

71

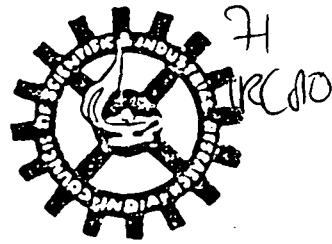
IRC 80



Slow Sand Filtration Project

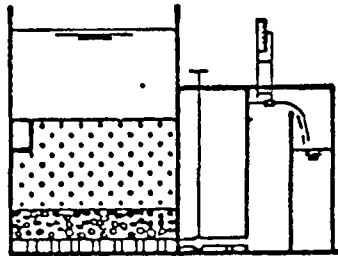
MEETING OF REPRESENTATIVES OF
SSF-PROJECT COUNTRIES

NAGPUR, INDIA - SEPTEMBER 15-19, 1980



International Reference
Centre for Community
Water Supply and
Sanitation

P.O. Box 5500
2280 HM RIJSWIJK
The Netherlands



National Environmental
Engineering Research
Institute

Nehru Marg,
NAGPUR - 440 020
India

1.11

STATUS REPORT ON
SLOW SAND FILTRATION PROJECT
IN JAMAICA

prepared by: Mr. J.A. O'Connor,
Mr. B.L. Muir

LIBRARY

Centre
Nagpur

August, 1980.

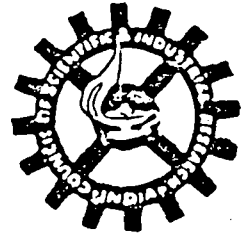
71 IRC 80-1.11 (5)



Slow Sand Filtration Project

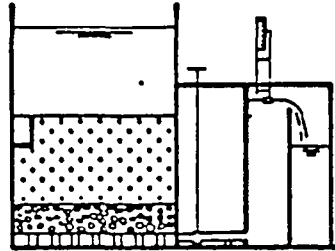
MEETING OF REPRESENTATIVES OF
SSF-PROJECT COUNTRIES

NAGPUR, INDIA - SEPTEMBER 15-19, 1980



International Reference
Centre for Community
Water Supply and
Sanitation

P.O. Box 5500
2280 HM RIJSWIJK
The Netherlands



National Environmental
Engineering Research
Institute

Nehru Marg,
NAGPUR - 440 020
India

STATUS REPORT ON
SLOW SAND FILTRATION PROJECT
IN JAMAICA

prepared by: Mr. J.A. O'Connor,
Mr. B.L. Muir

August, 1980.

STATUS REPORT ON SLOW SAND FILTRATION PROJECT

JAMAICA

INTRODUCTION

Jamaica is among eight countries which have been selected to participate in the Slow Sand Filtration (S.S.F.) Pilot Demonstration Project. This Pilot Demonstration Project was initiated by the WHO, IRC, The Hague, Netherlands. Two rural water supply projects were selected, for design, construction and evaluation of full-scale Slow Sand Filters, namely:-

- Peace River (in the parish^x of Clarendon)
- Endeavour/Camrose/Kemshot (in the parish of St. James)

The project is being undertaken in conjunction with the Ministry of Health and Environmental Control.

OBJECTIVES:

The main objectives of the project are to evaluate and develop criteria for promoting the use of S.S. Filtration in developing countries; and also to determine whether such systems would be appropriately suitable to local conditions, circumstances and needs. The study research is to include both technical and non-technical aspects. In this connection, much emphasis will be placed on the social, cultural and economic factors which could influence an optimum performance of the Plants.

x Parish: comparable to a province.

1. PROGRESS REPORT ON SELECTED COMMUNITIES

1.1 Endeavour/Camrose/Kempshot WATER SUPPLY PROJECT (ST. JAMES)

The project envisaged a supply of domestic water to the following districts in the parish of St. James:-

- a) Endeavour
- b) Hopeton
- c) Hampton
- d) Williamsfield, Plum Tree, Salwater
- e) Tathfield, Camrose, Kempshot
- f) Grantham, Bellevue
- g) Bandon/Welcome Hall

This area lies approximately 10 miles south of one of the major Tourist Resort Areas of Jamaica's North Coast, Montego Bay. It is mountainous, woody and rugged terrain, with elevations ranging from 600 feet (183 m) to 1,800 feet (550 m) amsl. The roads leading to the area and those within the area itself are rough. Housing in the area is generally sub-standard, with no modern facilities available. The local population is mainly dependent on agriculture. In general, it might be said that the population residing in this area are from the economically poorer section of the society. It is an area with a serious water problem where the residents have to transport water manually and on donkeys, over long distances. Standards of hygiene are considered to be rather low in this area.

2.1.1 DESCRIPTION OF TREATMENT PLANT (ANNEX 1-3)

The construction of the main elements of the project have been completed. This was achieved through a contractor who was chosen by the selective tendering process.

2.1.2 Intake Works

The intake well constructed of R.C. is located near a Blue Hole. A diversion rubble wall was constructed across the Blue Hole. This diversion wall diverts water towards the well. Constructed also is an earthen embankment, which is raised around the source. This is to eliminate surface runoff from entering the Blue Hole Source. Installed on top of the intake well are two V.T. pumps, each of 1.5 H.P., one of which will be a standby.

2.1.3 Clear Water Reservoir

The treated water from the S.S.F. will flow by gravity to the clear water sump which has now been completed. The capacity of the sump is 20,000 gallons and is of R.C. The water is chlorinated and pumped through the distribution system, consisting of 4 inch diameter and 3 inch diameter G.S. pipes. Pumping is achieved with the use of two 25 H.P. V.T. pumps which have been installed. The treated water is pumped up to a 50,000 gallons tank, from which it is relifted to another 20,000 gallons tank located at Kempshot. The water is distributed by gravity through a network of G.S. pipelines.

