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PROJECT PERFORMANCE AUDIT REPORT

BOTSWANA: GABORONE-LOBATSE WATER SUPPLY PROJECT  
(Credit 233-BT)

December 30, 1976

Operations Evaluation Department

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BOTSWANA: GABORONE-LOBATSE WATER SUPPLY PROJECT  
(Credit 233-BT)

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Currency Equivalent  
(Rand)

	<u>Year</u>
1 Rand = 1.41 US\$	1969
1 Rand = 1.39 US\$	1970
1 Rand = 1.27 US\$	1971
1 Rand = 1.23 US\$	1972
1 Rand = 1.18 US\$	1973
1 Rand = 1.17 US\$	1974
1 Rand = 1.15 US\$	1975



PROJECT PERFORMANCE AUDIT REPORT

BOTSWANA: CABORONE-LOBATSE WATER SUPPLY PROJECT  
(Credit 233-BT)

Preface

This memorandum presents the results of a performance audit on credit 233-BT made to the Republic of Botswana for the country's first water supply project. The credit for US\$3 million was signed in February 1971 and closed in March 1976. The audit is based on the Project Completion Report (PCR) prepared by the East Africa Regional Office, supplemented by a review of the project documents and Bank files, and discussions with the Bank staff involved with the project.

The memorandum summarizes at some points, and expands at others, the discussions of the PCR, here attached.



PROJECT PERFORMANCE AUDIT BASIC DATA SHEET

BOTSWANA: GABORONE-LOBATSE WATER SUPPLY PROJECT

(Credit 233-BT)

	<u>Original</u>	<u>Amounts (in US\$ mln.)</u>		<u>As of 8/31/76</u>	
		<u>Disbursed</u>	<u>Cancelled</u>	<u>Repaid</u>	<u>Outstanding</u>
Credit 233-BT	3.0	2.9	nil	nil	3.1

Project Data

	<u>Original Plan</u>	<u>Actual or Est. Actual</u>
Conception in Bank		Sept. 69
Board Approval		2/2/71
Credit Agreement		2/10/71
Effectiveness	5/14/71	5/26/71
Physical Completion	Dec. 72	July-Aug. 74
% of original project actually completed	50%	100%
Credit Closing	12/31/73	3/76
Total Costs (mln)	US\$ 3.3	US\$ 3.7
Financial Return on (Incremental) Investment	12%	12%

Mission Data

	<u>Month, Year</u>	<u>No. of Days</u>	<u>No. of Persons</u>	<u>Manweeks</u>	<u>Date of Report</u>
Identification	-	-	-	-	-
Preparation	-	-	-	-	-
Preappraisal	4/70	5	2	1-3/7	5/12/70
Appraisal	6/70	<u>18</u>	4	<u>8-2/7</u>	7/14/70
Subtotal		<u>23</u>		<u>9-5/7</u>	
Supervision I	9/71	4	2	1-1/7	9/27/71
Supervision II	2/72	4	3	1-5/7	4/24/72
Supervision III	11/72	7	2	2	12/28/72
Supervision IV	4/73	6	2	1-5/7	6/18/73
Supervision V	9-10/73	4	2	1-1/7	11/73
Supervision VI	5/74	5	2	1-3/7	7/23/74
Supervision VII	11-12/74	8	3	3-3/7	1/24/75
Supervision VIII	7/75	<u>4</u>	2	<u>1-1/7</u>	9/3/75
Subtotal		42		13-5/7	





PROJECT PERFORMANCE AUDIT REPORT

BOTSWANA: GABORONE-LOBATSE WATER SUPPLY PROJECT  
(Credit 233-BT)

Highlights

All the major physical and institutional objectives were achieved, although with some delay, and the project is operating satisfactorily.

The project involved a reorganization and strengthening of Botswana's water supply system. A major component, and an unusual feature of the project, was a 32-mile pipeline to supply water to an important town threatened by drought. Although the drought ended before the line was completed, the uncertainty as to its course at the time the project was started and the risk of substantial economic loss should it continue or recur, provided justification for the premature construction of the line. In addition, the enterprise most vulnerable to the drought agreed to bear the cost of constructing the line.

The following points may be of particular interest:

Reorganization of the beneficiary (para. 2).

Unpredictability of prevailing drought and the security provided by the 32-mile pipeline (paras. 7-9 and PCR paras. 30 and 38).

Role of expatriates in the entity's management (para. 10 and PCR paras. 32, 49-51 and 63).



PROJECT PERFORMANCE AUDIT MEMORANDUM

BOTSWANA: GABORONE-LOBATSE WATER SUPPLY PROJECT  
(Credit 233-BT)

1. Credit 233-BT of US\$30 million to the Government of Botswana, for relending to the Water Utilities Corporation (WUC) of Botswana, was the third credit to the country and the first for a water supply project. It was approved in February 1971, and disbursements were completed in March 1976. Since this credit the Bank has made four loans and three more credits to Botswana. One of these loans<sup>1/</sup> has financed a project with a large water supply component.
2. WUC is a government-owned corporation, created in June 1970 by the Government to manage and operate the water supply component of the Shashe Project, and to take over the water supply system of Gaborone-Lobatse area from Gaborone Water and Electricity Unit (GWEU), then a part of Public Works Department (PWD).<sup>2/</sup> The Bank supported the Government in this reorganization and endorsed the setting up of two separate divisions within the WUC, one to operate the water supply component of Shashe Infrastructure and the other to operate Gaborone and Lobatse Water Supply System.
3. The project, part of Gaborone and Lobatse System, consisted of: (a) additions at the site of the Gaborone treatment works consisting of a 2-IMgd treatment plant, a 3-IMgd treated water reservoir, and a treated water pumping station and mains in Gaborone; (b) a 32 mile long, 10-inch pipeline connecting Gaborone and Lobatse, together with its associated pumping station; (c) at Lobatse, a 1.24 IMgd storage reservoir and mains, and (d) provision for managerial and technical assistance.
4. The Bank credit, about 90% of the estimated total project costs, was to finance mainly the cost of foreign exchange component. The capital costs of the 32-mile, 10-inch pipeline were to be borne by Botswana Meat Corporation (BMC) in the form of annual payments of interest and principal to WUC over a 30-year period.
5. The project was implemented largely as planned with a cost overrun of about 10% in current terms (PCR para. 41) but about 10% underrun in real terms. It was completed well behind the appraisal schedule (Annex 2) - the delays ranging from about 1½ years on the Lobatse waterworks component to about 2½ years on the Gaborone-Lobatse pipeline, the project's major component. The main reasons for the delays were lack of effective management and competent site supervision by the contractors, damage to pipes due to their mishandling in the factory, and financial difficulties of the beneficiary (PCR paras. 22-28). Bank loan disbursements were slower than the appraisal estimates, due mainly to the slow progress of construction work and also because, in making withdrawals, priority was given to the British loan of about US\$0.4 million, acquired during project implementation.

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<sup>1/</sup> Loan 776-BT - Shashe Infrastructure Project - a major mining venture in Botswana, has a large water supply component (in excess of \$20.0 mln.).

<sup>2/</sup> In this reorganization, the Government incorporated the recommendations of its consultants to separate GWEU from PWD.

6. The operating and financial performance of WUC's Gaborone and Lobatse Division has been adequate through FY 1975. Sales of water were close to the appraisal estimates (Annex 4), increasing from 448 IMg in FY 1972 to 614 IMg in FY 1975, despite about 10% increase in tariffs during this period. WUC's revenues from the division more than covered the operating costs but, as expected at the appraisal, the operating income (less depreciation) did not cover the interest charges. The average tariff was raised higher than expected at the appraisal; this enabled WUC to achieve a rate of return in line with that estimated at the appraisal and marginally higher than the stipulated 4.5% through FY 1975 (Annex 4). But the tariff will probably need to be raised again to meet the rates of return of 7% stipulated for FY 1976, and 8% for subsequent years. The incremental internal rate of return on the project is 12%, the same as that at the appraisal (Table 1).

