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THE WORLD BANK

Report No.17289 MAS

PROJECT APPRAISAL DOCUMENT

REPUBLIC OF MAURITIUS

ENVIRONMENTAL SEWERAGE AND SANITATION PROJECT

January 16, 1998

Water and Urban 1

Infrastructure Department

Africa Region

CURRENCY EQUIVALENTS

(As of January 12, 1998)

Currency Unit = Mauritian rupee (Mau Rs)
US$ 1.00 = Mau. Rs. 22.425
Mau. Rs. 1.00 = US$ 0.045

FISCAL YEAR

July 1 - June 30

SYSTEM OF WEIGHTS AND MEASURES: Metric

1 meter (m)	=	3.28 feet
1 hectare (ha)	=	2.47 acres
1 kilometer (km)	=	0.625 miles
1 liter	=	0.220 imperial gallons (I)
1 cubic meter (m3)	=	220 I

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ABBREVIATIONS AND ACRONYMS

BADEA	Banque Arabe pour le Développment Economique de l'Afrique (Arab Bank for the Economic Development of Africa)
BOD	Biological Oxygen Demand
BTO	Back-to-Office report
CAS	Country Assistance Strategy
CFD	Caisse Française de Développement (French Development Fund)
CHA	Central Housing Authority
COL	Collaboration
CON	Consultation
CWA	Central Water Authority
EA	Environmental Assessment
EDF	European Development Fund
EIB	European Investment Bank
ERR	Economic Rate of Return
FAC	Fonds d'Aide et de Coopération (Assistance and Cooperation Fund - French Cooperation)
FY	Fiscal Year
GIS	Geographical Information System
GOM	Government of Mauritius
KfW	Kreditanstalt für Wiederaufbau (German Fund for International Cooperation)
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
IDA	International Development Association
IEPS	Initial Executive Project Summary
IFRR	Internal Financial Rate of Return
IS	Information Sharing
LIBOR	London Inter-Bank Offered Rate
LMTD	Long and Medium Term Debt Service
m3/d	Cubic meters per day
MAFC	Ministry of Agriculture, Fisheries and Cooperatives
MEDRC	Ministry of Economic Development and Regional Cooperation
MLGE	Ministry of Local Government and Environment
MOF	Ministry of Finance
MOH	Ministry of Health
MPU	Ministry of Public Utilities
MR	Moderate risk
NARV	Net Annual Rental Value
NEAP	National Environmental Action Plan
NGO(s)	Nongovernmental Organization(s)
NPV	Net Present Value
NR	No risk
NSP	National Sewerage Program
OECF	Overseas Economic Cooperation Fund (Japan)
O&M	Operation and Maintenance
PAD	Project Appraisal Document
PHRD	Population and Human Resources Development (Japanese grant)
PIP	Project Implementation Plan
PPF	Project Preparation Facility
PTI	Program of Targeted Interventions
SFD	Saudi Fund for Development
SMP	Sewerage Master Plan
UNDB	United Nations Development Business
WWA	Waste Water Authority

MAURITIUS
ENVIRONMENTAL SEWERAGE AND SANITATION PROJECT

PROJECT APPRAISAL DOCUMENT

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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

Africa Regional Office
Country Department 08

Project Appraisal Document

Mauritius
Environmental Sewerage and Sanitation

Date: January 16, 1998 [ ] Draft [X] Final
Task Team Leader: Abdelmoula Ghzala
Country Director: Michael Sarris Sector Manager: Jeffrey Racki
Project ID: 1921 Sector: Water Supply & Sanitation
Lending Instrument: Sector Investment and Maintenance Loan PTI: [ ] Yes [X] No

Project Financing Data [X] **Loan** [ ] **Credit** [ ] **Guarantee** [ ] **Other [Specify]**

For Loans/Credits/Others:

Amount: US$ 12.4 million

Proposed Terms: [ ] Multicurrency [X] Single currency
Grace period (years): 5 years [ ] Standard Variable [ ] Fixed [X] LIBOR-based
Years to maturity: 15 years
Commitment fee: 0.75%
Interest : 6.03%

Financing plan (US$m): US$ 65.6 million

Source	Local	Foreign	Total
Government	11.9	5.7	17.6
Cofinancier: Overseas Economic Cooperation Fund (OECF) - Japan	2.2	31.5	33.6
IBRD	0.0	12.4	12.4
Other - Local industry in-kind contribution (industrial wastewater pretreatment)	1.9	0.0	1.9

Borrower: Government of Mauritius
Guarantor: N/A
Responsible agency(ies): Waste Water Authority (WWA) of the Ministry of Public Utilities (MPU)

Estimated disbursements (Bank FY/US$M):	1998	1999	2000	2001	2002	2003
Annual	2.8	11.1	19.7	21.1	8.4	2.4
Cumulative	2.8	13.9	33.6	54.7	63.1	65.6

For Guarantees: N/A [ ] Partial Credit [ ] Partial risk

Expected effectiveness date: May 1998 Closing date: June 2003

Block 1: Project Description

1. **Project development objectives** (see Annex 1 for key performance indicators): The proposed project will address severe wastewater pollution from heavily urbanized areas of Port Louis, targeting the city's southern districts, industrial zones and affected coastal zones. The main objectives are to: (i) improve the health and sanitary conditions of the populations in these areas; (ii) reverse the current trend of environmental pollution on the island and in its coastal zone; and (iii) support Government efforts to implement priority institutional and technical measures identified in the Sewerage Master Plan.

2. **Project components** (see Annex 2 for a detailed description and Annex 3 for a detailed cost breakdown):

Component	Category	Cost Incl. Contingencies (US$M)	% of Total
A. Physical Component - Montagne Jacquot Sewerage System	Physical	57.2	87.2
(i) Land acquisition and compensation			
(ii) Pipelines and sewers			
(iii) Pumping stations			
(iv) Treatment Plant			
(v) Sea outfall			
(vi) Industrial pretreatment			
(vii) Supervision			
B. Wastewater Sector Equipment and Expertise	Institution-building/Policy	4.6	7.0
(i) Sector studies			
(ii) Sector expertise			
(iii) Equipment to support CWA/WWA joint billing system	Physical		
C. WWA Institution-building	Institution-building/Other	3.8	5.8
(i) WWA program management assistance			
(ii) WWA personnel training			
(iii) Support for Industrial waste management program implementation			
	Total	65.6	100

3. **Benefits and target population**: The project is expected to mitigate the risk of water-borne disease epidemics (notably hepatitis A), which, if not addressed, will impose substantial direct and indirect costs on the tourism and export industries. The project will also have a direct impact on human health by protecting potable, irrigation, and marine water resources from industrial and household wastewater pollution, and eliminating sewer back-ups and overflows. Sound public sector management of wastewater will benefit the country as a whole; the Montagne Jacquot component will directly improve the living conditions of a concentrated urban population in Port Louis. The project is expected to protect the vulnerable water resources of the Port Louis Lagoon, in addition to the marine and coastal ecosystems of Port Louis and the northwest shore. Treatment and future reuse of urban wastewater for irrigation will benefit agriculture and conserve potable water resources. Industry will be encouraged to utilize clean technologies, and to operate in an environmentally sound manner. The project will contribute to reducing the costs of cleaning up pollution and will generate revenues to sustain wastewater services.

4. **Institutional and implementation arrangements:**

Implementation period: FY98-FY03 (6 years), to correspond to GOM absorptive capacity for all projects in the National Sewerage Program (NSP).

Executing agency: The Waste Water Authority

Project coordination: WWA, assisted by external consultants, will be responsible for project implementation and coordination with other projects in the NSP. WWA will coordinate tariff collection with the Central Water Authority (CWA). The Steering Committee (see below) will ensure donor and overall NSP coordination.

Project oversight (policy guidance, etc.): Steering Committee, chaired by the Ministry of Economic Development and Regional Cooperation (MEDRC) and comprising high-level officials from MEDRC, MPU, Ministry of Finance (MOF), and the Ministry of Local Government and Environment (MLGE).

Implementation arrangements: WWA will be the project implementing agency. A "contract of delegation" between the GOM and the WWA will confer on WWA the function of "maître d'ouvrage délégué" for wastewater sector management and will specify the relative roles and responsibilities of WWA and MPU (see Project Implementation Plan). A Steering Committee, chaired by MEDRC and comprising officials of MEDRC, MOF, MPU and MLGE, will oversee NSP and the project to ensure coordination and timely implementation of necessary sector policy development and reform. On a larger scale, the Steering Committee will ensure national interagency coordination and coordination between all donor-funded activities in the NSP.

Cofinancing arrangements: The Japanese Overseas Economic Cooperation Fund (OECF) will provide parallel financing. OECF has committed to financing construction of the Montagne Jacquot treatment plant, the two pumping stations and the sea outfall. The Bank has financed preparatory studies and design work, and will finance the transmission and rising mains and the institutional strengthening component. OECF components will be subject to OECF procurement guidelines, while the Bank-financed components will following Bank procurement guidelines. There are no major incompatibilities between the Bank and OECF guidelines.

Physical component: Final engineering and design work for the Montagne Jacquot system will be completed by the WWA before Board presentation (February 12, 1998), with assistance from internationally-selected consultants financed under a PHRD Grant. Prequalification and bids will be coordinated to minimize start-up delay and to enable award of contract upon effectiveness. WWA will acquire the land and rights of way for construction and will manage construction of the Montagne Jacquot system through contracts with consultants, selected according to International Competitive Bidding. The project will be implemented in five and a half years, completed by December 31, 2002 and closed on June 30, 2003.

Sector equipment and expertise: The WWA is responsible for engaging the expertise and procuring equipment, defining study terms of reference, managing implementation of the studies and proposing sector legislation and reforms based on study results. Expertise will include provision of and training in software to support the new billing arrangements with CWA. Sewage sector reforms, the cost recovery system and institutional restructuring of WWA for its future role will require actions by the GOM as a whole and by other national institutions involved in the sector. The Ministry of Public Utilities will ultimately be responsible for making changes in sector policy, particularly those that lead to integration of water and wastewater sector management. Wastewater sector reforms will be carried out in a consistent and coordinated manner with the reforms planned for the other utilities, e.g. reform of the water sector and the CWA (particularly those relating to tariffs and the cost recovery system) and establishment of a utilities investment corporation to hold the assets of the water, wastewater and electricity sectors. The Steering Committee is to ensure coordination between reforms in the wastewater sector and other related sectors (such as environment, regional administration, industry, etc.). The MPU, through WWA, will take the lead in designing and launching the public awareness campaign on water and wastewater sector issues, including the National Connection Program, new tariffs and the implementation of the NSP. The WWA will procure equipment (water meters), in consultation with CWA, in support of the joint billing with the CWA.

4. Institutional and implementation arrangements (continued):

Institution-building component: WWA will be responsible for the institutional strengthening component and for ensuring implementation of staff training and timely input of appropriate technical expertise as defined in the Project Implementation Plan. Critical activities are addressed in the Institutional Action Plan, integrated into the Project Implementation Plan with detailed performance indicators as part of project conditions, and was finalized and agreed on during negotiations. WWA, with the assistance of PHRD-financed consultants, will develop and propose amendments to existing sectoral legislation, and work with MLGE and MEDRC to draft and enact necessary intersectoral legislation. WWA, assisted by technical assistance, will be responsible for negotiating an agreement with industry on pretreatment standards and methods, and will oversee compliance.

Cost recovery arrangements: Cost recovery will be implemented by the WWA in concert with CWA: a sewerage tariff is to be introduced July 1, 1998, as a surcharge to the water tariff corresponding to the amount of water used. The exact tariff level, structure and periodic revision over the project life were finalized prior to and agreed upon during negotiations. Revenues will be collected by the CWA and the sewerage surcharge transferred to the WWA. Industrial compliance with pretreatment standards (set by the MLGE) will be monitored by the MLGE and reported to WWA; WWA will be responsible for monitoring industrial contribution to pretreatment, and imposing penalties for noncompliance.

Procurement: Works wholly or partly funded by IBRD will be procured in accordance with the Bank's *Guidelines for Procurement under IBRD Loans and IDA Credits* (published January 1995; revised January and August 1996). Consultancy services wholly or partly financed by IBRD will be procured in accordance with the Bank's *Guidelines for Selection and Employment of Consultants by World Bank Borrowers* (January 1997). The Borrower's procurement regulations and procedures have been reviewed and found acceptable. Before negotiations, a General Procurement Noticewas prepared by WWA and transmitted to IBRD for publication in the United Nations Development Business (UNDB) to advertise all assignments expected to be financed by IBRD under the project. WWA will use Standard Bidding Documents published by the Bank for preparation of bidding and prequalification documents for works to be procured under International Competitive Bidding (ICB), and for Requests for Proposals and consulting service contracts. Detailed project procurement arrangements are given in Annex 6.

Accounting, financial reporting and auditing arrangements: Under the project, WWA will implement (before June 30,1999) a cost accounting system tracing the cost of the various services, including depreciation, the cost of capital and other common costs, and associated revenues, to provide a full basis for cost recovery and tariff policy. WWA will keep separate project accounts together with their statutory financial statements. Content of terms of reference for the annual audits of the project accounts was agreed upon at negotiations. Auditing will be carried out by independent auditors acceptable to the Bank, and the reports of such audits will be submitted to the Bank no later than six month after the end of the Borrower's fiscal year.

Monitoring and evaluation arrangements: *Supervision.* The Bank will devote some 80 staff weeks for supervision of loan progress through FY2003. During the first three years, supervision will focus on progress towards achieving specific objectives such as works, implementation of WWA institutional action plan, tariffs and cost-recovery targets, implementation of the industrial waste management program and the performance of involved agencies. Particular attention would be given during supervision and project reviews to implementation of the national sewerage connections program, including execution of the reticulation system, WWA staffing, implementation of the WWA training program and the operation and financial performance of the WWA. In addition, effluent quality monitoring will be carefully monitored (particularly industrial effluent) to ensure compliance with quality standards.

4. **Institutional and implementation arrangements (continued):**

Monitoring: Overall project monitoring will be based on indicators confirmed during appraisal and the Project Implementation Plan which was finalized by the Borrower and agreed on during negotiations. Monitoring will be carried out by the Steering Committee, chaired by MEDRC, and assisted by consultants as necessary. Progress under each project component and the Institutional Action Plan will be monitored and coordinated by WWA under the guidance of the Steering Committee. Progress reports will be prepared by WWA every six months and submitted to the Bank within one month thereafter. No later than three months after completion of the project, GOM will prepare and furnish to the Bank a report on the execution of the project, its costs and the benefits derived and to be derived from it.

Mid-term review: A Mid-term Review will be carried out in June 1999 by the Bank, together with GOM and OECF. In addition to covering all areas included in annual reviews, the Mid-term Review will assess the implementation status of the National Sewerage Program, the various sectoral studies, degree of implementation of policy reforms, institutional arrangements, tariffs and the cost-recovery system, the regulatory framework, private sector participation and evolution of the role of WWA in the sector. Prior to the Mid-term Review, WWA will contract a consulting firm (under project finance) to review and assess the progress of NSP and WWA restructuring, conduct a study on water and sanitation sectors and prepare the necessary documentation for the Review. In particular, the Review will consider and discuss the results of the following studies and reports: (i) review of past performance and implementation of the NSP in general, and the Montagne Jacquot project in particular; (ii) review of recommendations and proposals of the study on public utilities (water, wastewater and electricity sectors), including a 5-10 year action plan to implement recommendations; and (iii) review of the project implementation plan (PIP) and recommendations for updating/amending the PIP for the remainder of project implementation. It is expected that the Mid-term Review will result in determination of a general framework for future integrated water and sanitation sector policy and development, which will in turn guide reforms of policies and institutions in the two sectors and related sectors. At this time, the technical and financial viability of the proposed Utilities Investment Corporation, Ltd will be reviewed and evaluated.

