

**DIAGNOSTIC MISSION TO ESTABLISH  
A DRY MILL AT THE MASAHA  
COFFEE WASHING STATION**

November 2002

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## **1. OBJECTIVE OF THE CONSULTANCY**

Based on the high potential for added value, coffee is one of the most promising commodity sectors in Rwanda. A third of population, working small plots of 1,000 square meters on average, depends on this commodity for its principal sources of cash. ADAR Project seeks to introduce through its partner-clients an integrated network producing fully washed coffee destined for export to the speciality coffee market. The immediate challenge is to establish a coffee processing system that nurtures and retains the best qualities of the coffee bean, currently being devalued by poor washing techniques.

The undersigned is a coffee dry milling consultant who is to provide technical assistance to Seven Lakes Trading Company (SLCT), a washing station owner/operator and ADAR client.

The coffee dry milling consultant's assistance will first cover the following element: a preliminary review and a detailed examination of coffee milling equipment in store in Kampala, and second: make a preliminary design of coffee dry milling building for an annual throughput of approximately 500 to 1000 tons of clean Arabica coffee.

The final annual capacity will be discussed with the client. the consultant will make specifications of parchment milling equipment from reception to bagging of green coffee with a capacity of 2-3 tons per hour of clean coffee, provide other technical advice including installation supervision and commissioning.

## **2. SPECIFIC TASKS TO BE PERFORMED BY THE CONSULTANT FOR SEVEN LAKES TRADING COMPANY**

1. Examine the items of John Gordon coffee milling equipment lying in store in Kampala, prepare a list detailing the model number, capacity and condition of each item, and estimate the suitability for Arabica parchment processing.
2. Discuss with the client the start-up and final milling capacity to be provided.
3. Provide a preliminary sketch of the coffee mill building to suit the start-up and final capacity chosen.
4. Make a detailed review of John Gordon milling equipment in the store of the client (capacity and condition), availability of motors, starters, elevators, etc.); identify additional milling equipment required in order to set up the proposed coffee mill.

5. Prepare a final equipment list for the proposed mill and an estimated price for any additional new equipment, which would have to be purchased.
6. Prepare a sketch, preferably on Word Draw Program, showing the lay out plan and elevation and process flow for the proposed mill.
7. Provide an estimate of the consulting-supervision time required to install and commission the dry milling equipment.

## **DELIVERABLES**

- ◆ Before departure from Kigali, the consultant will present and discuss the following: dimensions and basis construction details.
- ◆ Sketch of milling machinery layout and process flow-plan elevation.
  
- ◆ Detailed report including an estimate of the consulting time required for the supervision-installation of the milling equipment (phases of construction, installation, commissioning and engineering supervision).
- ◆ Presentation and discussion of the consulting report;
- ◆ The consultant will provide an electronic version of the report.
- ◆ Preliminary drawing on Word Draw of the proposed mill building–plan and elevation with

## SUMMARY

Initially it was envisaged that the consultant would meet the Managing Director of Seven Lakes Trading Company, Mr Mohamed Salih, in Uganda and at the same time the consultant was to make a detailed review of the John Gordon Limited coffee processing equipment supposedly in store in Kampala.

However, Mr Mohamed Salih was not available in Kampala at the time the consultant tried to meet him on October 14<sup>th</sup> 2002 and so far has not arrived in Rwanda.

It also turned out that all the John Gordon Limited machinery had now been moved to Kigali, Rwanda.

The undersigned arrived in Rwanda on Thursday, November 7<sup>th</sup> 2002, for a ten day input period to undertake the consultancy work detailed above.

The consultant was scheduled to complete the required work by the end of Saturday, November 16<sup>th</sup>, 2002.

The consultant was briefed on arrival by the ADAR Chief of Party, Mr Geoffrey Livingston and Special Initiatives and Training Cadre, Mr Anastase Murekezi.