7. Studies conducted by government-appointed consultants in 1968-69 had identified the need for additional water works capacity by 1972 to meet the normal growth in water consumption in Gaborone-Lobatse areas. The existing drought, and its probable extension by another two years, had created an urgent need for an additional source of water supply in the Lobatse area where the abattoir, managed by BMC, was the largest customer. Were the abattoir to be shut down for a prolonged period, because of shortage of water supply, BMC would have incurred a loss of about US\$7 million per annum.<sup>1/</sup> One alternative was to supply water from Gaborone to Lobatse by installing a pipeline and the associated pumping equipment, and the other was to construct a new dam at the Tsiklane site in the Lobatse area. The second alternative was not considered feasible mainly because the required studies on water yield and civil engineering work could not have been completed, and the dam built in time to meet the emergency.

8. The above studies had also concluded that the existing drought could last between two to five years and would be likely to occur once in twenty years. On the other hand, an FAO/UNDP study, completed in 1972, concluded that the drought situation in Botswana was erratic and unpredictable, and that the droughts were likely to occur once in seven years.

9. In retrospect, the pipeline, costing around US\$1.5 million, was built at least 3 years before it was needed. Assuming that it will not be used until 1977, the pipeline will have incurred a total capital charge of about US\$0.5 million over the 3-year period (about US\$0.15 million per annum). This represents a cost to the economy. For this price, it has provided security against a drought and the consequential loss of about US\$7.0 million per year to BMC from having to shut down the abattoir. When the drought ended in 1972, the immediate need for the pipeline receded. However, because the investment was already committed and the construction had begun, and because of the continuing and perceived need for a reliable alternate source of water supply, the Bank pressed WUC and its consultants to complete the project as soon as possible. All credit covenants were met.

<sup>1/</sup> Estimated at the appraisal, which seems realistic. Also, at the time of the appraisal, BMC through its exports was a major foreign exchange source (about 90% by value of the country's exports) for the country. Although meat, as a proportion of total exports, has declined in importance since the development of diamond mining, BMC still remains the major employer in Lobatse area, and its net sales have almost tripled between 1970-75.

10. The Bank made a contribution to the development of water supply system of Botswana, and to the creation and development of WUC into a well-managed organization albeit, entirely by expatriates. In retrospect, it would seem that more attention should have been given to training of local employees, to gradually replace the expatriates. The Bank's eight supervision missions<sup>1/</sup> (about two a year) were quite adequate, given the small size of the project and the fact that WUC, though a new organization, has been well managed. This was one of the rare cases where the Bank staff associated with the project remained the same from appraisal to completion.

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<sup>1/</sup> This was mainly due to Shashe Infrastructure Project which was simultaneously supervised by the same staff members.



Table 1

(INCREMENTAL) INTERNAL RATE OF RETURN  
(Costs and Revenues in R'000)

Year	Capital Cost (Current Prices)	Operating Cost (Current Prices)	Water Sales IMG	Revenues	Other Income (Current Prices)	Total Revenues (Current Prices)	Net Revenue	Deflation Factor	Net Revenue 1972 Prices
1972	449	-	-	-	-	-	(449)	100	(449)
1973	328	-	-	-	-	-	(328)	116	(282)
1974	1,050	-	-	-	-	-	(1,050)	136	(777)
1975	481	5	19	18	94	112	(374)	147	(254)
1976	158	21	76	73	94	167	(12)	147	(8)
1977	-	38	138	166	94	260	222	147	151
1978	-	55	202	242	94	336	281	147	191
1979	-	76	278	334	94	428	352	147	239
1980	-	98	372	446	94	540	442	147	301
1981	-	122	465	558	94	652	530	147	360
1982	-	122	465	558	94	652	530	147	360
1983	-	122	465	558	94	652	530	147	360
1984	-	122	465	558	94	652	530	147	360
30 years		30 years	30 years	30 years	30 years	30 years	30 years	30 years	30 years

=====  
(Incremental) Rate of Return  12%  
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i) Average Tariff = 1975 & 76 R 0.96/1,000 Ig  
Thereafter R 0.96 x 1.25/1,000 Ig

ii) Retail Price Index is used as Deflator





PROJECT COMPLETION REPORT

BOTSWANA: GABORONE-LOBATSE WATER SUPPLY PROJECT

CREDIT 233-BT

1. Borrower: The Republic of Botswana  
Beneficiary: The Water Utilities Corporation (WUC)
2. Credit Number: 233-BT
3. Credit Amount: US\$3 million
4. Date of Credit Agreement and Project Agreement: February 10, 1971
5. Effective Date: May 26, 1971
6. Closing Date: March 31, 1976 (extended twice, from December 31, 1973)
7. Credit Terms: No interest, 50 years with no amortization for the first 10 years; 1/2 of 1% of the principal amount will be payable semi-annually from June 1, 1981 to December 1, 1990, and 1-1/2% semi-annually from June 1, 1991 to December 1, 2020.
8. Credit Service Charge: 3/4 of 1%
9. Onlending Terms: Repayable over 30 years, including a grace period of five years.  
Onlending Interest: 7% interest on the outstanding amount of the loan.
10. Exchange Rate: R 1 = US\$1.15 (September 1975). At appraisal exchange rate was R 1 = US\$1.41, but it varied during project construction.
11. Project Department Report: PU 54a
12. Fiscal Year: April 1 - March 31

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1/ The major sources of information used for this report are the Appraisal and Supervision Reports and WUC's Completion Report.

13. Abbreviations and Acronyms:

WUC	-	Water Utilities Corporation
BMC	-	Botswana Meat Corporation
UNDP	-	United Nations Development Program
IMgd	-	million Imperial gallons per day
IMg	-	million Imperial gallons
mm	-	millimeter

Background

14. In September 1969 the Botswana Government approached IDA to finance a 32-mile pipeline between Gaborone Dam and the Lobatse treatment works below Nuane Dam which is the primary source of water for Lobatse. At that time, the drought conditions had existed for two years and these conditions persisted until after pipeline construction started. Storage behind Nuane Dam had been depleted and ground water supplies could be relied upon only for an additional 18 months. Government was concerned about the disastrous effect that the failure of the supply would have upon the abattoir located in Lobatse since the abattoir is an important element in Botswana's economy, a primary source of earnings for 90% of the rural population, and a major source of foreign exchange earnings.

15. An average rainfall of about 500 mm per year ranks the area among semi-arid lands; wide yearly variations and occurrence limited to the summer season when evaporation is at its highest also are unfavorable factors. Drought periods extending for periods of two to five years are not uncommon. Intermittent rains occurring in small amounts provide limited benefit on small watersheds such as that of Nuane Dam.

16. Information provided to the Bank shortly after the September 1969 request indicated that the Gaborone waterworks, constructed in 1966 at the time of independence, would be unable to meet growing urban water demand expected by the early 1970's. A project was then being contemplated to upgrade the water systems of both Gaborone and Lobatse and to provide a standby supply to Lobatse from the Gaborone Dam reservoir. Storage capacity of Gaborone Dam was likely to suffice until well into the 1980's.

17. At that time, the Shashe Infrastructure Project (Loan 776-BT) -- the objective of which was to support the first major mining venture in Botswana, was being appraised and the two projects became interlocked to some degree through the utilization of the Water Utilities Corporation (WUC) as water authority for both projects, employment of the same consultants, same Bank staff on the water supply aspect, common supervision missions, etc. The Shashe Infrastructure Project was eventually approved after the Water Supply Project due to technical and financing problems related to the mining venture although it became operational earlier.

