050	
13.2	94	0.020	
9.5	89	0.010	
6.7	84	0.005	
4.75	73	0.002	
2.36	45		

Hydrometer Type: ASTM 152H / N/A
Dispersant Type: Sodium Hexametaphosphate / N/A
Pretreatment: KTA T102 / KTA T103 / None
Loss on Pretreatment: None
Remarks:

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client:	EESL		
Address:	Honiara		
Project:	Kilu ufi hospital		
Test Method:	As 1289		
Job Number:	041 - 013	**Lab Number:**	
Sample Source:	BH 2 - 1m - 4 m	**Date Tested:**	20.07.2022
Sampled by:	Client	**Checked By:**	



Clay	Silt	Sand	Gravel

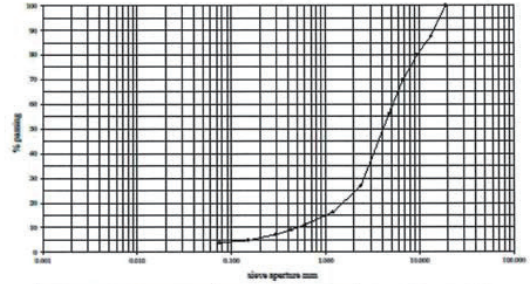
Sample Description: Gravelly CLAY; Red white, fine to course sand with fine to course gravel

Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0	100	1.18	64
75.0	100	0.600	59
63.0	100	0.425	57
53.0	100	0.300	55
37.5	100	0.150	51
26.5	93	0.075	48
19.0	88	0.050	
13.2	85	0.020	
9.5	80	0.010	
6.7	78	0.005	
4.75	76	0.002	
2.36	70		

Hydrometer Type: N/A
Dispersant Type: N/A
Pretreatment: None
Loss on Pretreatment: None
Remarks:

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client:	EESL		
Address:	Honiara		
Project:	Kilu ufi Hospital		
Test Method:	AS 1289 3.6.1 / 2		
Job Number:	041 - 013	**Lab Number:**	
Sample Source:	BH 2 - 8 m - 13 m	**Date Tested:**	20.07.2022
Sampled by:	Client	**Checked By:**	



Sample Description: Sandy GRAVEL: Brown, fine to coarse sand, fine to medium gravel, non plasticity

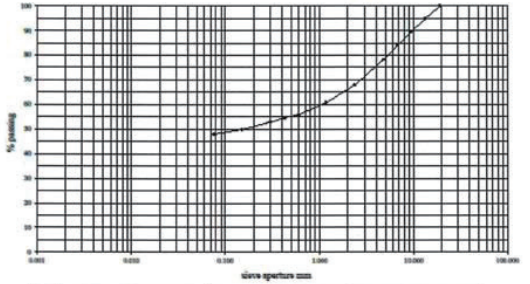
Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0		1.18	16
75.0		0.600	11
63.0		0.425	9
53.0		0.300	7
37.5		0.150	5
26.5		0.075	4
19.0	100	0.050	
13.2	87	0.020	
9.5	80	0.010	
6.7	70	0.005	
4.75	56	0.002	
2.36	27		

Hydrometer Type:	ASTM 152H / N/A
Dispersant Type:	Sodium Hexametaphosphate / N/A
Pretreatment:	KTA T102 / KTA T103 / None
Loss on Pretreatment:	None
Remarks:	

Form C06 File C:\Brand Reports\C06 Particle Size Distribution -10mm One Riffle Issue 2 June 2008 CL

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client:	EESL		
Address:	Honiara		
Project:	Kilu ufi Hospital		
Test Method:	AS 1289 3.6.1 / 2		
Job Number:	041 - 013	**Lab Number:**	
Sample Source:	BH 3 - 2 m - 5 m	**Date Tested:**	20.07.2022
Sampled by:	Client	**Checked By:**	



Sample Description: Gravelly CLAY: Red + white,moist, fine to coarse sand with fine gravel, medium to high plasticity

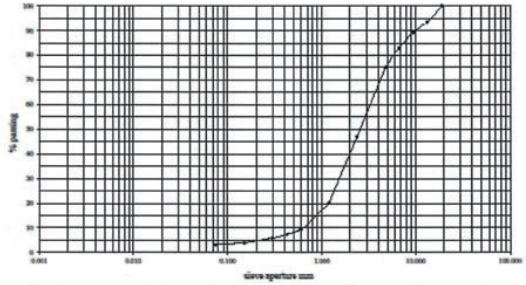
Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0		1.18	61
75.0		0.600	56
63.0		0.425	55
53.0		0.300	53
37.5		0.150	50
26.5		0.075	48
19.0	100	0.050	
13.2	95	0.020	
9.5	90	0.010	
6.7	84	0.005	
4.75	78	0.002	
2.36	68		

Hydrometer Type:	ASTM 152H / N/A
Dispersant Type:	Sodium Hexametaphosphate / N/A
Pretreatment:	KTA T102 / KTA T103 / None
Loss on Pretreatment:	None
Remarks:	

Form C06 File C:\Brand Reports\C06 Particle Size Distribution -10mm One Riffle Issue 2 June 2008 CL

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client:	EESL		
Address:	Honiara		
Project:	Kilu ufi Hospital		
Test Method:	AS 1289 3.6.1 / 2		
Job Number:	041 - 013	Lab Number:	
Sample Source:	BH 3 - 6 m - 10 m	Date Tested:	20.07.2022
Sampled by:	Client	Checked By:	



Sample Description: Sandy GRAVEL: Brownish, fine to coarse sand, with fine to medium gravel, trace silt, non plasticity

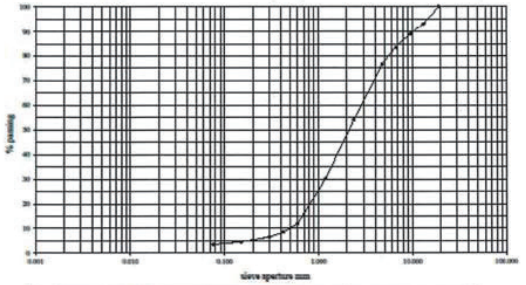
Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0		1.18	20
75.0		0.600	9
63.0		0.425	7
53.0		0.300	6
37.5		0.150	4
26.5		0.075	3
19.0	100	0.050	
13.2	93	0.020	
9.5	89	0.010	
6.7	83	0.005	
4.75	75	0.002	
2.36	47		