A work plan had been drawn up in advance by Mr Murekezi (see following page) which was to be used as a rough guide only.

Besides carrying out the requirements laid down by ADAR in the consultants Terms of Reference, the consultant's aim is to also ensure that the coffee processing equipment specified ensures that the newly proposed mill is capable of producing the best quality *fully graded* clean, green coffee.

Fully washed Arabica coffee which follows on to fully graded both by weight (by catadors or gravity tables graders), and by size (by rotary drum or flat bed vibratory graders) can attract a premium return of up to USD \$500 per tonne.

It is therefore imperative for processors who have gone to the trouble and expense of fully washing their coffee, to continue the process of producing quality coffee by fully grading their product.

It should be remembered that only 20% of the total coffee produced Worldwide, is FULLY WASHED.

## ADAR PROGRAM

### ASSISTANCE FOR THE DEVELOPMENT OF AGRIBUSINESS IN RWANDA - VISIT FOR MR. PETER JONES, CONSULTANT ON COFFEE DRY MILLING

Date	Time	Place	Action	N/Days
Monday, 14 Oct. 02		Kampala	Initial planning for examine SLTC's equipment for coffee dry milling	1
Wednesday, 6 Nov. 02			Travel from Njombe to Dar es Salaam/Tanzania	1
Thursday, 7 Nov. 02	1:10 pm	Airport	Arrival from Nairobi	1
	3:00 pm	ADAR	Briefing meeting with ADAR Technical Team	
Friday, 8 Nov. 02	8:30 am	Masaka	Discuss with Mohamed Salih, Managing Director (Tel: 08301560) on the SOW	1
	9:00 am		Examine the coffee dry milling equipment items available at Seven Lakes Trading Company (SLTC) in Kigali	
Saturday, 9 Nov. 02	10:00 am	Kigali	Visit CBC dry milling factory	1
	pm		Start preparation of the preliminary sketch of the coffee dry milling facilities	
Monday, 11 Nov. 02	8:30 am	Masaka	Finalise preparation of the preliminary sketch of the coffee dry milling facilities	1
Tuesday, 12 Nov. 02	14 p.m	Kinamba	Prepare final equipment list for the proposed coffee dry milling Estimate prices for additional items	1
Wednesday, 13 Nov. 02	8:00 am	ADAR	Prepare the final sketch on Word Draw Program for the lay out plan & elevation of the coffee milling facilities, including the process flow for the proposed factory	1
Thursday, 14 Nov. 02	8:00 am	ADAR	Prepare draft report addressing all the tasks planned in the SOW.	1
Friday, 15 Nov. 02	8:00 am	ADAR	Finalise the Masaka coffee dry milling factory report	1
Saturday, 16 Nov. 02	10:00 am	ADAR	Present the Masaka report to ADAR and SLTC	1
Monday, 18 Nov. 02	8:10 am	Airport	Departure for Dar es Salam via Nairobi	1
Tuesday, 19 Nov. 02			Travel to Njombe	1
<b>Total</b>				<b>13</b>

## **6. SPECIFIC TASKS UNDERTAKEN.**

### **6.1 MILLING CAPACITY.**

Initial discussions took place with the Seven Lakes Trading Company's General Manager, Ms Charlotte Mbabazi and several of her staff at the Seven Lakes Coffee Factory at Masaka.

The following points were agreed upon:

- **The initial amount of parchment coffee to be available for the 2002 milling season would only be about 80 tonnes.**

It was intended to increase the quantity of parchment for milling to 200 tonnes, hopefully by the 2003/4 season.

The final target aimed at for parchment processing was to be 600 tonnes per annum.

The considerations that follow are based on the above quantities, covering a final parchment availability to be between 600 to 1,000 tonnes per year. (See Appendix 1).