The Project - The Principal Elements

18. The Project consists of the construction of:

- (a) supply main and pumping station to convey raw water from the Gaborone Dam to the existing waterworks at Gaborone;

- (b) a 32-mile, 10-inch diameter pipeline connecting the Gaborone and Lobatse waterworks together with related pumping stations and ancillary works;
- (c) additions at the site of the Gaborone treatment works consisting of: a 2-IMgd treatment plant, a 3-IMg treated water reservoir and a treated water pumping station, mains in Gaborone;
- (d) a 1.25-IMg storage reservoir and mains in Lobatse;
- (e) a provision of managerial assistance, engineering, housing and miscellaneous equipment.

The Project has been constructed as designed and no change was made to the principal elements. It operates satisfactorily but was completed about two years behind schedule.

#### Design of the Project

19. Government initiated three studies for the Project: two by Sir Alexander Gibb and Partners (Lobatse water resources, issued July 1969 and feasibility study of the Project, issued April 1970); and a report on Gaborone Water and Electricity Unit (GWEU) (part 2, water) issued by Merz and McLellan (S.A.) in October 1969 and which was used extensively by Gibb.

20. The Gibb proposals were substantially reduced in scope during appraisal and the size of the Gaborone-Lobatse pipeline reduced from 12 to 10 inches.

21. Hesitation on whether to postpone the construction of the Gaborone-Lobatse pipeline persisted until late in the project preparation period. A decision to include the pipeline in the project was made at that time based upon the expectation that the drought would continue causing the pipeline to be required by 1972. As the drought continued until major contracts were awarded, there was no alternative to proceeding with construction.

#### Construction of the Project

22. The Project had no technical peculiarities and included only conventional waterworks, i.e. pipelines, treatment plant, storage reservoirs and pumping stations. Delays and difficulties encountered during construction were due mainly to mishandling of pipes within the factory by the pipe supplier (see para. 25) and to bad management by the civil contractors (see paras. 24-27).

23. The Project was constructed under four main contracts. The two equipment supply contracts involving Amalgamated Power Engineering S.A. (Pty), subcontractor for the Gaborone-Lobatse pipeline and Paterson Candy International S.A. (Pty), contractor for the treatment works in Gaborone, were successfully completed despite delays caused by the civil works contractor in providing access to sites.

24. The performance of Delkins Ltd., a Zambian-UK firm of the Lonhro group, the contractor for the Gaborone-Lobatse pipeline, however, was poor. Although construction should have taken 11 months, the contract was not substantially completed until August 1974 -- about 2-1/2 years later than required. The major cause of delay was the lack of effective management and competent supervision by the contractor and the use of improperly maintained, used equipment. This was aggravated further by difficulties in the transfer of working funds from Zambia and by the utilization of defective asbestos-cement pipes.

25. These pipes were manufactured by Everite, Ltd. (S.A.) and all pipes were subjected to hydrostatic pressure testing in the factory prior to lining with bitumen and, again, in the field after installation. Despite this, an abnormal number of pipe joints burst open upon being field tested after passing the factory test. Examination of the broken pipes showed cracks filled with bitumen indicating the pipes were defective at the time of shipment. These shortcomings, however, seem to have affected this contract only since asbestos-cement pipes from the same supplier have been used extensively in Botswana in the past without complaint.

26. An example of poor site supervision provided on the project is given by the thrice-repeated incident during which pipes already lain in trenches were permitted to float after flooding due to heavy downpours. On similar projects elsewhere, this is normally prevented through partial backfilling of the pipe immediately upon laying, leaving the joints temporarily exposed for inspection. Works often were left unfinished, e.g. trenches not backfilled, causing delays in the issuance of the engineer's certificate and in payment to the contractor.

27. Neither WUC nor its consultant (Sir Alexander Gibb and Partners) exerted much effort to force Delkins to accelerate the progress of work on the contract -- on the grounds that such pressure might cause the contractor to abandon the work. There was some justification for this attitude since, in such a case, WUC may have had to pay a substantial sum to complete the work without assurance or need (good rains had deferred the need for the pipeline) of hastening pipeline completion and with little likelihood of recovering liquidated damages from a potentially bankrupt contractor. The lack of action by Sir Alexander Gibb and Partners (the consultant) and by WUC may have weakened WUC's legal position until, after IDA's repeated requests and due action by Gibb's Nairobi office, Delkins was ordered to complete the work by a specified date; this action was effective in that the project became operational by mid-1974 although minor unfinished tasks remained for some time thereafter.

28. Lack of finance for the cost overruns (see para. 41) delayed the issuance of bidding documents for the second civil works contract which included mainly the construction of treatment works, storage, pumping station and distribution facilities -- all in Gaborone, and storage and distribution main additions in Lobatse. This contract eventually was awarded to Energoprojekt (Zambia-Yugoslavia) -- the lowest of three bidders. Ineffective management by the contractors delayed completion of Gaborone's waterworks until the period of peak demand in 1974.

### Objectives and Justification

29. With very minor exceptions, all the project objectives have been achieved although with some delay.

30. A standby water supply and assured supply for the mid-term future has been provided to Lobatse and, more particularly, to its abattoir. The Botswana Meat Commission (BMC), which owns and operates the abattoir, is bearing the capital costs of the Gaborone-Lobatse pipeline through a contract with WUC under which BMC makes level annual payments of interest and principal to WUC over a 30-year period.

31. The combined raw water supply available to Gaborone and Lobatse is expected to suffice until the early 1980's at which time storage capacity behind Gaborone Dam is scheduled to be increased by raising the height of the dam. Existing facilities for water treatment, pumping, conveyance and system storage have been augmented by the Project and appear capable of meeting the growing water demands of Gaborone and Lobatse until the early 1980's. Government and WUC are proceeding with a program of main extensions which seems likely to be accelerated in the future.

32. The implementation of the Gaborone-Lobatse water supply project -- together with the Shashe Infrastructure Project, brought about the establishment of WUC which is an effective, well-managed institution providing good service. WUC's senior staff, however, is composed exclusively of expatriates (see para. 49) with little likelihood of change in the immediate future.

33. To meet the rate of return requirements of the Project Agreement, it was necessary for WUC shortly after its inception to raise average water tariff by 60%. Free water provided to civil servants was abolished. Further, WUC, in accordance with proposals set forth in the Appraisal Report but which are not reflected in the Agreement, instituted a progressive tariff schedule which permits minimal water requirements to be supplied at reasonable cost while making higher levels of water consumption more costly.

34. The new tariff was introduced in April 1971 and an immediate reduction of water consumption of about 30% took place. As above-average precipitation occurred in the watershed by area at about the same time, it is not possible to identify the separate effects of these two factors on water consumption. Annex 1 reflects the historical growth in annual water demand. Comparison shows these to be in substantial agreement with assumptions of future demand made at the time of appraisal.

35. The decrease in consumption helped to avert adverse effects that delays in construction of the Project otherwise would have caused. Reservoirs were substantially drawn down by the summers of 1973 and 1974 and Gaborone was spared a water shortage only because of the favorable response of its citizens to an appeal to minimize water use during peak consumption periods.

36. Industrial wastes from the abattoir operated by the Botswana Meat Commission (BMC) in Lobatse formerly were discharged without treatment into an adjacent small stream having no visible natural flow during most months

of the year. This practice resulted in gross pollution of the surface flow of the stream and the gradual degradation of ground water quality as evidenced in production from nearby wells of the abattoir and the water utility. Section 4.03 of the Development Credit Agreement required Government to cause BMC to remedy the situation although no funds were provided in the Credit for this purpose. BMC satisfactorily met the requirements of the Development Credit Agreement by providing (one year later than required) extensive facilities costing about R 750,000 (far more than anticipated at appraisal). This outlay brought about improved segregation of waste streams within the factory and the construction of a highly effective (organic strength of raw waste reduced from 3,000 to about 20 mg/l BOD) waste treatment plant and disposal facilities. The treated effluent is fully utilized for the sprinkler irrigation of adjacent pasture lands in a carefully managed program that provides supplemental feed for up to 40,000 head of cattle p.a.

