Publication No. 45

GOVERNMENT OF NAGALAND

EVALUATION REPORT
ON
AUGMENTATION OF WATER SUPPLY SCHEME
TO
DIMAPUR TOWN
BY
PUMPING SYSTEM

DIRECTORATE OF EVALUATION
GOVERNMENT OF NAGALAND
KOHIMA

PREFACE

This Evaluation Report is brought out by the Planning and Co-ordination Department, Kohima, Nagaland. The proposal for Augmentation of Water Supply Scheme at Dimapur by Pumping System was approved in 1985 under the National Water and Sanitation Programme (Urban) to meet the requirement of safe drinking water for the rapidly increasing urban population of Dimapur. The Scheme aims to augment the water supply so as to provide 100 litres per day per capita water to 2 lakh persons. Though the scheme started in 1986-97, it has not been commissioned till date. The Government of Nagaland and Planning Commission, New Delhi, are therefore interested in conducting an in-house evaluation of the scheme to assess its progress and requirements.

The Department gratefully acknowledges the co-operation received from the officers and staff of PHE Department to enable us to bring out this report.

Mrs. Aparna Bhatia, IES, Officer on Special Duty, Department of Planning and Co-ordination has single handedly carried out this evaluation and brought out the report within a short span of ten days.

Lastly, but not the least, Shri. Kevingozo Visa, has provided valuable computer assistance in bringing out the report. His efforts are highly appreciated.

Dated, Kohima the 1st May 2001.

Development Commissioner
Government of Nagaland,
Kohima.

Ms. Soni Tandon,
Adviser (SP-NE)
Tel: 3719559

GOVERNMENT OF INDIA
PLANNING COMMISSION
YOJANABHAVAN
NEWDELHI-110001

D.O. NO. PC (P) 9/13(1)/2000-NER **Dated: 15.5.2001**

Dear Mr. Pandey

Please refer to letter no. PLG/GEN/MM-1/2001 dated 1' May, 2001 forwarding Evaluation Report of Augmentation of Water Supply Scheme to Dimapur and Extended Colonies by Pumping System. I have found that the Evaluation Report has been very well prepared, clearly bringing cut the progress of the project, financial constraints and technical deficiencies that the project had to face. The findings and recommendations have objectively been directed towards completion of the project at the earliest so that the benefits start accruing to the consumers. While I appreciate the efforts gone into preparation of the Evaluation Report, as well as, its high quality, I must emphasize that State Govts' highest priority must be to ensure how, at the earliest, the facilities created can be made use of.

2. It is important to note that this Augmentation of Water Supply to Dimapur Town by Pumping System has been under execution for more than 15 years, for which State Govt, has also availed of loan of Rs. 10.14 crore and now State Govt, has been bearing the liabilities of repayment of interest on the borrowings with commitment to repay the loan, without either ensuring that benefit of clean water has reached the beneficiaries or building up capacity to recover dues in the form of water charges, which will facilitate the State Govt, to repay the interest burden and meet operation and maintenance cost. It is in this background, I am reinforcing the need to draw short term and long term action plan to ensure that the facilities are commissioned at the earliest, Having taken up a scheme, State Govt, has to accord suitable priority to provide funds for such important schemes. The Evaluation Report has clearly highlighted this point that non-allocation of funds has led to non-completion/ delay in completion of the scheme.

3. In this context, I would like to suggest that adequate funds may be allocated to this scheme out of one-time ACA of Rs. 29.00 crore, allocated in the financing scheme of Annual Plan, 2001-02 for schemes/projects, details of which are to be formulated by the State Govt, and submitted to the Planning Commission.

4. As regards the system of installation of water is concerned, while I am glad to note that a notification to introduce metering system for distribution of water to consumers has been issued in November 1998, State Govt, will need to take a more realistic stand. Instead of incurring the expenditure on installation of meters in each house in one go, and thereafter employ staff for meter reading, a more practical solution could be that State Govt, may carry out a simple water consumption pattern study for an average household and determine the water charges on a monthly lump sum basis, depending up meter points installed in each house. Alternatively, the State Govt, may consider to charge around Rs. 50 per month per house to recover operation and maintenance cost. No doubt, it will be essential that at least for fixed hours in the morning and evening good neat water supply is made available to the beneficiaries, if they are expected to pay for the water.

5. Evaluation Report has pointed out that

- The Department experienced some difficulties with two of its main contractors M/s Sanjay Traders and M/s Phillips Traders, to whom lumpsum contract of undertaking Group 'A' and Group 'B' works were respectively given. The problems ranged from unsatisfactory construction to delays in the completion of works. It is suggested that the contracts be given in a phased manner, with future contracts depending on the quality of earlier work to avoid unsatisfactory work, cost over runs and delays in completion of the work.

- M/o of Urban Affairs and Employment while conveying the sanction for the revised estimates in 1995, had stressed on measures to protect the water source along with deforestation control in the catchment area. It is suggested that the PHE Department coordinates with other concerned departments, i.e. Department of Forest, Soil Conservation etc:, to ensure the dependability of the water source for thirty or more years.

- The two Balancing Reservoirs -Padam Pukhri and Raj Pukhri should be completed at the earliest to meet of the increased demand for water. Measures towards getting the stay order vacated should be explored for speedy hearings and judgment on Padam Pukhri reservoir case.

With best wishes,

Yours sincerely,

Sd/ -
(Somi Tandon)

Shri R.S. Pandey,
Chief Secretary,
Govt. of Nagaland
Kohima

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List of Abbreviations

CPHEEO	Central public Health and Environmental Engineering Organisation, Delhi.
C.I. Pipes	Cast Iron pipes
G.I. Pipes	Galvanized Iron pipes
ESR	Elevated Service Reservoir
LICI	Life Insurance Corporation of India
LPCD	Litre Per Capital Per day
MLD	Million Liters Per day
PHE	Public Health and Engineering
WTP (TP)	Water Treatment Plant

CHAPTER-1

EXECUTIVE SUMMARY

The Scheme

1.1.The Augmentation of Water Supply Scheme to Dimapur Town was sanctioned under the National Water and Sanitation Programme (Urban) in October 1985 for an estimated cost of Rs. 9.31 crores. It was revised to an estimated cost of Rs. 20.23 crore in October 1995. The scheme aims to augment the existing water supply of 30 Ipcd and provide safe drinking water at the rate of 100 Ipcd in Dimapur Town. (2.3)

The Evaluation Study

1.2.The Planning and Co-ordination Department undertook the study at the instance of Advisor (State Plan-North East), Planning Commission, New Delhi to assess the progress and requirements of the project for early commissioning the scheme. (2.4)

The Methodology

1.3.To meet the objectives of the study, physical verification of all sites of work was undertaken. Discussion with State and District level officers and perusal of files, correspondence and documents helped in collection of information relevant to the evaluation study. (2.5)

Funding of the Scheme

1.4.The Scheme has been financed through State Plan Resources and LIG negotiated loan. Each component is Rs. 10.145 crores each (equal to 50% of the total estimated cost). The entire amount of LIC component has been released for the water supply scheme. However, the State Government has not been able to provide its share of resources. (4.1,4.5)

The Expenditure Statement

1.5.The total cumulative expenditure is Rs. 1696.51 lakh up to March 2001. It is equal to the entire resources/funds made available to the scheme till date. Through this expenditure, most of the works have been completed. The main works remaining for the commissioning of the project are fitting and fixing of pumps, distribution pipelines and construction of few buildings and two overhead RCC reservoirs. (4.10)

The Physical progress of the Scheme

1.6.During the physical execution of the scheme, many changes have been brought to the original design of the project. From a five stage pumping system, the project is now a modified part pumping and part gravity flow scheme. (5.3).

The reason for the modification to the original design range from lack of funds, change of course of River Dhansiri, high maintenance and energy costs of the pumping system etc. (5.4)

1.7.The appraisal of the physical performance of the scheme shows that most of the works have been completed, for at least a partial commissioning of the scheme. (5.11 to 5.21) The problems which have been faced during this extent of physical progress include lack of adequate funds, problems with the Treatment Plant situated on a low lying area, litigation over acquired sites and making a culvert under the National Highway 39. (5.22)

Commissioning of the Scheme

1.8.The PHE Department aims to partially commission the project during the present financial year after satisfying/completing a few requirements in the Treatment Plant and the pipelines (6.2, 6.3). However, to commission the scheme completely, as per the proposed design, the PHE Department has made an estimate of fund requirement to the tune of Rs. 319 Lakh (6.5).