2.1.4 Slow Sand Filters

The construction of the Slow Sand Filters is behind schedule. It should be pointed out that the entire programme of activities were hampered due to

severe flooding which occurred in June 1979. The Western Section of the Island in which this study project falls, experienced its worst flooding in recorded history. This forced the National Water Authority to shift its priorities to the restoration of damaged water supply systems.

After consultations with the I.R.C., a total rephasing of Project programme was agreed on. Assurances were given that priority would be given to the implementation of the project. An engineer attached to the Western Region was assigned to be responsible for the construction programme. The rescheduled programme envisaged the completion and commissioning of the Filters by the end of March, 1980.

However, there has been a noticeable downturn in the economic situation, which has given rise to shortages of certain vital building materials, such as steel and cement. It was not possible to reallocate these materials from other projects, although due consideration was given to this.

Certain minor modifications have also been made, the area to be served was increased to include two other communities, namely Bandon and Welcome Hall. Also it was thought that since the system would initially operate without the use of the S.S. Filters, a comparison could be made, after the Filters were completed. Another possibility that was looked at, was to use as a control, a project which incorporates the use of S.S.F. and which was under construction at a project site some 25 miles away. This project does not have the socio-economic and cultural aspects built into it.

After discussions with the WHO/ IRC a further re-scheduling of activities has become necessary. It is now estimated that the construction period for the Slow Sand Filters for Endeavour/Camrose/Kempshot will be of a

four months duration and completion is expected by late December, 1980 to early January, 1981.

It should be emphasized that it is the intention of the N.W.A. to put into service the Water Supply System at Endeavour/Camrose/Kempshot, even before the S.S.Fs. are completed. Again, Diesel generators are to be used to provide the motive force for the pumps. In the meantime, the local electricity authority is actively pursuing the matter of the installation of 3-phase electricity to the site.

UNIT UNDER CONSTRUCTION	% COMPLETION
Intake well	100
Diversion Rubble Wall	100
Earthen Embankment	100
Control Building	100
Clearwater Tank	100
Distribution System	100
Slow Sand Filters	0
Installation of Pump and Electrical Equipment	60

The project was designed to supply potable water to:-

- a) Victoria
- b) Thompson Town
- c) Bromwell
- d) Garlogie

in the parish of Clarendon. These are farming communities within the Mocho Mountain range and they lie along and west of the main road between Four Paths and Frankfield in Clarendon. The terrain is very mountainous with elevations varying between 1,500 feet (457 m) and 3,200 feet (975 m) AMSL.

The major district - Thompson Town, lies along the main road and has the activities usually associated with a developed community, such as electricity, schools, post office etc. The other areas are less developed than Thompson Town and are served by parochial roads. The general standard of living in the area could be described as being average for rural farming communities in Jamaica.

Throughout the study area, there is a marked scarcity of health facilities and reliable water supply systems. Most of the areas are served by public and private rainwater catchment tanks. All the systems are therefore dependent on rainfall and are inadequate during the dry season. Periodic droughts also have a disastrous effect on the water supply of the entire area.

A re-scheduling of activities for the Peace River Project was also done and is as set out below:-

- i) design drawings to be completed by end of September 1980;
- ii) tenders to be invited and awarded by end of October 1980;
- iii) construction to be completed by end of 1981.

2.2.2 DESCRIPTION OF TREATMENT WORKS (ANNEX 4-7)

The source of supply is the Peace River. Water emerges from several points on the hillside and they all converge into forming a narrow stream.

The main elements are:-

- a) Intake Works
- b) Raw Water Sump
- c) Low Lift Pumps
- d) Slow Sand Filters
- e) Clearwater Reservoir Chlorination
- f) High Lift Pumping from the Clearwell to the distribution system
- g) Storage Facilities.

2.2.3 Intake Works

This includes the construction of Silt Traps upstream for pre-treatment and also the river course has been expanded to provide for a holding pond of very short detention time. Provision is made for flood gates which will be used to raise the level of the water by approximately 1.80m. A system of underground pipes will transport the raw water from the intake by gravity to a sump. The opening of these pipes are protected by the use of a screen and graded stones.

The raw water sump is presently under construction. Water will be pumped to the S.S.F. using V.T. pumps.

2.2.3 Slow Sand Filters

The design of the S.S.F. is being undertaken by the N.W.A. A decision was taken to delay the works on the S.S.F. for Peace River. It was felt that the experiences to be gained on the other project being carried out at Endeavour/Camrose/Kempshot would greatly reduce the expected associated problems of design and construction. The designs of the S.S.Fs are now completed except for the detailed drawings, which are now being produced. The design calls for 4 No. Filters, approximate sizes 7.50 x 4.50 m filters will operate for 24 hours/day with a filtration rate of between 0.15 and 0.25 m/hr.

2.2.4 Clear Water Storage

Filtered water will flow by gravity to a clear water storage tank, where chlorination will take place. The treated water will be pumped to two storage tanks located at Victoria. Pumping will be achieved by using two V.T. pumps and a 6 inch diameter Ductile Iron/Asbestos Cement pipeline to the 75,000 gallons and 100,000 gallons tanks. The storage tanks are located at the high points on the system and this facilitates gravity feed through the distribution system to the areas served.

2.2.5 DATA COLLECTION

Information on stream flows are available only for a period of three years. This is considered to be quite inadequate. However, it is planned to continue the stream gauging, which so far, has indicated that a minimum flow

of the order of 140 g.p.m. can be expected.

