

Report of Irrigation Project

Background

As part of the general program to resuscitate the Banana Industry in the Windward Islands, including St.Lucia, the European Union has provided a substantial amount of grant fund for agricultural Infrastructural works. These funds are provided in installments/blocks under the Special Framework of Assistance.

Under SFA99, (Special Framework of Assistance), an amount of \$10,159,425.00 EC was made available for the Banana commercialization component. The objectives of this programme are to develop the following:

- 1 a commercial and complete banana industry,
- 2 increase foreign exchange earnings and savings and
- 3 increase rural sector employment and farm household income.

The purpose is to develop an efficient diversified banana industry that is able to compete in a liberalized world market on a sustainable and competitive basis and to generate income in rural communities. The implementing agency for the project is the Trust of the Banana Industry of St.Lucia.

The main project elements include the following

1. Provision of effective drainage for some 200 acres of banana production at Cul-de-Sac.
2. The installation of Off-farm irrigation facilities on some 798 acres of banana product in Mabouya, Troumassee, Canelles, Roseau, Cul-de-Sac and Gauge.
3. Strengthening of the institutional capacity of the Banana Industry Trust.

The expected results are

1. Appropriate irrigation and drainage systems introduced.
2. Banana production improved
3. Management capacity enhanced (Banana Industry Trust and Banana Organizations)
4. Collaborate with the Financial Advisory Committee to find ways and means for the delivery of credit for on-farm investment.

Introduction

By the end of 2002, there will be approximately 967 acres of land with Off-Farm infrastructure in St.Lucia, mainly in the Cul-de-Sac (420 acres), Roseau (180 acres in Phase I and 150 acres in Phase 2), Mabouya (94 acres), Troumassee (57 acres), Canelles and gauge (66 acres). These lands will be the focal point for the development of an efficient agricultural sector, with high levels of productivity.

The two largest projects will be in Cul-de-Sac and Roseau. Both of these systems will consist of gravity fed reservoir and of central pumping stations with irrigation networks carrying water under pressure to the individual farms.

The irrigation "Off Farm infrastructure is financed from European Union Grant Funds (SFA99 and SFA 2000) directed through the Banana Industry Trust, which will have ownership over the equipment upon completion of the projects. The Deloitte and Touche Technical team were responsible for the preparation of the irrigation designs and the Ministry of Agriculture approved them.

The projects were tendered out in accordance with European Union procedure for Open Local Works contract, with the St.Lucia Banana Trust being the contracting Authority and the Ministry of Agriculture the Project Supervisors. FarmEX, a French based irrigation company was awarded the contracts for the irrigation projects being most compliant to EU evaluation guidelines.

The Irrigation Management Unit was established in March of 2002 to undertake the supervision of the irrigation works and subsequently to manage the irrigation systems upon completion; until such time that the farmers in each of the irrigated areas are fully trained to manage the systems on their own.

Irrigation Management Unit

The purpose of the Irrigation Management Unit within the Ministry of Agriculture, Forestry and Fisheries is to facilitate the development of irrigated agriculture within the Island.

The IMU would

1. Nurture the formation of water use groups as well as providing long term support to ensure the sustainability of these groups
2. Provide farmers who were irrigating with the knowledge (both technical and agronomic) to increase their productivity to a level comparable to their principal overseas competitors.
3. Assist farmers or Water Users Associations in obtaining water extraction permits
4. To lay the foundation for the establishment of a team of competent irrigation specialists in St. Lucia.

Terms of reference for the Irrigation Management Unit

The IMU would consist of three persons, one Irrigation Engineer and two Irrigation Technicians. The individuals comprising the unit include Felix Jaria, Quint Odlum and Thomas Gabriel.