37. The Credit Agreement sets no date for the completion of the formalities of transferring from Government to WUC the assets WUC needed for its operations although a period of two years was considered reasonable during negotiations. Although some preparatory legal work has been accomplished in transferring legal rights to certain of the physical assets (i.e., the Gaborone, Notwani and Njane dams) from Government to WUC, no actual vesting of rights has taken place for these or other assets. After repeated reminders by IDA, current indications are that some progress is being made in the preliminary legal work necessary to complete the legal transfer of assets to WUC.

38. The Project will benefit Botswana's economy by assuring the continuity of water supply to the abattoir and also the supply of safe water to Gaborone and Lobatse until the early 1980's with direct and indirect benefits due to improved convenience, health, productivity and fire protection. The existence of a strong, urban water authority, with potential for extension to other urban areas, will facilitate the expansion of existing systems and may aid in the future development of other urban systems.

#### Construction Schedule

39. The projected and actual construction schedules are as shown in Annex 2. Causes and consequences of the unusual delays experienced during the construction of the Project are explained above. There were no significant consequences because of the delay in the completion of the Project.

#### Project Costs

40. Annex 3 compares estimated and actual costs of the Project as of March 31, 1975. As all project transactions have not been fully settled, actual costs include a small amount covering expected final settlements.

41. The following is a summary of estimated and actual project costs.

A. Works to which IDA funds were applied:

	<u>Estimated</u> (R 1,000)	(as at March 31, 1975)	<u>Actual</u>
Raw water facilities	90		170
Gaborone-Lobatse pipeline	855		900
Gaborone waterworks	495		795
Lobatse waterworks	130		183
Miscellaneous	30		42
Engineering	200		310
Unallocated	<u>400</u>		<u>64</u>
Total	<u>2,200</u>		<u>2,464</u>

B. Works financed exclusively from Government funds:

	<u>Estimated</u> ----- (R 1,000) -----	<u>Actual</u> -----
Gaborone (and Lobatse) distribution extensions	<u>140</u>	<u>178</u>
Grand Total	2,340	2,642
or US\$ (at R 1 = US\$1.40)	3,276	3,699

42. At the time the completion report was prepared, it appeared that a small surplus may exist in the Credit and IDA has approved in principle that the surplus be used for miscellaneous equipment needed by WUC.

43. Although the provision made for price increase at appraisal of 8% was inadequate, cost overruns only amounted to about 12%. The cost overrun was financed largely by British funds (see para. 54).

44. The Project was prepared close to the end of a period of relatively stable and low prices in South Africa with contractors having surplus capacity. However, the volume of civil works construction was increasing in South Africa as the Project was being prepared causing contractors to have little interest in work in Botswana. Consequently, there was little interest in project contracts and only three to four bidders for each contract. Price changes then occurring in the market were not perceived until after the appraisal cost estimates had been completed and, as shown above, actual costs exceeded estimates.

Disbursements

45. In a few instances, major problems might have arisen from late completion of the disbursement procedure. Generally, the terms of payment to contractors provided that interest was due the contractor if payments were

not received within 30 days of the Engineer's certificate and, further, that the contracts might be cancelled to the advantage of the contractors if payments were not received within 60 days. Considering that IDA was to pay contractors directly, the time for payment was barely sufficient to meet possible administrative delays between the consulting engineers, WUC, the Government and IDA; two disbursements were late and Government had to pay contractors directly to avoid possible difficulties with contractors.

46. Disbursements have lagged consistently mainly because of the slow progress of the contracts but also because in making withdrawals priority was given to the British loan for financing cost overruns as a source of funds as the British Government required that it be fully disbursed by March 31, 1973.

#### Consultants' Performance

47. In his completion report, WUC's Engineer-Manager states: "The Consulting Engineer services have been of the general standard expected from any large, internationally-known firm operating away from its home office." We concur with this view. Design is conventional and required nothing else; however, Gaborone's new treatment plant does not incorporate some of the latest developments in flash mixing, flocculation, and filtration control. The latter possibly could have improved plant operation, reduced the size of the plant and its cost. Furthermore, Gibb did not give sufficient attention to price increases taking place at the time the project cost estimates were being prepared.

48. A possible criticism of Gibb is their inaction for a period in the Delkins' case (see paras. 24-27). Obviously, the matter was both delicate and complex and was further complicated by the fact that the opinions of legal advisors differed widely. Nevertheless, the difficulties of taking a firm line with Delkins at an earlier date were probably overestimated.

#### Organization and Management

49. Since the beginning of 1971 when it commenced operations, WUC has developed into an effective and well-managed institution. Nevertheless, the corporation is still heavily dependent upon expatriates for managerial positions as there are no suitably qualified local men. There is a shortage of high school graduates with the background to undertake engineering training at the professional level and there is little hope that this situation will be improved in the foreseeable future. Up to now, WUC has been able to offer employment terms adequate to retain and attract expatriates (in spite of a recent Government trend to limit expatriate benefits) and the continuance of this capability is important to its future staffing.

50. WUC has trained a number of local men to fill positions at the artisan level through on-the-job training. Lately, arrangements have been made to send local men to the Swaziland College of Technology for full-time training of one or two years.

51. At the time WUC came into being, it lacked the staff to carry out its responsibilities. Therefore, temporary arrangements under which manage-



ment, technical and accounting services were to be provided through agency arrangements with the Department of Water Affairs and with the Botswana Power Corporation until about the time WUC's Shashe Division came into being were entered into. These arrangements worked well and were concluded in 1973 as planned after WUC had successfully recruited its own staff.

52. However, Bank staff holds the opinion that, in a country with a small population where skilled personnel are scarce, the creation of separate corporations for power and water in lieu of one jointly-operated corporation is questionable. However, this was Government's position when the Project was being processed.

53. In mid-1972 WUC commenced recruiting its own staff beginning with the position of Engineer-Manager. The Water Affairs Department Director (on a FAO/OPAS engagement) and subsequently acting as WUC Chief Executive Officer and Secretary through the Agency Agreement, left his office at the end of his contract in December 1972; he had indicated that he was prepared to consider Government's request that he return to Botswana as WUC's Chief Executive. By then, Government had arranged with UNDP to substitute the OPAS post as WUC's Chief Executive in place of that of Director of Water Affairs in its country program and had asked that this be proposed to WHO as the sponsoring agency. In spite of UNDP interventions following WHO delays, the Water Affairs Department Director finally was not able to take up his new post before the end of June 1973. Fortunately, the delay did not critically affect the Gaborone-Lobatse project. One year later, WHO cancelled the Water Affairs Department Director's contract on the grounds that only an adviser position was acceptable for African countries. The foregoing staffing arrangements with WHO were made by Botswana through WHO's Brazzaville office and are illustrative of the difficulties that may be faced in arranging appointments for staffing through that office. Fortunately, UNDP agreed to directly fund WUC's Engineer-Manager position so as to enable WUC to obtain the services of the Water Affairs Department Director again. It is expected that his present UNDP contract will be extended to December 31, 1976.

#### Financing of Project Costs

54. As some of the project transactions have not yet been finally settled, the final project costs have not yet been determined. The following summary (although including some estimates under the heading of actual costs) should be adequate to indicate material variations between actual and expected project financing.

	<u>Actual</u> <u>Costs</u>	<u>%</u>	<u>Estimated at</u> <u>Appraisal</u>	<u>%</u>
	(R'000)		(R'000)	
Project Costs	2,642	100	2,340	100
<u>Sources of Funds</u>				
IDA	2,127	80	2,145	92
British Funds	294	12	-	-
Government	221	8	195	8
	<u>2,642</u>	<u>100</u>	<u>2,340</u>	<u>100</u>

As may be noted from the above, the main change from the estimated financing plan was that because of the project cost overrun, Government's (including British funds) contribution to the Project was increased from 8% to 20%.

