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# Advice and design for a 'GeoLab', Geological Department, The Gambia

Minerals & Waste Programme

Open Report OR/12/003





BRITISH GEOLOGICAL SURVEY

MINERALS & WASTE PROGRAMME

OPEN REPORT OR/12/003

# Advice and design for a 'GeoLab', Geological Department, The Gambia

CJ Mitchell

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## Executive summary

A visit to The Gambia was carried out by the British Geological Survey in December 2011 as part of the assistance offered to the Gambian Geological Department to establish a geological laboratory (referred to as the 'GeoLab').

In order to establish the test work requirements for the GeoLab, a number of mineral deposits and operations were visited in the Greater Banjul Area. These included a building sand deposit in Batu Kunku, a heavy mineral sand deposit in Tujereng, heavy mineral processing operation in Sanyang North, brick clay operation in Bafuloto, the Marisa Brickworks and its clay deposit in Faraba Bant and the lateritic gravel quarrying area in Faraba Bant. In addition, companies and organisations with a stake in the establishment of a GeoLab at the Geological Department were consulted including Moukhtara Holdings Company Ltd, the Gambian Roads Authority, the Gambian Technical Training Institute and the National Environment Agency.

It is recommended that a fully costed laboratory development plan is drawn up to encompass the equipment procurement, installation and commissioning; staff training; development of a test work programme; and maintenance of the test work capability.

The mineral resources of The Gambia are limited and restricted to Upper Tertiary and Quaternary sedimentary sequences. The most significant are silica sand, heavy mineral sand, kaolin, brick clay, laterite and cockle shells. The top priority of the Geological Department is the identification and provision of information on construction materials especially for the Greater Banjul Area.

It is recommended that the Geological Department establish a capability for the testing of brick and ceramic clay, building sand, cockle shells, construction aggregate, heavy mineral sand and imported mineral products.

The proposed GeoLab will consist of four rooms including sample reception, sample preparation, mineral evaluation and storage. The recommended laboratory equipment includes balances (weighing equipment), a binocular microscope, clay testing equipment, a drying oven and furnace, general laboratory equipment and particle-size analysis equipment.

# 1 Introduction

The Geological Department of The Gambia requested assistance from the British Geological Survey (BGS) in their efforts to establish a geological laboratory ('GeoLab') at their site in Kanifing South, Greater Banjul Area. The BGS Industrial Minerals specialist, Clive Mitchell, visited The Gambia in early December 2011 to provide advice on the GeoLab. This report summarises the visit, presents a proposed floor plan for the GeoLab and makes recommendations for the equipment to be used in the laboratory.

## 2 Summary of the visit to The Gambia

Clive Mitchell visited The Gambia from 3<sup>rd</sup> to 10<sup>th</sup> December 2011. The schedule for the visit was as follows:

Saturday 3rd December	Flight from Manchester, UK to Banjul, The Gambia
Sunday 4th December	Background research & planning for the week ahead
Monday 5th December	Meetings at the Geological Department
Tuesday 6th December	Field visits to Batu Kunku building sand deposit in Tujereng and heavy mineral sand deposit in Sanyang
Wednesday 7th December	Field visits to Gamclay and Marisa brick operations, as well as the clay and lateritic gravel deposits in Faraba Bant
Thursday 8th December	Visits to Moukhtara Holdings Co. Ltd, Gambian Roads Authority, Gambian Technical Training Institute and National Environment Agency.
Friday 9th December	Production of a scale-drawing of the Geological Department and a discussion regards the requirements for the GeoLab
Saturday 10th December	Flight from Banjul, The Gambia, to Manchester, UK

The visit was facilitated by Jerreh Barrow (one of the two geologists at the Geological Department) who made all the arrangements for meetings, field work, company visits and transportation. Meetings at the Geological Department were attended by Mr Fansu Nyassy (Director of the Geological Department), Alieu Jawo (the second geologist at the Geological Department) and Jerreh Barrow. Their assistance is gratefully acknowledged.

Field visits to industrial mineral resources included the following:

Site 1: Batu Kunku building sand deposit, Tujereng (N 13°18'46.5" E 16°48'0.2")

This is a deposit of clayey building sand that is off-white to orangey-buff in colour. This quarry is currently abandoned. This site is typical of those worked for building sand that are very close to the coast. It is now prohibited from working these coastal sites due to environmental concerns.