Block 2: Project Rationale

5. **CAS objective(s)** supported by the project — Document number and date of latest CAS discussion: Report No. 16426, April 22, 1997

The proposed project supports the CAS objective to safeguard the environment through better strategic planning and wastewater management. The project focuses on this latter, and as part of the Government's National Sewerage Program, fits well within the sector strategy developed with broad public participation and consultation.

6. **Main sector issues and Government strategy:**

High urbanization (40%) and economic growth have led to ***municipal and industrial pollution*** at a level that threatens human and environmental health. The 1990 National Environmental Action Plan (NEAP), prepared with Bank assistance, identified ***inadequate disposal of urban wastewater*** as a growing threat to the quality of underground water resources, and marine and coastal zone ecosystems. Existing wastewater infrastructure does not handle effluent in an environmentally sound manner. An ***increase in maintenance resources is needed*** to strengthen infrastructure performance. The NEAP also identified a ***the need to strengthen and coordinate the institutional framework, and clarify and enforce legislation*** to overcome problems in the sector. Based on the recommendations of the NEAP, the GOM developed a Sewerage Master Plan (SMP) in 1992, and the related National Sewerage Program, of which the proposed project is an integral part. Institutional studies of both the water and wastewater sectors have noted the ***growing imbalance between the water and wastewater sectors, in terms of infrastructure, management and cost recovery*** (for example, water services are currently available to 90% of the population, while the public sanitation network covers only 18%). The GOM strategy is to reduce these imbalances and

6. **Main sector issues and Government strategy continued:**
ultimately move the sectors toward closer coordination and integration by increasing sewerage infrastructure, connections and treatment, reforming water and wastewater institutions and legislation, and integrating cost-recovery measures. Although the GOM will reform and increase sewerage tariffs to cover recurrent costs, depreciation and contribute to debt service, it is committed to maintaining affordability for service.

7. **Sector issues to be addressed by the project and strategic choices:**
The project will ***provide needed wastewater infrastructure*** in Montagne Jacquot, one of the priority regions defined in the Sewerage Master Plan. The project will also ***address institutional and regulatory weaknesses*** by providing support to the newly established (March 1996) WWA, and providing a coherent framework for interagency coordination in sector management and policy development. A new WWA Act, slated for promulgation in 1998, will replace earlier legislation and effect restructuring of WWA as "maître d'ouvrage délégué" and enable closer coordination among the water, wastewater and environment sectors. Legislative reforms in related sectors will be coordinated by the Steering Committee. This alternative was chosen as being simpler than simultaneously revising the myriad wastewater and intersectoral legislations. Since private sector capacity is not well established in Mauritius, the project will ***facilitate involvement of the private sector*** by strengthening the WWA to plan infrastructure investments and manage wastewater service contracts, and package works and O&M contracts to correspond to private sector capacity. The project ***introduces cost-recovery mechanisms as a means of generating maintenance resources***, and economic incentives/disincentives for industrial compliance with environmental standards to reduce the cost of wastewater treatment and disposal. The wastewater tariffs to be introduced in July 1998 respect the GOM's commitment to affordability of service, and therefore increase gradually and do not fully cover cost of service provision (they will gradually come to cover recurrent costs, depreciation and will contribute to debt service). Given the imbalances between the water and wastewater sectors, it was decided to ***move gradually towards integration of the sectors.*** As noted above, the proposed WWA Act will enable better coordination with the water and Wastewater tariffs will be determined as a percentage of metered water consumption (subject to affordability criteria for domestic consumers), and will be jointly billed and collected by CWA with the water bills. Although not currently planned, the project could be expanded in the future to include a component for reuse of treated urban and industrial wastewater in agricultural irrigation as a means of preserving potable water resources. environment sectors. Finally, in preparation for the Mid-term Review, a study will be conducted on the water and wastewater sectors and will generate a framework, recommendations and an action plan for integrated management of the two sectors. The Mid-term Review will futher review the results of the study on public utilities and will evaluate the financial and technical viability of the proposed Utility Investment Corporation, Ltd.

8. **Project alternatives considered and reasons for rejection:**
1. The immediate involvement of the private sector to provide and manage wastewater services was rejected due to the initial need to: (i) establish a coherent national framework within which the private sector could operate; (ii) determine and enforce environmental regulations; (iii) strengthen WWA capacity to plan and manage infrastructure investments; and (iv) allow local private sector capacity to develop. Once these have been achieved through the project, more responsibility may devolve to the private sector through construction, service and/or maintenance contracts.

2. Three main alternatives were under consideration for design of the Montagne Jacquot sewerage system: (i) primary wastewater treatment with sea outfall disposal (100 m deep); (ii) secondary treatment with sea outfall (30 m deep); and (iii) tertiary treatment with reuse and sea outfall disposal. The appropriate technology has been chosen through updating of the preparatory feasibility study with further site investigations and analyses and consultations with experts and is reflected in the detailed system design. Based on these studies, an amended alternative (i) has been chosen (as recommended by the consultants and accepted by GOM), given current needs, relative costs, and social acceptability of wastewater reuse. The new alternative proposes pretreatment of industrial effluent, primary wastewater treatment with disinfection, and sea outfall disposal of only 30m deep. In future, as resources and social acceptance grow, treatment and infrastructure may be upgraded progressively to allow use of option (iii).

9. **Major related projects financed by the Bank and/or other development agencies** (completed, ongoing and planned).
World Bank:

- Mauritius Environmental Monitoring and Development Project (ongoing)
- Mauritius Port Development and Environmental Protection Project (ongoing)
- GEF Indian Ocean Oil Spill Contingency Planning Project (planned)

Other Donors: Within the framework of the National Sewerage Program:

- Caisse Française de Développement (CFD) - Grand Baie Sewerage Project
- European Development Fund (EDF) - St. Martin Treatment Plant Extension Project
- KfW/ European Investment Bank (EIB) - Baie de Tombeau Sewerage Project
- Banque Arabe pour le Développement Economique de l'Afrique (BADEA) - CHA Estates Infrastructure Rehabilitation
- Nordic Investment Bank/Nordic Development Fund - Sewerage Master Plan Urgent Works Project
- Saudi Fund for Development (SFD) - Plaines Wilhelms Additional Sewerage Works Project

10. **Lessons learned and reflected in the project design:**
Given the number of donor-financed sewerage projects within the National Sewerage Program, there is ***a need for tight coordination among the GOM and all donors***. The project falls within a clearly defined master plan, and includes a Steering Committee to ensure coordination among GOM agencies and donors, and implementation of the sector policies. The project addresses the ***limited absorptive and implementation capacity of the WWA*** through an institutional strengthening component and investment phasing. Institutional strengthening consists of providing necessary technical assistance to the WWA and in training and assisting WWA to play its future role of planning and programming sector activities, contracting out and managing the contracts, and monitoring the related quality of environment. Investments in works and equipment will be phased according to local implementation and financial capacity. Extensive preparatory studies address ***the need to adopt environmentally sound technology in project design***. The project incorporates cost-recovery mechanisms (user fees, treated wastewater reuse, industrial wastewater pretreatment, economic incentives) to ***ensure financial sustainability***. In addition, ***tender documents are to be ready before project effectiveness*** so as to facilitate implementation.

11. **Indications of borrower commitment and ownership:**
The GOM has shown steady commitment to developing and applying sound environmental policy. Following the 1990 NEAP, the GOM developed a Sewerage Master Plan to define programs to provide long-term solutions for the safe disposal of household and industrial liquid waste. This plan resulted in the National Sewerage Program which is being implemented with donor support. Following the recommendations of the SMP, the GOM created the Waste Water Authority, in March 1996, as an autonomous agency within the Ministry of Energy and Water Resources. The August 1997 government reorganization consolidated infrastructure agencies (including the WWA) within the new Ministry of Public Utilities, facilitating interagency coordination. The WWA is to be restructured through a new Act to enable it to play its new role as "maître d'ouvrage délégué" and to facilitate private sector involvement, with support from the proposed operation. To this end, the GOM is drafting the new WWA Act and has drafted and submitted to Parliament the Sector Policy Letter. The GOM has also committed to revising and applying wastewater tariffs to improve cost recovery. The GOM has also taken the initiative in reforming the public utility sectors (including the wastewater sector) by proposing to create a utility investment corporation to manage the investments for all utilities (water, wastewater and electricity).

12. **Value added of Bank support:**
The World Bank has been actively involved in environmental initiatives in Mauritius, and has developed a supportive working relationship with the GOM. Bank assistance has supported the NEAP, the Environmental Monitoring and Development Project and the Sewerage Master Plan Study. The Bank's strategy is to maintain its lead role in assisting the GOM to achieve the goals set in the NEAP and Sewerage Master Plan, and to contribute to the financing of the National Sewerage Program. While the Bank and other donors are assisting in providing the physical investments defined in the NSP, the proposed Bank operation adds components to improve sector management and ensure financial sustainability for the sector as a whole. In addition, the Bank has been instrumental in mobilizing Japanese OECF funding for environmental protection initiatives in Mauritius.

Block 3: Summary Project Assessments (Detailed assessments are in the project file. See Annex 8)

13. **Economic Assessment** (see Annex 4):	[X]	Cost-Benefit Analysis : NPV=Mau Rs 1.116 billion; ERR= 23% **(Please refer to following section)**	[ ]	Cost Effectiveness Analysis:	[ ]	Other [Specify]

Fiscal impact (for all projects): The GOM will contribute US$ 17.6 million over 6 years to project financing, representing 26.3 % of total project financing. This contribution will come from the Government's Capital Budget. Cost-recovery measures included in the project (tariffs, fees, pollution penalties) are designed to cover O&M and depreciation expenditures in the Current Account Budget, and a gradually increasing share of the debt service in the Capital Budget. This analysis is detailed in Annex 5.

14. **Financial Assessment** (see Annex 5) NPV at estimated Discount Rate of 10% =Mau Rs (129) million; IFRR= 8.1%
The proposed sewerage scheme and technology for the Port Louis South and Lower Beau Bassin/Coromandel areas, known as the Montagne Jacquot Sewerage System, was selected as the least-cost and most environmentally sound solution to wastewater pollution problems affecting these areas. This solution was selected after feasibility studies involving technical and economic comparison of various alternatives.

The Internal Financial Rate of Return (IFRR), which in constant prices relates the sewerage revenues to the capital and operating costs of the Montagne Jacquot sewerage facilities, was computed as an indication of the minimum economic return. The life of the project has been estimated at 30 years. Revenues attributable to the project were used as a first estimate of the consumer's willingness to pay in quantifying the estimated internal rate of return for the proposed project. The cost stream includes: (i) base costs and physical contingencies for civil works, equipment, engineering studies, supervision and operation and maintenance for the transport, treatment and disposal of wastewater for Port Louis South and Lower Beau Bassin/Coromandel; and (ii) the investment costs for additional household and industrial connections (to be financed by GOM and implemented by WWA). The IFRR is approximately 8.1%. The IFRR is considered to be acceptable given: (i) the nearly total lack of cost-recovery mechanisms at present; and (ii) the social nature of the propose project with its intangible anticipated health, economic and environmental benefits.
The computation of the IFRR is shown in Annex 5.

15. **Technical Assessment:**
The project concerns the transport, treatment and disposal of wastewater from the areas of
Port Louis South and Lower Beau Bassin/Coromandel. The tributary areas include residential, commercial and industrial wastewater sources, with industry concentrated on the industrial estates of Plaine Lauzun, Coromandel, and La Tour Koenig. The existing sewerage service consists of preliminary treatment works at Fort Victoria and Pointe aux Sables, and shallow ocean outfalls to dispose of the wastewater. The existing wastewater works provide inadequate treatment and create severe pollution problems in the vicinity of the ocean outfalls and should therefore be replaced.

A new wastewater treatment plant will be constructed at Montagne Jacquot; the site has been chosen for ease of expansion to provide additional capacity in future years and to provide higher levels of treatment, if required. Two new wastewater pumping stations and a new transmission main will be constructed to transport the wastewater from Fort Victoria and Pointe aux Sables to the Montagne Jacquot site.

15. **Technical Assessment continued**:
Different wastewater treatment alternatives were developed based on receiving-water quality standards for ocean waters and for wastewater reuse in irrigation; two main options were retained. It was concluded that the ocean water quality standards could be met with treatment works providing preliminary and primary treatment, disinfection, sludge stabilization, and sludge dewatering processes, with the effluent discharged through an ocean outfall 645 meters long at ad (Alternative 1). For Alternative 2, reuse of treated wastewater in irrigation, it was concluded that water quality standards could be met by treatment works providing preliminary, primary and secondary treatment, disinfection, sludge stabilization, and sludge dewatering processes, with effluent not used for irrigation to be discharged into the ocean at a depth of 20 meters.

The decision on which alternative to implement was based on the preliminary results of a study to determine the economic and technical feasibility of reusing treated wastewater from the Montagne Jacquot treatment plant in agricultura irrigation. As the feasibility of irrigation reuse cannot be established for the immediate future, the study recommended implementation of the Alternative 1. This alternative provides flexibility in that the primary treatment works can be expanded and the level of treatment increased at any time in the future.

For the effluent discharge, an ocean outfall at a depth of 100 meters deep was deemed impractical. An ocean outfall at a depth of 30 meters will provide satisfactory dispersal of effluent receiving primary treatment and disinfection. This meets water quality standards for recreational waters at the adjacent shore and at the Pointe aux Sables reef and lagoon.

Wastewater Flows: The average dry-weather wastewater flow from the service area is projected to grow from 24,800 cubic meters per day (m3/d) in 1997 to 60,500 m3/d in 2017. Essentially all of the growth in flow will be due to increases in population served. In the Pointe aux Sables service area, the average daily domestic flow will more than triple over the same period, from 6,500 m3/d in 1997 to over 19,900 m3/d in 2017. Domestic flow from Fort Victoria is projected to increase from 10,000 m3/d to 25,000 m3/d during this period.

The proposed investment, designed to respond to immediate needs, also provides the capacity to treat the wastewater flows projected for the year 2005, an average daily flow of 48,000 m3/d. An additional incremental investment by WWA of about US$3.5 million, envisaged for 2010, would provide the capacity to treat projected wastewater flow for the year 2017, estimated at 60,000 m3/d.

16. **Institutional Assessment**:
The Government of Mauritius has defined the sewerage program (NSP), presently under implementation with the assistance of the donor community, as a national priority. The GOM is in the process of taking the necessary measures to facilitate program efficiency and enable implementation of the most appropriate policy reforms to respond to the present and future needs of the sector.

The scope of the NSP, and consequently donor concerns about national capacity to implement this program, call for the definition of the future role of WWA coherent with the sector policy and the overall objectives of the NSP. This will involve: (i) review and modernization of the sector's legal and institutional frameworks; (ii) adoption and progressive implementation of appropriate cost-recovery mechanisms to allow financial sustainability; (iii) subsequent restructuring, strengthening and training of WWA to adequately play its future role as "maître d'ouvrage délégué"; and (iv) adoption of the necessary measures to ensure proper program implementation. All of these aspects are included in a Sector Policy Letter that the GOM has prepared. In addition, the GOM will draft and promulgate a new WWA Act to provide a legal basis for WWA's new structure and function and to define its role, responsibilities and interactions with other concerned institutions, governmental or private.

a. Executing agencies: The WWA will retain overall responsibility for project execution. During project preparation, WWA has been assisted by international consultants and by technical expertise provided under the project and by the European Union.

16. **Institutional Assessment continued**:
b. Project management: WWA will carry out day-to-day project management activities. Given the limited capacity and experience of WWA, it will be assisted, over the life of the project, by external consultants with international experience and practical operational backgrounds in the overall management of sewerage systems. The institutional strengthening component will provide needed training to supplement the external technical assistance in developing WWA's capacity to plan and manage contracts for capital projects and operation and maintenance.