55. Some of the principal features of WUC's financial operations from FY1971 to FY1975, followed by comments, are given below. Income Statements and Balance Sheets for this period are presented in Annex 3.

	1971 (3 months)	FY			
		1972	1973	1974	1975
<u>Rate of Return</u>		<u>(in %)</u>			
Appraisal Forecast	1.4	4.7	5.8	4.4	4.6
Actual		3.8	6.7	5.3	4.53
Project Agreement Requirement		4.5	4.5	4.5	4.5
<u>Operating Income (after charging depreciation but before interest)</u>		<u>(thousands of Rands)</u>			
Appraisal Forecast	9	118	178	177	205
Actual	0	93	161	132	165
<u>Average Net Fixed Assets in Operation</u>		<u>(thousands of Rands)</u>			
Appraisal Forecast	2,529	2,534	3,600	4,505	4,392
Actual	2,529	2,452	2,376	2,401	3,648
<u>Quantity of Water Sold</u>		<u>(thousands of cubic meters)</u>			
Appraisal Forecast	527	2,200	2,393	2,625	2,884
Actual	473	2,038	2,347	2,523	2,792
Percentage Variation (under)	(25)	(7)	(2)	(4)	(3)
<u>Revenues from Water Sales (excluding fixed charge re pipeline)</u>		<u>(thousands of Rands)</u>			
Appraisal Forecast	69	383	421	462	507
Actual	55	389	452	470	587
Percentage Variation over (under)	(25)	1	7	2	15
<u>Operating Expenses (except depreciation)</u>		<u>(thousands of Rands)</u>			
Appraisal Forecast	40	186	216	223	239
Actual	35	217	222	274	349
Percentage Variation over (under)	(12)	17	3	22	46

### Revenues

56. Revenue and demand forecasts were generally close to estimates with the exception of FY1975 when revenues were boosted by a 25% tariff increase introduced in December 1974 largely to meet increased power and employment costs. Average water rates have been high throughout compared to other Eastern Africa countries, but this reflects water scarcity, high power costs and the low density of the urban population. Because of construction delay, the agreement under which the Botswana Meat Commission (BMC) is to pay WUC the pipeline costs by monthly payment over 30 years together with 7% interest did not come into effect until July 1974 as compared to the forecast date of April 1972 expected at appraisal. Despite the delay in the WUC-BMC agreement becoming effective due to late project disbursements on the pipeline, interest payments payable by WUC prior to receiving monthly payments from BMC did not impose any significant financial burden on WUC.

### Expenses

57. From January 1, 1971, when WUC became operative, to the end of FY1973 operating expenses, other than depreciation, were close to forecast. However, by FY1974, the effects of increased power and employment costs were felt and this trend continues.

### Rate of Return

58. The project assets, which about doubled the existing fixed assets, came into operation in FY1975 two years later than expected. Helped to some extent by this delay, the 4.5% project agreement rate of return requirements were met from FY1973 to FY1975. However, largely because of increasing power and employment costs combined with additional depreciation on project costs, WUC may find it difficult to meet the 7% project agreement requirements for FY1976 and FY1977 and a further tariff increase may have to be considered.

### Financial Performance

59. WUC's financial performance for its Gaborone-Lobatse division from its inception to the end of FY1975 has been about as good as could be expected. At appraisal, it was estimated that WUC's revenues from its Gaborone-Lobatse division would not be adequate to cover operating expenses, depreciation and interest during its early years so that accounting losses (measured after taking all these items into account) sustained in these years and shown in the annual accounts were expected. As noted above, average water rates are unavoidably high but they have been adequate to maintain a satisfactory, if not strong financial position. As expected, WUC's internal cash generation has been insufficient to finance capital expenditures in its early years of operations, but with the growth in water sales, it seems likely that WUC should be capable of financing a modest but growing proportion of its capital expenditures in future years.

### Auditing

60. Auditing has been carried out by the international accounting firm, Coopers and Lybrand, and has been satisfactory. Certain initial problems caused the auditors to make a number of qualifications to their first audit report, but with one exception the causes of the qualifications were corrected enabling the auditors to remove the qualifications from subsequent reports. The remaining qualification arises because the auditors consider that since WUC has operated with an annual accounting loss, this is in conflict with the principles of financial operations laid down by the Water Utilities Corporation Act. However, as noted in the previous paragraph, these accounting "losses" have always been expected.

### Other Points

61. There are no significant lessons to be drawn from the Bank experience on this Project. The Project accomplished its goals despite completion delays. Initially, the Project was overdesigned but this was corrected. The consultants might have monitored the price escalations taking place during project preparation more effectively. For a time, employer and consultant seemed to be paralyzed by the possible consequences of the collapse of a lethargic contractor but eventually took effective action to make the contractor complete his work.

62. This is a rare case in the Bank where continuity has been maintained in staff assignment, from preparation of the Project until completion, with the exception of a 6-month period before Bank's reorganization in 1972 during which the engineer in charge was temporarily replaced and of the assignment of a young professional to help at the preappraisal and appraisal stage. There has also been a similar continuity on the borrower's side and Mr. Lang was closely associated with the project in the preparation stage when he worked for Government and in the construction phase when he was WUC's Manager. Consultants' staff has been less stable but throughout most of the construction, supervision was carried out by the same engineer, Mr. J. Bannister. IDA's supervision was regularly carried out, with a mission about every six months, and this was conveniently combined with supervision of the Shashe Infrastructure Project. Good working relationships were maintained throughout between Bank staff and Government, WUC and the consultants.

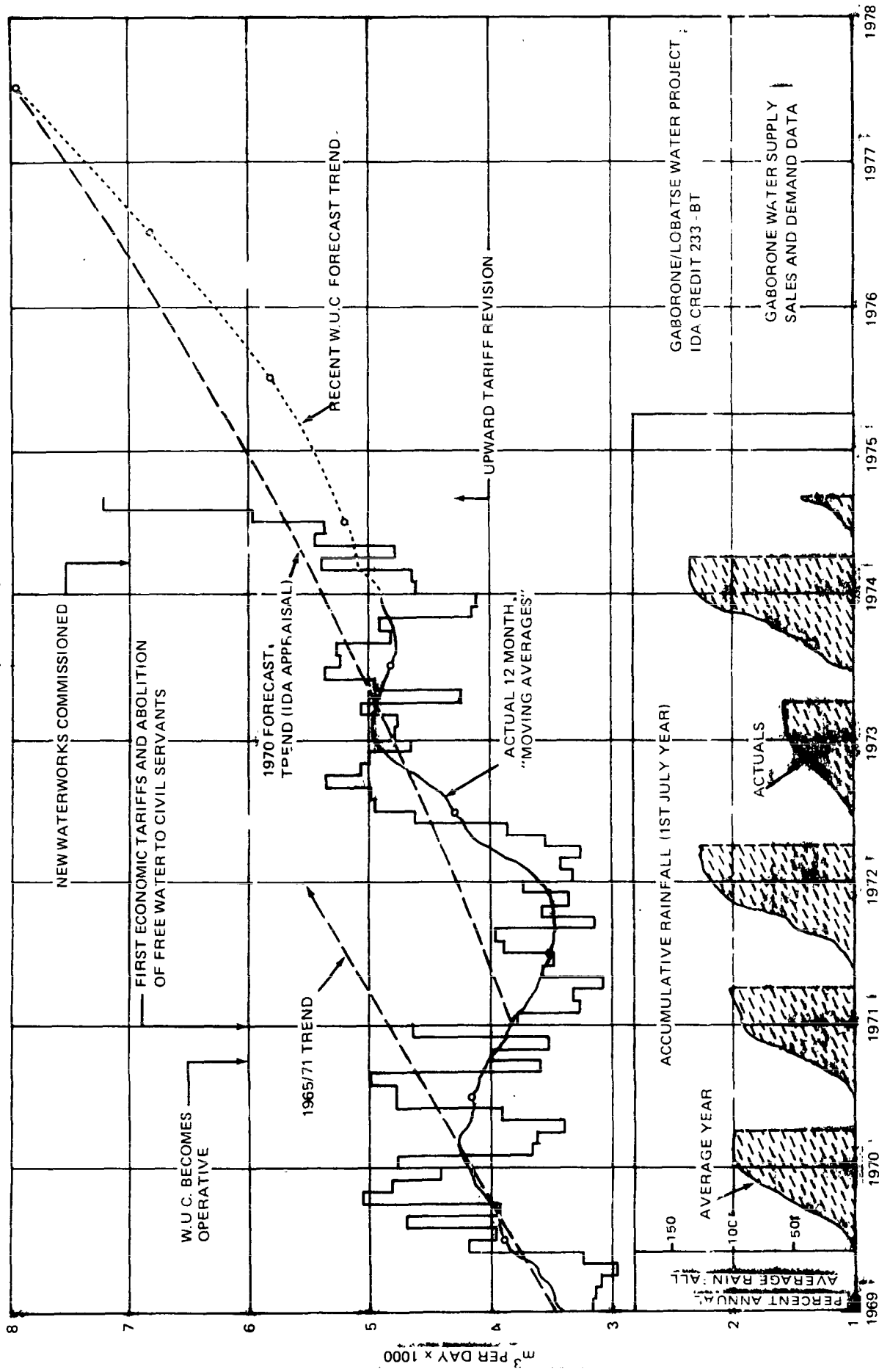
63. Little consideration was given at the time of appraisal to training. It seemed that the development of junior staff could best be handled locally and that there was little chance of reducing the dependence on expatriate staff to fill senior positions in the foreseeable future. This assessment seems to have been correct and it is doubtful that anything significant could have been done in assisting WUC in staff development.