Site 2: Heavy mineral beach sand deposit, Tujereng (N 13°18'26.5" E 16°48'3.4")

Unworked heavy mineral beach sand deposit in dunes approximately 50 to 100m from the surf zone.

Site 3: Sand tailings from heavy mineral beach sand operation (N 13°15'13.8" E 16°46'46.3")

Quartz sand tailings from the heavy mineral sand processing operation at Sanyang North. Currently, this deposit is worked as a source of building sand at a rate of approximately 9000 tonnes per day.

Site 4: Heavy mineral beach sand operation, Sanyang North (N 13°15'8.5" E 16°46'44.3")

This is the site of a heavy mineral sand processing plant (Figure 1). This consists of a pontoon with 14 double spiral gravity separators that produce a heavy mineral concentrate (mainly ilmenite plus rutile and zircon) and quartz sand tailings (waste product). The heavy mineral concentrate is stored in nearby stockpiles that are guarded by the Gambian police.



**Figure 1. Heavy mineral beach sand processing plant, Sanyang North, The Gambia**



Site 5: Gamclay brick clay processing operation, Bafuloto (N 13°18'16.7" E 16°37'51.5")

At this site, a new brick clay processing plant was being assembled which consisted of breakers, roller mills and an extruder for producing bricks and blocks.

Site 6: Marisa Brick works (N 13°16'43.3" E 16°33'40.9")

Marisa Bricks is a well established company that produces approximately 15,000 bricks per month. The brick clay is mixed with kaolin (from Bafuloto) and extruded as bricks which are air dried and then fired in wood fuelled tunnel kilns (Figure 2). In addition, at this site, there is a lateritic-gravel processing plant producing washed construction aggregate, several plastic product production lines and a sweet factory.



**Figure 2. Tunnel kiln, Marisa Brick Company, The Gambia**

Site 7: Brick clay deposit, Faraba Bant (N 13°15'48.4" E 16°31'46.2")

The brick clay deposit worked by the Marisa Brick works is located in Faraba Bant. This is a partially flooded area not far from the south bank of the River Gambia.

Site 8: Lateritic gravel quarry, Faraba Bant (N 13°15'4.9" E 16°30'23.1")

This site is a large area with many quarries (that have coalesced into one big quarry) operated by many companies that extract and process the lateritic-gravel for use as construction aggregate (Figure 3).



**Figure 3. Lateritic-gravel quarry, Faraba Bant, The Gambia**

In addition to the field visits, companies and organisations that have a stake in the establishment of a GeoLab at the Geological Department were consulted as follows:

1. Moukhtara Holdings Company Ltd

A meeting was held with Alida Meyer, Sales Manager for Moukhtara Holdings (the parent company for Marisa Brick). It was agreed that she would forward copies of technical test data for their brick clay to the Geological Department.

2. Gambian Roads Authority

A meeting was held with Isatou Cham, Engineer and Ensa, Laboratory Manager. A tour of their laboratory revealed the following equipment:

- Drying ovens and muffle furnace
- Mechanical property testing (California bearing ratio; compressive strength; point load; Aggregate Impact Value; Marshall Compaction; Los Angeles Abrasion Value)
- Clay testing (Casagrande; cone penetrometer; soil consolidation; clay extruder)
- Physical property testing (specific gravity balance; sand cone replacement for density)
- Particle-size analysis (stainless-steel sieves; sieve shaker)
- Weighing (digital top pan balances)
- Water baths (temperature controlled bath; ultrasonic bath; water tank)
- Sample preparation (sample splitters; laboratory concrete mixer; high-shear stirrer; portable-coring machine)



Much of the laboratory equipment at the Gambian Roads Authority is suitable for the evaluation of material used in all forms of construction. To avoid duplication and unnecessary expense, it is recommended that the geological laboratory at the Geological Department should not include the mechanical testing equipment already in place at the Gambian Roads Authority. Also, it is recommended that the Geological Department collaborate with the Gambian Roads Authority on construction materials research and provision of information on suitable resources within The Gambia.

### 3. Gambian Technical Training Institute (GTTI)

A meeting was held at the Gambian Technical Training Institute. A tour of their foundry laboratory revealed the following equipment:

- Gas permeability meter
- Universal sand strength machine
- Laboratory sand mixer
- Sand rammer
- Sieve shaker and stainless steel sieves
- Hardness tester
- Microscope plus video attachment
- Grinder-polisher
- Drying oven

An interesting feature was the old road surfacing material still evident on the GTTI campus. This shows the use of cockle shells in the wearing-course layer of the road (Figure 4).