Design and specifications for construction of the Montagne Jacquot Sewerage System have been developed during project preparation by international consultants, selected according to World Bank guidelines, financed through a Japanese PHRD Grant. The construction works are conventional in nature and therefore no major risks are expected during implementation. Construction will be carried out by private contractors selected through international competitive bidding. Sea outfall construction is expected to proceed with contractor prequalification. Given its limited experience, and the scope of the works to be undertaken, WWA will be assisted in construction supervision by external consulting engineers, to be selected internationally. The consulting duties will include verification of compliance with specifications for works and equipment, and supervision of construction, installation, testing and commissioning of the various physical components.

17. **Social Assessment**:
A social assessment, undertaken as part of the environmental impact assessment, looked at the impact of the proposed project on stakeholders (residents, businesses and workers) in the project and neighboring areas. The project will improve environmental living conditions and reduce health threats for populations in heavily urbanized and industrial areas of Port Louis (southern districts and affected coastal area). Tariffs for cost-recovery will be set according to a cost-recovery study that examined ability and willingness to pay for sewerage service (affordability). Costs for populations will be somewhat offset by pretreatment of effluent by industries, which will reduce the overall cost of service.

For the country as a whole, there is a need to convince the population of the need to connect to the public sewer system and to pay for sewerage services. The cost of connection is relatively high (Rs. 15,000, approximately US$750), a strong disincentive to switch from on-site sewerage. In addition, sewerage tariffs historically have been set quite low, billing has been haphazard, and collection has not been enforced. The WWA will launch a public awareness campaign to inform the population of the improvements in service underway through the NSP; this will be linked to information on the new tariffs so as to instill the idea of paying for better service. Sewerage tariffs determined as a percentage of water consumption will increase the transparency of the service provided, and the new system of joint billing with water fees should increase collection and reinforce the interrelated nature of the two sectors. The GOM is currently considering a National Sewer Connection Program, to provide incentives (economic and otherwise) for households to connect to public sewers.

18. **Environmental Assessment (EA)**: Environmental Category [X] A [ ] B [ ] C

Two of the three main sources of water pollution in Mauritius are from waste water sources: contamination of domestic water supplies by overflowing of sewerage during cyclones and floods, and disposal of industrial waste (e.g. dyes) into natural water bodies (MLGE 1991). The purpose of the Montagne Jacquot Sewerage and Sanitation Project is to provide a long-term solution for the treatment and disposal of wastewater in the Port Louis South and Lower Beau Bassin/ Coromandel area, to achieve pollution abatement to a level that allows the disposal of treated effluents in the natural environment and to maintain sustainable development of economic activities of Mauritius. A full environmental assessment was carried out as part of project preparation, as required by the World Bank and the GOM's National Environment Policy. Mitigation measures from the EA will be incorporated into project design, and will form the basis of standards for treated wastewater prior to disposal.

18. **Environmental Assessment continued:**
The environmental and socio-economic impacts of the Montagne Jacquot water and sanitation project are expected to be overwhelmingly positive. The present discharge arrangements in the Port Louis area and south beyond Pointe aux Sables are resulting in extremely poor environmental quality, unacceptable impacts on human health and well-being, and degradation of the marine environment to such a serious extent that only a few species can survive in the areas affected by wastewater discharges.

The implementation of the Montagne Jacquot project, and in particular the decommissioning of several outfalls and their replacement with a single ocean outfall off Montagne Jacquot, is expected to have some immediate beneficial effects, but because of the exceptionally serious degraded state of the local marine environment, natural rehabilitation of the currently affected areas will take some time. It may even take several years before normal seaside activities such as swimming, fishing, various activities in boats and beachcombing can be resumed in the Bain des Dames and at Pointe aux Sables without fear of serious health implications. The processes of natural rehabilitation may be assisted nevertheless, by community efforts at beach cleaning, and there is little doubt that development of strategic plans with the relevant government agencies for enhancing economic opportunities, will assist in regenerating the worst affected communities and help them to realize the economic potential of the area. Because of the proximity of the Bain des Dames and Pointe aux Sables communities to the main commercial center of Mauritius, and the recognition they have already received as potential recreational zones in the city, it is likely that development of tourism and services, may well assist in the expansion of employment opportunities in the area.

Potential negative impacts associated with the project
Construction phase impacts. The principal negative impacts associated with the Montagne Jacquot project would be experienced during the construction phase, and primarily caused by the trench digging operation to lay the main transfer pipeline from Fort Victoria via Pointe aux Sables works to Montagne Jacquot. Whether the route chosen is along the main road or through the lagoon off Pointe aux Sables, mitigation of the negative impacts is not a straightforward matter and contractors will need to be closely supervised, to ensure implementation of the recommended mitigation measures, as well as efficient and competent management of the construction activities. No resettlement is involved, but construction of the pipeline will most likely cause serious disruptions in traffic for approximately 3 months. Every attempt will be made to reduce this disruption, including carrying out construction activities at night or outside of rush hours.

Impacts of the ocean outfall. Although the wastewater discharge at Montagne Jacquot is expected to fall well within the required effluent standard, and to achieve the desired water quality standards in the receiving environment, the actual environmental impacts of the discharge cannot be accurately predicted on the basis of the available information. Experience from elsewhere suggests that the performance of individual outfalls and environmental impacts on living communities, depends so much on the physical dispersion characteristics of the receiving environment, that generalizations can be misleading. Nevertheless, because of the introduction of a disinfection stage into the effluent treatment process, the potential health hazards for swimmers, divers etc. in the vicinity of the outfall will be negligible.

The potential impacts of treated effluent on benthic communities, and in particular corals, are exceptionally difficult to predict accurately. Despite the system of diffusers and expected dispersion and dilution performance of the outfall, the relatively slow bottom currents may militate against steady removal of effluent out of the main discharge area, leading to progressive eutrophication of coastal waters off Montagne Jacquot. Because of the extreme sensitivity of corals to elevated nutrient concentrations, it is highly likely that some bleaching and death will be observed in communities near to the discharge. Inevitably loss of corals leads to progressive deterioration of the reef ecosystem, since it is dependent on coral productivity to drive the system, so that the greater resilience of associated species becomes more or less irrelevant.

18. **Environmental Assessment continued:**
While it is obviously preferable to avoid any deterioration in coastal marine communities and reef ecosystems in particular because of the many important resource generation and protection functions they serve, there are very few locations around the coast of Mauritius where it is possible to avoid coral reefs. The site adopted for the Montagne Jacquot outfall is one of the few breaks in the reef on the west coast suitable for an outfall, where the consequences of some deterioration in reef communities (not of exceptional quality or diversity) are acceptable, on grounds of making possible the urgent and very necessary improvements in environmental quality further north.

Impacts of the Montagne Jacquot WastewaterTreatment Plant. Providing the new wastewater treatment plant at Montagne Jacquot is efficiently and properly managed, the potentially significant impacts can be mitigated in the course of normal remedial action on site and/or through supervision and monitoring of staff activity. A plant of this type occasionally produces offensive odors, and if they prove to be unacceptable to the local residents, it is possible to consider including an odor control system. The project plans include a buffer zone (detailed in the environmental mitigation plan) between the plant and the neighboring community, which should mitigate most of the noise and smell problems. Additionally, the sludge disposal operation will have to be managed cleanly and efficiently, or it may result in complaints from the general public. The technology on site will be relatively straightforward to manage, and so ensuring that the plant staff are conscientious and committed to running a well managed operation is probably the most important element in ensuring future trouble-free operations.

19. **Participatory Approach:**	Identification/Preparation	Implementation	Operation
Beneficiaries/community groups	CON		
Intermediary NGOs			
Academic institutions			
Local government			
Other donors	IS/CON/COL		
Local Industry	CON	CON/COL	CON/COL

20. **Sustainability:**
Environmental and health benefits will be sustained by the continuous functioning of the Montagne Jacquot system, which depends on available resources for and provision of routine maintenance. Industrial compliance with environmental regulations is also critical to sustain project benefits. These factors should be assured by the cost-recovery mechanisms (tariffs, economic incentives for environmental compliance, etc.), and by improved sector management.

21. **Critical Risks** (see fourth column of Annex 1):

Project outputs to development objectives

Risk	Risk Rating	Risk Minimization Measure
Risk that new MPU not able to work with other Ministries	NR	Clarify roles and responsibilities in implementation plan during negotiations
Risk of inadequate GOM enforcement capacity for tariff collection and industrial compliance	MR	Project will strengthen regulatory and legislative frameworks for environmental management; GOM is already using economic incentives/ penalties and legal measures to encourage compliance. Gradual, affordable and transparent tariffs, and joint billing with water charges should improve revenue collection.
Risk of inadequate WWA management capacity	MR	Project includes institutional strengthening through training and technical expertise. Works will be phased to match development of institutional capacity.
Risk that National Connection Program not implemented completely or on time	MR	Government is committed to carrying out the National Connection Program, and will combine connection incentives with public awareness.
Risk of inadequate maintenance of Montagne Jacquot system	MR	Project includes technical assistance for operation and maintenance; construction contracts to include O&M for 3 years after construction. Thereafter, sufficient private sector and WWA management capacity should be established.

Project components to outputs

Risk	Risk Rating	Risk Minimization Measure
Risk of inadequate WWA absorptive capacity	MR	Project will be phased to correspond to institutional strengthening measures; works will be packaged in suitable lots.
Risk of slow start-up due to newly restructured MPU and relevant agencies	NR	Continuity of staff in newly restructured agencies/Ministry
Risk that cost-recovery measures may not be affordable or feasible (resistance to paying)	MR	Tariffs will be set according to cost-recovery study that examined ability and willingness to pay. Tariffs will be phased for gradual increase.
Risk that cofinancing will not be available	NR	OECF has indicated its commitment to project

Overall project risk rating

Risk	Rating
	NR

22. **Possible Controversial Aspects:**

There may be social resistance to paying increased tariffs, however increases will be phased to avoid undue hardship. Likewise, there may be social resistance to connecting to public sewers due to the relatively high connection cost and lack of acceptance of the need to connect. This will be addressed by the public awareness campaign and incentives built into the National Connection Program.

Industry may be reluctant to comply with effluent pretreatment requirements. The project includes clear effluent and pretreatment standards and an industrial compliance plan, which will be negotiated with industry. This compliance plan will be supported by economic incentives and penalties to ensure compliance.

Reuse of treated wastewater for agricultural irrigation does not have widespread acceptance. If proven feasible by the wastewater reuse study, this component may be added later, when more socially acceptable.

Block 4: Main Loan Conditions

23. **Project conditionality:**

Most of the necessary policy and institutional reforms have been achieved under the National Sewerage Program. According to the findings of the preparation studies, additional policies may need to be enacted to institute cost recovery, environmental guidelines and define the future role of WWA. The following conditions identified for project preparation have been fulfilled:

Prior to Negotiations:

- Draft Institutional Action Plan (institutional reforms and institutional strengthening measures needed to ensure sustainable operation and maintenance of sewerage system, including staffing and responsibilities of WWA and timing of interventions) prepared and submitted to Bank.
- Commencement of land acquisition program.
- Draft Sector Policy Letter furnished to the Bank.
- Proposals for agreements with industry defining level and procedures for pretreatment.
- Draft legislation on cost-recovery measures (tariffs, penalties, fees) prepared and submitted to the Bank.
- Project Implementation Plan (PIP) prepared.

During Negotiations:

- Agreement on industrial pretreatment standards developed by the Ministry of Local Government and Environment.
- Agreement with GOM on cost-recovery policy, tariff level and structure, tariff collection, and revenue management system.
- Agreement with GOM on Institutional Action Plan.
- Finalization of PIP.
- Agreement with GOM on Sector Policy Letter.
- Agreement on a date and format for a Mid-term review.

Prior to Board:

- Commitment on financing plan by OECF and GOM.
- Institutional Action Plan adopted and under implementation, according to timetable agreed upon during negotiations;
- Prequalification and tender documents for construction of Montagne Jacquot works prepared and acceptable to the Bank.
- Steering Committee established.
- Sector Policy Letter received from GOM.

Effectiveness Conditions: The following conditions are to be met prior to project effectiveness:

- Consultants and technical experts selected and contract ready to be negotiated.
- OECF funds ready to be disbursed.
- Program for wastewater quality monitoring agreed.
- Land acquisition completed.

24. Other [classify according to convenant types used in the Legal Agreements database.]

Block 5: Readiness for Implementation

[X] The engineering design documents for the first year's activities are complete and ready for the start of project implementation **(prior to Board)**. [ ] Not applicable

[X] The procurement documents for the first year's activities are complete and ready for the start of project implementation. **(prior to Board)**.

[X] The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality **(following negotiations)**.

[ ] The following items are lacking and are discussed under loan conditions (Section G):

Block 6: Compliance with Bank Policies

[X]	This project complies with all applicable Bank policies.
[ ]	[The following exceptions to Bank policies are recommended for approval: . The project complies with all other applicable Bank policies.]

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Annex 1

Project Design Summary

Narrative Summary	Key Performance Indicators[1]	Monitoring and Supervision	Critical Assumptions and Risks
CAS Objective Improved management of the environment, especially for ecotourism and waste treatment	• Marine/coastal ecosystems maintained at current levels (number/diversity of flora and fauna) • Potable water quality maintained	Ministry of Local Government and Environment (MLGE)	**(CAS Objective to Bank Mission)**
Project Development Objectives Improve health and sanitary conditions for affected populations in Port Louis (southern districts, industrial zones) and coastal regions	• % drop in water-borne diseases (Hepatitis A, eye and skin diseases) by end of project • improved potable water quality	Ministry of Health MLGE	**(Development Objectives to CAS Objective)** Assumes awareness of public health and sanitary practices by population
Reverse current trend of environmental pollution from wastewater	• falling levels of BOD, organic and chemical contamination in marine and ground water in significant selected areas (i.e. sea outfall, Port Louis Lagoon, selected beaches, coral reefs, etc).	MLGE/ Ministry of Public Utilities (MPU)/ Ministry of Agriculture, Fisheries and Cooperatives (MAFC)	Risk of industrial noncompliance with environmental regulations Assumes household connections to sewerage system and sanitary practices
Support GOM implementation of priority institutional and technical measures in Sewerage Master Plan	• Reform of WWA • Water/wastewater sector policy integration • Construction of Montagne Jacquot system	MPU/Ministry of Economic Development and Regional Cooperation (MEDRC)	Assumes GOM commitment to Sewerage Master Plan despite personnel changes, reshuffling, and restructuring

[1] Baseline and targeted values should be shown, with the latter divided into values expected at mid-term, end of project and full impact.