Physical, chemical and bacteriological examination of the raw water have been carried out. The results obtained have been good, but not conclusive. From the results there is no indication that any pre-treatment will be necessary. However, tests are still being conducted in the NWA's Laboratory and provisions have been made should it become necessary to pre-treat the water before filtration.

2.2.6 MECHANICAL EQUIPMENT

The V.T. pumps both for low lift and high lifts are on order. A diesel generator will provide power to drive the pumps, until the local electricity Authority has completed the installation of a 3-phase system to the site.

It is proposed to put the system into operation even before the S.S.Fs are completed. This is possible to achieve, due to the good quality of the water and also with the installation of the diesel unit.

UNIT UNDER CONSTRUCTION	% COMPLETION
Intake Works	100
Raw Water Sump	80
Inlet pipes from R.W.S.	25
Distribution System	100
Storage Tank	100

OUTSTANDING WORKS TO BE COMPLETED -

- i) Construction of the Clearwell
- ii) Construction of the Control Building and Access Road
- iii) Finalization of design drawings for the S.S.F.
- iv) Procurement of Mechanical & Electrical Equipment

SUMMARY

It is our view that the S.S.F. project is of great value to developing countries and in particular to the Jamaican situation. The use of this type of filter for water supplies to rural communities has many advantages, and in a world of soaring oil prices, it is particularly advantageous in reducing power costs which are associated with the more complex backwashing systems of the Rapid Gravity Filters.

We are aware of the fact that our programme is not on schedule. However, it is our intention to continue to participate in this Pilot Demonstration Project, with a view to making a meaningful contribution in terms of developing criteria, both from a technical and non-technical point of view.

Jamaica is proud to be associated with the Project and it is hoped that this meeting will provide a platform for the free exchange of ideas, which in turn will assist us to overcome some of our problems and ultimately to speed up the implementation and complete the outstanding works.

It is indeed a fitting tribute to the WHO/ IRC for initiating this Pilot Demonstration Project, and we sincerely believe that it will be a success.

3. A DOCUMENT OF EXPERIENCES GAINED IN THE ACTUAL EXECUTION (IMPLEMENTATION) OF THE HEALTH EDUCATION EXTENSION AND COMMUNITY PARTICIPATION COMPONENT.

INTRODUCTION:

In an attempt to prepare and present this paper on the above mentioned broad subject matter area, the author wishes to deal first with a brief treatment of historical developments related to the Jamaica SSF Projects from immediately after the International SSF-Conference held in The Hague on May 29th - June 3rd, 1978 to the present time.

Emphasis will be laid on the PROBLEMS and PROGRESS and both POSITIVE and NEGATIVE EXPERIENCES encountered in efforts at the implementation of the ACTION PLAN.

3.1 Actions taken to inform National level Policy-makers and Administrators about the SSF project.

On my return from the SSF- Conference, my first action was to prepare the "REPORT AND RECOMMENDATIONS" on the Conference and to present it to the Permanent Secretary and Directors of the Health Education Services and Environmental Control Division of the then Jamaican Ministry of Health and Environmental Control, (June 1978).

This document message provided administrative, technical and professional information needed for programme-support and necessary actions. It was also used to influence Policy-makers and Administrators to arrive at a positive decision to participate in the WHO/IRC SSF Research and Demonstration Project.

The Ministry of Health and Environmental control agreed to participate in the Jamaican Slow Sand Filtration Project and communicated that decision to the National Water Authority in August 1978.

However, as a result of an organizational communication problem, the Health Education Division and myself were not informed of this decision until early November 1978.

The Chief Medical Officer gave significant support to the project. This positive attitude provided further opportunities to inform Senior Managers and Administrators about the SSF-project, at the Chief Medical Officers meeting, held in December 1978.

Prior to the meeting circulation of the following documents was facilitated by the C.M.O.:

- A concise report on the objectives and results of the Community Education and Participation Conference at the Hague, May 1978.
- The Jamaican Health Education Extension and Community Participation Proposals. Working Document No. 7 of the above mentioned meeting.
- Project document for Phase II of the Jamaican Slow Sand Filtration projects, as prepared by the National Water Authority.

During the meeting tremendous support for the project was scored among many of these Senior Administrators as evidenced by subsequent positive voluntary feedback and actions.

3.2 Actions taken to inform Policy-makers and Administrators at local level (Parish/Village).

In November 1978 a Central Programme Management Committee was set up. The basic objectives of this committee were to facilitate effective coordination and general planning, implementation and evaluation etc. of the SSF-project. One month later, in December 1978, the Outline of the Health Education Component for the Jamaican SSF-project was completed. The execution of the action-plan belonging to the Health Education Outline was considerably delayed since the inactivity of the Central Project Management Committee inhibited decisions on the implementation of crucial aspects of this plan.

3.1.1. Peace River Water Supply Project (Clarendon)

Health Extension Education Activities were initiated and implemented with the Parish Health Administrators of Clarendon Health Department in March, 1979.

Group-approaches and person-to-person discussions, supported by similar written information as in the case of the Chief Medical Officers meeting, were applied with marked measure of success. The Medical Health Officer and his Senior Health Officers (Nursing and Environmental Health) were ready and willing to have the Local Coordinating Committee set up; but here again, lack of prompt support from the Central Programme Management Committee delayed this implementation aspect for a prolonged period of time. Consequently, implementation of Sections B1 - 12 of the Action Plan were set back. Partly due to the fact that the project at St. James for technical

reasons was to have priority over Clarendon, the setting up of a Local Coordinating Committee received less attention from the Central Programme Management Board and as a consequence thereof, it was only formally set up at a meeting at the Clarendon Health Department on April 23, 1980.