Operation and Maintenance Costs

1.9.The PHE Department aims to generate resources for the Operation and Maintenance costs of the project from an estimated yearly revenue of Rs. 40 Lakh. It proposes to generate this revenue through the introduction of the metering system in Dimapur (6.8 and 6.9). The Department proposes to share the burden of the cost of introducing metering system with the consumers through introduction of security deposit and connection charges. The ability of all categories of consumers being able to bear the cost of introduction of consumer distribution pipelines and metering system being difficult, the Department may have to consider alternate sources of finance. (6.10to6.13)
Recommendation

1.10.It is recommended that the State provide the State Plan component of funds at the earliest for the commissioning of the Water Supply Scheme. The PHE Department should co-ordinate with other State Departments to ensure dependability of the water source for thirty or more years. The quality of the water supplied on commissioning the scheme should be regularly monitored for hygienic drinking water and complete consumer satisfaction. (7.10to7.15)

CHAPTER-2

INTRODUCTION

2.1.Provision of water supply and sanitation are integral elements of any strategy to improve the quality of life. The rapid population growth has absorbed the Nagaland Government's efforts towards augmentation and improvement in the access to safe drinking water in the urban areas. Water supply being a State subject, the Department of Urban Development of the Ministry of Urban Affairs and Employment, Government of India, assists the state government in their programmes by way of formulating broad policy framework, giving central assistance, providing technical guidance and helping them with external assistance from bilateral and multilateral institutions for the State Government projects.

2.2.At the State level, the task of providing safe drinking water and sanitation has been entrusted to the Public Health & Engineering Department. The Department formulates various water supply and sanitation projects under the supervision of Secretary, PHE and Chief Engineer, PHE. The State has been divided into 10 (ten) PHE divisions where the schemes thus formulated are implemented by Executive Engineer, Sub-Divisional Officer and other staff,

2.3.The Augmentation of Water Supply Scheme to Dimapur Town was sanctioned under the National Water and Sanitation Programme (Urban) in October 1985 for an estimated cost of Rs. 9.31 crores by the Ministry of Urban Affairs and Employment. The scheme aimed to augment the existing water supply of 30 litres per capita per day (Ipcd) and provide safe drinking water in Dimapur Town at the rate of 100 Ipcd to an estimated population of 2 lakh persons (estimated ultimate population for year 2011 A.D). The scheme was revised to an estimated cost of Rs. 20.23 crore in October 1995 and was expected to be commissioned in 1988-89.

The Study

2.4.In view of the slow progress of the project, an evaluation of the scheme has been undertaken by the State Planning and Co-ordination Department at the instance of Advisor (State Plan - North East), Planning Commission, New Delhi to assess the progress and requirements of the project. The objectives of the evaluation study are:

a) To assess the physical and financial progress of the project.
b) Identify the reasons behind the delay in commissioning of the augmentation scheme.
c) Determine the works required to be done and indicate the requirements of funds to commission the project.
d) Understand the problems experienced in the execution of the scheme, if any, and suggest possible measures for their removal/correction.

Methodology:

2.5.The extent of work done on the project was reviewed by physical verification of all sites of work. The primary and secondary data has been collected through discussions with State and District level officials of the PHE Department. A perusal of documents and related files at the State headquarter and district level established the financial progress of the project, the difficulties experienced during the implementation and the requirements to be met before the project can be commissioned.

Reference Period

2.6.An attempt has been made to make assessment of the performance of the project from the time of onset of the project till the date of physical verification.

Field Tour

2.7.All the work sites related to the Augmentation of Water Supply scheme, including those where work has been abandoned were visited during the month of April 2001. Discussions were held with the implementing officers on technical aspects such as level of completion of each of the proposed works and the time and funds required at each site/stage of the water supply scheme.

CHAPTER-3

AUGMENTATION OF WATER SUPPLY TO DIMAPUR - AN OVERVIEW

3.1.Dimapurisan important town in Nagaland State. It is the commercial centre of the State. It is connected by land and air routes with the important urban centres in the North East Region of India. National Highway 36 and 39 pass through the town, which are the basis of the road transportation activities of both Nagaland & Manipur. Dimapur is also the only railhead for the two States. Its commercial and demographic importance is reflected by the ever-burgeoning population. The decadal growth rate of population was 133.66% in 1971,144.22% in 1981 and 76.07% in 1991. Dimapur Town has an estimated population of 97,453 persons, and the ultimate population in 2011 is estimated to be two lakh persons.

The Water Supply & Drainage before the onset of the scheme:

3.2.The water supply to Dimapur town was initially limited to areas near Purana Bazaar. Later on two new water pumping stations were installed near Purana Bazaar from Dhansari River and at Chumukedimafrom Diphu River, both near the Dimapur- Kohima National Highway - 39 (NH 39). The water supply from the two head works covers only about 42.4% of the population. Remaining 57.6% of the population use water from wells, open tanks, ponds for drinking and other purposes. Taking into consideration the household requirements, and the fresh settlements in the town and adjoining areas, it was felt that the existing water supply to the town was only about 25 to 30 litres per capita per day (Ipcd) which was lesser than the minimum recommended rates of 70 to 100 Ipcd in urban areas by CPHEE Organisation, New Delhi was inadequate. Realising the inadequacy of the existing water supply and distribution system in meeting the requirements of a rapidly increasing population and an expanding town, the Government of Nagaland allotted a high priority for the formulation of a water supply scheme for Dimapur. After conducting field investigations in February and March 1984 and estimating the demand for water, the PHE department of the State formulated the new piped water supply scheme for the town.

Demand for water

3.3.The total water demand for Dimapur town was estimated as under:

a) Domestic water demand: This includes the water required for domestic needs such as drinking, cooking, washing, flushing of toilets, etc. As per the recommendation of the Environmental Hygiene Committee, contained in the Manual on Water Supply and Treatment by CPHEE Organisation, New Delhi, a minimum of 70 to 100 Ipcd is required. Accordingly, the supply of 100 Ipcd was proposed in the Augmentation of Water Supply Scheme.

b) Institutional and commercial water demand: This includes water required for the institutional and commercial centres. This was estimated to be 0.09 MLD (Million litres per day).

c) Industrial Demand: No separate provision for industries was made as most of the industries were conveniently served by the existing works on River Diphu.

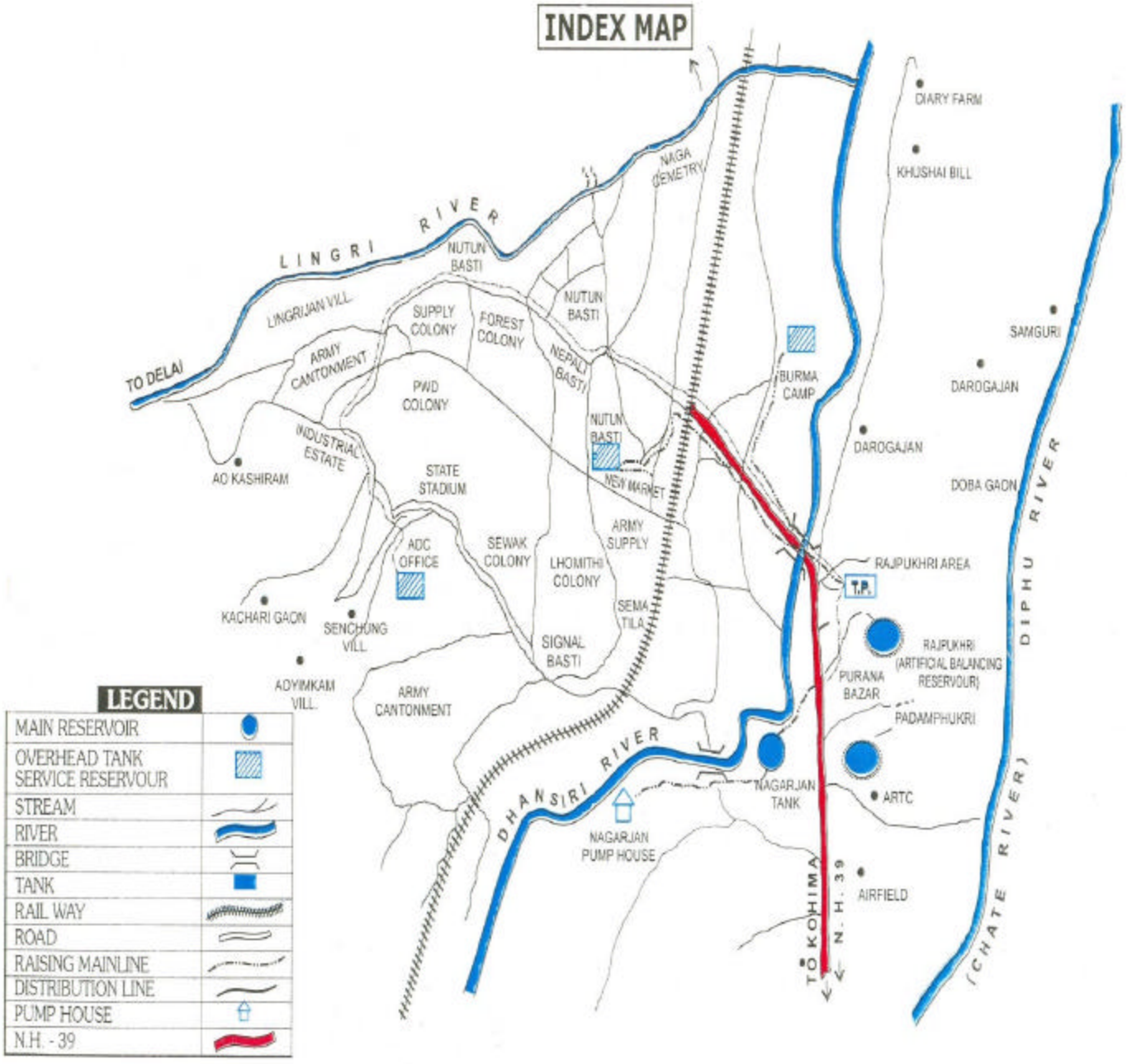
d) Water demand for fire fighting: A provision of 1.26 MLD was estimated keeping in consideration the extensive use of wood in housing and proximity of large-scale forests to the town.