Narrative Summary	Key Performance Indicators[2]	Monitoring and Supervision	Critical Assumptions and Risks
Project Outputs			**(Outputs to Development Objectives)**
Sustainable provision of wastewater services in priority area: Completion and operation of Montagne Jacquot Sewerage System	• Transfer of effluents works begin in 1999; completed by end of 2001 • Pumping stations works start in 2000; completed by end of 2001 • Treatment plant works begin in 1999; completed by end of 2001 • Sea outfall works begin in 2001; completed by end of 2001 • Treatment plant operation to start by mid-2002 at 25,000 m3 • Volume treated to increase to 48,000 m3 by 2010, and to 60,000m3 by 2014.	MPU/WWA	Assumes adequate management capacity in WWA
	• Cost-recovery system established by July 1998. Wastewater tariffs determined on metered water consumption, collected by CWA and transferred to WWA.	CWA/WWA	Risk of inadequate maintenance funding or lack of maintenance
	• National Sewer Connection Program underway: house connections rising an average of 8,500 per year (minimum targets are 32,000 total connections in 1998/1998, 91,000 total connections by 2004, and 109,000 total connections by 2007. Sewer reticulation to be carried out according to following table.	MPU	Risk of delays in implementation of National Sewer Connection Program (due to inadequate incentives, time required for public awareness), may jeopardize full utilization of new infrastructure and cost recovery.
Improved sector management and interagency coordination	• Steering Committee in place by July 1998 • WWA restructuring action plan started by June 1998; WWA fully restructured by end of 2002 • WWA staffing/training program carried out	MPU/MEDRC	*Assumes that restructured MPU facilitates interagency coordination* Risk that new MPU not able to work with other Ministries Assumes low staff turnover
	• Procurement contracting time for large contracts reduced from present level to approximately 3 months by 2003	WWA/MPU MPU/World Bank	
	• Working ratio increases from 50% in 1998 to 85% in 2002/2003 (NSP operation)		Assumes implementation of connection program and cost recovery
	• Operating ratio goes from 65% in 1998 to 110% in 2002/2003 (NSP operation) to 90% in 2006/2007.	CWA/WWA	
	• Outsourcing of O&M on existing infrastructure increasing from 0% in 1998/1999 to 75% in 2002/2003. • CWA/WWA agreement signed June 1998. • Agreed tariff billing and transfer system in place by July 1998 • Sector legislation reform: (i) review sector legal framework (2/98); (ii) draft MPU/WWA contract of delegation (3/98); (iii) WWA Act - drafted (4/98) and promulgated (9/98); (iv) review for conformation other related acts (9/98) and draft revisions by midterm review (6/99); (v) Integrated water/wastewater policy framework drafted by Midterm Review (6/99); (vi) new contract of delegation signed (2/01). • Infrastructure mapping and inventory carried out (12/98) • Replacement of worn existing sewerage infrastructure, as specified in contract of delegation.		Assumes private sector absorptive capacity

2 Baseline and targeted values should be shown, with the latter divided into values expected at mid-term, end of project and full impact.

Narrative Summary	Key Performance Indicators[3]	Monitoring and Supervision	Critical Assumptions and Risks
Project Outputs continued			**(Outputs to Development Objectives)**
Better compliance with wastewater regulations by industry	• WWA/Industry agreement negotiations completed by 05/99 and signed by 06/99. • Industrial effluent standards proposed by WWA, Water Resources Unit and Dept. of Fisheries to Dept. of Environment by Midterm Review (6/99). • Industrial effluent meets standards agreed in WWA/industrial agreement by operation (2003).	MLGE/MPU/MAFC	Risk of inadequate GOM enforcement capacity
Project Components 1. Montagne Jacquot sewerage system (a) Land acquisition and compensation (b) Pipelines and sewers (c) Pumping stations (d) Treatment plant (e) Sea outfall (f) Industrial pretreatment (g) Supervision	**Inputs** Bank, counterpart and cofinancier funding Feasibility study and detailed design	World Bank (WB)/ OECF/MPU WWA	**(Components to Outputs)** Assumes that cofinancing is available Assumes choice of environmentally sound project technology
2. Sector Studies and Expertise		WB/MPU/Steering Committee	
3. WWA Institution-building (a) WWA program management assistance (b) WWA Staff Training (c) Support for industrial waste management program	Institutional and Cost-recovery study WWA established WWA/Industry agreement		Risk of inadequate WWA absorptive capacity Assumes that WWA able to operation within new MPU and that newly restructured agencies able to work together Assumes that WWA and industry will reach agreement

[3] Baseline and targeted values should be shown, with the latter divided into values expected at mid-term, end of project and full impact.

National Sewer Connection Program
Annual Reticulation (equivalent connections)

	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003
National Total	4,500	10,000	10,000	10,000	10,000
Montagne Jacquot region (of total)	1,000	2,500	2,500	2,500	2,500

Annex 2

Detailed Project Description

Project Component A - US$57.2 million (total cost of component)

Montagne Jacquot Sewerage System. This component, an integral element of the Government's Sewerage Master Plan, comprises the physical construction of the Montagne Jacquot Sewerage System, including acquisition of the treatment plant site, industrial pretreatment of wastewater, construction of pipelines and sewers, two pumping stations, the treatment plant and the sea outfall, and supervision works. On the basis of a pre-feasibility study, three technological options were considered. The final design of the sewerage works was defined on the basis of preparation studies on technical feasibility, cost of technologies, environmental impact and cost-recovery feasibility. The chosen option consists of the following subcomponents:

(i) Land acquisition and compensation: The WWA will first acquire the site for construction of the Montagne Jacquot Treatment Plant, including a buffer zone between the plant and the neighboring community. WWA will also acquire all rights of way necessary for construction of the treatment plant and transmission mains. The pumping stations will be built on sites currently occupied by outdated pumping stations, so no land acquisition is required for them. There will be no resettlement due to the project, however construction of transmission mains may interrupt operation of businesses, in which case, compensation may be paid. This subcomponent is financed entirely by the Government of Mauritius.

(ii) Pipelines and sewers: Pipelines will be constructed to accommodate the forecast increasing flows and will carry wastewater from the Fort Victoria and Pointe aux Sables pumping stations directly to the Montagne Jacquot treatment plant. The network will consist of transmission and rising mains connecting the pumping stations with the Montagne Jacquot plant; additional connections would be added as needed to connect the industrial estates and residences to the transmission mains. At the present time, all transmission and rising mains will be land based, but with the option for "cross-bay" connection from Fort Victoria to Pointe aux Sables if a contractor submits a technically feasible proposal, as the Environmental Impact Assessment deemed this option environmentally sound. This subcomponent will be funded by the World Bank.

(iii) Pumping stations: Two new pumping stations are to be constructed on the sites of the Fort Victoria and Pointe aux Sables pumping stations, which are currently inadequate to handle even current wastewater flows in an environmentally sound manner. The new works are needed to handle the forecast increasing wastewater flows; the existing works will be left in place to handle emergencies. The pumping stations are centrally located and can therefore facilitate effluent transmission with the use of minimum of force mains and optimized usage of gravity sewers. In particular, Pointe aux Sables is located to handle transfer of wastewater from the new developments and industrial estates, and can utilize existing gravity sewers. The construction contract will include three years of operation and maintenance, after which time O&M will be opened for contracting by the general private sector. The Overseas Economic Cooperation Fund (OECF) will finance this subcomponent.

(iv) Treatment Plant. The Montagne Jacquot Treatment Plant will utilize primary treatment plus disinfection. Initially, the plant will be constructed with the capacity to handle a 48,000 m3 flow. In a later phase, the plant may be expanded to handle 60,000 m3. Sludge will be stabilized and dewatered and transported by truck for disposal in a sanitary landfill. As with the pumping stations, the construction contract

will include three years of operation and maintenance, after which time these activities will be opened for contracting to the private sector at large. This subcomponent will be financed by OECF and GOM.

(v) Sea outfall. Based on the findings of the environmental impact analysis, industrial and urban wastewater that has undergone preliminary and primary treatment with disinfection may safely be disposed of in an open sea outfall of 30 meters deep. The effluent from the plant will be discharged by gravity to the open sea off the coast of Montagne Jacquot through a pipe line leading to a series of six diffusers at an average depth of 30 meters. The outfall will be approximately 645 meters out from the shore line. The diffusers will spaced at 10 meters to prevent intermixing before the plumes reach the surface. OECF and GOM will provide financing for this subcomponent.

(vi) Industrial Pretreatment. Under the project, industries in unserved areas will contribute to building pretreatment works that will be connected to the Montagne Jacquot system. As part of the project, an agreement is to be negotiated and signed between the WWA and industries specifying industrial effluent standards, pretreatment measures and monitoring arrangements (see component C). This agreement will be supported by economic incentives, such as polluter pays and an industrial facilitation fund to encourage compliance. This subcomponent is to be financed by industry.

(vii) Supervision of works. All construction works (pipelines, pumping stations, treatment plant and sea outfall) will be supervised by independent contractors. OECF and GOM will fund one contract for supervision of OECF-financed subcomponents, and the Bank will finance a contract for supervision of pipeline and sewer construction.

Project Component B - US$4.6 million (total cost of component)

Sector Equipment and Expertise. This component, cofinanced by the World Bank and the GOM, addresses the need for reforms in the water and wastewater sectors in the interest of achieving improvements in and integration of policy and management of both sectors. In particular, the project will clarify the linkages (legal, fiscal and organizational) between WWA, the Central Water Authority (CWA), the Water Resource Unit of the Ministry of Public Utilities, the Ministry of Environment and Quality of Life and the Ministry of Agriculture, Fisheries and Cooperatives. This will be achieved by engaging technical assistance to carry out the studies listed below, strengthen intersectoral coordination and assist with preparing recommendations for Mid-term Review discussion of the general framework for integrated sector policy and development and draft policies and an action plan to implement recommendations, as well, preparation of the awareness campaign to support initiatives in the water and wastewater sectors, and establishment of the National Sewer Connection Program to be implemented over 10 years.

(i) The studies in this component consist of: (a) mapping of the sewer networks; (b) a Household Connection inventory and feasibility study; (c) GIS and digital software; (d) institutional studies for the Midterm review (progress on and need for new restructuring of sector institutions); (e) implementation of the public awareness campaign; (f) project implementation audit; and other studies as needed.

(ii) Expertise will be provided to carry out the above studies and to upgrade and train in software necessary to carry out joint billing for water and wastewater services.

(iii) The above expertise will be complemented by provision of water meters to support the joint billing. WWA will procure this equipment according to CWA specifications. This will be financed by the GOM.

Project Component C - US$3.8 million (total cost of component)

WWA Institution-building. This component, cofinanced by the World Bank and the GOM, addresses the financial and institutional constraints in the provision of wastewater services, as identified in the Sewerage Master Plan. The project will assist the Waste Water Authority (established in March 1996) in its development from a division within the Ministry of Public Utilities to an autonomous agency with overall responsibility for constructing, operating, maintaining and financing wastewater infrastructure. Subcomponents include:

(i) WWA program management assistance to strengthen WWA to assume its new role as "maître d'ouvrage délégué." This will include technical assistance on cost accounting and on preparation of terms of reference for studies and contracts, the contracting procedure and management of project contracts with the private sector. The technical assistance will also support the WWA in outsourcing of O&M on the existing wastewater infrastructure and eventual contracting out of O&M and construction on future works. This will enable the WWA to focus on planning, programming and managing contracts for future works.

(ii) WWA staff training program. This program will focus on the training of the WWA staff in their new role to: (i) manage the ongoing National Sewerage Program, including contracting out of works and services, supervision of construction, future supervision of operation and maintenance of wastewater treatment systems; (ii) plan and program future required investments/extensions in the sector; (iii) monitor, with MLGE, environmental quality and standards and implement mitigating measures; and (iv) manage projects and facilitate private sector involvement in the wastewater services. The program includes training both in-country and abroad.

(iii) Support for implementation of the industrial waste management program. As noted in Component A, industry is to contribute to the project by pretreating its effluent. This subcomponent focuses on developing a framework for negotiation between WWA and industry, negotiating an agreement on pretreatment standards, methods, monitoring arrangements and incentives and strengthening WWA to monitor and ensure compliance with standards and regulations. During negotiations, agreement was reached with the GOM on pretreatment standards, to be set by WWA in consultation with the Ministry of Local Government and Environment (MLGE), and a timetable to install and operate pretreatment facilities, to be determined and agreed upon by the WWA and industry. Industry would then install pretreatment facilities, either at-source or collective, for which incentives may be provided by the GOM (tax incentives, facilitation fund, penalties). During implementation, industries, the MLGE and WWA will monitor the quality of pretreated industrial effluent against these standards and WWA will review the results semi-annually. Any industry not meeting the standards, according to the agreed-upon timetable, would be subject to "polluter-pays" penalties.

Implementation arrangements:

Implementation arrangements are detailed in the Project Implementation Plan (PIP). WWA is currently preparing engineering and design work for the Montagne Jacquot system with assistance from internationally-selected consultants financed under a Japanese PHRD Grant and a Project Preparation Facility advance. WWA will manage construction of the Montagne Jacquot system through contracts with consultants, selected according to International Competitive Bidding. Cost recovery will be implemented by the WWA in concert with CWA: sewerage tariffs will be determined according to amount of metered water. Revenues will be collected by the CWA and the sewerage surcharge transferred to the WWA. Industrial compliance with pretreatment standards (set by the MLGE) will be monitored by industry, the MLGE and reported to WWA; WWA will conduct its own monitoring to check industrial contribution to pretreatment, and imposing penalties for noncompliance. WWA will also be responsible for implementing the environmental mitigation plan (see

Project Implementation Plan, Annex 5). WWA will be responsible for the institutional strengthening component, and for ensuring that appropriate technical expertise is engaged, equipment procured and staff training carried out according to the Project Implementation Plan. WWA will develop and propose amendments to existing sectoral legislation, and work with the MLGE and the MEDRC to draft and enact necessary intersectoral legislation. The Steering Committee will ensure coordination between program agencies and among all donor-funded projects within the NSP.

Procurement: Works wholly or partly funded by IBRD will be procured in accordance with the Bank's *Guidelines for Procurement under IBRD Loans and IDA Credits* (published January 1995; revised January and August 1996). Consultancy services wholly or partly financed by IBRD will be procured in accordance with the Bank's *Guidelines for Selection and Employment of Consultants by World Bank Borrowers* (January 1997). The Borrower's procurement regulations and procedures have been reviewed and found acceptable. Before negotiations, a General Procurement Notice was prepared by WWA and transmitted to IBRD for publication in the United Nations Development Business (UNDB) to advertise all assignments expected to be financed by IBRD under the project. WWA will use Standard Bidding Documents published by the Bank for preparation of bidding and prequalification documents for works to be procured under International Competitive Bidding (ICB), and for Requests for Proposals and consulting service contracts. Detailed project procurement arrangements are given in Annex 6.

Accounting, financial reporting and auditing arrangements: Under the project, WWA will implement (before June 30,1999) a cost accounting system tracing the cost of the various services, including depreciation, the cost of capital and other common costs, and associated revenues, to provide a full basis for cost recovery and tariff policy. WWA will keep separate project accounts together with their statutory financial statements. Terms of reference for the annual audits of the project accounts were agreed upon at negotiations. Auditing will be carried out by independent auditors acceptable to the Bank, and the reports of such audits will be submitted to the Bank no later than six month after the end of the Borrower's fiscal year.

Monitoring and evaluation arrangements: *Supervision.* The Bank will devote some 80 staff weeks for supervision of loan progress through FY2003. During the first three years, supervision will focus on progress towards achieving specific objectives such as works, implementation of WWA institutional action plan, tariffs and cost-recovery targets, implementation of the industrial waste management program and the performance of involved agencies. Particular attention would be given during supervision and project reviews to implementation of the national sewerage connections program, including execution of the reticulation system, number of WWA employees, implementation of the WWA training program and the operation and financial performance of the WWA. In addition, effluent quality monitoring will be carefully monitored (particularly industrial effluent) to ensure compliance with quality standards.

Monitoring: Overall project monitoring will be based on indicators confirmed during appraisal and the Project Implementation Plan which were finalized by the Borrower and agreed on during negotiations. Monitoring will be carried out by the Steering Committee, chaired by MEDRC, and assisted by consultants as necessary. Progress under each project component and the Institutional Action Plan will be monitored and coordinated by WWA under the guidance of the Steering Committee. Progress reports will be prepared by WWA every six months, commencing in November 1998, and submitted to the Bank within one month thereafter. No later than three months after completion of the project, GOM will prepare and furnish to the Bank a report on the execution of the project, its costs and the benefits derived and to be derived from it.