Hydrometer Type:	ASTM 152H / N/A
Dispersant Type:	Sodium Hexametaphosphate / N/A
Pretreatment:	KTA T102 / KTA T103 / None
Loss on Pretreatment:	None
Remarks:	

Form C06 File C:\Hand Reports\C06 Particle Size Distribution -10mm One Riffle Issue 2 June 2008 CL

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client:	EESL		
Address:	Honiara		
Project:	Kilu ufi Hospital		
Test Method:	AS 1289 3.6.1 / 2		
Job Number:	041 - 013	Lab Number:	
Sample Source:	BH 4 - 7 m - 9 m	Date Tested:	20.07.2022
Sampled by:	Client	Checked By:	



Sample Description: Gravelly SAND: Brownish red, fine to coarse sand, fine to medium gravel trace clay low plasticity,

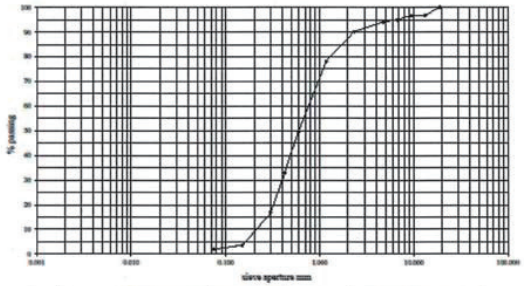
Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0		1.18	30
75.0		0.600	12
63.0		0.425	9
53.0		0.300	7
37.5		0.150	5
26.5		0.075	4
19.0	100	0.050	
13.2	93	0.020	
9.5	89	0.010	
6.7	84	0.005	
4.75	77	0.002	
2.36	54		

Hydrometer Type:	ASTM 152H / N/A
Dispersant Type:	Sodium Hexametaphosphate / N/A
Pretreatment:	KTA T102 / KTA T103 / None
Loss on Pretreatment:	None
Remarks:	

Form C06 File C:\Hand Reports\C06 Particle Size Distribution -10mm One Riffle Issue 2 June 2008 CL

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client:	EESL		
Address:	Honiara		
Project:	Kilu ufi Hospital		
Test Method:	AS 1289 3.6.1 / 2		
Job Number:	041 - 013	Lab Number:	
Sample Source:	BH 5 - 7 m	Date Tested:	20.07.2022
Sampled by:	Client	Checked By:	



Sample Description: Gravelly SAND: Brownish, fine to coarse sand with fine gravel, trace clay, Non plasticity

Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0		1.18	78
75.0		0.600	50
63.0		0.425	33
53.0		0.300	17
37.5		0.150	4
26.5		0.075	2
19.0	100	0.050	
13.2	97	0.020	
9.5	97	0.010	
6.7	95	0.005	
4.75	94	0.002	
2.36	90		

Hydrometer Type:	ASTM 152H / N/A
Dispersant Type:	Sodium Hexametaphosphate / N/A
Pretreatment:	KTA T102 / KTA T103 / None
Loss on Pretreatment:	None
Remarks:	

Form C06 File C:\Excel Reports\C06 Particle Size Distribution -10mm One Riffle Issue 2 June 2008 CL

Annex D – Coordinates of Test locations

Table 5.Kilu'ufi Hospital boreholes & excavation pits locations - GUX1 ASTRO UTM (Azimuth Survey)

POINT NAME	EASTING	NORTHING	HEIGHT	REMARKS
BH1	685851.577	9033840.707	21.058	Peg
EP1_1	685847.25	9033842.659	20.934	Chopstick, corner of pit
EP1_2	685848.441	9033843.596	21.228	Chopstick, corner of pit
EP1_3	685847.502	9033844.817	21.321	Chopstick, corner of pit
EP1_4	685846.406	9033843.888	21.05	Chopstick, corner of pit
BH2	685842.604	9033858.535	21.341	Peg
EP2_1	685842.008	9033854.554	21.211	Chopstick, corner of pit
EP2_2	685842.418	9033853.182	21.101	Chopstick, corner of pit
EP2_3	685843.892	9033853.44	21.216	Chopstick, corner of pit
EP2_4	685843.517	9033854.878	21.228	Chopstick, corner of pit
BH3	685853.909	9033869.246	21.821	Peg
EP3_1	685855.461	9033867.611	21.846	Chopstick, corner of pit
EP3_2	685854.505	9033868.715	21.827	Chopstick, corner of pit
EP3_3	685853.346	9033867.722	21.937	Chopstick, corner of pit
EP3_4	685854.36	9033866.669	21.839	Chopstick, corner of pit
BH4	685866.701	9033853.781	21.984	Peg
EP4_1	685863.474	9033850.943	21.71	Chopstick, corner of pit
EP4_2	685862.234	9033849.871	21.562	Chopstick, corner of pit
EP4_3	685861.454	9033851.111	21.603	Chopstick, corner of pit
EP4_4	685862.592	9033852.094	21.641	Chopstick, corner of pit
BH5	685850.436	9033886.705	21.704	Peg
EP5_1	685848.139	9033885.155	21.873	Chopstick, corner of pit
EP5_2	685847.677	9033886.544	21.808	Chopstick, corner of pit
EP5_3	685848.977	9033887.244	21.808	Chopstick, corner of pit
EP5_4	685849.507	9033885.833	21.905	Chopstick, corner of pit

Annex E1 – Borehole Sample Photographs

BH-01 Samples Photographs

BH-02 Samples Photographs

BH-03 Samples Photographs

BH-04 Samples Photographs

BH-05 Samples Photographs

Annex E2 – Excavation Pit Photographs

Excavation Pit 1

Excavation Pit 2

Excavation Pit 3

Excavation Pit 4

Excavation Pit 5

７－４．水質調査

2022

Water Quality Report

KILU'UFI HOSPITAL

ENGINEERING ENVIRONMENTAL SERVICES LTD

1. Introduction

Engineering Environmental Services Limited (EESL) was tasked to undertake water quality sampling and testing at Kilu'ufi Hospital on behalf of the Joint Venture of Fukunaga Architects-Engineers, Yachiyo Engineering Co ltd and Binko International Ltd for the Improvement of Kilu'ufi Hospital Project funded by the Japanese International Corporation Agency (JICA).