The total daily demand for water with 24 hours operation was estimated to be 21.0 Mid for Dimapur town. The production of water under the existing water supply schemes being 2.7 MLD (30 Ipcd supply) the PHE department proposed to supply 18.3 MLD of water under the new scheme in order to provide 100 Ipcd water supply to an ultimate population of two lakh persons.

The Project Proposal

3.4.The PHE Department decided to use both river Diphu and Dhansiri flowing in proximity to the Dimapur Town as the source of the Dimapur water supply scheme. The two existing tanks near the Dimapur Town -Rajpukhri Tank and Padampukhri Tank, with storage capacities of 10,43,100 M3 and 5,94,000 M3 respectively are to be used as balancing reservoirs cum pre-sedimentation tanks. These capacities are equivalent to approximately 40 days requirement of the 21 MLD required for the town, after accounting for an estimated 50% losses. The location of the rivers and the reservoirs, treatment plant and the overhead storage tanks are indicated on the Index

Name of Project :- AUGMENTATION OF WATER SUPPLY TO DIMAPUR TOWN



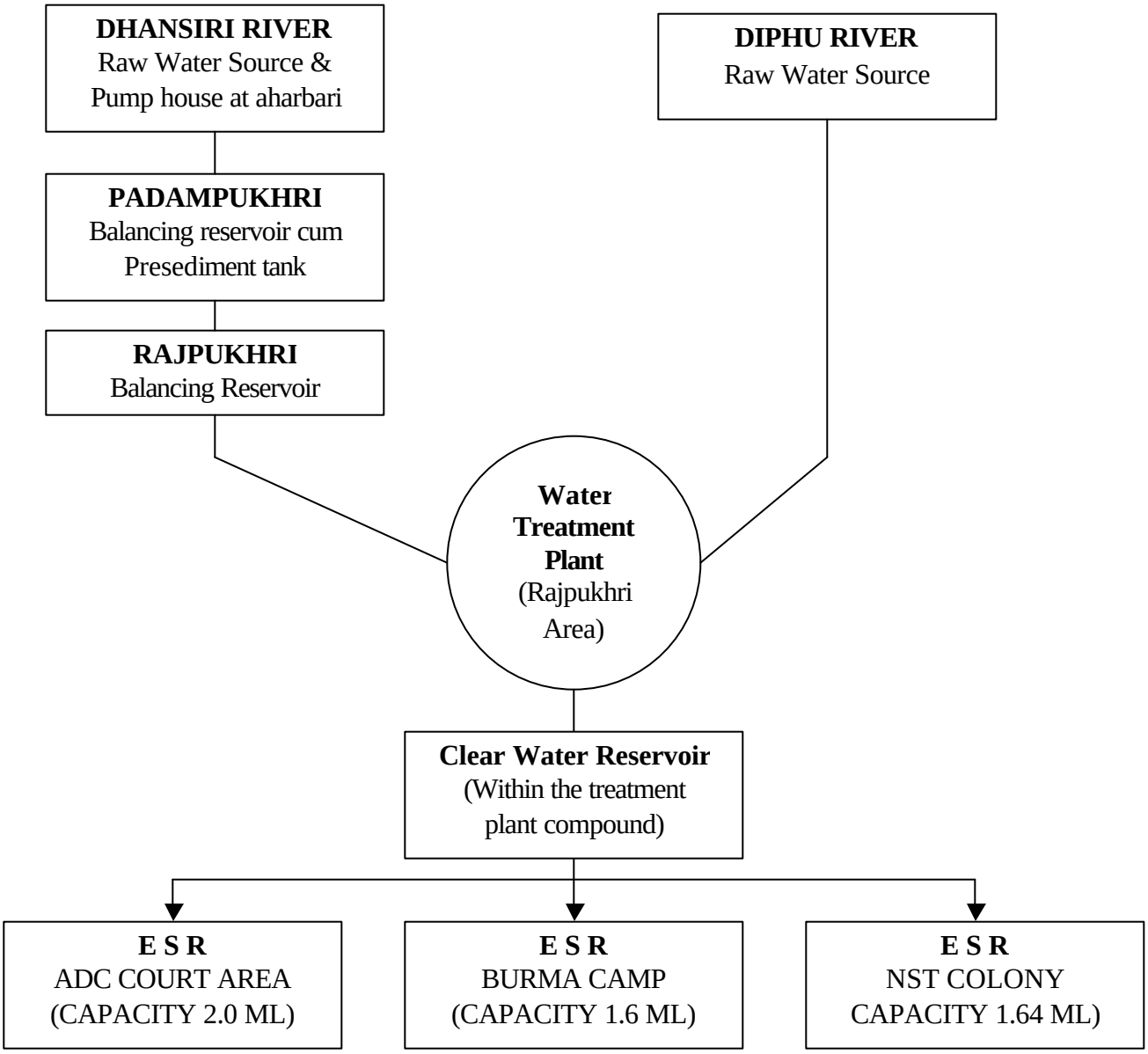
Map on Page 7 of this report. Though the map is a sketch map and has not been made true to scale, it gives an idea about the location of various work sites in the project.

3.5 As indicated in the map, the raw water pumped from both the sources and from the Padampukhri and Rajpukhri Tanks will flow to the Treatment Plant (TP) in the Rajpukhri area. At the Treatment Plant the Aerator, Clariflocculator, Filters and chemicals are used for purification of water, by the use of conventional coagulation - sedimentation - filtration - disinfection system/process. The treated water will be pumped to the town to the three elevated service reservoirs to be constructed at Burma Camp, NST Colony and ADC Court area for onward distribution to households. The Diagram 3.1 shows the flow of water from each stage till it reaches the overhead service reservoirs as potable water. The movement of water from each stage of collection and purification till the overhead reservoirs is visualised through utilisation of pumps (electric & diesel) of different capacities.

3.6.The above proposal was formulated during 1984-85. The technical approval of Government of India for execution of the scheme was conveyed in October 1985 for an estimated cost of Rs. 9.31 crores. The works on the scheme commenced during 1986-87. Though the project was supposed to be commissioned within a period of three year, i.e. in 1989, the project experienced problems in implementation such as financial difficulties, land disputes and litigation, insurgency, changes in the proposed design, etc. which resulted in slow progress and upward revision of the cost estimates to Rs. 20.29 crore. These factors and their impact have been discussed in detail in the subsequent chapters of this report.

Diagram 3.1

FLOW DIAGRAM OF THE AUGMENTION OF WATER SUPPLY SCHEME TO DIMAPUR TOWN



NOTE: The flow of water requires five-staged pumping

(A) From Dhansiri river Jackwell to Padampukhri Balancing Reservoir.
(B) From Padampukhri Reservoir to Rajpukhri Balancing Reservoir.
(C) From Rajpukhri Balancing Reservoir to treatment plant in Rajpukhri area.
(D) From Diphu river Jackwell & Pump house to treatment plant.
(E) From clear Water reservoir to Elevated Service Reservoirs.

CHAPTER-4

THE FINANCIAL PERFORMANCE OF THE SCHEME

4.1.The Augmentation of Water Supply Scheme to Dimapurtown is the biggest water supply project under taken by the PHE Department in Nagaland. The original estimated cost of Rs. 9.31 crores was sanctioned during the year 1986-87 against the scheme. The same was revised to Rs 20.29 crores during 1993-94 on account of inclusion of new components in the Treatment Plant, price escalation, etc. The proposed funding of the scheme is as under.

a) State Plan (50% of the Total Estimated cost) 10.145 crores
b) LIC negotiated loan (50% of the total estimated cost) 10.145 crores
LICI component

4.2.Life Insurance Corporation of India had initially approved a loan of Rs. 344 lakh, which was 30% of the total estimated cost of the project. With the upward revision of the cost of the project to Rs. 20.29 crore, the LIC agreed to give loan to the extent of Rs. 10.145 crores. The Life Insurance Corporation of India loan is subject to the following terms and condition.

1.The project should be completed within 3 years period.
2.The loan is repayable within a period of 25 years at 10% compounded interest per annum, or such higher rates as prevailing at the time of disbursement of loan.

4.3The State Government gave an undertaking that it would provide for all necessary finance apart from the LIC loan for completion of the project. The State Government also undertook to finance any portion of over run in the estimated cost of the scheme for any reason what so ever which the LIC may not agree to finance.