64. With minor exceptions, WUC's reporting to the Bank has been satisfactory. WUC complained, however, that the quarterly reports were a heavy burden for a small corporation and it might have been possible to reduce the content of the quarterly report at an earlier stage after confidence in WUC's management had been developed.

65. The WUC's Manager, considers that the feasibility studies to determine the nature and timing of the next large investment (additional waterworks, heightening of the Gaborone dam spillway) should not start until 1978 when he believes that a clearer picture of future growth will emerge. However, considering the length of time required to carry out the necessary studies, it is becoming urgent to assess surface and ground water for the entire region, the economics of water development and to plan, as far as possible, the development of the region accordingly. It seems certain that by the end of the 1980's, the water resources of the area will be reaching full utilization and this raises wider questions regarding the long-term expansion of the Gaborone-Lobatse area and even of South East Botswana as water resources are very limited.



**BOTSWANA - GABORONE LOBATSE WATER SUPPLY PROJECT  
COMPLETION REPORT  
ACTUAL AND PLANNED CONSUMPTION**



PLOT DATE 1ST APRIL

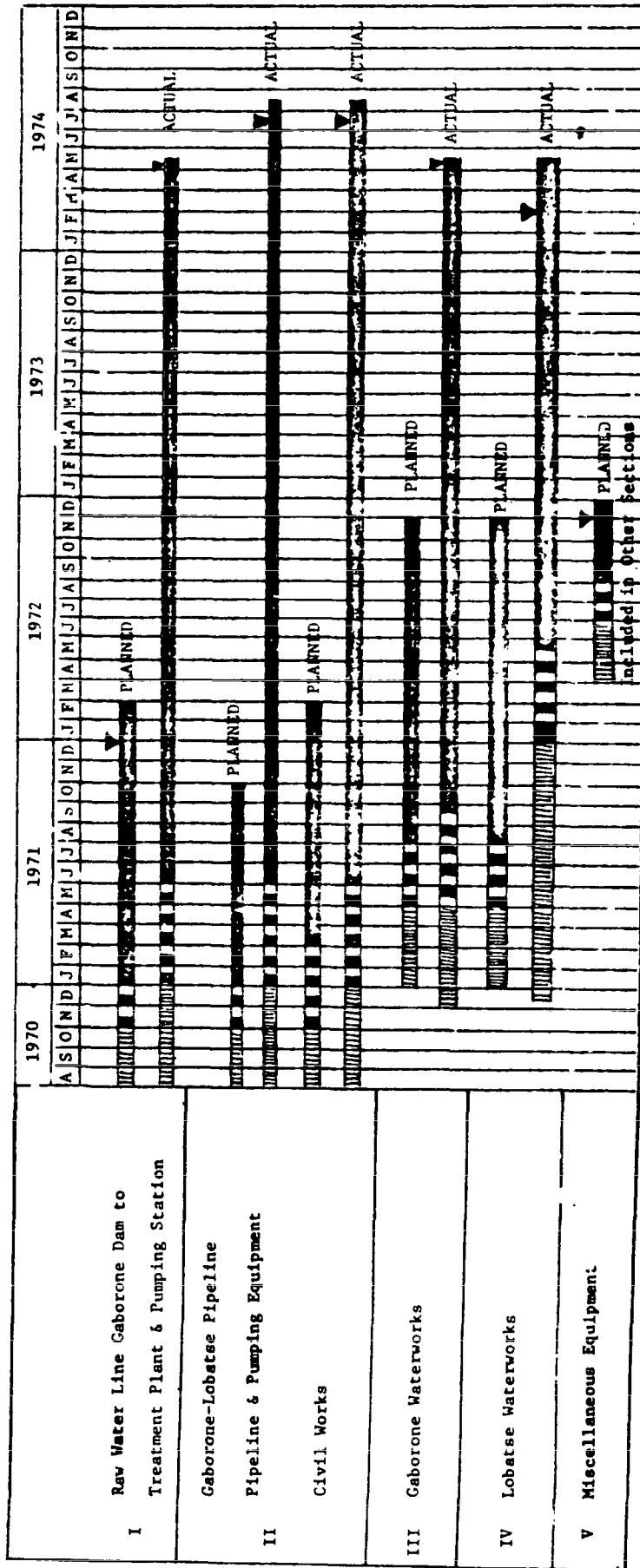
Note Weekly peak consumption about equals average daily consumption x 1.25.