This report presents results from the water quality testing undertaken from samples collected at the Kilu'ufi hospital kitchen tap and water source on the 7th of July 2022.

2. Methodology

The methodology of sampling and testing was fairly simple and straightforward. A total of 8 water samples were collected. Six of the samples were collected from the three water taps (2 each) in the kitchen and the other two samples were collected from the water source a few hundred meters from the hospital.

The samples are collected in sealed containers with reagents. These containers are then stored in a cool dry esky and are transported to the National Public Health Laboratory in Honiara for testing on the next day.

Two tests were conducted on the samples. A total of four samples were tested for presence of physical and chemical compounds, and another test was conducted for microbiology on the other four samples.

Details and Results of the testing is presented in section 3.

3. Laboratory Test Results

Results of the Microbiology Test and Physical/Chemical Test is discussed below.

3.1 Microbiology Test Report

According to the microbiology test report by the National Pubic Health Laboratory (NPHL), there is a significant presence of coliforms and E.Coli detected from the water samples. The highest concentration of coliform and E.Coli were detected from the location of the water source, with a total coliform of >2420 MPN/100mL and E.Coli of 579 MPN/100mL as seen in Figure 1 & 2.

National Public Health Laboratory (NPHL)
P.O. Box 349, Honiara, Solomon Islands.
Telephone: (+677) 38871

Test Report No. MTR 72/22 | Date of Issue: 14/07/2022 | Version No.: 03 | Page 1 of 2

MICROBIOLOGY TEST REPORT

Job Number: J2267

Customer: EESL

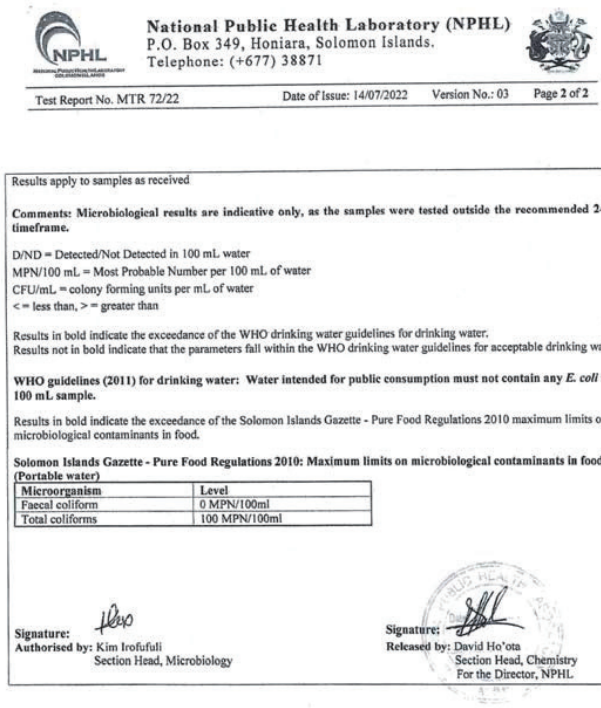
Address: Kukum Highway

7252798, mosesdavis386@gmail.com

Sample Type: Water | **Date/time received: 08/07/2022, 3:21 pm** | **Date/time tested: 08/07/2022, 5:30 pm**

Sample No.	Date/time collected	Sample description	Analysis	Result	Units	Method
J2267-1	07/07/22 2:30 pm	ABERO Source	Total coliforms	>2420	MPN/100 mL	Colilert-18: APHA (online) 9223 B
			E. coli	579	MPN/100 mL	
J2267-2	07/07/22 3:30 pm	Kitchen Tap 1	Total coliforms	>2420	MPN/100 mL	Colilert-18: APHA (online) 9223 B
			E. coli	196	MPN/100 mL	
J2267-3	07/07/22 3:38 pm	Kitchen Tap 2	Total coliforms	>2420	MPN/100 mL	Colilert-18: APHA (online) 9223 B
			E. coli	219	MPN/100 mL	
J2267-4	07/07/22 3:40 pm	Kitchen Tap 3	Total coliforms	>2420	MPN/100 mL	Colilert-18: APHA (online) 9223 B
			E. coli	162	MPN/100 mL	

Figure 1. Microbiology Test Report, NPHL (Kilu'ufi Hospital Water Samples)



National Public Health Laboratory (NPHL)
P.O. Box 349, Honiara, Solomon Islands.
Telephone: (+677) 38871

Test Report No. MTR 72/22 | Date of Issue: 14/07/2022 | Version No.: 03 | Page 2 of 2

Results apply to samples as received

Comments: Microbiological results are indicative only, as the samples were tested outside the recommended 24hr timeframe.

D/ND = Detected/Not Detected in 100 mL water
MPN/100 mL = Most Probable Number per 100 mL of water
CFU/mL = colony forming units per mL of water
< = less than, > = greater than

Results in bold indicate the exceedance of the WHO drinking water guidelines for drinking water.
Results not in bold indicate that the parameters fall within the WHO drinking water guidelines for acceptable drinking water.

WHO guidelines (2011) for drinking water: Water intended for public consumption must not contain any *E. coli* in a 100 mL sample.

Results in bold indicate the exceedance of the Solomon Islands Gazette - Pure Food Regulations 2010 maximum limits on microbiological contaminants in food.

Solomon Islands Gazette - Pure Food Regulations 2010: Maximum limits on microbiological contaminants in foods (Portable water)

Microorganism	Level
Faecal coliform	0 MPN/100ml
Total coliforms	100 MPN/100ml

Signature:
Authorised by: Kim Irofufuli
Section Head, Microbiology

Signature:
Released by: David Ho'ota
Section Head, Chemistry
For the Director, NPHL

Figure 2. Microbiology Test Report, NPHL (Kilu'ufi Hospital Water Samples)

These result means that the total coliform and E.coli exceeds the maximum recommended for human consumption as per the World Health Organization (WHO) drinking water guidelines of 0 MPN/100mL. However, the maximum for coliform is 100 MPN/100mL as per the WHO guidelines. Coliforms are bacteria that are not harmful and are naturally present in the environment. They are used as an indicator of the presence of potentially harmful, faecal bacteria (indicated by the *E. coli* species).