4.4 The loan repayments are being made from the annual State resources by Government of Nagaland.

4.5 The instalments of LIC loan received for the project are stated in Table 4.1

Table 4.1

Life Insurance Corporation of India (LICI)
Loan Component Released

Year	Amount
1987-88	Rs. 47.00 Lakh
1988-89	Rs. 117.00 Lakh
1989-90	Nil
1990-91	Nil
1991-92	Rs.140.00 Lakh
1995-96	Rs.276.00 Lakh
1996-97	Nil
1997-98	Rs. 434.50 Lakh
TOTAL	**Rs. 1,014.50 Lakh**

Table 4.2

Statement of Funds released by the State Government for the Scheme & Expenditure Incurred

(Rupees in lakh)

YEAR	STATE ALLOCATION	STATE ALLOCATION OF LIC LOAN COMPONENT	TOTAL ALLOCATION	TOTAL EXPENDITURE
1987-88	40.00	-	40.00	43.79
1988-89	-	173.88	173.80	152.72
1989-90	-	50.00	50.00	138.14
1990-91	94.7C	45.74	140.44	57.01
1991-92	90.84		90.84	100.80
1992-93	-	-	-	43.80
1993-94	42.00	-	42.00	17.64
1994-95	-	-	.	428.27
1995-96	-	244	244.80	14.69
1996-97	-		-	232.40
1997-98	-	384.51	384.51	157.84
1998-99	-	-	-	277.01
1999-2000	-	-	-	23.73
2000-2001	-	-	-	8.67
Total	**267.54**	**898.13**	**1696.51**	1696.51
Materials	335.67	-	335.67	
13%D.C.	78.5	116.67	195.17	
Grand Total	**681.71**	**1014.80**	**1696.51**	

Source - Office of the Executive Engineer, PHE, Stores Division, Dimapur

4.7 The Ministry of Urban Affairs and Employment, Government of India while sanctioning the revised project estimate had put the condition that the budget provision under the State Plan, for the project should be as under for the timely completion of the project (i.e. by 1998-99).

Year	Amount (Rupees in lakh)
1995-96	250
1996-97	250
1997-98	200
1998-99	219

From Table 4.2, it can be observed that the State was unable to provide adequate funds to the implementing department. No funds have been placed during the period 1995-99, to the Dimapur division, except in the form of pipes and other materials.

4.8 The actual amounts of funds received at the PHE division from the State Government (State Plan and LIC component) are as in Table 4.2. The table shows that the funds have been allocated for the project only during four years (1987-88, 1990-91, 1991-92 and 1993-94). The department has completely utilised the LICI loan component. The unavailability of State Plan component of funds, to the tune of around Rs. 3.32 crore, has been the main reason behind the inability of PHE department in commissioning the scheme.

4.9 The yearly financial progress report in terms of the total expenditure incurred on the water supply scheme is also reflected in Table 4.2.

4.10 The cumulative figures, in terms of the item wise expenditure incurred is as in Table 4.3. An analysis of the cost estimates and the expenditure incurred in Table 4.3 shows that the main works remaining for the commissioning of the project are fitting and fixing of pumps, laying and fitting of Raising Main Lines and distribution pipe lines, construction of buildings, security fencing and construction of two overhead R.C.C. reservoirs.

4.11 Table 4.3 also shows that no provision has been made in the project for a consumer distribution system for the delivery of treated water. The provision/ cost estimate has only been made for the delivery of treated water till the overhead service reservoirs and the sub-reservoirs.

Table 4.3

Financial Progress up to March 2001

SI. No.	Item	Estimated cost (Rupees in lakh)	Expenditure up to March 2001 (Rupees in lakh)
1.	Preliminaries	20.00	20.00
2.	Land Acquisition	50.00	50.00
3.	Intake Structures at River Dhansari		
	i) Construction of intake well at Dhansari	15.00	10.00
	ii) Electrical and Mechanical works at Dhansari	18.00	5.00
	iii) Construction of approach road at Dhansari	1,48441	1,48441
	iv) Construction of security fencing at Dhansari	4.58	4.58
		39.06	21.06
4.	Buildings: Construction of functional and non-functional buildings	24.86	2.50
5.	Balancing reservoirs at Rajpukhri and Padampukhri		
	i) RCC retaining wall on NE corner, inside Padampukhri	27.27071	13.63535
	ii) Construction of Jackwell & Pump house at Rajpukhri	4.00	4.00
	iii) Construction of Jackwell & Pump house at Padampukhri	5.00	5.00
	iv) Construction of Intake connecting bridge, Padampukhri	8.85	8.85
	v) Construction of Intake Connecting Bridge, Rajpukhri	98	8.98
	vi) Construction of Connecting Bridge, Dhansari		
	vii) Construction of Jackwell, and Pump house, Dhansari river	10.20596	2.00
	viii) All renovation works	280.70	280.70
6.	Raising Main line (C.I. pipes)		
7.	Pumping Units Procurement, Pump house fixing and fitting of 1 nos. each of 55 H.P. and 135 H.P. diesel pumps and 55 H.P.		
8.	Water Purification Plant		
	ii) Raw water channel & flush	4.04506	4.04506
	iii) Flush Mixer	4.26160	4.26160
	iv) Clarifloculator	23.4795	23.4795
	v) Filter and filter house	41.7343	41.7343
	vi) Chemical House and Wash water tank	26.9050	26.9050
	vii) Pure water pump and pump house	10.00254	10.00254
	viii) Mechanical equipment	104.22390	104.22390
	ix) Electrical equipment (provision and installation)	18.75	18.75
	x) Bituminous road inside the treatment plant	3.15	3.15
	xi) Security fencing	6.0	6.0
	xii) Installation of power station	47.07	51.95
	xiii) Raw water pump	0.83950	0.83950
	xiv) Pure water reservoir	26.90570	26.90570
		321.03	325.91

9.	Overhead RCC Reservoirs (Elevated Service Reservoirs, ESR)		
	1. ESR I, Burma Camp	99.27093	-
	2. ESR II, NST Colony	78.71474	-
	3. ESR III, ADC Court Area	82.57954	82.57954
	4. Earthwork	3.00	3.00
	5. Construction of security fencing	2.59	-
		266.16	85.58
10.	C.I. Pipelines	447.95	294.90
11.	Misc. items of work	45.00	387.65
12	Price escalation of various items	-	102.17
Total		1796.44	1696.51
Add 13% Departmental charges		233.53	-
Total Estimated cost		2029.97	-
Total Expenditure		1696.51	-

CHAPTER-5

PROJECT IMPLEMENTATION - THE PHYSICAL PROGRESS

5.1 The project received technical clearance of Government of India, Ministry of Urban Affairs and Employment and clearance of the State Planning Department in 1985-86. The works on the project started in 1987. The project is being implemented through the Executive Engineer, PHE, Stores Division, Dimapur.

Changes in the Project Design

5.2 While conducting the evaluation, the field tours to the work sites brought to light certain significant modification to the project design during its implementation. A comparison of Flow Diagram 5.1 with the Diagram 3.1 on page 9 of this report shows the changes brought to the original project design.

5.3 The main changes area as under:

a) The raw water source at Dhansari river has been shifted from Naharbari, Dimapur to Nagarjan, where the old pump house of the existing (operating) water supply scheme of Dimapur is located. The new Jack-well and Pump house with two electric pumps of 40 H.P., pump the water (through 300mm dia. C.I. pipeline) to the pre-sedimentation tank, situated at a short distance in the Nagarjan area.