BOTSWANA

GABORONE-LOBATSE WATER SUPPLY PROJECT

COMPLETION REPORT

Actual Construction Programme

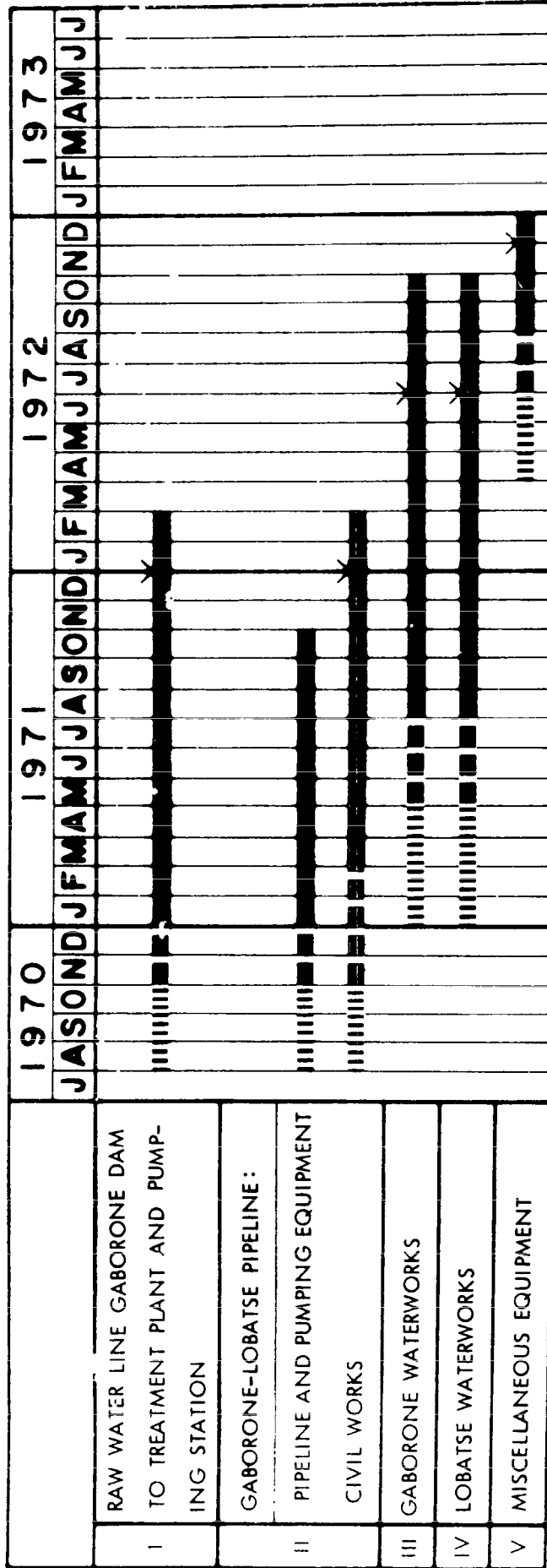


 Design & Preparation of Contract Documents  
 Tendering and Adjudication  
 Construction or Supply  
 Commissioning



# BOTSWANA GABORONE - LOBATSE WATER SUPPLY PROJECT

## APPRAISAL CONSTRUCTION PROGRAM



- ||||| DESIGN AND PREPARATION OF CONTRACT DOCUMENTS
- ■ ■ ■ ■ TENDERING AND ADJUDICATION
- ■ ■ ■ ■ CONSTRUCTION OR SUPPLY
- ∨ COMMISSIONING

BOTSWANAGABORONE-LOBATSE WATER SUPPLY PROJECTCOMPLETION REPORTProject Costs Together with Appraisal Estimate

	<u>Appraisal Estimate Rands</u>	<u>Actual Costs Rands (Note 1)</u>
<u>Raw Water Line</u>		
Dam to Treatment Plant	80,000	97,854
Raw Water Pumping Station	<u>10,000</u>	<u>72,532</u>
Subtotal	90,000	170,386
<u>Pipeline to Lobatse</u>		
Pumping Station	60,000	96,964
Micro Strainer	5,000	-
Pipeline	780,000	768,174
Ancillary Works	<u>10,000</u>	<u>35,072</u>
Subtotal	855,000	900,210
<u>Gaborone-Treatment Works</u>		
2 Imgd Treatment Plant	190,000	336,069
3 Img Reservoir	120,000	218,495
Pumping Station	70,000	81,024
Mains and Pipework	105,000	159,829
Pipework at Water Tower	<u>10,000</u>	<u>-</u>
Subtotal	495,000	795,417
<u>Lobatse Waterworks</u>		
1.25 Img Reservoir	80,000	136,136
Main	40,000	47,099
Control for Different Supply	<u>10,000</u>	<u>-</u>
Subtotal	130,000	183,235
<u>Miscellaneous</u>		
Technical Assistance, Housing, Vehicles, Laboratory, etc.	<u>30,000</u>	<u>42,145</u>
	1,600,000	2,091,393
Unallocated	400,000	63,021
Engineering	<u>200,000</u>	<u>310,000</u>
	<u>2,200,000</u>	<u>2,464,414</u>

NOTE:

1. As all project costs had not been fully settled at the time this report was prepared, actual costs include a small amount covering expected final settlements.

BOTSWANA

GABORONE-LOBATSE WATER SUPPLY PROJECT

COMPLETION REPORT

Comparison of Appraisal Forecast and Actual Income Statement  
(Gaborone-Lobatse Division only)

	Three Months to		Year to		Year to		Year to				
	March 31, 1971	March 31, 1972	March 31, 1973	March 31, 1974	March 31, 1974	March 31, 1975	March 31, 1975	March 31, 1975			
	Appraisal Report	Actual	Appraisal Report	Actual	Appraisal Report	Actual	Appraisal Report	Actual			
<u>Water Sales (Img)</u>	<u>138</u>	<u>104</u>	<u>479</u>	<u>448</u>	<u>526</u>	<u>516</u>	<u>577</u>	<u>555</u>	<u>634</u>	<u>614</u>	
<u>Revenues</u>											
Water Sales	69	55	383	389	421	452	462	470	507	587	
Other	1	1	6	7	6	19	6	27	6	26	
Pipeline Charges	-	-	-	-	94	-	94	-	94	78	
	<u>70</u>	<u>56</u>	<u>389</u>	<u>396</u>	<u>521</u>	<u>471</u>	<u>562</u>	<u>497</u>	<u>607</u>	<u>691</u>	
					<u>(Thousands of Rands)</u>						
<u>Expenses</u>											
Employment & Admin.	12	15	87	86	108	111	112	141	117	182	
Electricity	13	8	46	77	49	70	53	77	58	82	
Other	15	12	53	54	59	41	58	56	64	85	
Depreciation	21	21	85	86	127	87	162	91	163	153	
	<u>61</u>	<u>56</u>	<u>271</u>	<u>303</u>	<u>343</u>	<u>309</u>	<u>385</u>	<u>365</u>	<u>402</u>	<u>502</u>	
<u>Income (Deficit) before Interest</u>	<u>9</u>	<u>-</u>	<u>118</u>	<u>93</u>	<u>178</u>	<u>162</u>	<u>177</u>	<u>132</u>	<u>205</u>	<u>189</u>	
<u>Interest Charges</u>	<u>45</u>	<u>45</u>	<u>182</u>	<u>175</u>	<u>284</u>	<u>174</u>	<u>353</u>	<u>179</u>	<u>350</u>	<u>254</u>	
<u>Less: Interest Received</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>12</u>	<u>-</u>	<u>-</u>	
	<u>45</u>	<u>45</u>	<u>182</u>	<u>175</u>	<u>284</u>	<u>174</u>	<u>353</u>	<u>167</u>	<u>350</u>	<u>254</u>	
<u>Net Income/Loss</u>	<u>(36)</u>	<u>(45)</u>	<u>(64)</u>	<u>(82)</u>	<u>(106)</u>	<u>(12)</u>	<u>(176)</u>	<u>(35)</u>	<u>(145)</u>	<u>(65)</u>	
Return on average net plant in service			4.7	3.75	5.8	6.7	4.4	5.3	4.6	4.5	