Irrigation Engineer

His duties will be as follows:

1. Oversee and coordinate the island wide irrigation program to minimize conflict for the limited water resources, in the attainment of increased agricultural production. Oversee the installation works on all the irrigation/drainage projects island wide
2. Establish a database on all irrigated lands in the island.
3. Work closely with the head of the Water Resources Management Project in relation to the collection, sharing and monitoring of water resources

4. Prepare programs for the irrigation technicians and where required, the irrigation systems operators concerning their duties and supervise their activities.
5. Plan irrigation water distribution schedules and the operation of system facilities.
6. Propose improvements to or extensions of existing irrigation systems.
7. Propose revisions of irrigation regulations, which are considered inadequate, inappropriate or unsuitable.
8. Prepare Operation and Maintenance plans for Irrigation and drainage system facilities financed under the Banana Trust or as requested.
9. Supervise the Operation and Maintenance work carried out by the field technicians and irrigation systems operators.
10. Assist in the establishment and efficient functioning of Water User Groups/ Co-operatives.
11. Assist Farmer or Water User Associations in obtaining water use permits
12. Recommend appropriate agricultural and agronomic practices to be used in conjunction with irrigation systems.
13. Prepare Monthly status reports for the Banana Trust and quarterly reports to the Director of Agriculture on the state of the Water User Associations/Cooperatives and the work of the unit.
14. Provide training in irrigation and Drainage.
15. Prepare promotional material and assist in public education programs on matters relating to irrigation and drainage
16. Prepare and submit a proposed programme of work in the areas of irrigation and Drainage as required on an annual basis.
17. Identify potential water sources for Irrigated agricultural development.
18. Design irrigation /drainage systems for farmers and supervise the adoption of such designs.
19. Facilitate quarterly farmer meetings to encourage farmers to highlight problems associated with irrigation and drainage.

Irrigation Technicians

The irrigation technician will report the Irrigation Engineer. His/their duties include the following:

1. To assist the Agricultural Engineer in the supervision of Drainage and Irrigation works.
2. Assist the Agricultural Engineer in the implementation of Training Programs.
3. Inspect all irrigation systems, financed by the EDF or when requested to by any appropriate body, within the area designated to them by the Irrigation Engineer at least once every two weeks during the dry season.
4. Implement instructions given by the Irrigation Engineer.
5. Advise and supervise operation and maintenance activities.
6. Utilize meteorological data to optimize irrigation system operations
7. Assist Water User Associations or other organizations to deal with emergency problems such as flood and structural damage inflicting losses or potential losses to agricultural production.
8. Assist community representatives in the creation and development of Water User Associations.

9. Assist Water User Associations or any other official body, in organizing meetings to discuss issues relating to the efficient utilization of irrigation systems or irrigation water resources.
10. Provide agronomic advice to farmers to maximize their productivity on irrigation lands.
11. Assist in the supervision and monitoring of all irrigation and drainage projects.
12. Ensure that the recommendations made by the Irrigation Engineer in relation to irrigation and drainage are implemented
13. Promote the uptake, where appropriate and proper utilization of irrigation systems.
14. Provide monthly reports and when necessary special reports to the Irrigation Engineer
15. Perform any other duties are required by the Agricultural Engineer from time to time.

Cul-de-Sac Irrigation Project

General Description

The irrigation project in Cul-de-Sac has two main components:

1. The Gravity line and Reservoir

The limited water resources does not allow for the direct pumping from the Cul-de-Sac river to irrigate the proposed area, as a result earthen reservoir will be constructed to store 54000m³ water from which water will be pumped to the individual farms. The reservoir will be lined with butyl lining to arrest the problems of losses through seepage.

An intake structure will be constructed along the Cul-de-sac River, just down stream the confluence of the Ravine Passion and Ravine Souffre. A 630-mm gravity PVC gravity pipeline will feed the reservoir. The difference in elevation between the base of dam and the point at which the pipe enters the reservoir is approximately 5 meter over a length of approximately 2.2 Km.