E. coli is a more specific indicator of faecal contamination and is a potentially more harmful pathogen than other bacteria typically found in the total coliform group. The presence of coliform bacteria in tap water suggests that there could be a problem with existing equipment or treatment systems, contamination of the source water or a breach in the distribution system that could introduce *E. coli* contamination.

It should be noted that contamination of the water source is very likely considering that there are residential homes and villages close to the water source less than 100m away.

The microbiology results suggest that the water may not be safe for drinking.

3.2 Chemistry Test Report

According to the chemistry test report tested from the National Public Health Laboratory (NPHL), the concentration of physical and chemical components tested fall within the WHO drinking water guideline for acceptable drinking water.

Parameters tested include Turbidity, pH, dissolved oxygen, dissolved solids, Ammonium, Nitrite, Nitrate and Iron.

National Public Health Laboratory (NPHL)
P.O. Box 349, Honiara, Solomon Islands.
Telephone: (677) 38871

Test Report No. CTR 22 / 52

Date of Issue: 12 / 07 / 22

Page 1 of 1

CHEMISTRY TEST REPORT

Job Number: J2267
Customer: EESL
Kukum Highway
Email: mosesdavis386@gmail.com Tel: 7252796

Description of goods : Raw water
Customer Product Code : NA

Destination : General Public
Receiving date : 8 / 06 / 22
Sample number : 4
Analysis date : 8 - 12 / 07 / 22

Part A — Physical & Chemical Tests

Ser No.	Lab No.	Sampling Point:	Physical				Chemical			
			Turbidity (NTU)	pH	Dissolved Oxygen (mg/L)	Total Dissolved Solids (ppm)	Ammonium, NH_4^+ (mmol/L)	Nitrite, NO_2^- (mg/L)	Nitrate, NO_3^-	Iron, Fe (mg/L)
1	J2267-5	ABERO Source	2.09	7.36	7.02	104	0.052	0.063	<2.2	<0.200
2	J2267-6	Kitchen Tap 1	2.54	7.23	7.08	99.5	0.0063	0.067	2.3	<0.200
3	J2267-7	Kitchen Tap 2	2.94	7.21	6.83	102	0.0055	0.077	2.4	<0.200
4	J2267-8	Kitchen tap 3	2.75	7.21	6.92	101	0.0095	0.095	<2.2	<0.200

Note: Total suspended solids (TSS) was not included due to insufficient sample volume.

Results apply to samples as received.

Results in bold indicate the exceedance of the WHO drinking water guidelines for drinking water.
Results not in bold indicate that the parameters fall within the WHO drinking water guidelines for acceptable drinking water.

The table below shows the relevant recommended World Health Organization (WHO) drinking water quality guidelines and analytical methods used in producing this report:

Parameter	WHO Guideline Value	Analytical Method
pH	6.5-8.5	Electro-chemical Probe
Turbidity (NTU)	5	Nephelometry
Total Dissolved Solids (ppm)	-	Electro-chemical Probe
Dissolved Oxygen (mg/L)	-	Dissolved Oxygen Probe
Ammonium (mmol/L)	-	Photometry
Nitrite (mg/L)	3	Photometry
Nitrate (mg/L)	50	Photometry
Iron (mg/L)	-	Photometry

Authorized by: David Hoota
Signature: (.....)
Section Head, Chemistry

Released by: Dickson Manongi
Signature: (.....)
Director

Figure 3. Chemical & Physical Test Result, NPHL (Kilu'ufi Hospital Water Samples)

4. Conclusion

EESL has carried out a water quality sampling and testing at Kilu'ufi Hospital kitchen taps. Two tests were carried out on 8 samples. A Microbiology test and a Physical/Chemical test was conducted by the National Public Health Laboratory in Honiara.

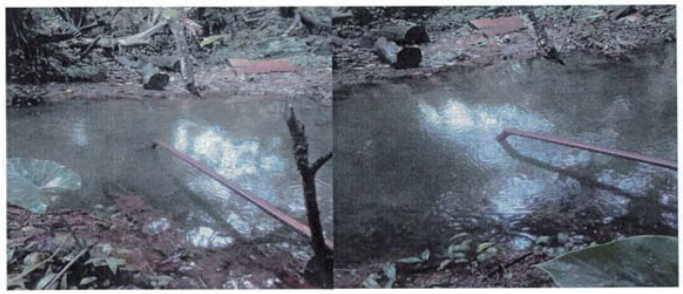
The microbiology test results indicate that the presence of E.Coli at the water source and in the taps is considerably higher than the recommended guideline of the WHO and is deemed unsafe for consumption. Contamination of the water source is also possible from human activities in close proximity to the water source as houses and dwellings are built around the area of the water source.

For the purposes of drinking, a water treatment system is required to treat the water from the source prior to distribution to the hospital for use.

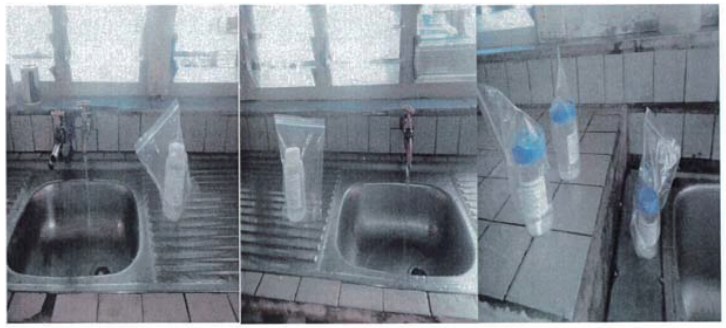
The physical and chemical testing indicates the amount of ammonium, nitrite, nitrate, iron, pH, dissolved oxygen, dissolved solids and turbidity are well within acceptable guidelines of the WHO.