3.2.2. Endeavour/Camrose/Kempshot Water Supply Project (St. James) .

The transfer of information to the responsible officers in the St. James area was arranged in a similar way as in Clarendon. This led to the formal installation of the local Coordinating Committee for the St. James SSF-project on October 3, 1979. Dr. B.A. Wint M.O. was designated as the chairman of the committee.

3.3 Baseline Health Survey.

During the Central Programme Management Committee in October 1979, a Programme Implementation Sub-committee was set up. This sub-committee was charged with the planning and execution of the baseline health surveys in the two Project Villages.

The sub-committee consists of:

- Mr. Linus Reid - Research/Coordinator
- Mr. Charles Clayton - Research Assistant
- Mr. B.L. Muir - Health Education Officer.

Administrative and logistic programme support arrangements were also effected by National Water Authority to determine and settle financial expenditures etc. - in relation to the execution of the SSF Project. It must be stated here that these arrangements turned out to be among significant determinants of the acceleration of the Projects from this point in time onwards.

During various meetings within the Environmental Control Division, and with the N.W.A. notable in-puts in the preparation of the baseline survey were achieved in:

- a. The Draft Baseline Data Gatherine Research Design for the Projects.
- b. The related Draft Questionnaire; and
- c. In ensuring that generally and specifically the Socio- Economic, Socio - Cultural Demographic and Health data needed, were incorporated to adequately provide the required Health Education Baseline Planning and Evaluation data for the accepted Health Extension Education and Community Participation Programme Components of this Project which I had the privilege of preparing.

3.3.1 Baseline Health Survey - St. James

Starting from October 1979, weekly visits were paid to Montego Bay and the rural project area of St. James. These visits regularly amounted to a stay of two full days in that Parish.

Notable achievements were:

- a. Assisting in the development/completion of the Draft Research Data - gathering Questionnaire.
- b. Assisting in the selection and training of the proposed (Questionnaire) Interviewers.
- c. The Pre-Testing of the Questionnaires.
- d. De - briefing sessions with Interviewers involved in the Pre-Testing Exercises.
- e. Steps towards the finalisation of the revised Questionnaire to be used in the programme by Mid - Nov. 1979.
- f. Sundry logistic and related programme - support activities at National and Local Levels.

It is worth mentioning here that two representatives of the National Planning Agency, Dr. Pat Anderson and Mr. Errol Lee, have provided major in-puts in the development of the Questionnaires.

The final version of the field survey questionnaires was completed towards the end of 1979.

In preparation for the survey orientation sessions were held for health workers and others who were expected to carry out this survey. After pre-testing of the questionnaires, further sessions were held. After the final briefing sessions with the selected and trained interviewers, the Health Education, Socio-Economic and Socio-Cultural Baseline Survey was executed and completed in February 1980.

Arrangements for the general tabulations and analyses of the Survey findings were effected. A competent private Consultant was engaged to effect proper Computer Processing and production of needed statistical and other tabulations of the Survey results.

However, due to some delay and misinterpretation on the part of the consultant, the comprehensive computerised data compilation and analyses of the completed questionnaires will only be available by the middle of August 1980.

3.3.2 Baseline Health Survey Clarendon

Although there had been quite some delay in the actual setting up of the Local Coordinating Committee, once it was established, it immediately undertook steps to discuss and make preliminary arrangements for

- the selection and training of interviewers.
- the execution of the Socio-Economic and Socio-Cultural data gathering exercise in the Clarendon Project area.
- Community meetings.

This tremendous commitment on the part of the committee did not just happen but has been the fruits of skilful planning and directing of programmes relating to educational and multi-strategical organizing in-puts.

Because of the energetic approach of the Coordinating Committee, the completion of Baseline Survey was very quickly achieved.

After its completion in July, 1980, the questionnaires were handed over to the data processing consultant for tabulation and further analysis.

4. COMMUNITY EDUCATION AND PARTICIPATION

The basic programme objectives and approach did not vary significantly within Jamaica.

The strategies included:-

- 4.1 The fullest possible representation of the formal health and health-related agencies and the formal and informal leadership of the community, aimed at and achieved in the composition of the Local Coordinating Committee.
- 4.2 Participation of the representatives on the Committee in the decision-making process has been a prime feature in the development, planning and implementation of the Village's Baseline Surveys.
- 4.3 Approximately 30% of the interviewers involved in the Baseline Survey were drawn from among Community Secondary School leavers. The remainder were from Community Health Aides and Maternity District Midwives, all of whom received special training in Interviewing Techniques.
- 4.4 Information to the Community and its organizations in relation to the project and the Baseline Surveys were transmitted with the assistance of the Public Health Nurses and Inspectors, Community Health Aides and District Midwives.

4.5 The methods and media used were person to person and group-approach, supplemented by written communication (letters) to leaders of Community Based Organizations.

4.6 The basic objectives were :

- to inform the community about the project and associated activities
- to stimulate and heighten community awareness and interest in the SSF Project
- to facilitate community acceptance and support for the SSF Project.

4.7 Initial evaluation FEED-BACKS in terms of community acceptance participation and support have been markedly rewarding.

Indications are that, in respect of the St. James SSF Project, the EXPECTATIONS of the community for the promised water supply have been heightened; and there appears to be signs of frustration that it might not be a reasonably early reality.

Consequently, the St. James Local Health Authorities recently expressed fears and reluctance to start early planning and implementation of the community health extension education programme, except and until there are, visible to the community, clear signs of acceleration of construction works for the Village Demonstration Water Supply Treatment, Storage and Distribution facilities.

Appropriate early actions by the National Water Authority to correct or clarify this particular problem are under review (based on recent discussions).