## **6.2. PRELIMINARY COMMENTS**

### **6.2.1 LAYOUT SKETCHES FOR TEMPORARY COFFEE MINI-MILL PROPOSAL.**

Whilst visiting the Seven Lakes Coffee Factory at Masaka it was noted that the Company had already installed from their stock, one John Gordon AH1 hullers (capacity 800 kg/hour) and one John Gordon Mark V. B catador (capacity 1,400 kg/hr).

The installed machinery however made no provision for pre-cleaning or the removal of stones from the parchment coffee prior to being milled (hulled).

Secondly , the grading of the newly hulled green coffee to be undertaken by the Mark V. B catador would only grade the green coffee by weight.

When a detailed review of the coffee milling equipment had been undertaken earlier (see following & Appendix 2) the consultant had found several John Gordon Limited CC-4 type catadors and one John Gordon Limited Eliminator used for the removal of extraneous matter from parchment coffee.

As it is intended to continue their endeavour to improve the coffee quality at Masaka, by fully grading by size as well by weight, it was decided they should consider obtaining a suitable *size-grader* and *three elevators* as soon as possible. These machines could be installed temporally with the existing installed AH1 huller along with three of the existing CC-4 catadors from stock and moved to the new mill later.

A simple layout elevation sketch has been drawn based on this concept. (See Appendix 3 & 4).

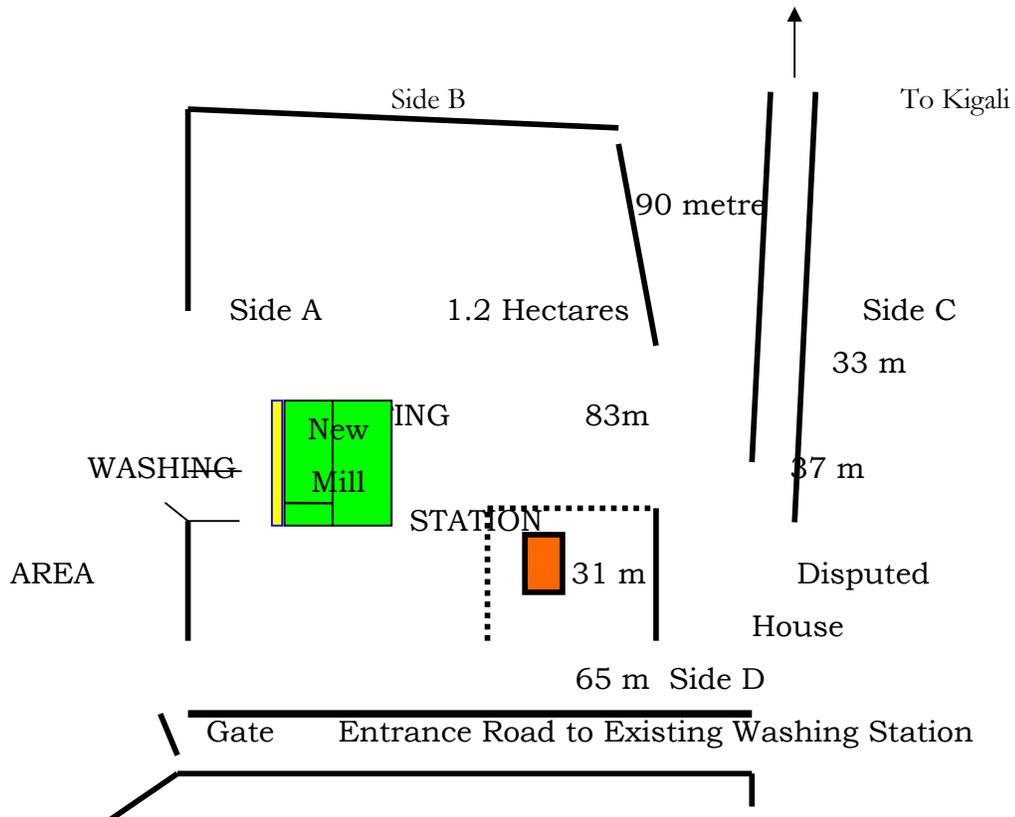
Should it be decided to consider the purchase of these minimal machines only initially for the above, a separate quotation was obtained. (See Appendix 5).