5 Appendix

❖ **Water Source**



❖ **Kitchen Tap Samples**



７－５．不発弾除去証明・報告書

COMPLETION - CLEARANCE CERTIFICATION AND REPORT		
Map Name: Kilu'ufi field compound	UXO clearance at– Kilu'ufi field compound Auki Malaita Province	**MAP REFRENCE & NAME OF CLEARANCE Area**

PART 1- DETAILS OF CLEARANCE OR SURVEY			
Name of clearance organization:	Solomon Islands Battle Area Clearance (SIBAC)	**Date Start:**	15/August/2022
		Finish Date:	19/August/2022
Clearance or survey : Survey (with Clearance)		**Quantity and types of munitions located**	

Methods & Technologies used:

Large Loop Magnometer set at figure 8, threshold of 40 and delay - 200 (2) Magnex 120 set at mod 2 & 3 for both shallow and deep search. Calibration Pit established on site. The following munitions were used as calibration items at the depths stated below.
(1) 1 x US MKII Hand Grenade placed at 30cm depth
(2) 1 x US 50mm projectile was placed at a depth of 40cm

(4) 1 x US 75mm projectile was placed at a depth of 70cm
(5) 1 x US 90mm projectile was placed at a depth of 1 meter

Quantity and types of UXO destroyed on site: N/A	**Depth of clearance**: 4 meters	**Square meters of cleared: area 7000 sq.meter**
Is area now metal free?: Free from UXO/AXO only.		**Type & locations of cleared area marking**(see attach maps)
Quality Assurance carried out by:		**Quality Control carried out by:**

PART 2 - DECLARATIONS	
A. Declaration by certified (IMAS) operator field Manager: I declare that the area described in this document has been cleared in accordance with International Mines Action Standards, and that to the best of my knowledge and belief, it is free of, Unexploded ordnances only to the depths stated on this form.	**B. Declaration by Responsible Authority:** NB: No authorized firm is legally mandated to oversee Quality Control management and validation.(1) This Declaration of clearance is accepted.(2) The area described in this report is accepted as clear of unexploded ordnances only
Name: Mr. Reinhard Alalo	**Name:**
Position/Title: Manager Director	**Name of organization:**
Signature:	**Signature:**
Date:	**Date:**
THIS DOCUMENT HAS BEEN DISTRIBUTED AS SHOWN BELOW	
a. Original to: Client : Ministry of Health & Medical services	**b.Copy to:** SIG RSIPF Database
c. Copy to	**d.Copy to:**

Cover Page

Solomon Islands Battle Area Clearance

UXO Clearance Work At

Kilu'ufi Hospital

Ministry of Health & Medical Services

Final Completion Report

Date: 22/8/2022

Contents

Permanent Secretary
Ministry of Health & Medical Services
P O Box 242 Honiara
Solomon Islands

Attention: Procurement Officer

Dear Sirs/ Madam

RE: COMPLETION REPORT FOR THE UXO CLEARANCE WORK at Kilu'ufi field COMPOUND

Solomon Islands Battle Area Clearance is pleased to present to your office this document which is the completion Report containing the Quality Assurance Certificate plus all the Technical details of the UXO work carried out at Kilu'ufi field compound.

We would like to assure you that the UXO/AXO Survey (*and subsequent Clearance*) works at the said Site was carried out according to, and adhered to International Mine Action Standards and Solomon Islands UXO Policy.
Thank you for believing in S.I.B.A.C. hence entrusting S.I.B.A.C. to carry out this UXO/AXO clearance works at Kilu,ufi field compound, Malaita Province.

SIBAC is looking forward to continue working with the Ministry of Health & Medical Services for all your upcoming UXO Clearance works in the near future.

Yours Faithfully,

_____

Reinhard Alalo

Managing Director S.I.B.A.C.

Executive Summary

The Solomon Islands Battle Area Clearance **SIBAC** is envisioned to provide flexible and efficient solutions to clear all areas that has been affected or contaminated with Explosive Remnants of WW2.
The outcome of this particular task and hence this document, is obviously from the concerted effort by the SIBAC Team comprising of former EOD experts, administration, workers and the field Survey team.
The task that is normally carried out to meet this inevitable need is now a nation-wide requirement for all areas both land and sea front beddings, which has been littered with Explosive Remnants of World War II.
SIBAC recognizes that there are many different challenges facing the Team with regards to the UXO agenda where each of us, whether as resident living in contaminated areas, land owners, NGOs, private business and the Government has a part to play.
SIBAC has always been proactive but cautious about the nature of the task, yet would continue to be at risk via injury from explosion apart from other natural and work accidents.
Although Solomon Islands has always been and continues to be at risk of natural hazards such as earth quakes ,tsunami and tropical cyclones due to its unique location , little has been said about the hazards that is underneath us from the presence of Explosive Remnants of World war II.
Apparently this kind of land areas preparation needs, coupled with the urban drift, government ,private individual and business house-holds expansion, the need for land practically increases, as such the need for UXO clearance simultaneously increases.

This is a highly technical service and as once being said that, for all technical industries, only specifically trained people can do what is involved in their field of respective expertise. With most, partly or half trained can still engage themselves and learned further for improvement while they on work sites. However, UXO work is exceptional, hence only the fully trained and tested accredited personals can be engage, for a safe community environment.
As we look to the future, the management of SIBAC understands that there are other parts of the country that would need this exercise prior to any development.
SIBAC is well grounded with all the knowledge of all the areas that were affected by WW2, as such whatever development that is proposed for such areas, would have to be examined with the use of deep search magnetometers and to be certified as free from ERW prior to any development.

This completion Report and certification can not only serve as a report for the principal as required from us as UXO contractor, but also as a record , guide for future UXO references , and as an information learning tool .

The sophistication of the UXO task and the inevitable need for it has motivated the ones who are qualified to engage themselves in it, this is also why and how SIBAC was born. The strength of any UXO set up as such depends on highly trained and qualified staff with the availability of deep search magnetometer metal detectors and other appropriate machines and hand tools.
This is the piece of work from SIBAC and one of the many to come, finally SIBAC would embrace the new – upcoming UXO policy and would fit in where ever appropriate.

INTRODUCTION

Solomon Islands are one of the nine Pacific Nations that was affected by WWII in 1942. Of these nine nations, Solomon Islands were among the top four countries in the South Pacific that have experienced heavy Military activities by the Imperial Japanese Army and the Allied forces between 1942 – 1943.