CONCLUSION

The author has sought to briefly reflect the crucial historical developments of the Jamaican Slow Sand Filtration Project.

If I may have succeeded in communicating quite valuable and objective information about the Jamaican SSF Project, I would be indeed extremely happy.

In closing, however, it must be stated here that educational activities in pursuit of our Jamaican Programme Goals (annex 8) our suggested Long Term Programme objectives (annex 8) and our Short Term Programme objectives (annex 9) have been receiving active attention with some perceptible degree of success. Certain problems affecting the rapidity of the progress of our Projects have been highlighted. Some have been wholly or partially solved. Of what remains to be solved, particularly the completion of tabulations and analyses of both Baseline Surveys, and the availability of these results for the health education programmes planning, implementation and evaluation, we believe early solutions are forthcoming.

Speaking for the Jamaican team in general, it seems reasonable to say that optimal levels of interest and commitment towards completion of programme activities remain imperative for a valuable and meaningful winding-up of these projects.

ENDEAVOUR/CAMROSE/KEMPSHOT WATER SUPPLY - ST. JAMESSALIENT FEATURES AT A GLANCE

Name of districts: Endeavour
Hopeton
Hampton
Williamsfield, Plum Tree, Salwater
Tathfield, Camrose, Kempshot
Grantham, Bellevue

Parish: St. James

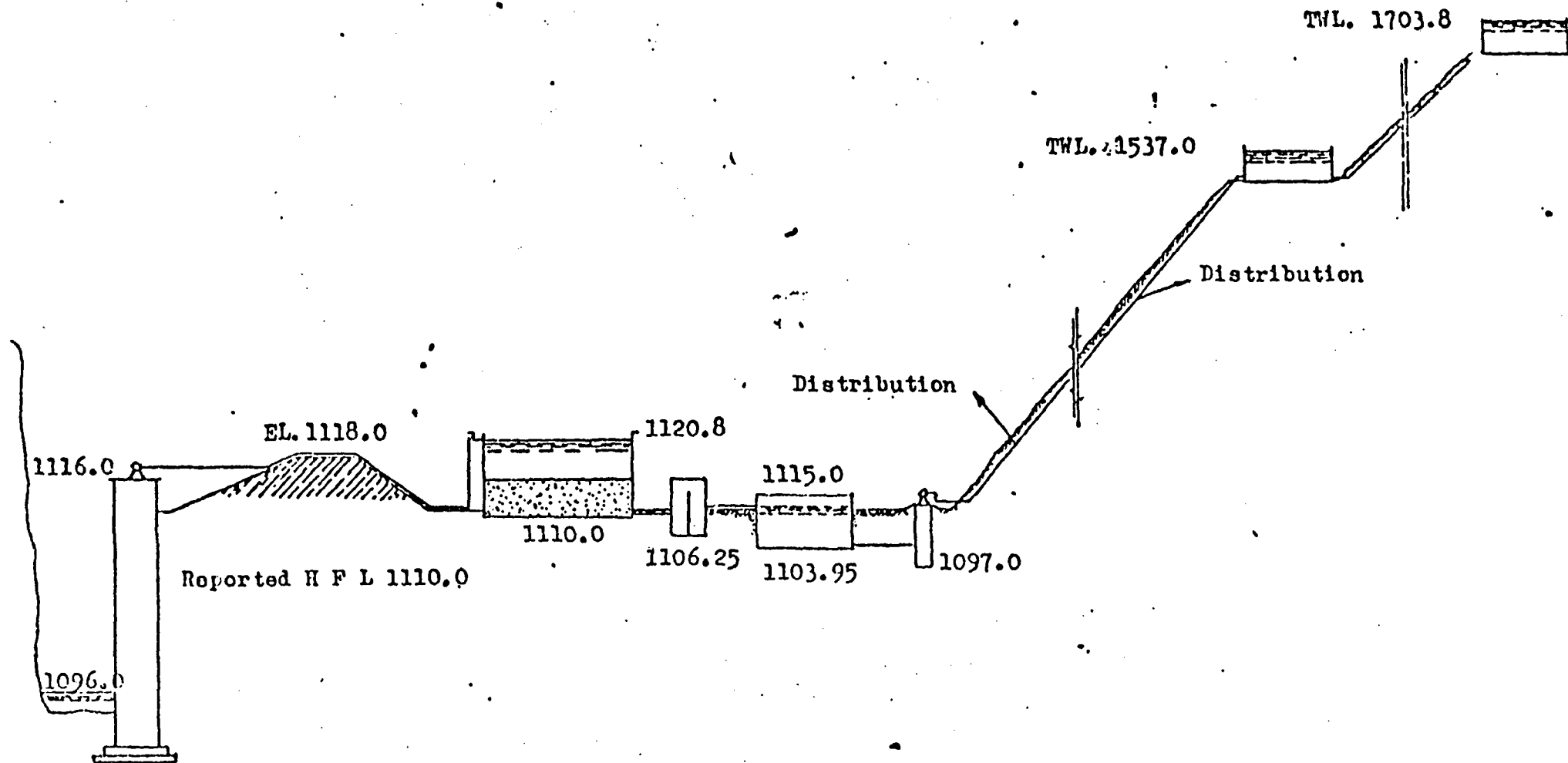
Population: Present population : 2,000
Population in year 1980 : 2,376
Population in year 1990 : 2,614
Population in year 2000 : 2,875

Per Capita Supply: 20 gpcd (1980) (90 lcd)
25 gpcd (1990) (115 lcd)
32.5 gpcd (2000) (145 lcd)