**Figure 4. Cockle-shell road at the Gambian Technical Training Institute, The Gambia**

#### 4. National Environment Agency (NEA)

A meeting was held with Bulli Mustapha Dibba, Director of Administration & Finance and Adam Ceesay, Program Officer, Environmental Quality. It was agreed that contact would be maintained between the Geological Department and the NEA.

### 3 Geological laboratory

#### **3.1 TESTWORK REQUIREMENTS FOR THE GEOLOGICAL DEPARTMENT**

The development of an effective laboratory capability can be split into three phases:

##### 1. Design, procurement and installation

The design of a geological laboratory takes into consideration the test work requirements of the organisation based on its research priorities and demand from its stakeholders. The procurement of equipment is an expensive and time consuming process that is often the only aspect considered. Many development projects have donated laboratory equipment to geological surveys without considering the other important aspects. Installation of equipment in a dedicated laboratory is critical. It is often unplanned and never completed. As a result, many organisations have equipment that is inappropriate for its needs, is not installed and no one knows how to use.

##### 2. Commissioning and training

Once the equipment has been installed in the laboratory it needs to be ‘commissioned’ i.e. test trials that are carried out by an experienced technician to ensure that the equipment works as expected and produces accurate test data. Commissioning is then followed by training the staff that will work in the laboratory; this can be carried out by the technician that commissioned the equipment. Often these aspects are carried out at the same time.

##### 3. Programme development and maintenance of capability

Once a fully commissioned laboratory with well trained staff is in place, the next phase is to establish a work programme that satisfies the organisational need for mineral evaluation. Alongside this work programme there needs to be a budget for maintenance of the equipment and for development of new testwork capabilities as the need arises. Without a work and maintenance programme the laboratory capability will not mature and in time the knowledge of the staff will diminish and the equipment will fall into disrepair.

It is recommended that a fully costed laboratory development plan is drawn up to encompass all three aspects to ensure that the testwork capability is sustainable and relevant to the needs of The Gambia.

The mineral resources of The Gambia are limited and confined to the Upper Tertiary and Quaternary sedimentary sequences. The most recent mineral resource investigation of The Gambia was carried out in the 1990’s by a Chinese survey team (China National Complete Plant Import & Export Corporation, 1995). This survey identified a total of 24 mineral deposits and a further 41 mineral occurrences. The most significant mineral resources are silica sand, heavy mineral sand, kaolin, brick clay, laterite and cockle shells. In addition there are occurrences of marl and peat.

The top priority of the Geological Department of The Gambia is the identification and provision of information on the available mineral resources that are suitable for use in construction. The main demand for construction material is in the Greater Banjul Area (GBA) especially in and around the communities of Bakau, Brikama, Brufut, Serrekunda and Sukuta.

Concrete blocks made from imported cement and basalt aggregate (from Senegal) are a popular construction option. There is no production of cement or hard rock aggregate in The Gambia. In 2010, The Gambia imported over 300,000 tonnes of cement from Senegal (60%), Spain (38%) and Turkey (2%). In the same year, The Gambia imported 128,000 tonnes of hard rock aggregate from Senegal. One possible alternative to concrete blocks would be to manufacture clay blocks instead.

Building sand is currently worked from rapidly dwindling sources. In the past, much environmental damage was inflicted on the coastal areas where beach sand was worked. This has since been banned. However, if the current source runs out it is likely that illegal working of beach sand would resume. One possible alternative would be to process the fine waste arising from the production of aggregate from lateritic gravel. This fine waste is a potential source of building sand and brick clay.

The Gambia also imported the following mineral products in 2010: calcium carbonate, chalk, diatomite, graphite, gypsum (mostly as plaster), marble, quick lime (CaO), phosphate, salt, sand, slate and talc.

It is recommended that the Geological Department aim to establish the following testwork capability in their geological laboratory as an immediate priority:

- **Brick and ceramic clay testing** including consistent descriptions of the colour and texture of clay; measurement of the particle-size distribution of clay; and measurement of the plastic, forming and firing properties of potential brick and ceramic clay.
- **Building sand testing** including measurement of the particle-size distribution from coarse sand to clay-sized particles; and determination of the mineralogical composition using a binocular microscope.
- **Cockle shell testing** including particle-size distribution; and determination of the potential to produce burnt lime (CaO) and mineral filler products.
- **Construction aggregate testing** including testing the competence of potential hard rock aggregate (using a Schmidt Hammer); measurement of the particle-size distribution from coarse gravel to sand sized particles; and determination of the lithological composition.
- **Heavy mineral sand testing** including heavy mineral separation; and determination of the ilmenite, rutile, zircon and other heavy mineral content using a binocular microscope.
- **Mineral product testing** including consistent descriptions of the colour and texture; measurement of the particle-size distribution; and determination of the mineralogical and lithological composition.