### **6.3. COFFEE MILL BUILDINGS.**

An irregularly shaped area was shown to the consultant at Masaka, right adjacent to the existing washing station. The top end of the plot comes up against the entrance road into the existing washing station.

There seemed to be some indecision as to the actual dimensions and the shape of the plot, there is also some dispute over-taking over a small house situated within the confines of the plot as the owner does not wish to move!

The consultant was informed by the General manager that the land available is about 1.2 hectares in area and is roughly 65 metre wide at the road (Side D) x 83 metres deep (Side A). This area is more than adequate for the proposed new coffee curing mill which should require an area of about 45m x 40m including surrounding access roads. (See sketch below. *NTS*)



### 1.2 Hectare Plot for Proposed New Coffee curing Mill

The recommended sizes for the proposed new mill to include all the recommended machinery are as follows:

- Main Factory: 15m long x 6 m wide. [90 m<sup>2</sup>] The factory building's eaves should be at least 8 m above the factory finished floor level. The factory floor should be at 'tail-gate' height above the service roads for ease of unloading parchment coffee and for loading finished green coffee into lorries. (See Appendix 6 and 6A)

- Parchment Storage: 7.5m x 6m [45m<sup>2</sup>] This area is usually situated alongside the mill main-building. (See Appendix 6)
- Finished Product Storage: 7.5m x 6m [45m<sup>2</sup>] This area is usually situated alongside the mill main-building. (See Appendix 6)

Optional Areas to be considered:

- Hand picking table area: (Could include bagging area): 15m x 12m [180m<sup>2</sup>] (see appendix 14)
- Colour Sorter Room: 4m x 4m [16m<sup>2</sup>] This area can be taken from within the main-mill building, but should be dust free. (See Appendix 15)
- Drying Section: 12m x 6m [36m<sup>2</sup>] Usually situated outside, but near to the main mill building. (See Appendix 16 and 17).

#### **6.4. REVIEW OF EXISTING MACHINERY (HELD IN SEVEN LAKES LTD KINAMBA STORE).**

John Gordon coffee processing machinery was found stored at Seven Lakes Ltd Kinamba store.

Although the consultant had made a prior request before coming to Kigali, asking for all the boxes of machines to be opened and placed on the store floor, this had not been done. Some considerable time was spent on several trips to the store and then having to wait for the many boxes to be presented in such a way as the contents could be examined in detail.

The machines were found in two adjacent room, which have been designated as 'Room A' and 'Room B' for ease of location.

The equipment found was for both dry processing (curing/hulling/milling) and wet processing (pulping). The equipment for both processes was mixed in two rooms.

The dry processing machinery is suitable for Arabica coffee, but could also be used for Robusta coffee.

All the hullers are suitable for both Arabica parchment coffee and Robusta cherry coffee but it should be remembered that when hulling Arabica the huller should be fitted with the special slotted-hole huller-screen. The screen has to be changed when hulling cherry, to a woven-wire screen. Both screens were located and demonstrated by the undersigned at Masaka to the GM and staff.

To assist separate and identify the two process-types of machinery, two separate lists have been drawn up which are included in this report as '*Appendix 2: Machinery located for dry processing*' and '*Appendix : Machinery located for wet processing*'. (See Appendix 2 & 2a).

Each of the two tables show as Appendix 2 and 2a give the location of the machines by room, the quantity of each type of machine found, the machine's name, type, electrical power requirements and throughput capacity.

Virtually all the dry processing machinery was returned to their original boxes when possible and the boxes numbered by marking in chalk. The chalked box numbers are shown on both the dry and wet processing lists to enable easy identification against the details and comments recorded.

As the wet processing does not come in the scope of the consultants TOR, the wet process list and corresponding appendix pages are meant mainly to assist the client identify the wet processing equipment held in stock in rooms A and B at Kinamba.