Mid-term review: A Mid-term Review will be carried out in June 1999 by the Bank, together with GOM and OECF. In addition to covering all areas included in annual reviews, the Mid-term Review will assess the

implementation status of the National Sewerage Program, the various sectoral studies, degree of implementation of policy reforms, institutional arrangements, tariffs and the cost-recovery system, the regulatory framework, private sector participation and evolution of the role of WWA in the sector. Prior to the Mid-term Review, WWA will contract a consulting firm (under project finance) to review and assess the progress of NSP and WWA restructuring, conduct studies on public utilities and on the water and sanitation sectors and prepare the necessary documentation for the Review. In particular, the Review will consider and discuss the results of the following studies and reports: (i) review of past performance and implementation of the NSP in general, and the Montagne Jacquot project in particular; (ii) review the recommendations and proposals of the study on the water and wastewater sector studies, including a 5-10 year action plan to implement recommendations; and (iii) review of the project implementation plan (PIP) and recommendations for updating/amending the PIP for the remainder of project implementation. It is expected that the Mid-term Review will result in determination of a general framework for future integrated policy and development of the public utilities sectors (water, wastewater and electricity), which will in turn guide reforms of policies and institutions in these and related sectors. The Mid-term Review will also evaluate the technical and financial viability of the proposed utilities investment corporation based on sector studies.

Annex 3

Mauritius

Environmental Sewerage & Sanitation Project

Components Project Cost Summary

Project Components	(US$ Million)				
	Local	Foreign	Total	% Foreign Exchange	% Total Base Costs
A. Montagne Jacquot Sewerage System	12.1	35.4	47.6	75	87
B. Waste Water Sector Equipment & Expertise	0.2	3.7	4.0	94	7
C. WWA Institutional Building	-	3.3	3.3	100	6
Total BASELINE COSTS	**12.4**	**42.5**	**54.8**	**77**	**100**
Physical Contingencies	1.0	4.2	5.2	81	10
Price Contingencies	2.6	2.9	5.5	52	10
Total PROJECT COSTS	**16.0**	**49.6**	**65.6**	**76**	**120**

Note: Figures may not add up to total due to rounding

Mauritius

Environmental Sewerage & Sanitation Project

Components Project Cost Summary

Project Components	(US$ Million)				
	Local	Foreign	Total	% Foreign Exchange	% Total Base Costs
A. Montagne Jacquot Sewerage System					
Land Acquisition & Compensation	2.4	0.0	2.4	0	4
Pipelines & Sewers	2.6	7.8	10.4	75	19
Pumping Stations	1.1	5.4	6.5	83	12
Treatment Plant	2.9	9.9	12.8	77	23
Sea Outfall	0.9	6.7	7.5	89	14
Industrial Pretreatment	1.4	0.0	1.4	0	3
Supervision of Works	0.9	5.7	6.5	87	12
Subtotal Montagne Jacquot Sewerage System	**12.1**	**35.4**	**47.6**	**75**	**87**
B. Waste Water Sector Equipment & Expertise					
Sector Expertise	0.0	0.5	0.5	100	1
Sector Studies	0.0	1.8	1.8	100	3
Equipment to support CWA/WWA joint billing system	0.2	1.4	1.7	85	3
Subtotal Waste Water Sector Equipment & Expertise	**0.2**	**3.7**	**4.0**	**94**	**7**
C. WWA Institutional Building					
WWA Program Management Assistance	0.0	2.4	2.4	100	4
WWA Personnel Training	0.0	0.6	0.6	100	1
Industrial Waste Management Program	0.0	0.3	0.3	100	1
Subtotal WWA Institutional Building	**0.0**	**3.3**	**3.3**	**100**	**6**
Total BASELINE COSTS	**12.4**	**42.5**	**54.8**	**77**	**100**
Physical Contingencies	1.0	4.2	5.2	81	10
Price Contingencies	2.6	2.9	5.5	52	10
Total PROJECT COSTS	**16.0**	**49.6**	**65.6**	**76**	**120**

Note: Figures may not add up to total due to rounding

Mauritius

Environmental Sewerage & Sanitation Project

Components Project Cost Summary

	(Mau Rs Million)			(US$ Million)				
	Local	Foreign	Total	Local	Foreign	Total	% Foreign Exchange	% Total Base Costs
A. Montagne Jacquot Sewerage System								
Land Acquisition & Compensation	50.0	0.0	50.0	2.4	0.0	2.4	0	4
Pipelines & Sewers	54.6	165.4	220.0	2.6	7.8	10.4	75	19
Pumping Stations	22.6	113.6	136.2	1.1	5.4	6.5	83	12
Treatment Plant	62.0	208.8	270.8	2.9	9.9	12.8	77	23
Sea Outfall	18.1	140.8	158.9	0.9	6.7	7.5	89	14
Industrial Pretreatment	30.0	0.0	30.0	1.4	0.0	1.4	0	3
Supervision of Works	18.4	119.4	137.8	0.9	5.7	6.5	87	12
Subtotal Montagne Jacquot Sewerage System	**255.7**	**748.0**	**1,003.7**	**12.1**	**35.4**	**47.6**	**75**	**87**
B. Waste Water Sector Equipment & Expertise								
Sector Expertise	0.0	10.0	10.0	0.0	0.5	0.5	100	1
Sector Studies	0.0	39.0	39.0	0.0	1.8	1.8	100	3
Equipment to support CWA/WWA joint billing system	5.3	29.8	35.0	0.2	1.4	1.7	85	3
Subtotal Waste Water Sector Equipment & Expertise	**5.3**	**78.8**	**84.0**	**0.2**	**3.7**	**4.0**	**94**	**7**
C. WWA Institutional Building								
WWA Program Management Assistance	0.0	51.1	51.1	0.0	2.4	2.4	100	4
WWA Personnel Training	0.0	12.0	12.0	0.0	0.6	0.6	100	1
Industrial Waste Management Program	0.0	6.0	6.0	0.0	0.3	0.3	100	1
Subtotal WWA Institutional Building	**0.0**	**69.1**	**69.1**	**0.0**	**3.3**	**3.3**	**100**	**6**
Total BASELINE COSTS	**261.0**	**895.8**	**1,156.8**	**12.4**	**42.5**	**54.8**	**77**	**100**
Price Contingencies	21.1	89.6	110.7	1.0	4.2	5.2	81	10
Physical Contingencies	55.7	60.2	115.9	2.6	2.9	5.5	52	10
Total PROJECT COSTS	**337.7**	**1,045.7**	**1,383.4**	**16.0**	**49.6**	**65.6**	**76**	**120**

Note: Figures may not add up to total due to rounding

Mauritius
Environmental Sewerage & Sanitation Project
Components by Financiers
(US$ Million)

(US$ Million)	OECF		IBRD		GOM		Private Sector		Total	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
A. Montagne Jacquot Sewerage System										
Land Acquisition & Compensation	0.0	0.0	0.0	0.0	2.5	100.0	0.0	0.0	2.5	3.7
Pipelines & Sewers	0.0	0.0	6.8	55.0	5.6	45.0	0.0	0.0	12.4	19.0
Pumping Stations	6.6	85.0	0.0	0.0	1.2	15.0	0.0	0.0	7.7	11.8
Treatment Plant	13.4	85.0	0.0	0.0	2.4	15.0	0.0	0.0	15.7	24.0
Sea Outfall	7.7	85.0	0.0	0.0	1.4	15.0	0.0	0.0	9.1	13.8
Industrial Pretreatment	0.0	0.0	0.0	0.0	0.0	0.0	1.9	100.0	1.9	2.9
Supervision of Works	6.0	76.1	0.7	8.4	1.2	15.5	0.0	0.0	7.9	12.0
Subtotal Montagne Jacquot Sewerage System	**33.6**	**58.8**	**7.5**	**13.1**	**14.2**	**24.7**	**1.9**	**3.4**	**57.2**	**87.2**
B. Waste Water Sector Equipment & Expertise										
Sector Expertise	0.0	0.0	0.2	40.0	0.3	60.0	0.0	0.0	0.5	0.8
Sector Studies	0.0	0.0	1.7	80.0	0.4	20.0	0.0	0.0	2.1	3.2
Equipment to support CWA/WWA joint billing system	0.0	0.0	0.0	0.0	1.9	100.0	0.0	0.0	1.9	2.9
Subtotal Waste Water Sector Equipment & Expertise	**0.0**	**0.0**	**1.9**	**41.7**	**2.7**	**58.3**	**0.0**	**0.0**	**4.6**	**7.0**
C. WWA Institutional Building	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WWA Program Management Assistance	0.0	0.0	2.2	80.0	0.6	20.0	0.0	0.0	2.8	4.3
WWA Personnel Training	0.0	0.0	0.5	80.0	0.1	20.0	0.0	0.0	0.7	1.0
Industrial Waste Management Program	0.0	0.0	0.3	80.0	0.1	20.0	0.0	0.0	0.3	0.5
Subtotal WWA Institutional Building	0.0	0.0	3.0	80.0	0.8	20.0	0.0	0.0	3.8	5.8
Total Disbursement	**33.6**	**51.3**	**12.4**	**19.0**	**17.6**	**26.8**	**1.9**	**2.9**	**65.6**	**100.0**

Note: Figures may not add up to total due to rounding

ANNEX 4

National Sewerage Program

Mauritius Environmental Sewerage and Sanitation Project

Economic Analysis of the capital investment of the project (Montagne Jacquot Sewerage System)

Program Objectives

The National Sewerage Program is designed to remove a public health threat that could severely affect the national economy. The program also aims at reducing the present level of coastal pollution resulting from discharge of raw sewage into coastal waters near populated residential areas. The Montagne Jacquot Sewerage System Project, an integral component of the Program, addresses these issues at the national level and, in particular, for the area of Port Louis South.

Potential Environmental Health Threats

The safety of the public water supply in Port Louis is monitored by the Environmental Health Unit in the Ministry of Health (MOH). Samples are taken regularly from various points of the distribution system and undergo bacteriological tests. While the drinking water supply is generally safe, results from sample testing in the years 1994 and 1996 show some intrusion of contaminants from sewage. The likely explanation for this contamination is intrusion of contaminated groundwater into the distribution system during periods when the system is empty or under lower pressure than the surrounding groundwater.

If demand for sewerage infrastructure continues to vastly outpace supply, and if the current infrastructure ages without replacement, there is a potential that such contamination could lead to the spread of infectious diseases, such as cholera or typhoid, could spread to the entire population directly through the water distribution system or indirectly through infected persons that handle contaminated food.

Without the project the current unsatisfactory state of environmental threat could be expected to deteriorate further. Economic and population growth would further strain the present rudimentary sewerage system and on-site sanitation systems, increasing groundwater contamination in the Port Louis area. As noted above, contamination of potable water in the Port Louis distribution system could trigger a water-related epidemic, such as cholera or typhoid fever. Such an epidemic would have a disastrous impact on the country's important tourism industry. In addition, eutrophication of the coastal waters off Fort Victoria and Point aux Sables would increase further and remain a danger to the public at large, to fishing, and to the marine environment.

With the project these threats would be removed. The project could be expected to produce a number of benefits:

(a) direct benefits to residential water supply consumers, in the form of increased consumption, since the sewerage network would replace the septic tanks which serve at least one third of the population. As a result, septic tank users would save the cost of periodic tank emptying. Similarly, industrial consumers could increase their water consumption due to the increase in sewerage capacity;

(b) direct benefits to present and future consumers in the Fort Victoria and Pointe aux Sables areas could be expected to produce higher real estate values reflecting discontinuation of raw sewage discharge into nearby coastal waters. Real estate value increases are a proxy for the discounted net environmental benefits over future years;

(c) benefits from avoiding potential loss of tourism revenue, other production losses and higher curative health care costs that would occur should the present unsatisfactory environmental situation trigger a water-related epidemic. The project is akin to buying insurance against catastrophic scenarios, the cost of which would surpass the premium of the insurance policy;

(d) intangible benefits in the form of the preservation of the aquatic environment, now under stress from raw sewage discharge off Fort Victoria and Pointes aux Sables.

The Principles of Economic Evaluation

The economic evaluation of the Montagne Jacquot Sewerage System comprises two phases: first, a least-cost analysis and second, a cost-benefit analysis.

The *least-cost analysis* tests whether the expected project objectives could be met by alternative project designs at a lower economic cost than the proposed design. The analysis is contained in the engineering studies and confirms that the project, as designed, is indeed the least-cost, environmentally sound solution. It employs simple and well-tested technology to collect sewage, pump it to a primary treatment plant to be constructed at Montagne Jacquot and discharge the treated sewage into the sea via a submarine outfall at a point well outside the ecologically sensitive coral reefs. At the discharge point, ocean currents and dissolution will be sufficient to render the discharges ecologically safe.

An important complementary control for the potential threat of a water-related epidemic is to ensure that the water supply system operates at full pressure at all times. This would involve Central Water Authority redesign and improvement of operations in the Port Louis area. At present, the most serious contamination occurs when cyclones pass over Mauritius and are followed by torrential rains. At these times, turbidity in the river from which Port Louis receives its raw water rises to such high levels that the treatment plant cannot purify the water. The plant is routinely shut down and the distribution system eventually empties from negative pressure, causing seepage from septic cesspools that could contaminate both the water distribution system and groundwater reserves.

The *economic cost-benefit analysis* is more involved. It compares the economic costs and benefits of the Montagne Jacquot project component over the construction period and over its assumed 30-year period of operation. Detailed calculations are shown in Annex 4-Table 01 and Table 02. All costs and benefits are expressed in constant mid-1997 prices. All investment and operating costs are net of import duties and of either taxes or subsidies. Prices for unskilled labor

and for foreign exchange have not been shadow-priced. Mauritius enjoys full employment and labor rates are assumed to reflect relative labor scarcity. Similarly, foreign exchange can be freely traded in the open economy and the exchange rate is assumed to reflect the scarcity of foreign exchange.

Assumptions for the Economic Cost-Benefit Calculation

Incremental project costs are those of the Montagne Jacquot project component. Additional costs are charged to reflect additional sewage collection costs necessary to connect consumers that now rely on septic tanks. The off-setting cost savings from not having periodic emptying of septic tanks have not been quantified, implying a slight overestimation of operation and maintenance costs. It has been assumed that there are no sunken investment costs.

Three kinds of project benefits have been quantified:

First, incremental consumer payments for newly charged sewage collection and treatment are assumed to measure mainly the consumers' willingness to have their sewage removed.

Second, the rise in land values has been estimated for the Pointe aux Sables area. The entire area adjacent to the beaches is about 400 hectares. At present, the value is considerably lower than comparable areas elsewhere in the Port Louis area, in part due to raw sewage pollution of the coastal area. An informal survey of property prices revealed that the prices for undeveloped land could be expected to double or even treble if coastal pollution is discontinued. In order to avoid double-counting benefits and to be conservative, the assumption has been made that prices would rise substantially less, or on the order of 50 percent on average. For the same reasons, the area of influence has been reduced by 10 percent to avoid the risk of double-counting between consumer payments and rises in property values.

Third, benefits in the form of avoided potential loss of tourism revenue, attributable to the project, have been estimated in the following fashion:

(a) A trend-line for total tourism revenue has been projected by applying a least-squares analysis to the 1986-1995 period. Annual tourism revenue for each of these years was deflated using Mauritius' consumer price index.

(b) Total tourism revenue was then projected for each of the years 2002-2032, while keeping constant annual tourism revenue from 2007 onwards. This level of revenue corresponds to the *with project* scenario.

(c) The assumption was then made that a cholera epidemic would strike Mauritius in the year 2002/2003, corresponding to the first year of operation of the Montagne Jacquot sewerage system. Such an epidemic would be expected to substantially lower tourism flows to Mauritius. The estimate is that the reduction in annual tourism would be 10 percent below the *with project* scenario. As a point of comparison, in the case of a similar cholera epidemic in Perú in 1991, the decline in gross tourism earnings due to the cholera epidemic ranged from 28 percent to 6 percent.