### 3.2 LABORATORY DESIGN AND EQUIPMENT

The Geological Department intend, in the medium to long-term, to replace their current buildings with new purpose built offices and laboratory. In the meantime, the proposed GeoLab will be housed in the current main building. A layout for the geological laboratory is shown in Appendix A. The laboratory will be sub-divided into four areas as follows:

#### 1 Sample reception

This is where samples first enter the laboratory and are registered. This room includes a registration desk, a work bench, a floor standing balance and sample storage racking.

#### 2 Sample preparation

This is where the samples are prepared for mineral evaluation. This room includes crushing, grinding, sieving and weighing equipment, as well as storage racking. This room must remain isolated from the rest of the laboratory as the work carried out will be dusty. Dust extraction may be required for this laboratory (this has not been included in the list of recommended equipment).

#### 3 Mineral evaluation

This is the main area of the laboratory and is where the mineral evaluation work will take place. This room will contain work benches, sample racking, balances, drying oven, furnace, binocular microscope and other equipment. This room must remain dust-free to ensure the equipment remains in good working order.

#### 4 Storage

This room will consist mainly of storage racking for sample archiving.

The recommended laboratory equipment is listed in Appendix B. This equipment has been selected to provide the essentials for a geological laboratory and to enable the testing requirements to be achieved. A summary of the equipment is shown in Table 1.

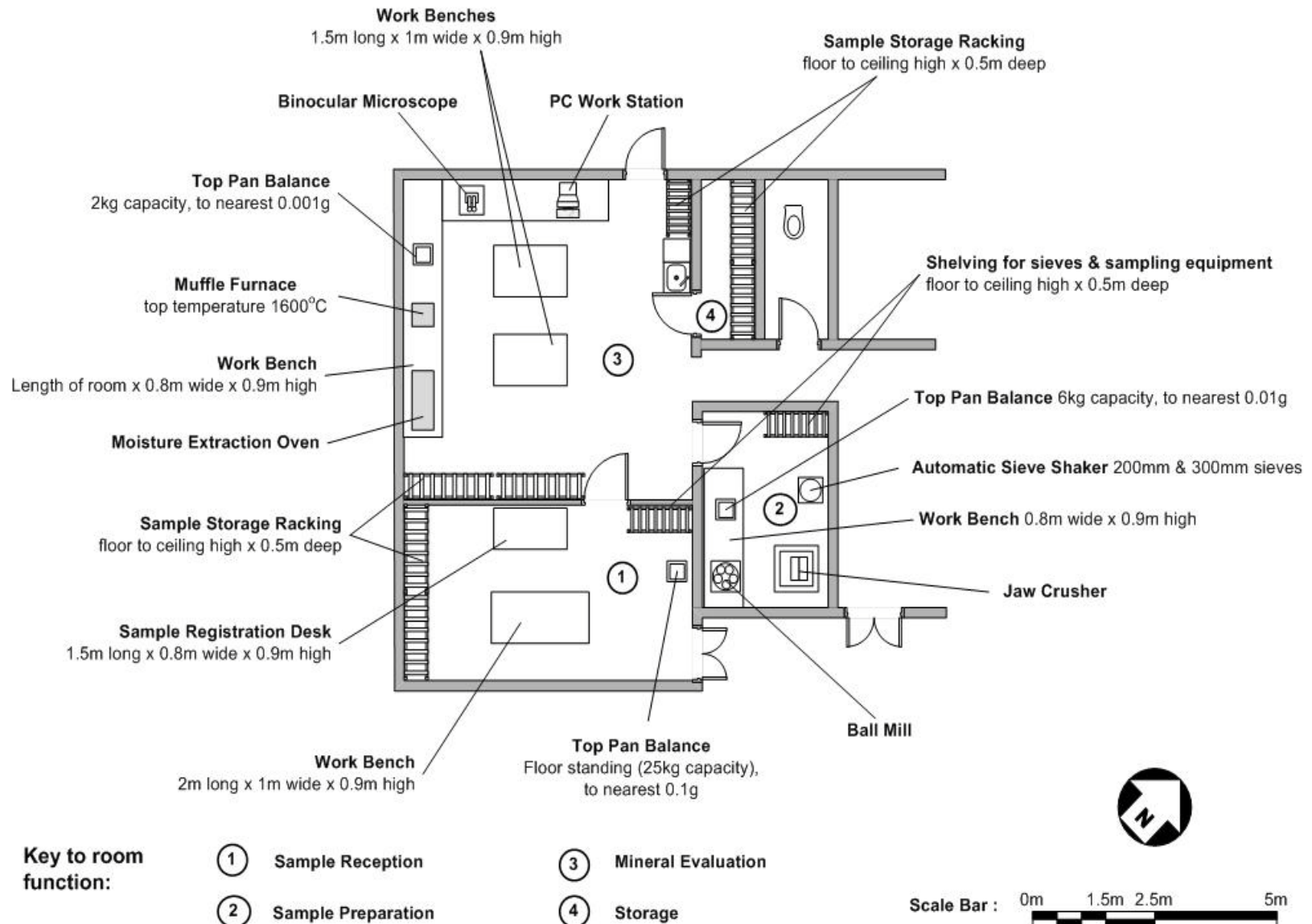
Laboratory equipment	Cost
Balances (weighing equipment)	£3350.23
Binocular microscope	£962.78
Clay testing equipment	£1026.74
Drying oven and furnace	£2437.67
General laboratory equipment	£3058.06
Particle size analysis equipment	£4452.69
Air freight	£2105.79
Total	£17,393.96