The spread of WW2 and its impact in Solomon Islands covers many parts of Guadalcanal Province, Western Province, Central Islands Province, and Choiseul Province; short land Islands and some parts of Malaita, Isabel and Renbel Provinces.

However, when the war ended the warring forces left behind millions of tonnes of all types of ammunitions, wreckages and some bulk of chemical weapons in the former battle fields and offshore areas used as their post war dumping sites.
To this day, the dangerous legacy of WW2 activities and its impact still remain in many parts of the country with very little has been said about the threat/hazards and the impact of these deadly ERW could cause to the environment and to the lives of many Solomon Islanders.
Recently we have witnessed a number of unexpected deaths caused by WW2 ERW explosions that alarms the nation of the dangers of these deadly items and the need to carry out UXO clearance works.

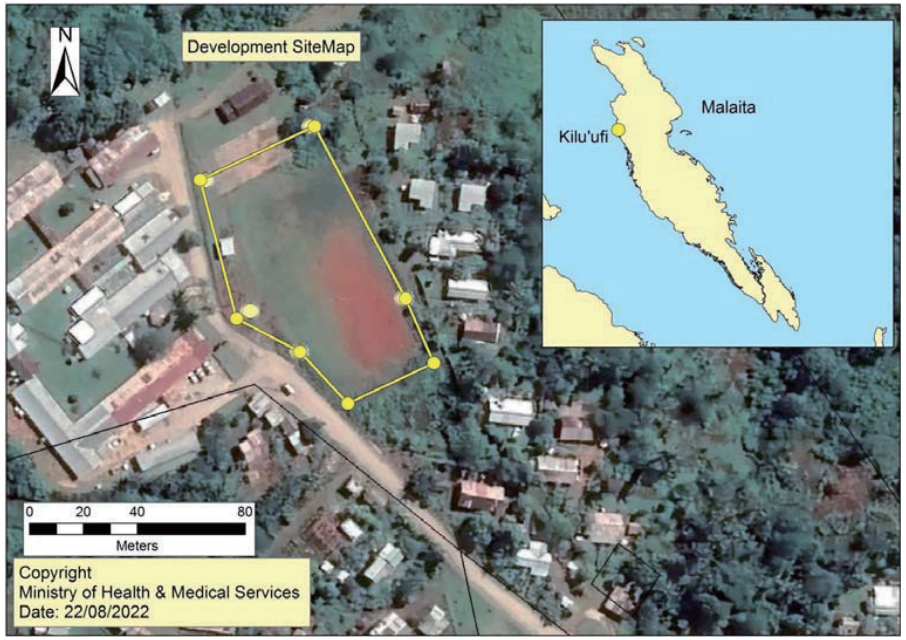
Thus the aim of this very important task is to detect, identify, isolate and remove all hazards of ERW from the area specified in this document. With this regard, four Personnel from SIBAC left Honiara per MV Pelican on the 15th of August 2022 to carry out this inevitable task at Kiluufi Hospital via this award by the Ministry of Health and Medical Services.

METHODS

- The area described in this report was searched utilising high performance equipments for both deep and shallow search. Thus, (1) Large Loop Magnetometer in parallel 2 x 1 meters configuration and (2), the Magnex 120 in parallel 1 x 1m configuration were both used to search and scan the area. All search actions were conducted in accordance to the International Mine Action Standards and SIBAC SOP.
- Liaison with client and stakeholders prior to commencing actual BAC works to ensure everything is ok and ready for operations.
- Conduct Site visit to the area to identify actual location and to analyse the terrain and other hazards that may hinder our operations and most importantly to have a good knowledge of the area of operation.
- Condoning the area of operation with caution tapes to avoid public access to avoid unnecessary accidents or deaths to the local populace.
- Carry out visual search to remove all surface items to lessen unwanted readings. Visual search formation was carried out as per SIBAC SOP procedures.
- Surface clearance to remove all items located near the surface from 0 – 30cm
- Sub surface clearance to remove all readings located deeper than 30cm – 4m depths
- Report all UXO finding to RSIPF EOD team as soon as possible for quick removal from the clearance area.
- Report any findings of UXO armed with mechanical time fuzes or chemical munitions to EOD team in a timely manner
- Record all clearance actions in the daily log book

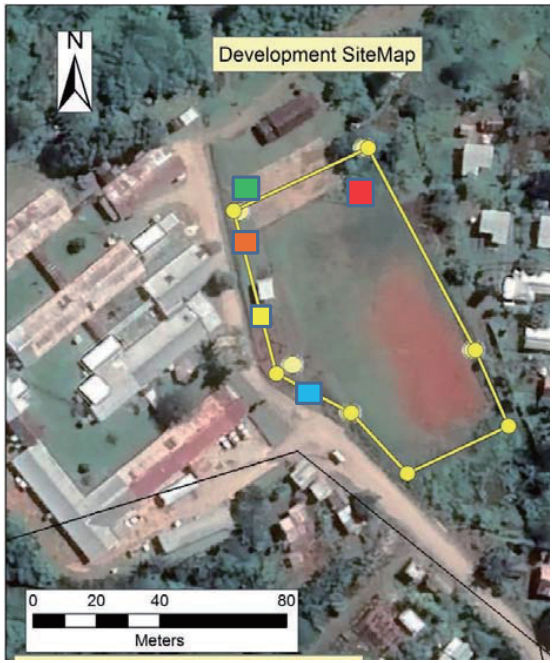
Project Information

Project Site		REF NO#	Total Square Area
Kilu'ufi Hospital Auki, Malaita Province Solomon Islands	**Land Parcel Number**: 151-001-0032		7000 Sq.meter



SITE SETOUT

Administration and safe parking area, UXO and Scrap Sites, Calibration pits and MEDIC EVACUATION map.



Color Legends

- UXO Site
- Admin Site
- Scrap Site
- Car Park
- Medic Evac

Equipments set up

Setting up the large loop metal detector in preparation for the actual UXO clearance works.