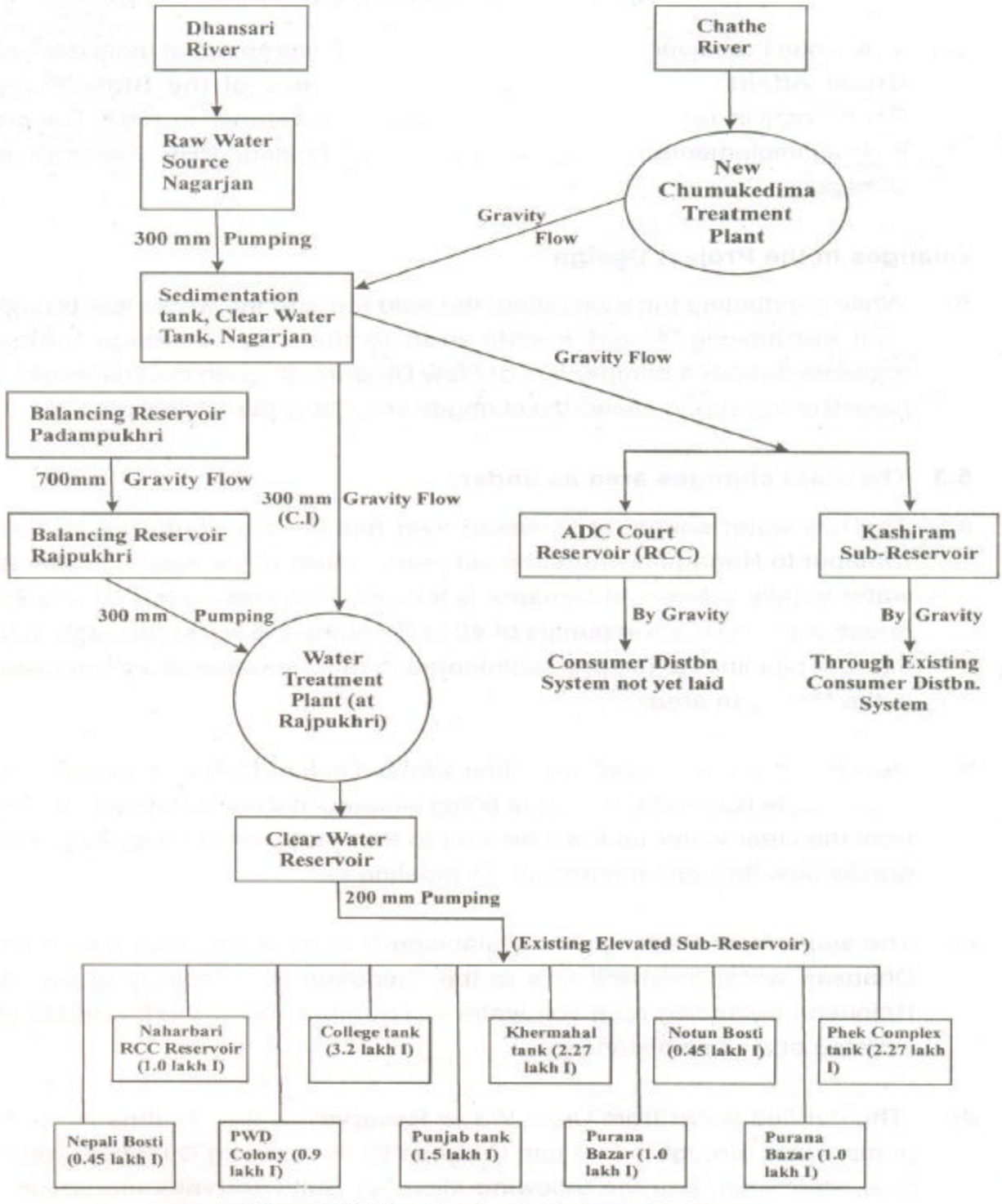
b) New Sedimentation tank and Clear Water Tank (1 lakh liter capacity) have been built at Nagarjan. This area being situated at a higher altitude, the water from the clear water tank will be sent to the treatment plant at Rajpukhri by gravity flow through 300mm dia. CI pipeline

c) The water from Padampukhri Balancing Reservoir (unconnected with the Dhansari water flow) will flow to the Rajpukhri Reservoir by gravity flow. Rajpukhri balancing reservoir water will pump water to the treatment plant situated at a close distance.

d) The purified water from Clear Water Reservoir in the Treatment Plant will pump water through a 250 mm C.I. pipe to the existing C.I. pipe (200 mm) line, which can feed the following elevated Sub reservoirs already in use (instead of the 3 new RCC overhead service reservoirs in the original project).

Diagram 5.1

Augmentation of Water Supply scheme to Dimapur town(the modified design)



1. Naharbari RCC Reservoir - 1,00,000 liters
2. College Tank - 3.26,000 litres
3. Khermahal Tank - 2,27000 litres
4. Nuton Bosti - 45,000 litres
5. Nepali Bosti - 45,000 litres
6. PHE Complex - 2,27,000 litres
7. PWD Colony - 90,000 litres
8. Punjab Tank - 1,50,000 litres
9. Purana Bazaar Govt. High School - 1,00,000 litres
10. Fishery Compound Purana Bazaar - 100 000 litres

As these sub-reservoirs are all in operation, the consumer distribution lines are already established and operational, potable water will be distributed to the consumers through gravity flow. These reservoirs have been utilising a very small percentage of their full capacity. The storage capacity would be utilised to the full through the commissioning of this scheme.

e) The pumping of water from river Diphu to the Treatment Plant has been deferred for the time being, mainly because of lack of funds.

f) As an alternate to the water flow from river Diphu, water from Chathe river (an upstream tributary of river Diphu 3) will be delivered to the existing reservoir at Nagarjan. From there, water can be delivered to the RCC overhead Service Reservoir at the ADC Court (ESR III) with a capacity of 2 million liter. The treated water will flow to the ESR III and an operational elevated Sub-Reservoir at Kashiram by gravity flow. The Kashiram one lakh liter capacity reservoir is at the highest elevation over Dimapur town which will be able to cover 20% of Dimapur town by gravity distribution system.

Reasons behind changes in Design

5.4 Most of the changes mentioned above, were proposed and incorporated in the project design by the department after the year 1998. The main reasons behind these modifications were as under:

a) Lack of funds: The State Govt, has been unable to provide adequate plan funds for the project. As a result, various aspects of the scheme have been modified, keeping in mind the limitation of funds. The deferring of the development of River Diphu Raw Water Source and Pump House, construction of RCC overhead reservoirs at NST Colony and Burma Camp and the delay in laying, fitting and fixation of pipelines is mainly due to lack of funds.

3. " The nomenclature of the two streams is as per local usage. Together, they are called River Diphupani in the Survey of India maps.

b) Tilling of Jackwell at the River Dhansari Raw Water Source at Naharbari and change of course by the river: The Jackwell structure built at the Dhansari River at a cost of Rs.

10 lakh as the raw water source was observed to be tilling towards near collapse and not capable of being put to use. The reason for the titling was ascribed to the faulty implementation by the contractor as also to change of course of river Dhansari. Due to change of course of river Dhansari, the Jackwell was observed to be on dry ground during the visit to the site.

c) Land dispute at Padampukhri Balancing Reservoir and Rajpukhri Balancing Reservoir: Padam Pukhri and Raj Pukhri were allotted by the Government in 1984-85 for use as captive reservoirs for augmentation of water supply to Dimapur. The Department therefore renovated the tanks and constructed Jackwell cum pump houses. In the course of time, several unauthorized individuals started to encroach the tank site and causing destruction to the works done. This resulted in litigation. An eviction conducted on the individuals by the authority of ADC Dimapur resulted in a court case in the Kohima Bench of Guwahati High Court, which passed an interim order to maintain status quo on all parties concerned. During 2001, the High Court, while giving a judgment in favour of the PHE department, sent the litigants to the district civil courts for settling their disputes. The litigation as civil case Is still going on. On the other hand, the Department-was able to reach at an amicable agreement with the residents of Raj Pukhri during 1998 for relinquishing the claim on the land around the reservoir to the PHE department.

d) High Energy and Maintenance Costs of the Pumping System: There are five stages of pumping station from water source to clear water delivery point in the original approved design. The total pump horse power required was 906 H.P. The electric consumption charges were estimated to be 83.76 lakh per year by the PHED officials in April 1998 and revised to Rs. 1.08 crore per year in February 1999. The estimates are based on 16 hours operation per day at the designed capacity. If four pumps were not operated simultaneously, the dependability of delivering water to consumers was not same. Considering the energy costs, the maintenance costs and other pumping scheme difficulties, the feasibility of gravity scheme from Chathe River were investigated by the PHE Department officials with positive results

4. The water is treated at the new Churnukedima Water Treatment Plant, which has not been made by the funds of this scheme. The distribution lines from the treatment plant for Dimapur town

e) Change of raw water source found technically feasible: The PHE officials carried out a comparison between the Raw Water Source at Naharbari with the site near old Dhansiri bridge. Nagarjan where the earlier pump house is still operating. The site at Nagarjan was claimed to be superior to the one at Naharbari as the river course and supply of water there are expected to be more stable. Being based on gravity flow beyond the Sedimentation Tank at Nagarjan, up to the Treatment Plant, it was expected to require less maintenance. Other aspects of comparison to determine feasibility were as under:

Original Naharbari Site	**Newsite at Nagarjan**
a. Total length of C.I. Pipeline required	
From Jackwell to Padampukhri	From Jackwell to Bye pass line
700mm - 350m	700mm - 140m.
600mm -1061m	600mm - NIL
500mm - 899m	500mm - 299m
Total 2310m	**Total 439m**
b. Considerable amount of money required For land compensation.	No land compensation required
c. Problem of theft of material due to location of site in an isolated area.	Less problem expected.

d. Rate difference for constriction of Jackwell not much as the earlier Jackwell had capsized.

The Physical Progress of the Scheme

5.5 A perusal of various files and documents of relevance to the scheme revealed that majority of civil works and procurement of pumps, distribution pipes and materials had been completed before 1992. This can be observed from the information collected form the Annual Progress Reports which were prepared and submitted by the department. A compilation of the physical progress of works from the period 1992 to 2001 is presented in Table 5.1.