Source of raw water: Blue Hole

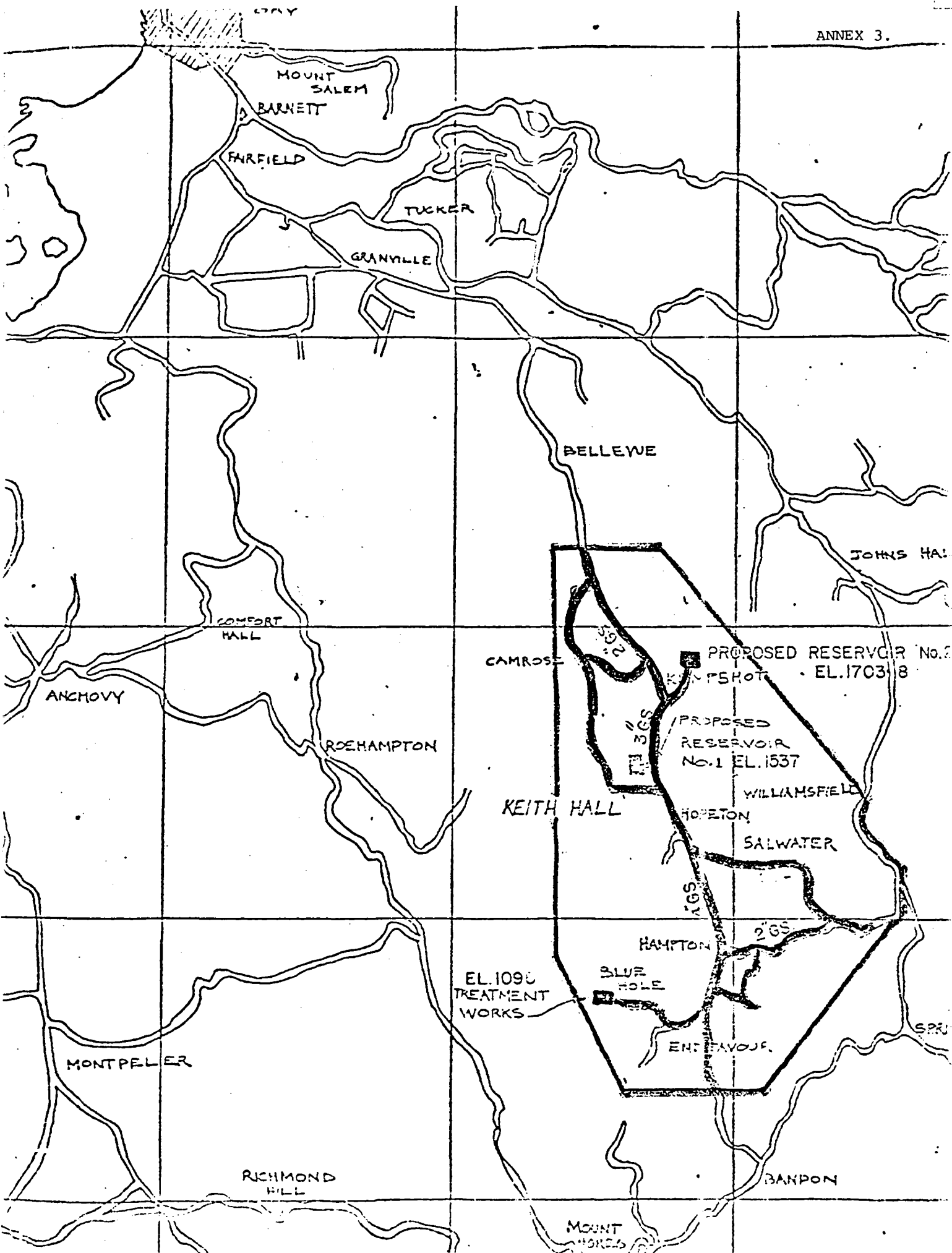
Flow Sheet

1. Raw water source: Blue Hole at Endeavour;
Normal W.L. 1,096.0;
R.C.C. intake well 8 ft. dia. (2.44 m)
2. Raw water pumping: V.T. pumps - 2 Nos., (1.5 H.P. each) one
as stand-by. Duration of operation -
ultimate 24 hours.
3. Pre-treatment: Not required at present
4. Slow Sand Filtration: 2 Nos. of slow sand filters
Size 30' x 30' (9.15 x 9.15 m²)
Design rate of filtration - 3 galls./
sq. ft./hour. (Subject to modification).
(0.15 m/hr)



Source Blue Hole	Intake Well Raw Water Pump	4" dia. G.S. Raw Water Main	Earth Embankment	Slow Sand Filter	Clear Water Measur- ing Chamber	Clear Well 20,000 Gals. capacity	High Lift Clear Water Pump	4" dia. G.S. Rising/ Distribu- tion main	Koith Hall Reservoir Capacity 50,000 Gals.	3" dia G.S. Rising/ Distribu- tion main	Kempsho Reserve Capacit 50,000 Gallon
------------------------	--	---	---------------------	---------------------	---	--	--	--	---	---	---

FLOW DIAGRAM OF ENDEAVOUR CAMROSE KEMSHOT WATER SUPPLY SCHEME



PEACE RIVER/VICTORIA WATER SUPPLY - CLARENDONSalient Features At a Glance

Name of District: Victoria
 Thompson Town
 Broomwell
 Garlogie

Parish: Clarendon

Population: 1970 Population : 4470
 1980 Population : 4937
 1990 Population : 5454
 Year 2000 Popula-
 tion : 6025