(d) Epidemics are a matter of probability. At present, Mauritius is free of cholera. However, there is a probability, assumed to be 10 percent, that an outbreak could result from the arrival of

an infected visitor coinciding with unfavorable conditions in the water supply distribution system. Avoided tourism revenue losses are then multiplied by this probability.

(e) Not all losses in gross tourism revenue are net losses. The estimated, probability-weighted tourism revenue losses are then multiplied by 80 percent, implying that variable costs are on the order of 20 percent in the Mauritius tourism industry.

The Internal Rate-of-Return of the Montagne Jacquot Sewerage System Project component

The internal rate-of-return is calculated for the Montagne Jacquot project component as 23%. This rate is considered satisfactory since it is well above the 10 percent estimated opportunity cost of capital in Mauritius. The average weight of each of the three main benefits expected is presented in Table 4-01:

Table 4-01

Benefit contribution to Total Benefits	Cons. Payments	Land value	Prob.{occurence}	Total Benefits
	43%	21%	36%	100%

In addition, the project has intangible social and environmental benefits that have not been quantified.

Sensitivity Analysis

Table 4-02 presents the various assumptions tested and their influence on overall project internal rate-of-return.

Table 4-02

Sensitivity/ERR	+ 20%	+ 10%	Base Case	- 10%	- 20%
Inv. Cost	17%	20%	23%	28%	35%
Cons. Payments	n.a.	n.a.	23%	n.a.	19%
Land value	25%	n.a.	23%	n.a.	21%

Table 4-03 tests the influence of the probability of occurrence of an epidemic.

Table 4-03

			Base Case		
Prob.{occurence}*	5.0%	7.5%	10%	12.5%	15.0%
Sensitivity/ERR	19%	21%	23%	25%	27%

The internal rate-of-return for the project is fairly robust. In all cases tested, the projected rate-of-return can be reduced , but is still above the opportunity cost of capital.

Poverty Alleviation Impact

The project is expected to alleviate poverty since it would improve sanitary conditions in Port Louis and, over time, raise connection rates both of which would favor the lower-income population in Port Louis proportionately more. Permanent improvement in environmental health could also be expected to favor the poorer population more since they would most likely be the first to be affected by a water-related epidemic.

Annex-4-Table 01

Economic Cost-Benefit Analysis of the Montagne Jacquot System

(Millions of Mau Rs in 1997 prices)

FY	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/27
Costs														
Investment Costs														
With the Project														
Conveyance&Treatment	66	150	327	373	151	43								
Wastewater Collection	0	32	75	53	60	67	74	95	79	87	95	0	0	0
House Connections	15	45	45	45	45	45	45	45	45	45	45	45	45	45
Total *With the Project*	81	226	447	472	256	155	119	140	124	132	140	45	45	45
Without the Project	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Incremental Investment Costs	76	221	442	467	251	150	114	135	119	127	135	40	40	40
Operations & Maintenance														
With the Project	3	3	3	3	3	35	37	39	41	43	45	45	45	45
Without the Project	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Incremental O&M	-2	-2	-2	-2	-2	30	32	34	36	38	40	40	40	40
Total Incremental Costs	74	219	440	465	249	180	147	169	155	165	175	80	80	80
Benefits														
1. Consumer Payments														
With the Project	35	100	107	118	132	141	155	164	173	182	191	191	191	191
Without the Project	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Incremental Payments	25	90	97	108	122	131	145	154	163	172	181	181	181	181
2. Increase in Land Value, Pointe aux Sables														
Area Benefitting, hectares	0	40	40	40	40	40	40	40	40	40	40	40	40	40
Estimated Increase, mn./ha	0	2	2	2	2	2	2	2	2	2	2	2	2	2
Total Increase during Year	0	80	80	80	80	80	80	80	80	80	80	80	80	80
3. Avoided Costs from an Epidemic														
Tourism Revenue With Project	11,000	11,600	12,300	12,900	13,500	14,200	14,800	15,500	16,100	16,700	17,535	18,412	19,332	19,500
Tourism Revenue Without Project	11,000	11,600	12,300	12,900	13,500	12,780	13,320	13,950	14,490	15,030	15,782	16,571	17,399	17,400
Incremental Revenue	0	0	0	0	0	1,420	1,480	1,550	1,610	1,670	1,754	1,841	1,933	2,100
Less Saved Variable Costs	0	0	0	0	0	-284	-296	-310	-322	-334	-351	-368	-387	-420
Incremental Avoided Costs	0	0	0	0	0	1,136	1,184	1,240	1,288	1,336	1,403	1,473	1,547	1,680
Probability of Occurrence						10%	10%	10%	10%	10%	10%	10%	10%	10%
Weighted Incremental Avoided Costs	0	0	0	0	0	114	118	124	129	134	140	147	155	168
Total Benefits from Project	25	170	177	188	202	325	343	358	372	386	402	409	416	429
Net Benefits from Project	-49	-49	-263	-276	-47	145	197	189	217	221	226	329	336	349

Annex-4-Table 02

Montagne Jacquot Sewerage System
Cost-Benefit Analysis

	COSTS	BENEFITS				
YEAR	Total Cost	Cons. Payments	Land value	Prob.[occurence]	Total Benefits	Net Benefits
	(in million Mau Rs)	(in million Mau Rs)	(in million Mau Rs)	(in million Mau Rs)	(in million Mau Rs)	(in million Mau Rs)
97/98	74	25	0	0	25	-49
98/99	219	90	80	0	170	-49
99/00	440	97	80	0	177	-263
00/01	465	108	80	0	188	-276
01/02	249	122	80	0	202	-47
02/03	180	131	80	114	325	145
03/04	147	145	80	118	343	197
04/05	169	154	80	124	358	189
05/06	155	163	80	129	372	217
06/07	165	172	80	134	386	221
07/08	175	181	80	140	402	226
08/09	80	181	80	147	409	329
09/10	80	181	80	155	416	336
10/11	80	181	80	168	429	349
11/12	80	181	80	168	429	349
12/13	80	181	80	168	429	349
13/14	80	181	80	168	429	349
14/15	80	181	80	168	429	349
15/16	80	181	80	168	429	349
16/17	80	181	80	168	429	349
17/18	80	181	80	168	429	349
18/19	80	181	80	168	429	349
19/20	80	181	80	168	429	349
20/21	80	181	80	168	429	349
21/22	80	181	80	168	429	349
22/23	80	181	80	168	429	349
23/24	80	181	80	168	429	349
24/25	80	181	80	168	429	349
25/26	80	181	80	168	429	349
26/27	80	181	80	168	429	349
27/28	80	181	80	168	429	349
28/29	80	181	80	168	429	349
29/30	80	181	80	168	429	349
30/31	80	181	80	168	429	349
31/32	80	181	80	168	429	349
Total	4,358	5,741	2,720	4,757	13,217	8,859
			Internal Rate of Return			23%

NPV at estimated discounted Rate			10%			
NPV	1,750	1,310	699	857	2,865	1,116

ANNEX 5

FINANCIAL ANALYSIS

THE WASTE WATER AUTHORITY

A. Past and present financial performances

Accounting and Auditing : As per WWA Act of 1991, the Waste Water Authority (formerly the Waste Water Division) is responsible for:

- implementation of the Investment Program of the sanitation sector;
- operation of all sanitation infrastructure (e.g. sewer networks, wastewater treatment plants); and
- management of the sanitation budget.

The WWA, currently equivalent to a Government department, follows the Government of Mauritius Financial Management Manual (August 1990) in its financial and accounting procedures, resource management, and control and audit procedures. The procedure for the approval and award of its contracts is governed by the 1994 Central Tender Bill with all tenders of Rs 500,000 and above being handled directly by the Central Tender Board. The Financial Management Manual applicable to the Ministries/Departments does not prescribe procedures for recording and accounting for fixed assets.

Wastewater Tariffs

Tariffs prior to July 1996: Previously, the sewerage tax was based on a percentage of the net annual rentable value (NARV) of the property for those connected to a sewerage network. For the different types of property, the percentage was:

- Domestic 1.0 %
- Commercial 1.5 %
- Industrial 2.0 %

New Tariffs: As of July 1, 1996, in conformity with the WWA Act of 1991, new tariffs have been determined as follows:

- **Domestic:** For domestic connections, the monthly charge will be Rs 25.00 per household per month. The billing will be effected on a quarterly basis.
- **Commercial:** For commercial connections, the rate will be 2.0 percent of the NARV, with billing effected on a yearly basis.
- **Industrial:** For industrial connections, the charge will be based on the water consumed, i.e. Rs 2.00 per m^3 of water consumed. The billing will be effected on a monthly basis and according to Central Water Authority (CWA) procedures.

These new tariffs represent a provisional means for better cost recovery.

Past and present financial performance

Expenditures

The expenditures of the Waste Water Authority are financed by the National Budget and are shown in Table 5-1 for a number of fiscal years.

Table 5-1: Expenditures of the WWA for the period 1992-97 (In Mau Rs Million)

Expenditures	92-93	93-94	94-95	95-96	96-97
Recurrent	30.3	36.5	38.2	38.1	44.6
Capital	33.7	28.3	15.0	39.7*	38.2
Total	64.0	64.8	52 6	77.8	82.8

* Actual expenditure = 39.7. The budget figure voted was 173 Mau Rs. million.

The total expenditure for 1995-96 shows a marked increase over that of previous years, which corresponds to the start of Investment Program implementation.

WWA Recurrent Costs: At the present level of recurrent costs and service connections, the cost of operation and maintenance (excluding depreciation and debt service) by the WWA for the current fiscal year, 1996-97, is Rs 4.10 per m3 of water flow. When translated to a fixed charge, the equivalent payment required from households to cover this cost will be Rs 82 per month. According to the proposed tariff, domestic consumers are expected to pay Rs 25 per month only, or less than 30 percent of the recurrent cost. They are thus heavily subsidized. The same is true for commercial and industrial consumers. Whereas the extent of subsidy to commercial consumers could not be estimated in the absence of the likely payment based on the NARV, the subsidy in case of industrial consumers is estimated to be over 50 percent.

Expenditure on Existing Wastewater Facilities and Funding: The consolidated capital expenditure on sewerage works over the year is not available. From the information gathered from the Master Plan report and the budgets of the Waste Water Division, total expenditure on capital works over the last 25 years, between 1970-95, is estimated at Rs 208 million. Full information on funding of the capital works is also not available. However, it can be assumed that a substantial portion of the expenditure was met from national budgetary resources.

Revenue: The revenue for the Waste Water Authority is derived principally from:

- the sewerage tax; and
- miscellaneous fees.

The sewerage tax has been defined above. Miscellaneous revenues include:

- house connection survey fees;
- cesspool and septic tank emptying fees; and
- house connections constructed by the Waste Water Authority.

At present, the average cost for a household connection to a new sewer network is about Rs 7,000 (from the household to the boundary of the property); to connect a household to an existing sewer costs between Rs 10,000 to 15,000 (from the household to the sewer network). For many households the relatively high cost of such works actually slows the rate of house connection and hence affects improvement in wastewater collection. Incentives will have to be identified to overcome this obstacle, such concessionary interest on loans, GOM sharing part of the work costs, etc.

The revenue collected during past financial years is shown in Table 5-2 below.

Table 5-2 : Revenue collected by the WWA (in Mau Rs million)

Revenue Source	92-93	93-94	94-95	95-96	96-97
Sewerage Tax	7.3	6.6	6.4	6.9	9.5
Miscellaneous	3.3	5.3	2.3	3.0	2.7
Total	**10.6**	**11.9**	**8.7**	**9.9**	**12.2**

As evident in the above table, the sewerage tax is the WWA's main source of revenue.

Conclusion: At present level of recurrent cost and number of service connections, the cost of Operation and Maintenance (O & M) (excluding depreciation and debt service) by the WWA for the current fiscal year, has been estimated to Mau Rs 3.2 per cum of estimated wastewater flow. When translated to a monthly wastewater charge, the equivalent payment required from the domestic households will be Mau Rs 64 at an average wastewater flow of 20 cum per month. According to the new tariff in place, the domestic consumers are expected to pay Mau Rs 25 per month only, or the equivalent of about 40% of the actual O & M.

These new tariffs, at this level imply a heavy level of subsidy. The same is also true for the commercial and industrial consumers. There is clearly a need to develop a sound and financially sustainable cost recovery policy which would take into account the constraints of affordability, equitability and willingness to pay. The proposed new cost recovery system is described in the following sections of this annex.

B. The National Sewerage Program

Program cost estimates: The National Sewerage Program, defined by the Sewerage Master Plan, has identified and prioritized 13 medium and large-scale projects (including works underway) to be implemented over next six years. The aggregate cost of these priority projects will be Mau. Rs. 5.511 billion by 2002-03. Details of the per project cost estimates and yearly phasing are provided in Annex 5-01. The broad break-down under generic categories is provided in Table 5-3:

Table 5-3

National Sewerage Program

Summary Cost Estimates (Mau Rs million)	Estimated Cost
Base Costs:	
Land	111
Civil Works	3,260
Equipment & Materials	1,376
Other	124
Total NSP Base Costs:	**4,870**
Contingencies:	
Physical	359
Price	297
Total Contingencies	656
Total Program Costs	**5,526**

Financing arrangements: The funding arrangements, for both external loans and grants and the Government contribution, are in the process of effectiveness, negotiation and/or finalization. Table 5-4 summarizes the funding arrangements proposed by the Government for implementation under the National Sewerage Program. Details by project and yearly phasing are given in Annex 5-02-A and Annex 5-02-B. Onlending of external loans/grants and Government counterpart contributions are discussed later in this Annex.

Table 5-4

National Sewerage Program

Proposed Financing Arrangements (Mau Rs million)	Estimated Cost
Total Program Costs:	**5,526**
Source of Financing:	
Govt. of Mauritius	1,848
External Agencies- Loan	3,150
External Agencies- Grant	498
Private Sector Financing	30
Total Financing	**5,526**

C. Cost Recovery Options and Targets

Cost recovery principles: Financial management and pollution control in the wastewater sector is a totally new area in Mauritius, and is one in which public involvement will be of major importance. The extent of cost recovery expected from consumers of wastewater services under the overall short and medium-term sector objectives must be considered carefully. The following cost-recovery options have been considered:

1. Operation and maintenance cost (O & M)

2. O & M cost plus depreciation;

3. O & M cost plus the higher of depreciation or debt service (for external loan onlending only);

4. O & M cost plus the higher of depreciation or debt service (for onlending of total Program costs);

Cost Recovery Targets: To derive a medium-term tariff, beginning fiscal year 1998-99 to fiscal year 2006-07, cost recovery targets have been calculated to arrive at the level of recovery required for the four options stated above. Details are given in Annex 5-03. Table 5-5 summarizes the results, at constant mid-1997 prices, of the cost recovery analysis for the various options and estimates the required average wastewater tariffs applicable to the water bill.

Table 5-5

National Sewerage Program
SUMMARY AVERAGE COST RECOVERY REQUIRED UNDER VARIOUS OPTIONS
(in constant Mau Rs/m3) (At Mid-1997 Prices)

OPTION/YEAR	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
A. Average Wastewater Cost									
1. Operation & Maintenance Cost	2.5	2.6	2.8	2.7	6.1	5.9	5.5	5.2	5.0
2. Operation & Maintenance plus Depreciation	3.3	3.7	4.3	4.2	11.1	10.9	10.0	9.4	9.0
3. Operation & Maintenance plus Depreciation or Debt Service (External loans) - Higher of the two	3.3	3.7	4.3	4.2	11.1	15.8	14.4	13.3	12.4
4. Operation & Maintenance plus Depreciation or Debt Service (Total costs)- Higher of the two	3.3	3.7	4.3	4.2	11.1	23.5	21.2	19.5	18.2
B. Average Wastewater Tariffs required									
1. Operation & Maintenance Cost	2.2	2.2	2.5	2.3	5.3	5.1	4.8	4.5	4.3
2. Operation & Maintenance plus Depreciation	2.8	3.2	3.8	3.7	9.7	9.5	8.8	8.2	7.9
3. Operation & Maintenance plus Depreciation or Debt Service (External loans) - Higher of the two	2.8	3.2	3.8	3.7	9.7	13.8	12.5	11.6	10.8
4. Operation & Maintenance plus Depreciation or Debt Service (Total costs)- Higher of the two	2.8	3.2	3.8	3.7	9.7	20.5	18.5	17.0	15.9

The relation of these costs and required average tariff levels to household income and affordability levels for water tariffs are discussed below.