5.6 The records of annual physical progress 1987 to 1991 (4 years) were not readily available for analysis. The analysis of the progress report of 1991-92 shows that majority of the civil works at Naharbari (the then raw water source of River Dhansiri), Padampukhri and Rajpukhri reservoir and Treatment Plant had been completed. Among the major civil works pending were completion of Reservoir at ADC Court, construction of Reservoirs at NST colony & Burma Camp and site development and construction at River Diphu raw water source. Among the mechanical and electric works (Group 'B Works) all works were complete. Fixation

TABLE 5.1

CONSOLIDATED FIGURE OF ANNAL PHYSICAL PROGRESS UNDER THE CHEME

SI. No.	ITEM Group A' Civil Works)	Estimated cost	Up to March '00	Up to March 99	Up to March '98	Up to March '97	Up to March '96	Up to March '95	Up to March '94	Up to March '93	Up to Marc h '92	Up to Marc h
1.	Preliminaries	Rs.20, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2.	Raj Pukhri & Pdam Pukhri											
	a Renovating and removal of rubbish on the surface	Rs.30, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	b Excavation of bed up to required level and removing the earth as directed	Rs.40, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	c Dressing the slopes inside and outside the proper grade and filling up pits	Rs.40, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	d Provision & construction of Brick channel at Raj Pukhri & Sugar Mill Nullah	Rs.50, 00,000.00	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
	e Providing and construction of compound wall	Rs.40, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	f Providing and construction of brick channel at Raj Pukhri to Sugar Mill nullah	Rs.5, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	g Excavation of all embankment for channel map for dewatering	Rs.20, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	h Provision and fixation of electricity at Raj Pukhri & Padam Pukhri	Rs.10, 00,000.00	50%	50%	50%	50%	50%	50%	50%	50%	50%	25%
3.	Construction of Water Treatment Plant											
	a Providing and construction of Aereator	Rs.5, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	b Raw water channel	Rs.3, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	c Distribution chamber	Rs.10, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	d Clarificulator	Rs.20, 00,000.00	100%	100%	M00%	100%	100%	100%	100%	10D%	100%	100%
	e Filter House	Rs.40, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	f Chemical House	Rs.20, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	g Pure Water Pump and Pump House	Rs.10, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	h Pipe to water treatment plant	Rs.4, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	I Wash water tank	Rs.4, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	J Provision & construction of compound wall	Rs.6, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	k Bituminous road inside WTP	Rs.3, 00,000.00	100%	100%	100%	90%	90%	90%	90%	90%	90%	90%
	l Mech. Equipment-connection pipe line & sludge in all WTP	Rs.63, 00,000.00	100%	100%	100%	50%	20%	20%	20%	20%	20%	20%
4.	Construction of ESR-II b Construction of Extra items	Rs.51, 00,000.00										
	a Additional foundation of ESR III	Rs.14, 06,520.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	b Supply of MS pipe in place if CI fitting and fixing	Rs.5, 45,319.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	c Construction of TWR at T..P.	Rs.25, 00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	d Raising of embankment at padampukhri	25,00,000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	e Earth filling outside the boundary at padampukhri on north side.	Rs.15, 000.00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

	f	Site Dev. Of ESR II near NST compound	Rs.3, 000.00	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
	g	Advance payment as per agreement	Rs.40, 53,000.00	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%

TABLE 5.1 (CONTINUED)

SI. No.	ITEM Group 'B' (Civil Works)	Estimated cost	Up lo March '01	Up to March '00	Up to March '99	Up to March '98	Up to March '97	Up to March '96	Up to March '95	Up to March '94	Up it Marc h '93	Up to March '92
1.	Bralimuuri BS	Rs. 5.00.000.00	100%	100%	100%	100%	100%	100%	100%	100%	100 %	100%
2.	Com Pump House at Raj Pukhri lie supply of equipment	Rs. 4.00.000.00	100%	100%	100%	100%	100%	100%	100%	100%	100 %	100%
3.	Construction of Jack Well cum Pump House at Padam Pukhri i/c supply of equipment	Rs. 5,00,000.00	100%	100%	100%	100%	100%	103%	100%	100%	I00S	100%
4.	Providing fitting & filing of electrical pumps sets & start Dhasai pumping	Rs.20,00,000.00	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
5.	-do- & start Diphu pumping station	Rs. 18.00.000.00	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%
6.	- do- start Diphu River intake station	Rs. 18,00,000.00	95%	95%	95%	95%	95%	33%	95%	95%	95%	95%
7.	-do - & start at Raj pukhuri	Rs. 15,00,000.00	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
8.	Pumping house Rajpukhuri	Rs.9, 00,000.00	95 %	95 %	95%	95 %	95 %	95 %	95 %	95%	95 %	95 %
9.	Connection of suitable connection bridge and Intake works at Raj Pukhri i/c drawing and design works	Rs. 8,980.000.00	100%	100%	100%	100%	100%	100%	100%	100%	100 %	100%
10.	Connection of suitable connection bridge and intake works at Padam Pukhuri l/c drawing and design works	Rs. 8,85.000.00	100%	100%	100%	100%	100%	100%	100%	100%	100 %	100%
11.	Construction of suitable connection of bridge 8 Dhansiri River draining & design.	Rs. 8.95,000.00	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
12.	do - at Diphu River	Rs.7.80.000.00	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
13.	Construction of Jack Well cum Pump House at Raj Pukhuri after completion 100K extra works.	Rs. 1.28,000.00	100%	100%	100%	100%	100%	100^%	100%	100%	100 %	100%
14.	Construction of Jack Well cum Pump House at Padam Pukhuri after completion 100% extra works	Rs. 1.28.000.00	100%	100%	100%	100%	100%	100%	100%	100%	100 %	100%
15.	Construction of Jackwell & Pump house at Dhansiri river (earth works 8c Soil works)	Rs. 7,50.000.00	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
16.	**Group'C'** Raising Mainline and Distribution C.I. Pipes, (laying, filing and fitting of the pipelines!		40%	40%	40%	40%	40%	40%	40%	40%	40%	40%

Source - Consolidated from annual progress reports of different years

of pumps, and fitting and fixation of electricity at all the work sites remained pending. No work was done in the Group 'C category, i.e. laying, fitting and fixing of the pipelines.

5.7.As per the initial project proposal, the project was to be commissioned in the year 1989. This highlighted that though considerable works were done, the progress of works was slow in comparison with the scheduled progress of the project. As per PHE officials the following factors were responsible for the slow rate of progress.

a) Due to financial constraint, Government could not provide funds as estimated and in a timely manner.

b) Land disputes and encroachments delayed the project works.

c) Original alignment for laying of pipes were affected due to land erosion along the river banks. A new area was acquired for the same for which land dispute occurred while the works were in progress.

d) Some items of works were damaged either partially or wholly, or collapsed due to weak soil.

e) Change of course of the river while the works in progress.

f) Thefts of material and tense situation due to insurgency delayed completion of work by the contractors.

5.8.The delays due to the above, reasons resulted in price escalation. The revised estimates after taking into account the price escalation and additional features in design, especially at the Water Treatment Plant were sent to the Government of India during 1993-94 (for Rs 20.29crores) for which approval was conveyed in 1996-97. The period from 1993-94 to 1996-97 was a period of limited physical progress and no financial allotment to the project. Most of the PHE department efforts were focussed on enhancement and release of loan component from LIC.

5.9.The works on the project started again during 1997-98 after the receipt of the LIC component from the Government. The work implementation was as per the changed design described in Para 5.3 of this Chapter. Many works were undertaken and completed between 1997-98 and 2000-01, bringing the project close to at least partial commissioning.

5.10. During 1999, the Central Bureau of Investigation undertook an inquiry vide Case No RD- 3(A) 98 ADU II, New Delhi, in respect of matter relating to purchase and disposal of pipelines by the PHE department. Some files and Project report relating to the Augmentation of Water Supply Scheme to Dimapur town were also taken/seized by the CBI, along with other PHE documents at the State and District level. The seizure was effected to examine whether the purchases had been made against any particular scheme.

The terms of reference or the final report of the inquiry has not been conveyed to the Department. The CBI inquiry pertains to purchases made against the stock of materials of the PHE department, and not the Augmentation of Water Supply Scheme for Dimapur. The aspect has not been examined in detail in this report as it does not fall within the stated objectives (Para 2.4) of this evaluation study.

Works done upto April 2001

5.11.During the physical verification, it was found that works had been completed to a considerable extent. The physical progress at each stage or component of project, as observed during April '01, is given below to get an idea about the works required to be done.

5.12.Raw water source at Nagarjan: The construction of the new Jackwell and pump house and electrification have been completed. Two 40HP pumps have been procured and fitted. The pipe line is fitted till sedimentation tanks. These works had been undertaken during 1999-2000. The works have been tested by the Department to ensure the delivery of raw water to the sedimentation tanks at Nagarjan.

5.13.Sedimentation Tank and Clear Water Tank at Nagarjan: All works on both tanks, started during 1999-2000, have been completed. Pipeline has been laid and fitted from here till the Treatment Plant except a 1.5 meter gap on National Highway 39. Culvert is required to be built under the NH 39 for the delivery of water to the Treatment Plant by gravity flow.

5.14 At the Treatment Plant, all the infrastructure has been established (ground and civil works, electrification, procurement and fitting of machinery and pumps). However, incomplete works remain at the Treatment Plant due to lack of funds. These works are a pre- requirement to partial commissioning of the project. These include:

a) Making of a sludge channel from the Treatment Plant till a stream (Sugar Mill Stream) 900 meter away. The treatment plant is situated in low lying area, which gets submerged under rain water during the rainy season, effecting the quality of the water. Therefore the plant cannot be made operational till the sludge channel in made.

b) Most of the pumps and machinery were purchase six to eight years ago. As they have not been used, they would require servicing before the scheme can be commissioned.