The joint venture of Hippolyte Equipment Services LTD and Phoenix Construction Company LTD was awarded the contract to undertake the Cul-de-Sac Reservoir Project. The project cost is approximately \$3.5 million EC

2. Off Farm infrastructure

The off farm infrastructure involves the provision of the following:

1. Approximately 10.7 Km of irrigation mains and sub-mains stretching from Cul-de-Sac junction to the Marc Junction.
2. 70 control head assembly made up of 2" and 3"
3. 70 shed to house the control heads
4. Six pumping units having a capacity of 133m³/hr (40l/s) at 55 m head and a maximum suction lift of 5 meter, complete with diesel engine.
5. Filter station as a modular unit to handle a flow rate of 800 m³/hr
6. 17 main line control valve assembly ranging from 315 mm to 125 mm.
7. Associated building Work including housing for the pumps and filter stations, 70 control sheds and housing for control valves, flush valves and air valves.

3 Location

The Cul-de-Sac irrigation project covers an area of 440 acres, which extends from the Soucis/Bexon to the Marc/Crown lands junctions. The bulk of the irrigated lands are to the left of the Bexon Road (in relation to Vieux-Forte) and in the Deglois area.

A section of approximately 50 acres is along the farm road behind the Odsan Service Station and though presently engage in agriculture have been air marked as commercial lands.

4. Pipe layout

The PVC pipes are laid approximately 1 meter below ground level to ensure that the pipes are not damage due to compaction of heavy traffic.

The pipe line runs along the left side of the road (in relation to Vieux-Forte) from the Soucis/Bexon junction to a point opposite the Odsan Service Station), just down stream the old broken off farm bridge. The pipeline crosses the road to service the farmer to the back of the Odsan Service Station up to the Prime Minister's farm. It also crosses the Cul-de-sac River and runs the entire length of the farm road up to the Marc/Crownlands junction. Along the length of the mains a number of branches are installed to services farms located away from the mains. The following pipe sizes have been laid

Pipe particulars

#	Quantity	Description
1	900m	110mm PVC pipe
2	2200m	125mm PVC pipe
3	2000m	160mm PVC pipe
4	2500m	200mm PVC pipe
5	1300m	250mm PVC pipe
6	1600m	315mm PVC pipe
7	220m	400mm PVC pipe
	10720m	Total

5. Control heads

A control head serves one or more plots and includes the following elements,

1. Fabricated steel inlet assembly,
2. Double action air release valve.
3. Steel disc filter (maximum 130 microns)
4. Water meter
5. Adjustable pressure regulator
6. Galvanized steel by pass assembly for Mazzei injector
7. Mazzei injector
8. Plastic fertilizer tank
9. Pressure gauges
10. Isolating valves
11. Solenoid programmable valve
12. Fabricated steel outlet distribution assemble

There are 32 control heads with 2” outlets, 26 with single and 6 with 2” double outlets. There are a further 45 control heads, with 30 single outlets and 15 with double outlets.

6. Farmers

There are 70 control heads in total each serving one plot. However this does not correspond to 70 farmers due to the fact that one farmer may have 2 or more plots. The list of farmer and there acreages are as follows:

Farmers Included in Cul De Sac Irrigation Project.					
Area	Control Head No	Farmer Name	Farm Area	Control Head	Control Head Flow
SOUTH	1	Vincent Narisse	2.93	2"1	21.7 m3/hr
	2	Alvan Estate	10.34	3"2	76.7 m3/hr
	3	Alvan Estate	6.89	2"2	51.1 m3/hr
	4	William Pascal	1.79	2"1	13.3 m3/hr
	5		6.97	2"2	51.7 m3/hr
	6	St. Hill	3.55	2"1	26.3 m3/hr
	7	William Pascal	3.6	2"1	26.7 m3/hr
	8		3.8	2"1	28.2 m3/hr
	9	Victor Jn Paul	4.28	3"1	31.8 m3/hr
	10	Benedict Mangal	3.92	3"1	29.1 m3/hr
	11	Victor Jn Paul	6.22	3"1	46.2 m3/hr
	12	Eltric Small	3.73	2"1	27.7 m3/hr
	13	Wayne Thomas	4	3"1	29.7 m3/hr
	14	Griffith Isidore	10.69	3"2	79.3 m3/hr
	15	Noelise Montrose	4.6	3"1	34.1 m3/hr
	16	Francis Elibox	4.45	3"1	33 m3/hr
	17	William Robertson	3.4	2"1	25.2 m3/hr
	18	Antoine Rampasade	2.79	2"1	20.7 m3/hr
	19	Margaret Tarapasade	8.67	3"2	64.3 m3/hr
	20	Robin Dwarkasingh	5.4	3"1	40.1 m3/hr
	21	Thomas St. Rose	6.14	3"2	45.6 m3/hr
	22	Robin Dwarkasingh	9.16	3"2	68 m3/hr
	23	Margaret Tarapasade	3.99	3"1	29.6 m3/hr
	24	Ignatius Elibox	5.6	3"1	41.6 m3/hr
	25	Thomas St. Rose	6.14	3"2	45.6 m3/hr
	26	Robin Dwarkasingh	3.5	3"1	26 m3/hr
Total East =			136.55	Average =	39 m3/hr
NORTH	1	Michael Doussa	5.98	3"1	44.4 m3/hr
	2	Nelbert Tota	5.63	3"1	41.8 m3/hr
	3		1.3	2"1	9.65 m3/hr
	4		0.87	2"1	6.46 m3/hr
	5	Mark Louis	3.7	3"1	27.5 m3/hr
	6	Timothy Bernard	1.77	2"1	13.1 m3/hr
	7		1.04	2"1	7.72 m3/hr
	8	Francoise Eugene	1.98	2"1	14.7 m3/hr

Farmers Included in Cul De Sac Irrigation Project.					
Area	Control Head No	Farmer Name	Farm Area	Control Head	Control Head Flow
	9	Augustus Soloman	2.88	2"1	21.4 m3/hr
	10	Felix Joseph	7.67	3"2	56.9 m3/hr
	11	Benjamin Sewak	4.08	3"1	30.3 m3/hr
	12	Nelbert Tota	5.63	3"1	41.8 m3/hr
	13	Cyprian Lansiquot	5.4	3"1	40.1 m3/hr
	14	Gabriel Saiwak	4.08	3"1	30.3 m3/hr
	15	Anthony Joseph	6.7	2"2	49.7 m3/hr
	16	Anthony Joseph	2.7	2"1	20 m3/hr
	17	Anthony Joseph	1	2"1	7.42 m3/hr
	18	Anthony Joseph	1.6	2"1	11.9 m3/hr
	19	Anthony Joseph	11.4	3"2	84.6 m3/hr
	20	Anthony Joseph	5.7	3"1	42.3 m3/hr
	21	Rupert Gadjahar	6.99	2"2	51.9 m3/hr
	22	Augustus Andrew	9.39	3"2	69.7 m3/hr
	23	Francis Soolai	5.6	3"1	41.6 m3/hr
	24	Michael Joseph	2.94	2"1	21.8 m3/hr
	25	B & H Holding	7.78	3"2	57.7 m3/hr
	26	Anthony John	2.88	2"1	21.4 m3/hr
	27	Forestus Albert	3.77	2"1	28 m3/hr
	28	Raymond Stephen	2.54	2"1	18.8 m3/hr
	29	Allayne Clifford	9.6	3"2	71.2 m3/hr
	30	Allayne Clifford	7.4	3"2	54.9 m3/hr
	31	Ramjanan	6.97	2"2	51.7 m3/hr
	32	Mary Phillip	5.87	3"1	43.6 m3/hr
	33	Valance Son	3.37	2"1	25 m3/hr
	34	Thomas Dwarkasingh	4.58	3"1	34 m3/hr
	35	Michael Duplesis	1.74	2"1	12.9 m3/hr
	36	Webster Gadjahar	4.4	3"1	32.7 m3/hr
	37	Thomas Dwarkasingh	4.58	3"1	34 m3/hr
	38	Endrus Clifford	7.4	3"2	54.9 m3/hr
	39	Endrus Clifford	7.4	3"2	54.9 m3/hr
	40	Francis Soolai	4	3"1	29.7 m3/hr
	41	Ismael Clifford	3.47	2"1	25.8 m3/hr
	42	Hector Toussaint	2.14	2"1	15.9 m3/hr
	43	Albert Weeks	1.68	2"1	12.5 m3/hr
	44		6.7	2"2	49.7 m3/hr
	45	Donald Jawahir	10.87	3"2	80.7 m3/hr
			215.17	Average =	35.5 m3/hr
	71	Total East + West	351.72		