D. Domestic Affordability Analysis

Affordability is the economic and financial ability of the consumer to demand certain goods and services given his other needs. Affordability also influences a consumer's willingness to pay. It is difficult to fix the affordability level for water supply and sewerage, given that water is usually considered a basic human need, and sewerage service levels are derived from water consumption.

However, it has been accepted, although more as a rule of thumb, that expenditure on urban water supply and sewerage should not exceed more than 4 to 6 percent of household income. In Mauritius, *Household Budget Survey (July 1994)* reported the average monthly household income for 1991-92 as Rs 6,500, with 62 percent of the population earning below the monthly average, and 7 percent earning less than Rs 2,000. The survey reports average expenditure on water as 1.4 percent (Rs 67.8) of monthly income. Considering a real term increase of 2.5 percent in the income level over the past several years the average monthly household income for 1996-97 has been assumed to be Rs 7,540.

Table 5-6 examines the relationship between the proposed water charges, analyzed by the CWA relative to income, and the amount available to meet the wastewater charges for the forecast period.

The analysis in this table shows that water charges in relation to household income rise over the period, with the maximum amount available for wastewater charges remaining stable at around Mau Rs 150/per month from 1998 through 2003, and then rising to allow better recovery of wastewater costs. It further suggests that wastewater charges should be maintained at around 2-3 percent of average household income.

Table 5-6

National Sewerage Program
SUMMARY DOMESTIC AFFORDABILITY ANALYSIS
(in constant Mau Rs/m3) (At Mid-1997 Prices)

OPTION/YEAR	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
A. Average Monthly Household Income	7,722	7,915	8,113	8,316	8,524	8,737	8,955	9,179	9,409
B.Assumed Expenditure on Water & Wastewater	4%	4%	4%	4%	4%	4.25%	4.50%	4.75%	5.00%
	309	317	325	333	341	371	403	436	470
C. Average Monthly Water Charges	160	169	178	187	195	200	205	210	215
	2.1%	2.1%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%
D. Income Available for Wastewater Charges	149	148	147	146	146	171	198	226	255
	1.9%	1.9%	1.8%	1.8%	1.7%	2.0%	2.2%	2.5%	2.7%
E. Estimated Wastewater Domestic affordable tariff	5.64	5.59	5.55	5.54	5.53	6.49	7.50	8.56	9.68

Whereas the analysis in Table 5-7 below shows that the wastewater charges as a percent of water charges need to be fixed at between about 25 percent in 1998/99 to about 175 percent in 2004/05 under the four cost recovery options considered, the affordability analysis shows that the wastewater charges should represent a maximum of 100 percent of the water charges. Table 5-7 further indicates that the monthly wastewater charges in relation to monthly household income, under the four recovery options considered, varies between 0.5 percent to 1 percent, to recover the O&M cost alone, to 4 percent (in fiscal year 2004/05) to recover full Program costs.

The analysis shows that the expected cost recovery in 2004/05 will be 1.8% if depreciation is recovered, and will be 3.5% for option 3 and 4.0% for option 4 if debt service is also to be recovered. Desired cost recovery falls within the assumed combined household expenditure level of 4 to 6 percent on water and wastewater charges, depending on the year and the recovery option considered.

Table 5-7

National Sewerage Program
SUMMARY AVERAGE COST RECOVERY REQUIRED IN RELATION TO HOUSEHOLD INCOME
(in constant Mau Rs/m3) (At Mid-1997 Prices)

OPTION/YEAR	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
Wastewater Charges versus Household Income									
1. Operation & Maintenance Cost	38	38	42	40	93	89	84	79	76
	0.5%	0.5%	0.5%	0.5%	1.1%	1.0%	0.9%	0.9%	0.8%
2. Operation & Maintenance plus Depreciation	41	49	55	65	63	168	165	154	145
	0.5%	0.6%	0.7%	0.8%	0.7%	1.9%	1.8%	1.7%	1.5%
3. Operation & Maintenance plus Depreciation or	41	49	55	65	63	168	317	290	269
Debt Service (External loans) - Higher of the two	0.5%	0.6%	0.7%	0.8%	0.7%	1.9%	3.5%	3.2%	2.9%
4. Operation & Maintenance plus Depreciation or	41	49	55	65	63	168	358	325	299
Debt Service (Total costs)- Higher of the two	0.5%	0.6%	0.7%	0.8%	0.7%	1.9%	4.0%	3.5%	3.2%

E. Proposed Water and Wastewater Tariffs

Tariff principle: Since water connection metering has proven workable, the level of wastewater service used may easily be determined from the volume of water consumed. The option retained for recovering wastewater charges is to levy these charges as a percentage of the water tariff, based on the volume of water consumed, and to combine both charges on one bill. Discharged wastewater is estimated at 75 to 80 percent of water consumption.

Tariff level: Based on the analysis presented for the cost-recovery options and targets and household income, wastewater tariffs for domestic users, using the affordability criteria, will be fixed as a percentage of water charges beginning in fiscal year 1998-99, (i.e. July 1, 1998). These rates will gradually rise over the years, with the limitation that in they do not exceed the domestic water charges for that year. The non-domestic charges will be fixed at a rate equal to water charges as of the same date.

Based on these consideration and the assumption for the proposed water tariffs, the required wastewater tariffs have been calculated and are presented below: in current and constant prices.

Table 5-8

National Sewerage Program
Proposed Water & Wastewater Tariffs

(in current Mau Rs/cum)	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
Proposed Water Tariffs									
Domestic	6.3	6.3	7.3	8.5	8.8	9.1	9.6	10.0	10.5
Non Domestic	13.0	13.6	14.2	14.9	15.5	16.2	17.0	17.8	18.7
Proposed Wastewater Tariffs									
Domestic (as % of Water Tariff)	45%	45%	60%	75%	85%	100%	100%	100%	100%
Non Domestic (as % of Water Tariff)	100%	100%	100%	100%	100%	100%	100%	100%	100%
Domestic	2.8	2.8	4.4	6.4	7.5	9.1	9.6	10.0	10.5
Non Domestic	13.0	13.6	14.2	14.9	15.5	16.2	17.0	17.8	18.7

Table 5-9

National Sewerage Program
Proposed Water & Wastewater Tariffs
Base : mid-1997

(in constant Mau Rs/cum)	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
Proposed Water Tariffs									
Domestic	6.0	5.8	6.4	7.1	7.1	7.0	7.1	7.1	7.1
Non Domestic	12.4	12.5	12.4	12.5	12.4	12.4	12.5	12.5	12.6
Proposed Wastewater Tariffs									
Domestic (as % of Water Tariff)	45%	45%	60%	75%	85%	100%	100%	100%	100%
Non Domestic (as % of Water Tariff)	100%	100%	100%	100%	100%	100%	100%	100%	100%
Domestic	2.7	2.6	3.8	5.3	6.0	7.0	7.1	7.1	7.1
Non Domestic	12.4	12.5	12.4	12.5	12.4	12.4	12.5	12.5	12.6

Tariff Structure: the principle retained is that: (i) users will be charged on their wastewater generation, determined as a percentage of their actual water consumption; and (ii) there will be a lower tariff for less affluent domestic consumers, with cross-subsidization by more affluent domestic and non-domestic consumers. Considering overall affordability, the combined cost to the household for both water and wastewater is relevant since these two originate from the same utility (water).

Billing and collections of wastewater charges: wastewater charges will appear on the same bill as the water charges. The bills will be issued and collected by the CWA. CWA will receive, for these services, a pre-agreed percentage of the amount collected. All specific stipulations will be agreed upon by WWA and CWA, to be implemented by July 1, 1998.

F. Affordability Test

The household affordability test for the proposed water and wastewater charges, over the years of the forecast period, is presented in Table 5-10 below. The results show that the combined charges are between 3 to 4.6 percent of average household income, at constant income and price levels, and are affordable given the criteria of a maximum 4 percent expenditure for water and wastewater for 2002-03 and 5 percent for 2006-07.

The suggested wastewater charges fully meet the operation and maintenance costs, and depreciation for all years of the covered forecast period. The tariffs can also contribute partially to the debt service.

Table 5-10

National Sewerage Program
AFFORDABILITY TEST on proposed Water and Wastewater Charges
(in constant Mau Rs/m3) (At Mid-1997 Prices)

OPTION/YEAR	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
A. Domestic Water Charges	160	169	178	187	195	200	205	210	215
B. Domestic Wastewater Charges (in %)	45%	45%	60%	75%	85%	100%	100%	100%	100%
C. Domestic Wastewater Charges	72	76	107	140	166	200	205	210	215
D. Total Monthly Charges	232	245	285	326	361	400	410	420	430
Monthly Household Income	7,722	7,915	8,113	8,316	8,524	8,737	8,955	9,179	9,409
Total Monthly Charges to Household Income	3.0%	3.1%	3.5%	3.9%	4.2%	4.6%	4.6%	4.6%	4.6%

G. Future financial projections

The financial forecasts for the period are presented in the proforma tables and tables and graphs of Annexes 5-01 to 5-11. These include wastewater flows and equivalent water flows to be billed, income statements, sources and uses of funds under the different options (i.e. without the debt service, with the debt service for onlending external loans only, with the debt service for onlending the total National Sewerage Program cost), balance sheet and cash analysis graphs and tariff analysis graphs.

The following assumptions have been made for the financial analysis:

1. Proposed works under the National Sewerage Program:

1.1. capital costs estimated for the 13 identified large and medium projects considered for priority implementation are as updated by WWA in August 1997 and in January 1998, for the Montagne Jacquot Sewerage Project and include estimated physical and price contingencies.

1.2. Physical completion targets for the projects are based on the National Sewerage Program updated by WWA in December 1997.

1.3. The Sewerage Connection Investment Program for the forecast period, still to be finalized, has been estimated to cost about Mau Rs 2.2 billions for the period up to fiscal year 2006/2007, and is to be financed by GOM up to fiscal year 2002/03, and thereafter through WWA internal sources of funds.

2. Inflation factor:

2.1. Local inflation assumed is 5 percent over the forecast period.

3. Operation and Maintenance Cost:

3.1. Existing recurrent costs have been assumed to increase by 5 percent per annum in real terms.

3.2. For the proposed projects, the O & M costs are based on estimates made by consultants in project feasibility studies, when available, and on the best judgment estimates when studies were not available.

4. CWA service fee for billing and collection.

4.1. For the financial projections, it has been assumed that CWA will receive a 5 percent fee on collected wastewater revenues for billing and collecting wastewater charges.

5. Provision for renewal of existing assets.

5.1. A provision for renewal of existing assets has been considered for the financial projections. This provision is estimated at about 5 percent of the book value of these assets, pending revaluation.

6. Depreciation:

6.1. Depreciation of the fixed assets under WWA management has been computed on the straight line method on rates based on the following estimated useful life of the new assets

Asset Nature	Life	Rate
Civil works/ Sea outfalls	40 years	2.5 percent
Equipment/ Materials	15 years	6.67 percent

6.2 The depreciation rate is 4 percent of the estimated value of the existing assets, pending revaluation.

7. Wastewater Flows and flows to be considered for revenue generation.

7.1. For revenue projection, wastewater flows have been determined based on possible coverage by the National Sewerage Program and estimated increases in service demand generated by the Sewerage Connection Investment Program of about Mau Rs 2.2 billions over the forecast period (i.e. an average of about Mau Rs 200 millions per annum). These estimated wastewater flows have been converted into water flow equivalents for billing and revenue generation purposes on the basis of a water-to-wastewater conversion rate of 80 percent. A 10 percent allowance has been made for possible demand elasticity response for domestic users; this becomes a 5 percent allowance for non-domestic users and Government agencies.

8. Long and Medium-Term Debt Service (LMTD)

8.1. Two options are considered for the financial projections:

8.2. Option 1: All external loan funds are assumed to be onlent to the WWA under the above conditions to carry an average interest at 5 percent, repayable over 20 years excluding the construction project period 1998-2003. The currency exchange risk has been assumed to be taken by GOM.

8.3. Option 2: All National Sewerage Program costs (including GOM contribution and external grants) are assumed to be onlent to the WWA under the above conditions to carry an average interest at 5 percent, repayable over 20 years excluding the construction project period 1998-2003. The currency exchange risk has been assumed to be taken by GOM.

H. Conclusions and Management of the Long and Medium Term Debt

From the overall analysis presented and the forecast financial statements for the period 1998-2007, it can be concluded that revenues generated through the proposed wastewater tariffs as percentage of the water tariffs, will allow, as illustrated by the Graph 5-11 below:

1. Coverage of the full O & M costs in all years;

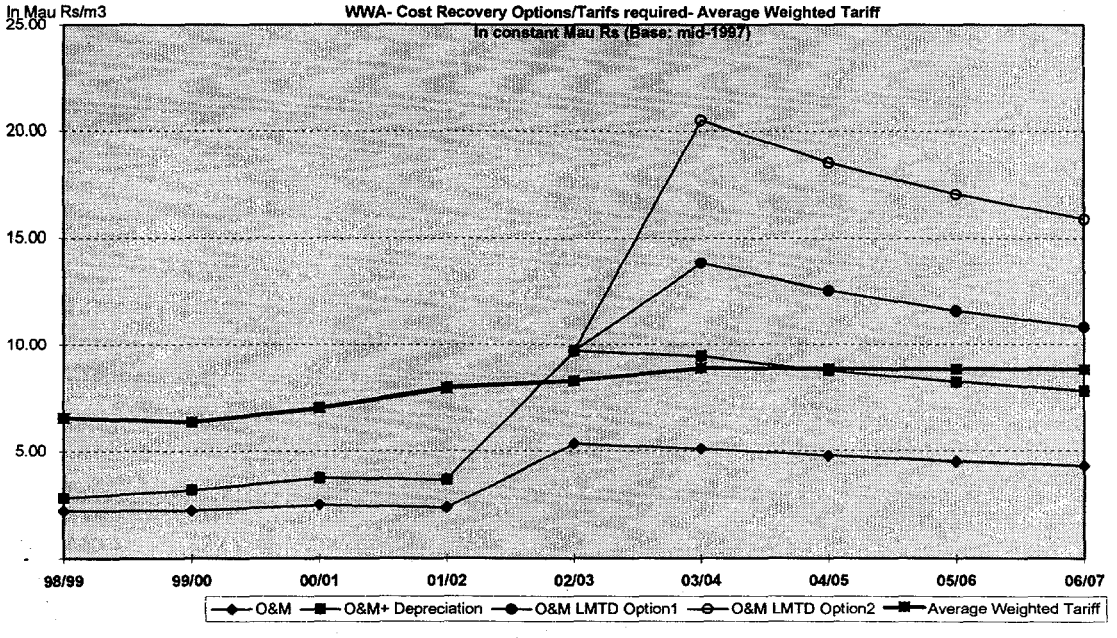
2. Coverage of full O & M and depreciation in all years, except in fiscal year 2002/2003 when most of the pumping and treatment facilities become operational;

The financial cash flow generated through the wastewater tariffs fixed at the affordability level will not allow the full coverage of the debt service, even if, only the external loans to GOM are onlent to the WWA, at the soft conditions considered.