However, it should be noted that most of the pulping machinery was in an excellent condition, most seen 'as new'.

#### **6.5. CONDITION OF EXISTING DRY PROCESSING MACHINERY.**

The general condition of all the dry processing equipment was found to be good with regards the mechanical state of the machines and lack of physical damage..

Out of the 19 dry process machines inspected, seven machines have no motors (see Appendix 2) and ten have no starters. Many V belts were seen but very mixed-up and spread over several none corresponding boxes.

Two boxes of miscellaneous mixed spares were seen which had been scattered within their boxes.

Two boxes of complete huller drums with fixed huller-bars were located which are for both the small AH5 huller and the larger AH1 huller but it is doubtful that they would ever be required in the normal running of a coffee curing mill.

## 6.6. MACHINERY LOCATED WHICH IS SUITABLE FOR A NEW DRY PROCESSING FACTORY.

The following machines found at Seven Lakes trading Limited store rooms at Kinamba are suitable for inclusion for the proposed new mill:

- 5 in total AH1 hullers x 800 kg/hour capacity. 3 required for new mill.
- 5 in total CC-4 catadors x 2,000 kg/hour capacity. 3 required for new mill.
- 1 in total Eliminator (small precleaner) x 1,850 kg/hour. 2 required for new mill.
- Out of the five AH1 hullers only two have motors and one starter.
- Three catadors are complete with motors and starters.
- The sole Eliminator pre-cleaner has a motor but no starter.

## 6.7. NEW MACHINERY REQUIRED FOR A NEW DRY PROCESSING FACTORY.

The following machines are required to complete a new coffee processing mill:

Quantity	Item
1	Masonry intake hopper (local construction).
1	Belt & Bucket Elevator E1 to feed dry parchment into...
1	Precleaner May be able to use one eliminator (IN STOCK).
1	Elevator E2 to feed into destoner.
1	Destoner (set under precleaner) 4a
1	Aspirator (Dust collection from destoner)
1	Belt & Bucket Elevator E3 to feed from destoner
3	Hoppers
3	AH1 hullers (IN STOCK)
1	Conveyor C1
1	Belt & Bucket Elevator E4 to carry coffee to...
1	Hopper
1	Grader (by size) + 11a Dust cyclone
3	Elevators E5, E6, E7 to feed green coffee to...
3	Catadors CC-4 Simplex type (IN STOCK)
1	Elevator E8 to conveyor...
1	Conveyor C2
3	Holding bins for graded coffee (Screen18, 17 and 16?)
3	**Hand picking tables (Optional)
1	Conveyor C3

- 1           \*\*Elevator E9 to bagging hopper (Optional)
- 1           Bagging Hopper
- 1           One semi-automatic bag weigher
- 1           Bag closing sewing machine

Items marked \*\* (Optional) are for use with optional hand picking tables.

A List showing all the recommended machines required, including costs, capacities and electrical power requirements has been drawn up (See Appendix 7).

Alternative quotations and suggested layouts for the recommended extra machinery were obtained from two separate companies.

The extra *John Gordon Ltd* machinery is quoted for in their proforma invoice # JGL 2749/B (See Appendix 8), which also includes the optional hand picking tables. A suggested layout/flow diagram also provided and is shown as Appendix 10. (See Appendix 10).

A second layout, giving the *allCoffee Ltda* plan view in conjunction with their offer shown on their proforma invoice # 02-RWA-247/exp (See Appendix 9 and 9A).

**6.8. CONSULTING-SUPERVISION TIME.**

If the buildings are complete, with a finished floor surface and fully roofed, it should normally take between eight to ten weeks to supervise the installation of the machinery as listed using local technicians and labour.

Normally, another week is necessary to commission the plant and machinery.