5.15 The clear water reservoir, which is to store purified water, is an underground tank. It gets submerged under rainwater during the rainy season. It was found to be filled with rainwater at the time of visit. Its walls, etc have to be raised above the rain water level to maintain the purity of the potable water stored for distribution.

5.16.Two pumps, diesel and electric, have been fitted to pump purified water through 200mm diameter pipeline to the existing consumer distribution system.

5.17.Distributiononn pipelines from Nagarjan to ADC Court RCC Reservoir and Kashiram reservoir have been laid during past two years.

5.18.Raj Pukhri and Padam Pukhri Balancing Reservoir: Due to litigation and encroachments these reservoirs are no longer central to the partial commissioning of the project. They however play an important role in meeting the future increased water needs of a larger population. The Padam Pukhri reserve still suffers from encroachments and litigation. Jackwell has been constructed. However, the electrification and fittings etc will be undertaken only after the court's judgement. During August 1998 an agreement has been reached upon with the Raj Pukhri area residents who have relinquished their claim to the land to the Department. The Jackwell cum pump house and fencing has been constructed. Pipeline to the Treatment Plant has been laid. Electrification and installation of pumps requires allocation of funds.

5.19.The two Million capacity RCC elevated service Reservoir at ADC court Area (termed ESR III in the project): The civil works have been completed. 200 mm diameter delivery line has been laid till the reservoir. However, the networks of consumer distribution system is not there. It has not been provided for under the project. 5.20 No works have been done towards construction of Overhead Service Reservoirs (termed ESR I and ESR II in the project) at NST Colony and Burma camp 5.21 Considerable length of pipelines (raising mainlines and distribution lines) have been laid during the past two years. The physical progress of works in respect of lying, fixing and fitting the pipes is as under.

Diameter	Length completed	Percentage F
A. Raising Mainlines (C.I. pipelines)		
700mm	148.05 meter	15%
600 mm	788.5 meter	35%
500 mm	235.2 meter	22%
300 mm	8000.65 meter	80%
B. Distribution C.I. Pipelines		
250 mm	969.6 meter	30%
200 mm	794.2 meter	47%
150mm	140 meter	100%
100mm	812.5 meter	60%
80 mm	NIL	

Problems encountered during 1997-2001

5.22 The main reasons claimed to be behind the Department's inability to complete the works during the period are as under.

a) **Inadequacy of funds:** The shortfall of state plan allocation of over Rs. 3 crore is the single most important reason behind the non completion of the works.

b) **Problems with the Treatment Plant:** The site selected for the Treatment Plant appears to be faulty. Being situated in a low lying area, it is submerged during rainy season. Further, it will remain flooded till the water is pumped out to the stream 900

meter away, either through digging of sludge channel or by laying a pipeline till the stream. The altitude of the stream being higher than the low lying Treatment Plant, the sludge water will have to be disposed off through pumping system.

c) The department had entered lump-sum contracts with two contractors- M/S Sanjay Traders & M/S Philips Traders for Group 'A' & Group 'B' works respectively. Work was delayed due to delays in payments to both the contractors and certain defects in the construction, which required rectification (in case of Sanjay Traders).

A perusal of the correspondence with the Philips Traders showed frequent reminders to the contractor to resume work during 1997-98, including issue of notice against him. The contractor in question remained unwilling lo resume work due to cases of losses due to theft of material, tense situation due to insurgency and delay in payments for works done. The contractor showed willingness to resume work in July 1998.
The total amount of money paid to the two contractors under the scheme is as under.

M/sSanjay Traders-Group'A'works - Rs. 7,09,06,188/-
M/s Philips Traders-Group'B'works - Rs. 1,02,79,000/-

d) Padam Pukhri: Due to continued litigation by the encroachers, the Department was unable to complete the works.

e) Culvert under NH 39: The spread of the project is on both sides of the National Highway 39 (Dimapur Kohima Highway; see Index Map3.1). Asa result, the C.I. pipeline has to be laid under the NH 39 to take raw water to the Treatment Plant and treated waterto DimapurTown reservoirs and tanks, through a culvert. The construction of the 1.5 meter RCC Culvert, 2 meter under the NH 39 requires a period of 2 months to be properly laid and set. The NH-39 being under the administrative control of 15 Border Roads Task Force (15 BRTF), the culvert has to be built by them. The liaison with BRTF has been maintained since around Dee 1999 - Jan. 2000. Even thought the amounts of Rs. 3.12 lakh towards construction of the culvert had been deposited during November 2000 by the PHE department, the work for the 1.5 meter culvert has started only during the last week of April 2001. The PHE Department considers the delay in construction of culvert by 15 BRTF as the single most important reason for the non-commissioning of the Augmentation of Water Supply project in March 2001, as was the target.
Other aspects regarding the commissioning of the scheme are dealt in the subsequent chapter.

CHAPTER-6

COMMISSIONING THE SCHEME

6.1 As per the Ministry of Urban Affairs and Employment letter sanctioning the revised cost estimate of the scheme, "Implementation of the components of the project should be planned in such a way that the project is partially commissioned. in order to accrue benefit as early as possible."

Partial commissioning of the Scheme

6.2 The Department claims to be working towards the partial commissioning of the project at the earliest. The Department had planned to partially commission the project by March 2001. However, due to the non-construction of the culvert under the NH 39, the department was unable to connect the pipeline from the raw water source to the Treatment Plant. A discussion with the senior PHE Officers revealed that the Department targets to partially commission the project by August or September 2001.

6.3 The following are the requirements which must be met before the project can be partially commissioned.

Items/task	**Time required to carry out the task**
a. Construction of the culver	2 months
b. Testing of flow of water and Testing of the operations of the Treatment Plant	2 months
c. Servicing of certain Pumps and equipment	1 month
d. Pumping of rain water to the nearby stream	few days

The above estimate is as per the Department.

The above estimate is as per the assessment of the Chief Engineer, PHE Department.

6.4 With the partial commissioning of the project, the department aims to provide treated water from Dhansiri River to the already existing sub-reservoirs upto their full capacity.

Completion of all works/components of the Scheme

6.5.The requirements for completion of all the works requires the availability of funds in a timely manner. A realistic estimate of funds required for commissioning of the water supply scheme was prepared by Executive Engineer, PHED, Stores Division, Dimapur. It is reproduced below.

TABLE 6.1

LIST OF WORK TO BE DONE FOR COMMISSIONING OF THE PROJEC

i) Sludge water to be drained out by C.I. Pipe 400mm 1.5KM. Estimated cost	Rs. 60.00 lacs.
ii) Consta. of Back wash reservoir Estimated cost	Rs. 5.00 lacs.
iii) Rectification of underground clear water reservoir as it is sub-merged during rainy seasons. 1.6m. Estimated cost	Rs. 3.00 lacs.
iv) C.I. fittings such as E/Tees, bonds 90° 45", *22'A°*, 11 ° colars sluice valves, flanges R/Sockets, R/Tees Air valves. Estimated Cost	Rs. 16.50 lacs.
v) Re-servicing of pumps and motors: Estimated Cost	Rs. 4.80 lacs.
vi) Electrification of Jackwell Pump House Estimated Cost	Rs. 2.60 lacs.
vii) Providing shuttering at Jack Well Pump House Estimated Cost	Rs. 0.92 lacs.
viii) Painting the RCC reservoirs & houses Estimated Cost.	Rs. 2.30 lacs
ix) Washing and clearing of reservoir clarafaculator. Estimated Cost	Rs. 0.87 lacs.
x) Distribution lines: Estimated Cost	Rs. 179.00 lacs.
xi) Constn. Of 1,00,000 litres S/R: Estimated Cost	Rs. 6.60 lacs.
xii) Liability Payment	Rs. 36.00 lacs.
xiii) Constn. Of central box: Estimated Cost	Rs. 1.40 lacs.

Rs. 318.99 lacs

Total Rs. 319/-lacs.

6.6.A total projected amount of Rs. 319 crore is required to complete the Augmentation of Water Supply to Dimapur Town in a satisfactory manner. The temporal requirement for completion of the works is not specified as it depends only on the availability of the funds.

Maintenance of the Scheme after Commissioning

6.7.The Augmentation of Water Supply to Dimapur Town is the largest Scheme undertaken by the PHE Department, Govt, of Nagaland. Its commissioning will be at the cost of Rs. 20.29 crore to the State Govt, plus the 10 to 16% compound rate of interest paid to LIC for the loan component. Further, as a portion of the scheme is through pumping, O &M costs and energy costs are likely to be high. It is necessary that the scheme generates revenue for itself after it is commissioned, to atleast meet the operation and maintenance costs from its own revenues.

6.8.The existing tariff system is based on fixed/lump sum rates based on the number of taps of the consumers. There is no metering system of water delivery to the consumers. The fixed and lump-sum rates based on the number of taps will not be adequate to meet the Operation & Maintenance costs of the project. The PHE department had indicated a gross yearly revenue of Rs. 40.00 lakh through the scheme, which would be sufficient to meet the maintenance cost.