**Table 1 Recommended equipment for the GeoLab**

## 4 Conclusions & recommendations

- 1 It is recommended that the Geological Department collaborate with the Gambian Roads Authority on construction materials research and the provision of information on suitable resources within The Gambia.
- 2 It is recommended that a fully costed laboratory development plan is drawn up to encompass the equipment procurement, installation and commissioning; staff training; development of a test work programme; and maintenance of the test work capability.
- 3 It is recommended that the geological laboratory ('GeoLab') facility is capable of carrying out testing of brick and ceramic clay, building sand, cockle shells, construction aggregate, heavy mineral sand and imported mineral products.
- 4 It is proposed that the GeoLab is established in the main building of the Geological Department in Kanifing South. The proposed laboratory has four areas: sample reception, sample preparation, mineral evaluation and storage.
- 5 It is proposed that the laboratory equipment should include balances (weighing equipment), binocular microscope, clay testing equipment, drying oven and furnace, general laboratory equipment and particle-size analysis equipment.

# Appendix 1 Plan for Geological Laboratory (GeoLab), Geological Department, Kanifing South, Greater Banjul Area, The Gambia





## Appendix 2    Quotation for laboratory equipment

The attached quotation was submitted by ELE International. This company is a reputable supplier that has provided equipment for the Afghanistan Geological Survey capacity building project that the BGS was involved with in the period 2004-2008. ELE has also provided equipment to other laboratories in The Gambia. The laboratory (visited as part of this work) at the Gambian Roads Authority was equipped entirely with ELE test equipment.



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## QUOTATION / PRO FORMA INVOICE

Quotation / Pro Forma No.	Date	Customer No.	Page
98098	03.01.12	CU03184	1 of 5
Your Ref. Geolab for Gambia		Created By: Ann-Marie Clarke	

### British Geological Survey

Geological Department Office of the President  
Serekunda Post Office PMB 227  
KANIFING SOUTH  
GAMBIA

Final Destination:

Gambia

Contact: Clive Mitchell  
Tel: 0115 936 3257  
Email:

## QUOTATION SUMMARY

Ex Works Total Goods Value : GBP 15,288.17

Total Freight Cost (see breakdown on final page) GBP 2,105.79

**Quotation Total** CPT Banjul **GBP 17,393.96**

Quotation inclusive of VAT where applicable

Part shipments to be allowed. Please Note: Minimum Ex Works Order Value 300.00 GBP

These prices are valid until 02.04.12. After this date they will be subject to re-negotiation

### Payment Terms:

Prepayment against order

### Remit funds to:

HSBC Bank plc  
Carmel House  
49-63 Fargate  
Sheffield  
S1 2HD

Sort Code: 404107  
Account Number: 11825755  
IBAN No: GB34MIDL40410711825755  
BIC: MIDLGB22

VAT no. GB789706562  
 Phone: + 44 (0) 1525 249200  
 Fax: + 44 (0) 1525 249249  
 Web: www.ele.com