7. Pumping Station/Filter Station

The pump and filter stations are housed in concrete structure with the following dimensions.

Pump *****

Filter Station.*****

The pumping station consist of six (6) ROVATTI pump units each having a capacity of 133 m³/hr at 55 m head, with a maximum suction lift of 5 m. The pumps are powered by Deutz diesel engines. Each pump has a 14 m long rigid suction pipe with a 22.5° elbow and steel delivery manifold to filter station and underground mains.

8. Gravity lines

The gravity line extend for 2.2 Km from intake structure built on the Cul-de-Sac River, (just downstream the confluence of Souffre and Cul-de-Sac Rivers) to the reservoir site. The pipe will be oriented along the left side of the farm road (on the opposite side of the WASCO pipe line). The diameter of the gravity pipe is 630mm. The average depth to which the pipe would be buried is approximately 3.0 m, however at some point the pipe is expected to be buried over 4.0 meters. The gradient of the pipe is 2.8m per 1000 m and the maximum flow rate will be 420l/s at a velocity of 1.5 m/s

9. Intake structure and temporary dam.

In order to facilitate the harvesting and subsequent gravity flow through the gravity line and temporary dam and an intake structure was constructed on the Cul-de-sac River just downstream the confluence of Souffre and Cul-de-Sac Rivers

A reinforce concrete apron approximately 0.4m thick by 8.0m wide by 17.0m long lies on the river bed. This allows for a stable section. The temporary sand dam is keyed into the apron and is built to a height of approximately 2meters. The sand bank bam occupies a volume of approximately 56 m³ Water is stored behind the sand dam and subsequently allows for water to enter the intake chamber. On both the upstream and the downstream ends of the apron, gabion mattresses are installed to protect the aprons from scouring..

The intake structure is a basically a reinforced concrete box structure rising perpendicular from the river bed and concrete apron, which allows for the entry of water into the intake chamber and subsequently into the gravity pipe. It is approximately. 6.0m long by 2.8m wide by 2.5 m high. The intake structure has two compartments. The first is the intake chamber which allows for the dissipation of the water energy and also acts as a silt trap. The relatively clean water then moves into the second chamber and finally into the gravity pipe.

Roseau Irrigation Project

Roseau irrigation project is made up of two phases. Phase I will provide the off farm irrigation equipment to supply irrigation water to 180 acres of land presently growing principally bananas. It is anticipated that phase one will be followed by phase two with a further 140 acres to which it shall be connected. Phase one however will function as an Independent system pumping directly from the Roseau River.

The off-farm irrigation infrastructure will comprise of a lockable pump and filter shed (enclosing three diesel pumps each having a capacity of 100m³/hr and a sand filter station.), off farm PVC pipeline, lockable control sheds and temporary sand bag dam.

Part of Phase 2 includes the construction of an earthen reservoir therefore once phase 2 has been completed the temporary dam shall be removed, pumps will be relocated to the reservoir and a physical connection made between phase one and two allowing for both phase to be managed as one unit. It must however be noted that phase 2 is under the SFA 2000.

The following description concentrates on the Phase I component of the project.

Location

The project area is sandwiched between Peru/ Coolietown road to the North and the Varnard Road to the south. It is bounded to the west by the Roseau highway. The project area is made up of 28 farmers and occupies an area of 180 acres.