6.9.The Department has been planning to introduce the metering system for distribution of water to the consumers since 1997-98. A Notification to this effect was issued on Nth Nov. 1998 in the form of 'The Nagaland Water Supply consumer Rules 1998' by the Government. The Notification states that charges for water supply shall be livable at the following rates:

Type of consumers	**Rates of Charges**
1. Domestic use	Rs. 10 per 1000 litres
2. Commercial use	Rs. 20 per 1000 litres
3. Industrial use	Rs. 25 per 1000 litres

Metering charge @ Rs. 5/- per month for meter maintenance shall be paid by the consumer.

6.10.The Department proposes to share the burden of the cost of introducing metering system with the consumers by introducing lump sum security deposit and connection charges. The rates of these lump sum charges are under finalisation. Discussion with the Chief Engineer, PHE brought to light that the department has estimated the cost of laying consumer distribution lines (from the new overhead RCC reservoirs) and introduction of metering system to be around Rs. 7.5 crores. The department is not in a position to finance this fund requirement from its own resources

6.11.If the entire cost of introduction of metering system is covered through deposits/ charges from the consumer, the State may not be able to meet the social objective of providing safe drinking water supply to all the residents. The economically weaker section of households may opt/decide against the use of the purified piped water supply and continue to depend on other (less safe) sources of water. This scenario may not be as per the principles of social justice.

6.12.The alternate scenario is that the cost of metering is partially borne by the consumers, and partially by the Department or the State Government. The proposal of partial Government support for introduction of the metering system is therefore also under consideration.

6.13.The-metering system has not been introduced till the time of this evaluation study. As the Department aims to partially commission the project by September 2001, the department will have to take some concrete steps towards revenue generation to meet the maintenance costs. This is imperative in the light of the fact that the State Government may not be in a position to meet the maintenance costs, the LIC loan servicing and the State Plan component of Rs. 3 crores simultaneously from its limited resources. This would adversely effect and delay the completion/ commissioning of the project even further. In the light of the above the Department and the State Government may have to consider the financing of the costs of the introduction of the metering system through external sources of finance.

CHAPTER-7

MAIN FINDINGS AND RECOMMENDATIONS

7.1.The Augmentation of Water Supply Scheme to Dimapur town has taken a considerable amount of time in construction. An analysis of the financial and physical progress of the project led to the following assessment of the scheme.

Main Findings

7.2.**Inadequacy of funds:** Since the onset of the execution of the scheme in 1987, the State was unable to provide adequate resources from the State Plans for the scheme. The inadequacy of funds was responsible for slow progress of work by the department (Group 'C' works) and the private contractors (on Group 'A' and 'B' works). This resulted in upward revision of cost estimates and delays in the commissioning of the project.

7.3.Some extent of faulty designing by the technical persons in formulation of the scheme cannot be ruled out. Though the river source (River Dhansari) is expected to have a dependable discharge through out the year, the choice of the location of the Jackwell as the raw water intake point was not chosen appropriately This has proven true retrospectively, with the river changing its course and the near collapse of the Jackwell at the site in Naharbari. The subsequent site in Nagarjan, where the Jackwell was reconstructed was found to be a more appropriate location for intake of raw water. This location was not new to the PHE Department. The existing (operating) pump house for water supply at Dimapur is located here. The technical feasibility of selection of a remote site at Naharbari over the site at Nagarjan needs to be explained by the officers who had taken the decision.

7.4.**Changes in the Design:** Many modifications have been brought in the design of the scheme at the time of its execution. The highlight of these changes is that instead of a five staged pumping design, the scheme is now based on pumping as well as gravity flow for the transmission/ flow of water. This has significant implications towards the energy and maintenance costs of the scheme. With the involvement of two pumps in place of five of the initial project, the recurring costs are likely to be lesser.

7.5.**Site of the Water Treatment Plant:** The selection of the site of the Water Treatment Plant at Raj Pukhri appears to be due to proximity to River Diphu and Raj Pukhri Balancing Reservoir (the third stage of flow of water- from the raw water intake source and Padam Pukhri Reservoir). However, it appears that adequate care was not taken while determining the site of the Treatment Plant. As per the Manual on Water Supply and Treatments, "Flooding is a common hazard for treatment plants and pumping stations. The maximum flood observed in the last 30 years should be taken into account and the treatment plant and pumping station structures may be built above the high -water mark expected, or may be surrounded by dykes to prevent damage due to flooding. "The above care was not taken in site selection or construction of the Treatment Plant, which remains submerged during the rainy season. Adequate care was not taken in constructing the Clear Water Tank above the rain water level. This underground tank gets submerged in rainwater during the rainy season.

7.6 **Balancing Reservoirs:** The Padam Pukhri and Raj Pukhri Balancing Reservoirs played an integral role in the initial design of the project. The flow from River Dhansiri was to be first pumped into Padam Pukhri reservoir, which also functioned as a pre-settling tank. It was to be then pumped to Raj Pukhri reservoir and subsequently to the Treatment Plant. Both the reservoirs suffered from encroachment problems after the works started near the reservoirs. The Department has reached an amicable settlement with the residents near the Raj Pukhri reservoir. The Padam Pukhri reservoir has remained involved in prolonged litigation. The case is still sub judice. In the case of a court ruling against the PHE Department's claim, it would be at a cost to the Department as the construction of Jackwell, renovation of the reservoir, etc have been completed by the Department. The Department would also loose a valuable water source, which has tremendous potential for future usage (with increased population and demand for water) and dry/ lean season utilisation.

7.7 **Physical Progress:** It was found that a majority of the works had been completed to enable the Department to partially commission the scheme in the near future. The Department hopes to be able to commission the scheme partially by August-September 2001 after completing a few important works at the Treatment Plant and construction of a culvert under the National Highway 39. The completion of all works of the scheme, however, requires the availability of the adequate funds.

5 A publication of Central Public Health and Environmental Engineering Organisation (CPHEEO). New Delhi.

7.8 The Department had given a lump sum contract of the Civil Works of the project (Group 'A' works) to M/s Sanjay Traders. The Department appear to be dissatisfied with the quality of construction work done by the contractor, especially the construction of Jackwell at Naharbari (which has been tilling towards collapse) and some of the Treatment Plant works.

7.9 **Consumer Distribution Lines:** It was observed that the project has provision for laying distribution pipelines till the Elevated Reservoirs and Sub- reservoirs, but no provision for distribution pipelines from these reservoirs/ tanks till the Consumers. This has immediate implications for the RCC Overhead Service Reservoir in ADC Court Area (i.e. ESR III), the construction of which has been completed, and the distribution lines laid and fitted to receive the purified water. However, with no funds or provision for consumer distribution lines, it will not be possible to provide water from this 2 million litre tank. The Chief Engineer, PHE stated an estimate of around 7.5 crores (under consideration in the Department) for provision of consumer distribution lines and introduction of metering system in Dimapur town. The availability of this considerable amount of funds requires to be explored further.

Recommendations

7.10 The failure of the Government to provide adequate funds to the Augmentation of Water Supply Scheme to Dimapur town has delayed the commissioning of the project. If the funds are provided during 2001-02, it will result in the completion of the project and accruing of benefits long overdue.

7.11.The scheme is partially based on the pumping systems. It is likely to incur energy and maintenance costs. It is suggested that the metering system should be introduced at the earliest for distribution of water to the consumers so that the scheme is able to generate adequate resources to meet its 0&M requirements.

7.12 A perusal of the official files and correspondence of the Department revealed that the Department experienced some difficulties with two of its main contractors-M/s Sanjay Traders and M/s Phillips Traders, to whom lump sum contract of undertaking Group 'A' and Group 'B' works respectively were given. The problems ranged from unsatisfactory construction to delays in the completion of works. It is suggested that the contracts be given in a phased manner, with future contracts depending on the quality of earlier work, to avoid unsatisfactory work, cost over runs and delays in completion of the work. Greater supervision of the works by technically sound officials of the Department will reduce the possibility of faulty designs/ constructions.

7.13 The Government of India, Ministry of Urban Affaires and Employment had, along with conveying the sanction for the revised estimate in 1995, had stressed on measures to protect the water source along with deforestation control in the catchment area. It is suggested that the PHE Department co-ordinates with other concerned departments, i.e.. Department of Forest, Soil Conservation, etc. to ensure the dependability of the water source for thirty or more years.

7.14.The two Balancing Reservoirs- Padam Pukhri and Raj Pukhri should be incorporated completely in the project at the earliest to meet of the increased demand for water. Measures towards getting the stay order vacated should be explored for speedy hearings and judgement on Padam Pukhri reservoir case.

7.15.After the scheme is commissioned, the quality of the purified water should be regularly monitored. Ensuring hygienic potable water would deter the people/ residents of Dimapur from using unsafe water from other sources. If adequate quantity of good quality piped water is made available to the people, it would generate positive public opinion and they would be veiling to pay the higher, meter based charges for the supply of water.