BOTSWANA












GABORONE-LORATSE WATER SUPPLY PROJECT

COMPLETION REPORT

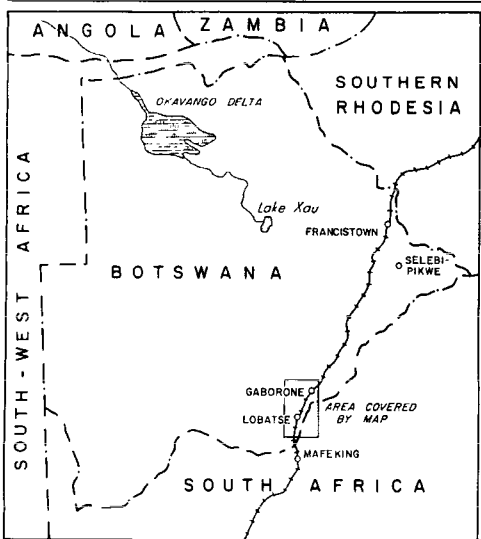
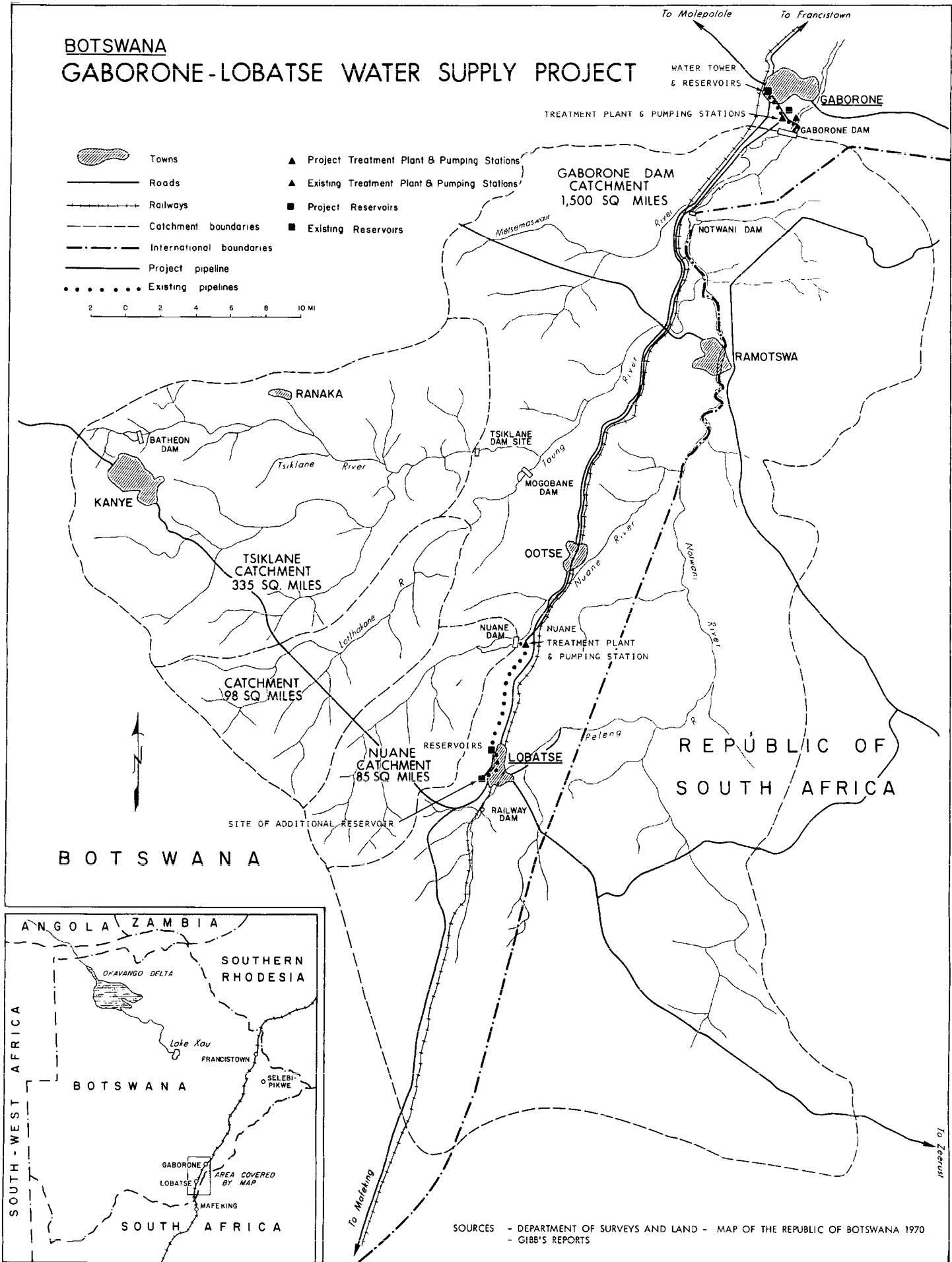
Comparison of Appraisal Forecast and Actual Balance Sheets  
(Gaborone-Lobatse Division only)

	March 31, 1971		March 31, 1972		March 31, 1973		March 31, 1974		March 31, 1975	
	Appraisal Report	Actual	Appraisal Report	Actual	Appraisal Report	Actual	Appraisal Report	Actual	Appraisal Report	Actual
(Thousands of Rands)										
<u>ASSETS</u>										
Current										
Cash	44	36	60	90	116	138	129	329	145	460
Accounts Receivable	26	116	32	82	35	92	38	87	42	81
Inventories	20	8	21	14	21	19	22	56	22	68
	<u>90</u>	<u>160</u>	<u>113</u>	<u>186</u>	<u>172</u>	<u>249</u>	<u>189</u>	<u>472</u>	<u>209</u>	<u>609</u>
Fixed										
Cost	2,550	2,550	2,640	2,560	3,833	2,571	4,900	2,712	4,950	5,310
Less: Accum. Deprn.	21	21	106	108	233	195	395	286	558	439
	<u>2,529</u>	<u>2,529</u>	<u>2,534</u>	<u>2,452</u>	<u>3,600</u>	<u>2,376</u>	<u>4,505</u>	<u>2,426</u>	<u>4,392</u>	<u>4,871</u>
Construction in Progress	188	-	1,686	2,674	1,032	1,197	-	1,923	-	109
	<u>2,717</u>	<u>2,529</u>	<u>4,220</u>	<u>5,126</u>	<u>4,632</u>	<u>3,573</u>	<u>4,505</u>	<u>4,349</u>	<u>4,392</u>	<u>4,980</u>
	<u>2,807</u>	<u>2,689</u>	<u>4,333</u>	<u>5,312</u>	<u>4,804</u>	<u>3,824</u>	<u>4,694</u>	<u>4,821</u>	<u>4,601</u>	<u>5,589</u>
<u>LIABILITIES &amp; CAPITAL</u>										
Current Liabilities										
Consumer Deposits	-	-	-	8	-	15	-	18	-	23
Creditors	15	45	17	274	17	81	18	56	19	330
Accrued Interest	45	32	45	60	83	66	113	89	114	104
Loan Repayments	-	-	-	-	-	-	-	-	-	-
	<u>60</u>	<u>77</u>	<u>62</u>	<u>342</u>	<u>100</u>	<u>162</u>	<u>131</u>	<u>163</u>	<u>133</u>	<u>457</u>
Government Debt	2,783	2,550	4,371	4,999	4,910	3,695	4,945	4,455	4,995	4,800
Govt. Irredeemable Capital Contrib.	-	107	-	96	-	96	-	96	-	96
Consumers Capital Contr.	-	-	-	2	-	11	-	269	-	461
Devt. Reserve Fund	-	-	-	-	-	-	-	13	-	15
Accum. Earn. (Deficit)	(36)	(45)	(100)	(127)	(206)	(140)	(382)	(175)	(527)	(240)
	<u>2,747</u>	<u>2,612</u>	<u>4,271</u>	<u>4,970</u>	<u>4,704</u>	<u>3,662</u>	<u>4,563</u>	<u>4,658</u>	<u>4,468</u>	<u>5,132</u>
	<u>2,807</u>	<u>2,689</u>	<u>4,333</u>	<u>5,312</u>	<u>4,804</u>	<u>3,824</u>	<u>4,694</u>	<u>4,821</u>	<u>4,601</u>	<u>5,589</u>

# BOTSWANA GABORONE-LOBATSE WATER SUPPLY PROJECT

-  Towns
-  Roads
-  Railways
-  Catchment boundaries
-  International boundaries
-  Project pipeline
-  Existing pipelines
-  Project Treatment Plant & Pumping Stations
-  Existing Treatment Plant & Pumping Stations
-  Project Reservoirs
-  Existing Reservoirs

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SOURCES - DEPARTMENT OF SURVEYS AND LAND - MAP OF THE REPUBLIC OF BOTSWANA 1970  
- GIBB'S REPORTS