Source of Raw Water: River

Flow Sheet

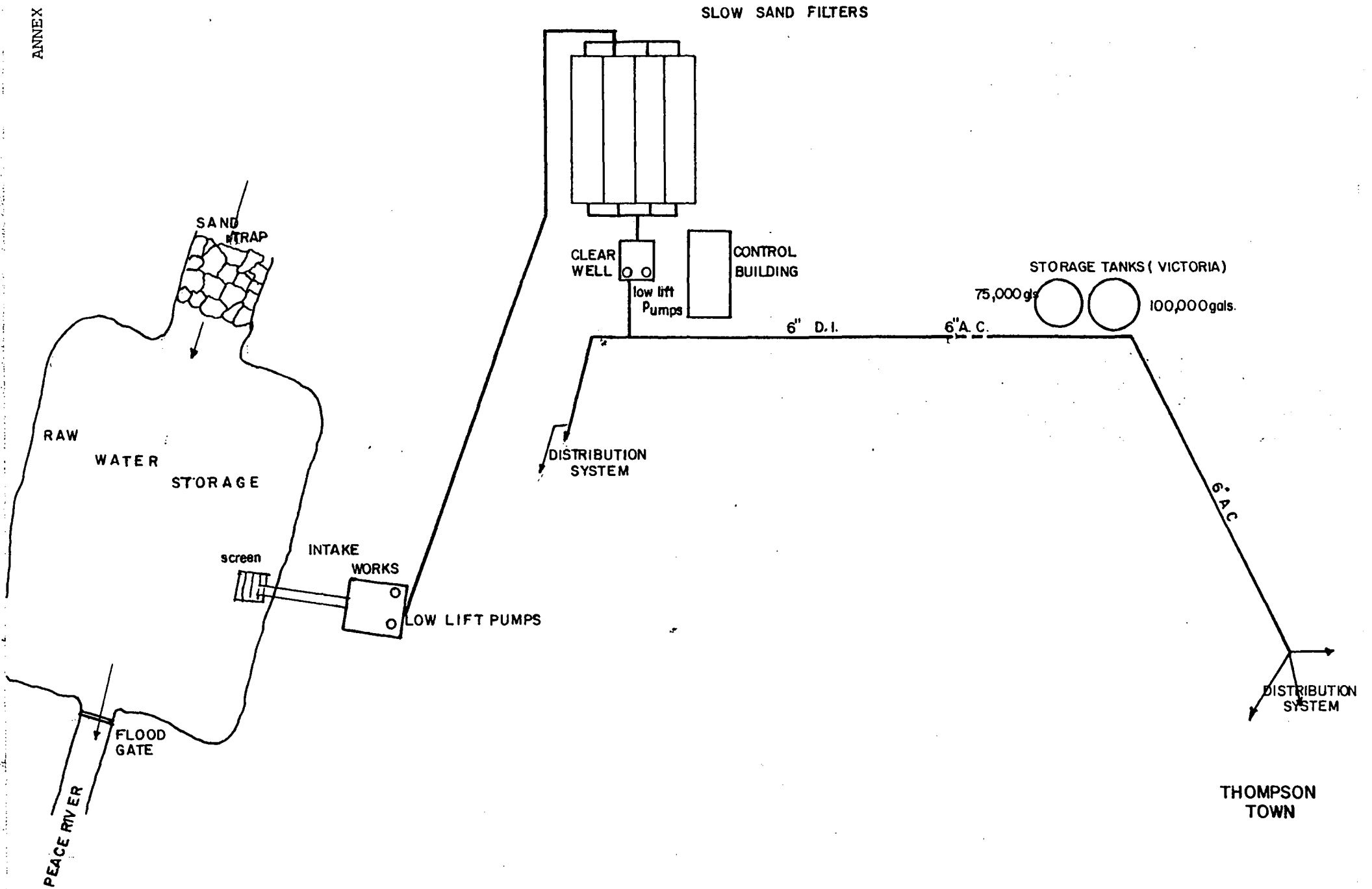
1. Raw Water Source: Peace River
 Avg. elevation 2,636 ft.
2. Raw Water Pumping: 2 No. Low Lift Diesel Pumps
 190 gpm at 80' head one as
 standby, ultimate 24 hour
 operation.
3. Pretreatment: Not required at present
4. Slow Sand Filtration: Total surface area 3,800 ft.² (350 m²)
 Filtration rate 3 gall./ft.²/hour. (0.15 m/hr)
5. Clear Water Well: R.C. Tank
 25,000 gall. capacity.
6. Balancing Tank: Storage reservoir at Victoria
 (existing) - 100,000 gall.
 Elev. 2,843 ft.
7. Distribution: Victoria
 Thompson Town - Gravity
 feed from
 Victoria Town
 Tank.