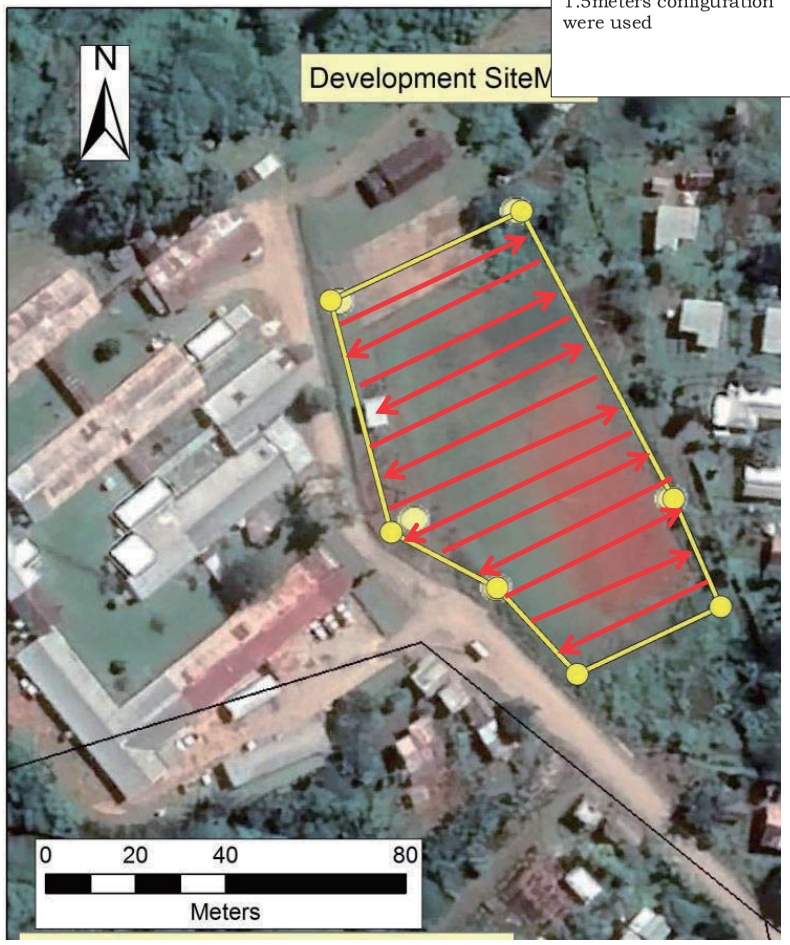
Kilu'ufi UXO clearance Team

- 1 X Supervisor
- 1 x team leader
- 2 x Aiders/Diggers

The clearance perimeter was condoned using cautioning tape to avoid public access

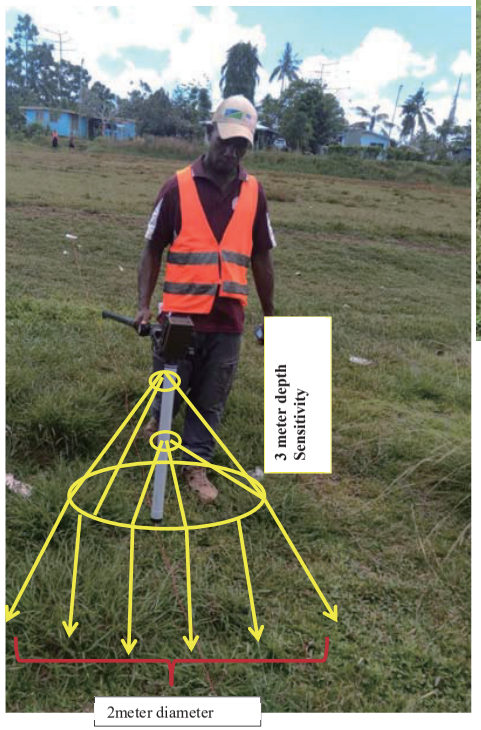
Scanning lay out map

The scanning process was conducted as shown below. Lanes of 2meter x 1.5meters configuration were used



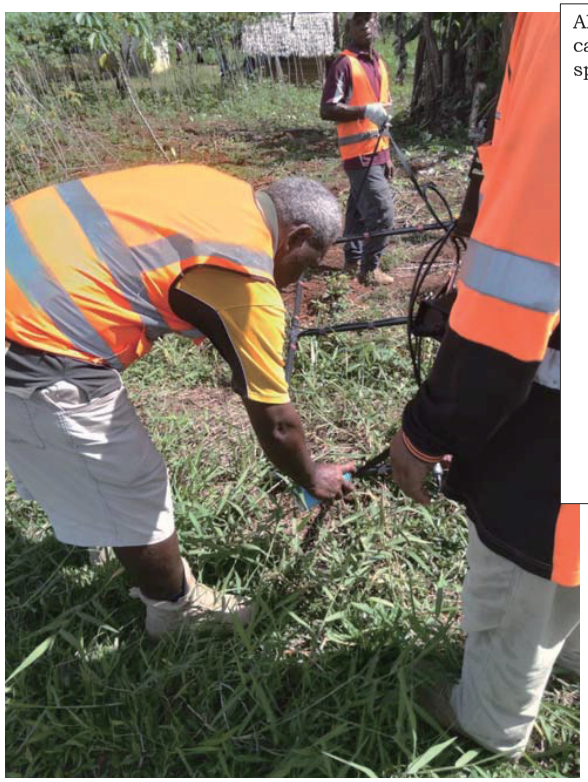
Scanning in Progress

Large Loop Metal detector indicating 2m x1.5m configuration and the maximum clearance depth of 4 meters.