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Your Ref. Geolab for Gambia		Created By: Ann-Marie Clarke	

Item	Product No.	Description	Qty	Unit Price	Total Price
1	23-7100	Soil Colour Chart. Tariff Code 902480 90 0 Net Weight (kgs) 0.50	1	153.00	153.00
2	23-3505	Mortar and Pestle Porcelain. Tariff Code 902480 90 0 Net Weight (kgs) 1.20	1	88.58	88.58
3	24-0430	Glass Plate. Tariff Code 701710 00 0 Net Weight (kgs) 7.00	1	43.00	43.00
4	24-0540	Cone Penetrometer. Complete with Stainless Steel Test Cone. Tariff Code 902480 90 0 Net Weight (kgs) 7.60	1	547.16	547.16
5	24-0811	Rod Comparator Tariff Code 902480 90 0 Net Weight (kgs) 0.08	5	9.00	45.00
6	24-2830	Gas Jar 75mm Dia X 300mm with Glass Cover and Rubber Bung. Tariff Code 701710 00 0 Net Weight (kgs) 4.71	3	50.00	150.00
7	24-2900	50ml Density Bottle with Perforated Stopper. Tariff Code 701710 00 0 Net Weight (kgs) 0.32	5	30.79	153.95
8	35-1480	Concrete Test Hammer Normal Type. EN 12504-2. Tariff Code 902480 90 0 Net Weight (kgs) 1.60	1	215.46	215.46
9	78-6000/01	Electronic Top Loading Balance 200g at 0.001g. Dual Voltage 50-60Hz Tariff Code 701710 00 0 Net Weight (kgs) 2.60	1	539.23	539.23
10	78-5447/01	Electronic Top Loading Balance 3000g X 0.01G Tariff Code 902480 90 0 Net Weight (kgs) 8.00	1	899.00	899.00
11	78-5485/01	Electronic Top Loading Balance 20000 X 0.1G with Below-Balance Hanger. 34 300mm Pan. Tariff Code 902480 90 0 Net Weight (kgs) 21.00	1	1,912.00	1,912.00
12	78-0110/01	Drying Oven 225 Litre Cap. Fan-Circulated. Supplied W/ 3 Shelves & 2-Year Warranty. Tariff Code 902480 90 0 Net Weight (kgs) 110.00	1	1,196.37	1,196.37
13	79-0310	200mm Dia BS Sieve 4.00mm Stainless Steel Mesh. Tariff Code 847490 90 0 Net Weight (kgs) 0.60	1	59.00	59.00
14	79-0270	200mm Dia BS Sieve 2.00mm Stainless Steel Mesh. Tariff Code 847490 90 0 Net Weight (kgs) 1.00	2	44.00	88.00
15	79-0230	200mm Dia BS Sieve 1.00mm Stainless Steel Mesh. Tariff Code 847490 90 0 Net Weight (kgs) 0.60	1	44.00	44.00
16	79-0190	200mm Dia BS Sieve 500Mic Stainless Steel Mesh. Tariff Code 847490 90 0 Net Weight (kgs) 0.60	1	44.00	44.00
17	79-0150	200mm Dia BS Sieve 250Mic Stainless Steel Mesh. Tariff Code 847490 90 0 Net Weight (kgs) 0.40	1	44.00	44.00
18	79-0110	200mm Dia BS Sieve 125Mic Stainless Steel Mesh. Tariff Code 847490 90 0 Net Weight (kgs) 1.00	2	44.00	88.00
19	79-0070	200mm Dia BS Sieve 63 Mic Stainless Steel Mesh. Tariff Code 847490 90 0 Net Weight (kgs) 0.91	2	44.00	88.00
20	79-2670	300mm Dia BS Sieve 63.0mm Perforated Plate. Tariff Code 847490 90 0 Net Weight (kgs) 2.40	1	81.00	81.00
21	79-2630	300mm Dia BS Sieve 31.5mm Perforated Plate. Tariff Code 847490 90 0 Net Weight (kgs) 1.90	1	81.00	81.00