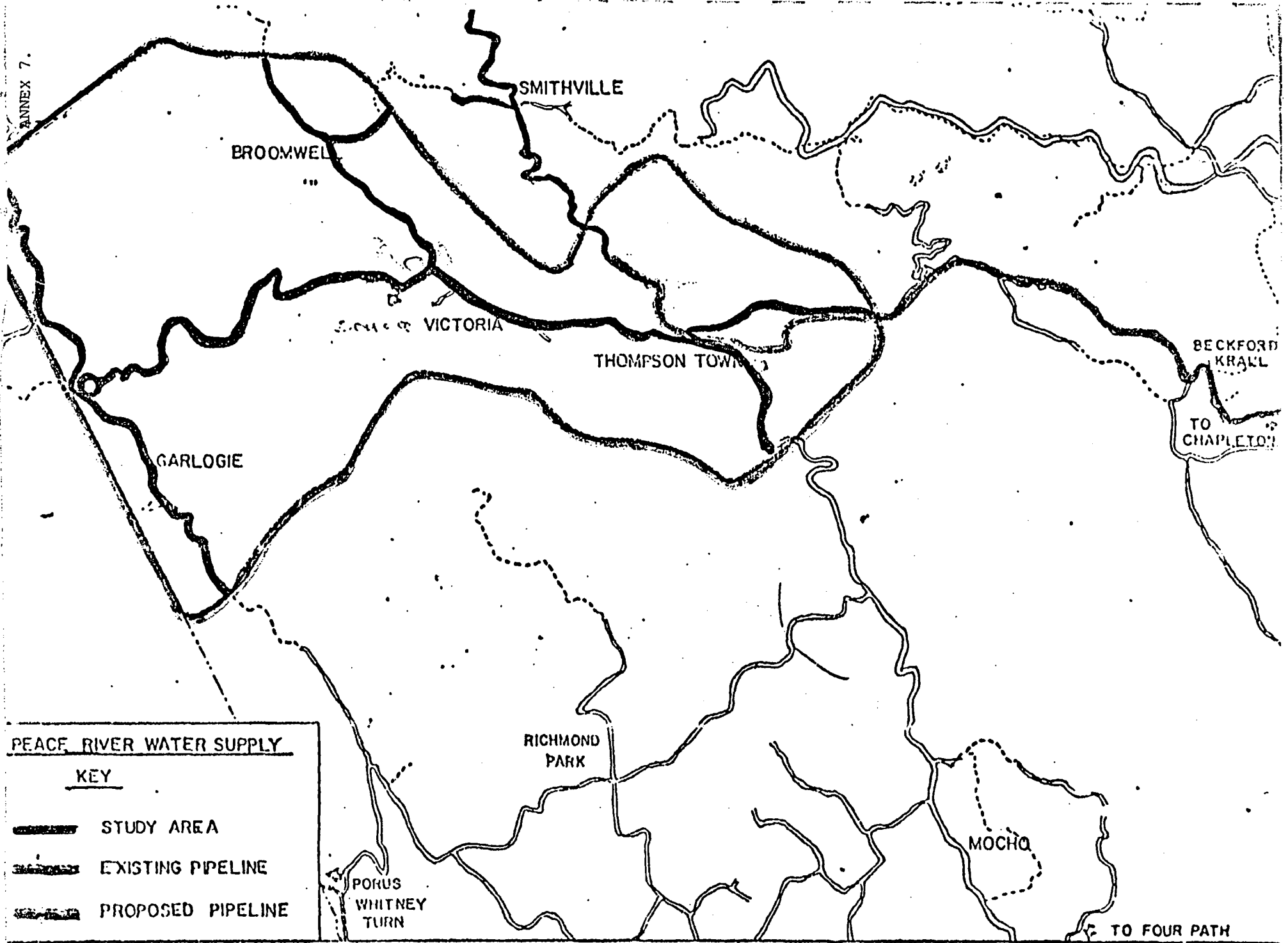
-2-

- Broomwell - Relift water from
Victoria Town
Tank.
- Garlogie - Lift water from
clearwell at treatment
plant.
5. Clear Water Well: R.C.C. tank 20,000 galls. capacity.
6. Floating tank: Keith Hall reservoir - 50,000 galls. capacity.
Kempshot reservoir - 20,000 galls capacity.
7. Distribution: Water pumped into the system by gravity from
reservoir.
8. Estimated cost: J\$600,000.

SKETCHMATIC DIAGRAM
PEACE RIVER WATER SUPPLY


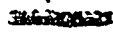

ANNEX 6.





PEACE RIVER WATER SUPPLY

KEY

-  STUDY AREA
-  EXISTING PIPELINE
-  PROPOSED PIPELINE

THE SUGGESTED PROGRAMME GOALS

1. To achieve the greatest possible well being of the people through social change, greater self-reliance in the community, better (community) organization, a better deal for the poor and improved standard of living, health, nutrition, income and leisure.
2. To improve the health status of the community by enhancing the utilization of improved quantity and quality of potable domestic water supply, good sanitation practices, and personal hygiene.

THE SUGGESTED ULTIMATE (LONG TERM) PROGRAMME OBJECTIVES

1. That by 1980 (or within two years from the commencement of the Slow Sand Filtration project), the communities will have chlorinated piped supplies of water available to them.
2. That by 1980 (or within two years from the commencement of the Slow Sand Filtration project), the percentage of householders not served by piped potable water, will be reduced by one-half (50%).
3. That by 1980 (or within two years from the commencement of the Slow Sand Filtration project) 50% of the population not served by water supply scheme, will receive treated (potable) water.

THE SUGGESTED INTERMEDIATE (SHORT TERM) OBJECTIVES

1. That the health administrators and experts concerned with the projects know, understand, are aware, are interested in and accept the ideas and concept of Slow Sand Filtration Health Extension Project.
2. That the team of health and health-related workers of the community organizations involved, know, understand, are aware of become interested in, and accept the ideas and concepts of the Slow Sand Filtration Health Extension Project.
3. That the health and health-related workers of the community or organizations be involved in the data-gathering, identification of health problems, and participate in the planning, implementation and evaluation processes of the project.
4. That the community organization leaders be involved in the data gathering, identification of the health problems, and participate in the planning, implementation and evaluation processes of the project.
5. That the communities will recognize the value of the immediate advantages of the reduction of time and energy spent in water collection from distant locations, by the availability and use of a more reliable and efficient water supply system.
6. That the communities recognize the economic value to them of the utilization of a more reliable and efficient water supply system in the development of "kitchen gardens/vegetable gardens (as is encouraged by our National Nutrition Education Programme, Jamaica).