The undersigned would be interested in carrying out supervision etc and has carried out similar duties on three mills in Tanzania, one in Uganda, one in Sudan, one in Zambia, one in Vietnam and one in Jamaica plus similar work in Ethiopia. (See CV sent to J E Austin).

**6.9. FINDINGS AND RECOMMENDATIONS**

Bearing in mind the endeavour being put into the Seven Lakes Washing Station to perfect their coffee cherry washing techniques, it would prove to be a total

waste of effort, if at the same time they did not also try to improve the quality of their coffee further. This can only be achieved by fully grading their superior product, both by weight and size. (See Appendix 11,12 and 13 on grading standards).

During the consultant's visit, it was arranged to mill 100 kg of fully washed Arabica parchment with the newly installed John Gordon AH1 huller at Masaka.

The results were most encouraging, out of 100 kg of parchment, 82 kg of clean green coffee was returned, showing curing losses of only 18%. (Rwanda mills average losses are reported as up to 25%) and minimal broken beans compared to what was seen at other local mills.

Having seen the good quality of the John Gordon Limited equipment held by Seven Lakes Trading at their Kinamba Stores, the consultant feels that the balance of equipment required to set-up a fully graded coffee curing mill should be procured as soon as possible to enable Seven Lakes Trading start producing fully graded *quality* coffee.

It was not possible for the consultant to analyse the milling costs at Masaka, but the curing cost, even with the extra power required for a grader and three elevators, should be very much lower than what Seven Lakes Trading Limited are paying now for their parchment coffee to be milled... and the quality will be far superior!

To maintain the Masaka Quality Coffee initiative, the consultant feels that one grader and three elevators should be bought and installed as soon as possible to facilitate improving their current mini-mill set-up at the Masaka washing station. (See suggested temporary layout in Appendix 3 and 4).

It should be preferable to be able to utilise these initially required machines later, by moving them to the new mill project once that phase has commenced.

It therefore is necessary to decide whether to order all the machinery at the same time and just use the grader and three elevators for now, or to order the minimum initial requirements for now (See Appendix: 3, 4 and 5) and obtain the balance of machinery later.

Prices and details have also been included in the report for handpicking tables. Three handpicking tables have been considered as optional requirements at this stage (See Appendix 8 [item 17] with sketch marked as Appendix 10), plus Appendix 9 [item 16] with sketch marked as Appendix 14)

The setting-up of an Artificial Drying Facility has to be considered by the client. Prices to assist with the decision are attached (See Appendix 16 and 17).

The Electrical Power supply should be checked as being adequate (about 90 kW) for the new mill (See kW column in Appendix 7).

A replacement stand-by generator will have to be considered to replace the existing under-sized 20 HP machine

Prices have been included in this report for supplementary machinery from two companies which the consultant has dealt with successfully over several years. The machines from both manufacturer's can be seen in Tanzania, Zambia, Uganda, Vietnam, Jamaica etc.

John Gordon Limited have been producing superior coffee processing equipment for just under 150 years and have machinery installed in over 70 countries Worldwide.

The land situation at Masaka must be resolved as quickly as possible and the building of the new factory commenced.

The installation of the machinery does not require a fully qualified engineer. Experienced technicians can manage the work subject to obtaining the services of an experienced person who is familiar with the machines in question.

An fully registered Grade 'A' electrical technician/contractor would be required to install the wiring which, again, could be supervised by the same experienced person as above.

About ten to twelve working personnel/labourers would be required.

Normally, it should take between 8 to 10 weeks to install all the machinery quoted for the proposed new mill subject to the new factory building being completed 100%. Another week would be necessary to commission the plant and train the operators, which totals 11 weeks maximum.

The 'Supervisor' should be required for about two weeks initially plus a week followed by another two weeks later to finalise the installation and commission the plant. This would total an overall input of 5 weeks for the supervisor which include the commissioning.

The undersigned has considerable experience installing and commissioning the machines in question (see attached CV - Appendix 18) should the Client wish to consider the undersigned's services.