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Item	Product No.	Description	Qty	Unit Price	Total Price
22	79-2580	300mm Dia BS Sieve 16.0mm Perforated Plate. Tariff Code 847490 90 0 Net Weight (kgs) 2.00	1	81.00	81.00
23	79-2555	300mm Dia BS Sieve 10.0mm Perforated Plate. Tariff Code 847490 90 0 Net Weight (kgs) 1.60	1	81.00	81.00
24	79-2540	300mm Dia BS Sieve 8.00mm Perforated Plate. Tariff Code 847490 90 0 Net Weight (kgs) 1.70	1	81.00	81.00
25	79-2515	300mm Dia BS Sieve 5.00mm Perforated Plate. Tariff Code 847490 90 0 Net Weight (kgs) 1.40	1	81.00	81.00
26	79-2500	300mm Dia BS Sieve 4.00mm Perforated Plate. Tariff Code 847490 90 0 Net Weight (kgs) 0.80	1	81.00	81.00
27	80-0200/01	Sieve Shaker Complete with Separate Control Panel. 220-240V 50Hz 1Ph. Tariff Code 902480 90 0 Net Weight (kgs) 25.00	1	1,228.50	1,228.50
28	81-0094	Support Assembly Tariff Code 902480 90 0 Net Weight (kgs) 13.00	5	75.64	378.20
29	81-0100	Spatula 100mm Blade Tariff Code 902490 00 0 Net Weight (kgs) 0.50	5	14.00	70.00
30	81-0120	Spatula 150 X 25mm Tariff Code 902490 00 0 Net Weight (kgs) 0.50	5	17.00	85.00
31	81-0140	Spatula 200mm Blade Tariff Code 902490 00 0 Net Weight (kgs) 0.59	5	21.00	105.00
32	81-0200	Aluminium Scoop Small. Tariff Code 902480 90 0 Net Weight (kgs) 0.25	1	16.69	16.69
33	81-0220	Aluminium Scoop Large Tariff Code 902490 00 0 Net Weight (kgs) 0.29	1	19.00	19.00
34	81-0222	Aggregate Scoop with Two Handles 250mm Long By 125mm Dia. 5Kg Capacit Tariff Code 902480 90 0 Net Weight (kgs) 0.77	1	47.00	47.00
35	81-0480	Crucible Tongs Straight 200mm. Tariff Code 902480 90 0 Net Weight (kgs) 0.10	1	5.56	5.56
36	81-0508	Heat Resistant Gloves with Gauntlet. Tariff Code 902490 00 0 Net Weight (kgs) 1.00	2	12.00	24.00
37	81-4030	Sample Tray 406 X 406 X 50mm. Tariff Code 902490 00 0 Net Weight (kgs) 4.40	2	16.00	32.00
38	82-0120	Glass Beaker 100ml Capacity Squat Form with Spout. Tariff Code 701710 00 0 Net Weight (kgs) 1.10	10	3.00	30.00
39	82-0140	Glass Beaker 250ml Capacity Squat Form with Spout. Tariff Code 701710 00 0 Net Weight (kgs) 2.50	10	4.00	40.00
40	82-0200	Glass Beaker 600ml Squat Form with Spout. Tariff Code 701710 00 0 Net Weight (kgs) 2.00	5	4.00	20.00
41	82-0260	Beaker Cover 100mm Dia. Tariff Code 701710 00 0 Net Weight (kgs) 0.25	5	12.00	60.00
42	82-0420	Measuring Cylinder 250 X 2ml Soda Glass Spouted. BS604. Tariff Code 701710 00 0 Net Weight (kgs) 2.25	5	10.61	53.05

VAT no. GB789706562  
 Phone: + 44 (0) 1525 249200  
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## QUOTATION / PRO FORMA INVOICE

## CONTINUATION

Quotation / Pro Forma No.	Date	Customer No.	Page
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Your Ref. Geolab for Gambia		Created By: Ann-Marie Clarke	