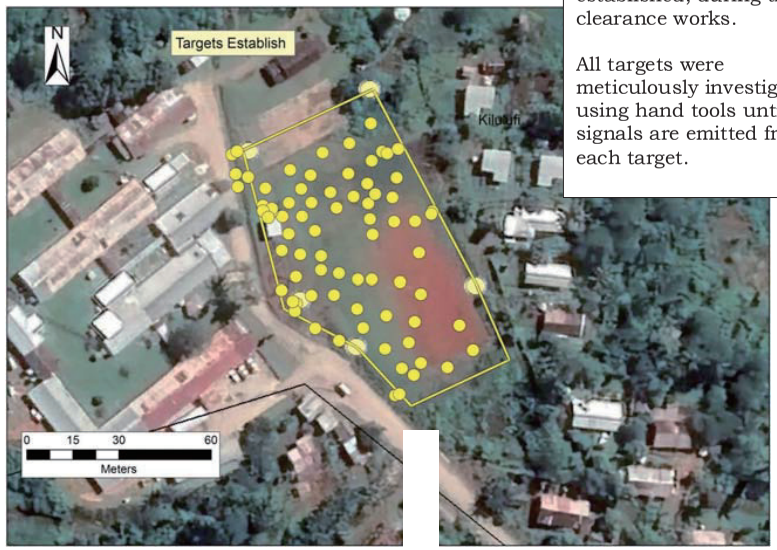
Pin Pointing of Targets using Magnex 120

Marking of Targets



All established targets were carefully marked using spray paint

Targets Established Map



A total of 80 targets were established, during the UXO clearance works.

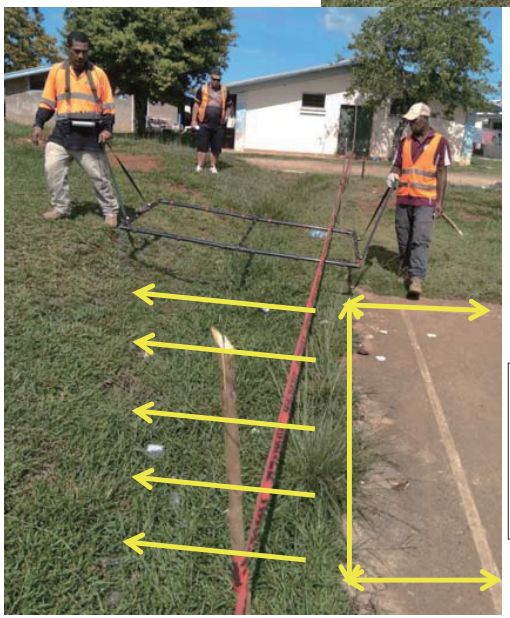
All targets were meticulously investigated using hand tools until no signals are emitted from each target.

Investigation of Targets

All established Targets were manually investigated using hand tools until no signals are emitted.

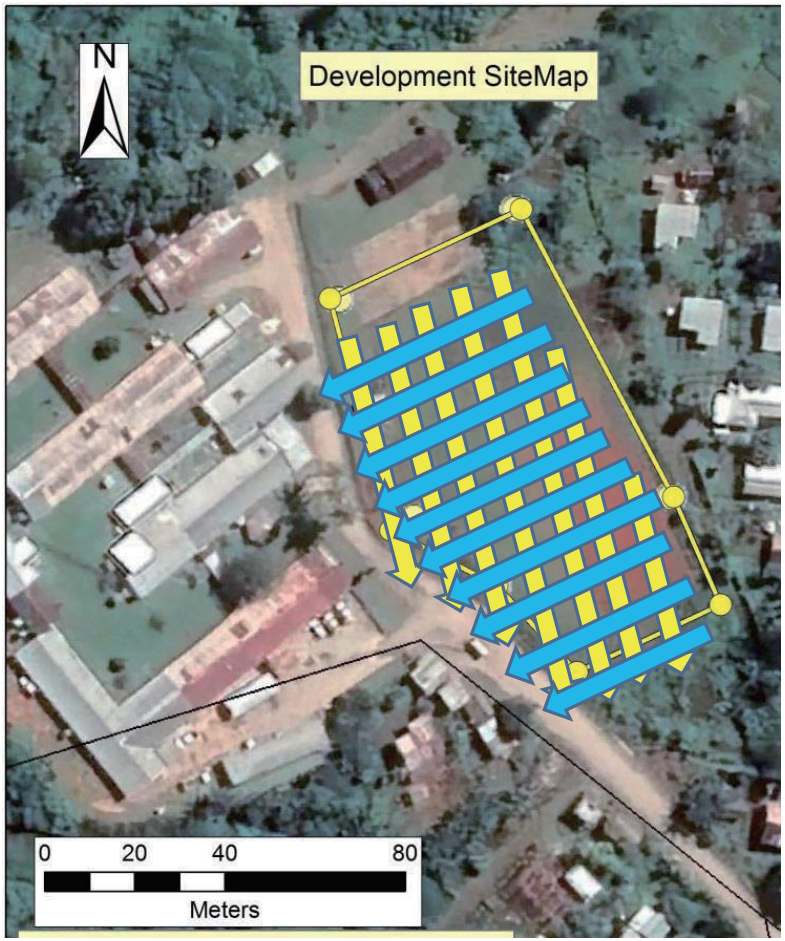
Interferences

Heavy interferences from overhead power lines and the existing generator fencing



Heavy interferences from steel rods in the concrete slab

Internal Quality Control & Quality Assurance map set out.



Internal QC & QA process was carried out over the entire area as indicated above

CONCLUSION

The Management of Solomon Islands Battle Area Clearance Team would like to thanked the Administration of the Ministry of Health & Medical Services for offering us this UXO clearance work at Kilu,ufi Hospital. SIBAC team will continue to support and work closely with the Ministry of Health to provide quality UXO clearance services for all your future development sites until all your development sites are free from the presence of these deadly Explosive Remnants of WW II.

Hence, the area specified in this document has been systematically scanned using high performance metal detectors, and the area is now declared free from the presence of UXO/AXO only and is now safe for its intended development purposes.

CHALLENGES

- There has been no major difficulties faced by SIBAC Team during our clearance work at Kiluufi Hospital, the only challenges we have encountered was, - the heavy interferences from existing infrastructures within the clearance perimeter, otherwise all good.

CERTIFICATION OF ERW CLEARANCE CERTIFICATE

The certification of Explosive Remnants of War "**CLEARANCE CERTIFICATE**" has been issued by Solomon Islands Battle Area Clearance Company to the Ministry of Health & Medical Services.

All actions and procedures carried out in our clearance work at Kiluufi hospital field area were done according to International Mine Action Standards and were limited to the clearance parameters specified in this document only.

Report Prepared by: Frank Konairara Tabai
(SIBAC, Information Manager-IM)

Report Approved by: Reinhard Alalo
(SIBAC, Director)