Pipe layout

The PVC pipes are laid approximately 1 meter below ground level to ensure that the pipes are not damaged due to compaction of heavy traffic.

From the pump house and filter station the mainline branches out into two with one branch feeding the Coolietown/Peru section and the other branch crossing the Roseau River to feed the farms on the Varnard side.

The pipe line (250mm diameter PVC pipe) runs along the farm road between Mr. P. Joseph and Mr. P. Rene for 250 meters. At the road junction it continues along the right side of the road in the direction of Coolietown/Peru, and extends some 965m where it further divides into two branches each 160mm in diameter, with one branch continuing along the Coolietown road up to Wint Desir for 665 meters and the other along the right side of the farm road for a further 530m to provide water to five farms.

On the southern side of the project (along the Varnard road), the sub mains run along the left side of the road (in relation to Varnard) for approximately 1075m and provide water for 8 farms. The diameter of the first 315m of pipe is 160mm and the remaining 760m is 200mm.

Control valves

There are six (6) control valves (three 8" and three 6" valves); two are located in the vicinity of the pump/filter house. These valves isolate and can be used to isolate the Northern and/or the southern irrigation lines. There are two other control valves on both the Northern and Southern lines to further isolate the flow to various sections if and when the need arises.

Pipe particulars

#	Quantity	Description
1	1300m	250mm PVC pipe
2	1550m	200mm PVC pipe
3	500m	160mm PVC pipe
4	140m	110mm PVC pipe
5	3490m	Total

Control heads/shed

A control head serves one plot and includes the following elements,

13. Fabricated steel inlet assembly,
14. Double action air release valve.
15. Steel disc filter (maximum 130 microns)
16. Water meter
17. Adjustable pressure regulator
18. Galvanized steel by pass assembly for Mazzei injector
19. Mazzei injector
20. Plastic fertilizer tank
21. Pressure gauges
22. Isolating valves
23. Solenoid programmable valve
24. Fabricated steel outlet distribution assemble

Each control head is enclosed by a lockable galvanize shed to protect the control head from the environmental elements both human and otherwise.

Farmers

There are 28 farmers in the project area, each farmer having only one control head.

#	Farmer Name	Telephone #
1	Andrew Brown (B180193)	
2	Anthony Augustin (A170755)	4512728
3	Benoit Mangal (M171003)	4512015
4	Celia Jn.Marie (J181156)	4514481
5	Clifton Dariah (D190285)	4511229
6	Felix Mangal (M171003)	4510723
7	Francis Elibox (E170792)	4510730
8	George Rickallie (R181139)	4514786
9	Ignatius Mangal (D180301)	4512015
10	John Mederick (M190504)	4518036
11	Julius Polius (P180577)	
12	Lawrencia Paul (P181042)	4514521
13	Lucius Modeste (M181068)	
14	Marilyn Charles (R181139)	4522029
15	Martin Samuel(Hill side)	4514200
16	Mathew Edward (E181034)	
17	Merline Elibox	
18	Moranlie Clifford (C181061)	4522417
19	Norbert Pascal (P200284)	4515280
20	Patrick Renee (R326260)	
21	Philson Joseph (J190322)	
22	Prisca Auguste (A181145)	
23	SLBC (E181034)-L.Henry	4514681*
24	Soloman Jn Baptiste (4511846
25	Thomas Dorville (R181139)	4515013

#	Farmer Name	Telephone #
26	Tony Du Boulay (D180425)	4514957
27	William Edward (E170784)	4514177
28	Wint Desir (D190447)	
29	Joseph Ghirawoo	4510278

Pumping Station

The Temporary pump house and filter stations are located on Mr. P. Renee land, approximately 100 meter upstream to the Roseau Bridge and on the right bank in relation to downstream. The dimension of the pump house is ***** and is cable of housing two pumps.

Contractors

Status of construction

Canelles Irrigation Project

General Description

Location

Pipe layout

Control heads

Farmers

Pumping Station

Gravity lines

River Dam

Reservoir

Contractors

Status of construction