Item	Product No.	Description	Qty	Unit Price	Total Price
43	82-0460	Measuring Cylinder 500 X 5MI Soda Glass Spouted. BS604 Tariff Code 701710 00 0 Net Weight (kgs) 3.00	5	22.00	110.00
44	82-1240	10MI Graduated Pipette. Tariff Code 701710 00 0 Net Weight (kgs) 0.40	2	4.00	8.00
45	82-1970	Evaporating Dish 100mm Dia X 40mm Depth. Tariff Code 902490 00 0 Net Weight (kgs) 5.00	10	21.00	210.00
46	82-2000	Evaporating Dish 150mm Dia X 45mm Depth. Tariff Code 902490 00 0 Net Weight (kgs) 3.40	10	38.57	385.70
47	82-2010	Evaporating Dish 200mm Dia X 55mm Depth. Tariff Code 902480 90 0 Net Weight (kgs) 4.00	10	62.00	620.00
48	82-2200	Buchner Funnel No. 5. Tariff Code 701710 00 0 Net Weight (kgs) 0.83	1	131.92	131.92
49	82-1540	Weighing Bottle Nominal Size 25 mm Dia 50 mm H. Tariff Code 701710 00 0 Net Weight (kgs) 0.12	5	24.00	120.00
50	82-2500	Wash Bottle Polythene 500ML. Tariff Code 902490 00 0 Net Weight (kgs) 0.50	5	5.00	25.00
51	82-3145	Polythene Bottle Wide Neck Screw Cap 1 Litre. Tariff Code 901580 93 0 Net Weight (kgs) 1.20	6	10.00	60.00
52	82-4005	Glass Rods 7mm Dia X 200mm. (Pack of 10) Tariff Code 701710 00 0 Net Weight (kgs) 0.43	2	7.00	14.00
53	82-7931	Filter Paper No. 95 Equivalent to Whatman No. 50. 110mm Dia. Box of 100. Tariff Code 902490 00 0 Net Weight (kgs) 0.15	1	16.00	16.00
54	510-164	Polythene Self-Sealing Bags (Pack of 100). 120mm Width X 200mm Depth Tariff Code 901580 93 0 Net Weight (kgs) 0.70	2	3.59	7.18
55	81-4769	Polythene Self-Sealing Bags 200mm Wide. Pack of 100. Tariff Code 902480 90 0 Net Weight (kgs) 0.60	1	6.47	6.47
56	550-025/01	Zoom Stereomicroscope with 10X Eyepieces 1:4 Zoom Ratio Rack & Pinion Focusing Tariff Code 901580 19 0 Net Weight (kgs) 8.00	1	962.78	962.78
57	583-132/01	or bital Shaker 220-240V 50Hz 1Ph. Tariff Code 901580 93 0 Net Weight (kgs) 50.00	1	1,818.47	1,818.47
58	82-1620	Polypropylene Beaker 100ML with Spout. Tariff Code 701710 00 0 Net Weight (kgs) 0.40	1	6.44	6.44
59	82-0260	Beaker Cover 100mm Dia. Tariff Code 701710 00 0 Net Weight (kgs) 0.05	1	12.00	12.00
60	82-2660	Polythene Funnel 180mm Dia. Tariff Code 701710 00 0 Net Weight (kgs) 0.40	2	16.00	32.00
61	83-4170/01	Muffle (Ashing) Furnace with Digital Control Pid. 1200 Deg. C Max Temp. 220-240V 50/60Hz Tariff Code 902480 90 0 Net Weight (kgs) 130.00	1	1,179.74	1,179.74
62	24-4125/01	High Speed Stirrer Complete with Paddle Cup & Baffle. 220-240V 50/60Hz 1Pt Tariff Code 902480 90 0 Net Weight (kgs) 3.90	1	345.00	345.00

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Geolab for Gambia		Ann-Marie Clarke	

Item	Product No.	Description	Qty	Unit Price	Total Price
63	24-4145	Sodium Hexametaphosphate 500G.	1	38.72	38.72
	Tariff Code	283539 00 0	Net Weight (kgs)	0.60	

Ex-works GBP 15,288.17

Airfreight GBP 1,432.79  
 FOB Airfreight GBP 673.00

**Total GBP 17,393.96**

All goods are available in Weeks

**Estimated Shipping Specification:**

Gross Wt (kgs): 449.71  
 Volume (m3): 1.789

COMPLIANCE WITH LAWS: Company represents that all Products delivered hereunder will be produced and supplied in compliance with all applicable laws and regulations. Buyer shall comply with all local laws and regulations applicable to the re-sale, installation, use, or import of all Products delivered hereunder. Buyer shall comply with all applicable export control laws and regulations of the United States, the UK, the European Union and any other country having proper jurisdiction and shall obtain all necessary export licenses in connection with any subsequent export, re-export, transfer and use of all Products and technology delivered hereunder. Buyer shall not sell, offer to sell, transfer, export or re-export any Company Products or technology for use in activities which involve the design, development, production, use or stockpiling of nuclear, chemical or biological weapons or missiles, nor use Company Products or technology in any facility which engages in activities relating to such weapons. Buyer shall also comply with the United States Foreign Corrupt Practices Act of 1977, as amended, the UK Bribery Act 2010, and any other applicable anti-bribery laws. If the buyer intends to resell any of the products included in this quotation, the Buyer may be required to go through the Company's anti-corruption screening process.