The cash flows generated can gradually contribute to a higher level of coverage of the debt service as indicated below in both options of the Debt Service:

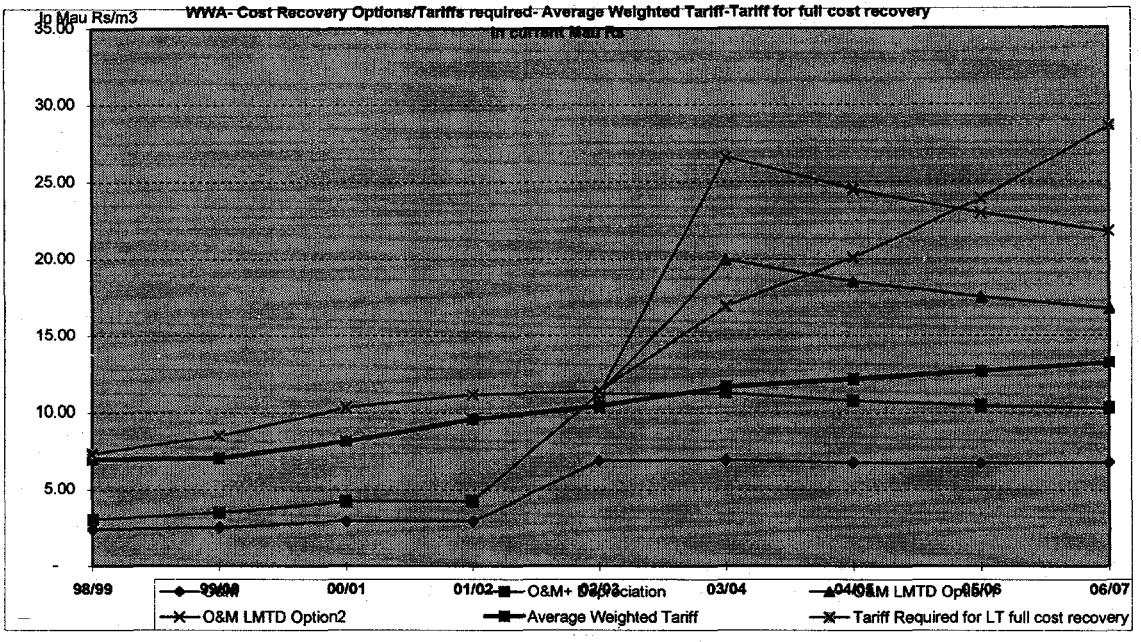
Debt Ratio	2003/2004	2004/2005	2005/2006	2006/2007
Option 1 (Onlending of External Loans)	0%	0%	17%	22%
Option 2 (Onlending of Total NSP costs)	0%	0%	9%	13%

Graph 5-11



The graph 5-12 below, presents, in the case of onlending of the total NSP cost to the WWA, the level of tariffs required to allow, over the forecast period: (i) the annual financial equilibrium; and (ii) the long and medium terms financial equilibrium.

Graph 5-12



From the above analysis, it was agreed with GOM, that:

1. The infrastructure investment assets for the NSP will not be vested in the new WWA to be created but will be managed by the new WWA within the framework of the foreseen contract (reflecting the "Maîtrise d'Ouvrage déléguée") between GOM and WWA.

2. These assets will remain the property of the State.

3. The liabilities associated with these assets (long and medium terms debt service) will therefore not be onlent to the new WWA, and will remain the responsibility of the State.

4. In addition to covering O & M and depreciation, the revenues generated from the proposed tariffs will also contribute partially and gradually to the debt service, through a "User Fee" and/or a percentage of the free cash flow generated.

5. The modalities and level of the contribution to the debt service through the proposed tariffs, are to be defined within the foreseen contract (reflecting the "Maîtrise d'Ouvrage déléguée") between GOM and WWA.

H. Financial Analysis- Montagne Jacquot Sewerage project

Internal Financial Rate of Return (IFRR)

The Internal Financial Rate of Return (IFRR), which in constant prices relates the sewerage revenues to the capital and operating costs of the Montagne Jacquot sewerage facilities, was computed as an indication of the minimum economic return. The life of the project has been

estimated at 30 years. Revenues attributable to the project were used as a first estimate of the consumer's willingness to pay in quantifying the estimated internal rate of return for the proposed project.

The cost stream includes: (i) base costs and physical contingencies for civil works, equipment, engineering studies, supervision and operation and maintenance for the transport, treatment and disposal of wastewater for Port Louis South and Lower Beau Bassin/Coromandel; and (ii) the investment costs for reticulation for additional household and industrial connections (to be financed by GOM during the first five years of the forecast period and implemented by WWA).

The IFRR is approximately 8.1%. The IFRR is considered to be acceptable given: (i) the nearly total lack of cost-recovery mechanisms at present; and (ii) the social nature of the proposed project with its intangible anticipated health, economic and environmental benefits presented in Annex 4. The computation of the IFRR is shown below in Table 5-13.

Table 5-13

Mauritius
Environmental Sewerage & Sanitation Project
Financial Analysis
Financial Rate of Return for Montagne Jacquot Project

YEAR	A. Investment (*)	B. Investment (*)	Total Investment (*)	Operating Cost (**)	Total Cost	New Connections	Sewerage Flow	Inc.Revenues	Net benefits
	(in million Mau Rs)	(in million Mau Rs)	(in million Mau Rs)	(in million Mau Rs)	in million Mau R	(in 000)	(in million m3/year)	(in million Mau Rs)	(in million Mau Rs)
97/98	60.7	0.0	60.7	-2.0	58.7	0.0	7.3	25.0	-33.7
98/99	144.7	31.8	176.5	-2.0	174.5	1.3	9.6	90.0	-84.5
99/00	322.4	74.8	397.2	-2.0	395.2	3.0	10.5	96.9	-298.3
00/01	368.5	53.3	421.8	-2.0	419.8	2.1	11.3	108.5	-311.3
01/02	146.3	59.7	206.1	-2.0	204.1	2.4	12.0	121.7	-82.4
02/03	43.1	66.5	109.7	30.4	140.1	2.7	12.7	131.1	-9.0
03/04		74.5	89.4	32.1	121.5	3.0	13.6	145.0	23.5
04/05		94.9	113.9	34.1	148.0	3.8	14.5	154.3	6.4
05/06		78.9	94.7	36.0	130.8	3.2	15.5	163.4	32.6
06/07		86.8	104.2	37.9	142.1	3.5	16.5	172.2	30.0
07/08		95.5	114.6	40.0	154.6	3.8	17.5	181.3	26.7
08/09		0.0	0.0	40.0	40.0		17.5	181.3	141.3
09/10		0.0	0.0	40.0	40.0		17.5	181.3	141.3
10/11				40.0	40.0		17.5	181.3	141.3
11/12				40.0	40.0		17.5	181.3	141.3
12/13				40.0	40.0		17.5	181.3	141.3
13/14				40.0	40.0		17.5	181.3	141.3
14/15				40.0	40.0		17.5	181.3	141.3
15/16				40.0	40.0		17.5	181.3	141.3
16/17				40.0	40.0		17.5	181.3	141.3
17/18				40.0	40.0		17.5	181.3	141.3
18/19				40.0	40.0		17.5	181.3	141.3
19/20				40.0	40.0		17.5	181.3	141.3
20/21				40.0	40.0		17.5	181.3	141.3
21/22				40.0	40.0		17.5	181.3	141.3
22/23				40.0	40.0		17.5	181.3	141.3
23/24				40.0	40.0		17.5	181.3	141.3
24/25				40.0	40.0		17.5	181.3	141.3
25/26				40.0	40.0		17.5	181.3	141.3
26/27				40.0	40.0		17.5	181.3	141.3
Total	1,085.7	716.9	1,888.7	960.8	2,849.5	28.7	473.9	4,834.0	1,984.5
							Internal Financial Rate of Return		8.1%

NPV at estimated Effective Rate of Interest			10.0%					
NPV	1,197	203	1,400	15	129	26	1,271	-129

(*) Investments costs are related to A. the construction works for the Montagne Jacquot Sewerage System and B. network extensions for new households and industries connections.
(**) Opearting and maintenance costs represent the computation of the detailed estimates for Montagne Jacquot Sewerage System.
(***) National sewerage tariffs proposed (based on proposed Water Tariffs) take into consideration the affordability/willingness to pay.

Sensitivity Analysis : Table 5-14 presents the various assumptions tested and their influence on overall project internal rate-of-return.

Table 5-14

Sensitivity/FIRR	20%	Base	-20%
Investment	6.4%	8.1%	10.6%
Revenues	12.1%	8.1%	4.1%
O&M	7.4%	8.1%	8.8%

ANNEX 5-01

SUMMARY NATIONAL SEWERAGE INVESTMENT PROGRAM

(Mau Rs/million)

Sl. No.	Project	Estimated Cost	Cost Already Incurred	Cost to be Incurred	Projected Expenditure					
					1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003
I	**Plaines Wilhems**									
i	St. Martin - Phase I	60.0	40.0	20.0	20.0					
ii	St. Martin - Phase II	780.0		780.0	13.0	76.7	153.4	306.8	230.1	
iii	CHA Phase I	22.0	14.6	7.4	7.4					
iv	Plaines Wilhems Trunk Sewer	450.0		450.0	-	10.0	44.0	88.0	176.0	132.0
v	Urgent Works	51.8	31.0	20.8	20.8					
vi	CHA Phase II	142.5	4.9	137.6	41.3	82.6	13.8			
	Total	1,506.3	90.5	1,415.8	102.5	169.3	211.2	394.8	406.1	132.0
II	**Port Louis South & Lower Basin**									
i	CHA Phase II	142.5	4.9	137.6	41.3	82.6	13.8			
ii	Montagne Jacquot	1,222.2	10.0	1,212.2	71.8	163.3	357.3	407.6	165.2	47.1
iii	Urgent Works	158.2	73.8	84.4	42.2	42.2				
	Total	1,522.9	88.7	1,434.2	155.2	288.1	371.1	407.6	165.2	47.1
III	**Port Louis North**									
i	Baie du Tombeau	800.0	10.0	790.0	50.0	111.0	222.0	296.0	111.0	
	Total	800.0	10.0	790.0	50.0	111.0	222.0	296.0	111.0	-
IV	**Rural Areas**									
	Grand Baie	450.0		450.0	50.0	60.0	120.0	160.0	60.0	
	Total	450.0	-	450.0	50.0	60.0	120.0	160.0	60.0	-
V	**Others**									
i	Reticulation System (Unspecified)	1,196.6	-	1,196.6		113.0	240.2	240.2	313.0	290.2
ii	Revolving Fund for House Connections	50.0	-	50.0		50.0				
	Total	1,246.6	-	1,246.6	-	163.0	240.2	240.2	313.0	290.2
	Grand Total/a	**5,525.9**	**189.2**	**5,336.7**	**357.7**	**791.3**	**1,164.4**	**1,498.6**	**1,055.3**	**469.3**
	Percent Works of Total	100%	3%	97%	6%	14%	21%	27%	19%	8%

/a: Includes estimated contingencies of Mau Rs 656 million (physical Rs.359 million and price Rs.297 million).

ANNEX 5-02-A

SUMMARY NATIONAL SEWERAGE INVESTMENT PROGRAMME
FINANCING PATTERN
(Mau Rs million)

Sl. No.	Project	Estimated Cost	Cost Already Incurred	Cost to be Incurred	Financing Pattern				
					Government	External Agencies		Private Sector	Total
						Grant	Loan		
I	**Plaines Wilhems**								
i	St. Martin - Phase I	60.0	40.0	20.0	60.0		-		60.0
ii	St. Martin - Phase II	780.0		780.0	367.0	413.0	-		780.0
iii	CHA Phase I	22.0	14.6	7.4			22.0		22.0
iv	Plaines Wilhems Trunk Sewer	450.0		450.0	90.0		360.0		450.0
v	Urgent Works	51.8	31.0	20.8	51.8		-		51.8
vi	CHA Phase II	142.5	4.9	137.6	31.4		111.2		142.5
	Total	1,506.3	90.5	1,415.8	600.2	413.0	493.2	-	1,506.3
II	**Port Louis South & Lower Basin**								
i	CHA Phase II	142.5	4.9	137.6	31.4		111.2		142.5
ii	Montagne Jacquot	1,222.2	10.0	1,212.2	298.6	20.0	873.7	30.0	1,222.2
iii	Urgent Works	158.2	73.8	84.4	158.2		-		158.2
	Total	1,522.9	88.7	1,434.2	488.1	20.0	984.8	30.0	1,522.9
III	**Port Louis North**								
i	Baie du Tombeau	800.0	10.0	790.0	335.0	65.0	400.0		800.0
	Total	800.0	10.0	790.0	335.0	65.0	400.0	-	800.0
IV	**Rural Areas**								
	Grand Baie	450.0		450.0	150.0		300.0		450.0
	Total	450.0	-	450.0	150.0	-	300.0	-	450.0
V	**Others**								
i	Reticulation System (Unspecified)	1,196.6	-	1,196.6	263.3		933.4		1,196.6
ii	Revolving Fund for House Connections	50.0	-	50.0	11.0		39.0		50.0
	Total	1,246.6	-	1,246.6	274.3		972.4	-	1,246.6
	Grand Total	**5,525.9**	**189.2**	**5,336.7**	**1,847.6**	**498.0**	**3,150.3**	**30.0**	**5,525.9**
	percent				33%	9%	57%	1%	100%

NATIONAL SEWERAGE INVESTMENT PROGRAM

YEARWISE FINANCING AND COUNTERPART FUNDING

ANNEX 5-02-B

(Mau Rs million)

Project	Estimated Cost	Cost Already Incurred	Cost to be Incurred	Projected Expenditure					
				1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003
St. Martin - Phase I									
Government	60.0	40.0	20.0	20.0					
External Agency - Loan	-	-		-					
Total	60.0	40.0	20.0	20.0					
St. Martin - Phase II									
Government	367.0	-	294.1	4.9	28.9	57.8	115.7	86.7	
External Agency - Loan									
External Agency - Grant	413.0	-	485.9	8.1	47.8	95.6	191.1	143.4	
Total	780.0	-	780.0	13.0	76.7	153.4	306.8	230.1	
CHA Phase I									
Government				-					
External Agency - Loan	22.0	14.6	7.4	7.4					
Total	22.0	14.6	7.4	7.4					
Plaines Wilhems Trunk Sewer									
Government	90.0	-	90.0	-	2.0	8.8	17.6	35.2	26.4
External Agency - Loan	360.0	-	360.0	-	8.0	35.2	70.4	140.8	105.6
Total	450.0	-	450.0	-	10.0	44.0	88.0	176.0	132.0
Urgent Works									
Government	210.0	104.8	105.2	63.0	42.2				
External Agency - Loan				-					
Total	210.0	104.8	105.2	63.0	42.2				
CHA Phase II									
Government	62.7	2.1	59.7	17.9	35.8	6.0			
External Agency - Loan	222.3	7.7	215.5	64.6	129.3	21.5			
Total	285.0	9.8	275.2	82.6	165.1	27.5			
Montagne Jacquot									
Government	298.6		298.6	60.0	40.8	82.2	51.0	19.8	44.7
External Agency - Loan	873.7		873.7	1.8	122.5	260.1	341.6	145.4	2.3
External Agency - Grant	20.0	10.0	10.0	10.0					
Private Sector	30.0		30.0			15.0	15.0		
Total	1,222.2	10.0	1,212.2	71.8	163.3	357.3	407.6	165.2	47.0
Baie du Tombeau									
Government	335.0	4.2	331.0	21.0	46.5	93.0	124.0	46.5	
External Agency - Loan	400.0	5.0	395.0	25.0	55.5	111.0	148.0	55.5	
External Agency - Grant	65.0	0.8	64.0	4.1	9.0	18.0	24.0	9.0	
Total	800.0	10.0	790.0	50.0	111.0	222.0	296.0	111.0	
Grand Baie									
Government	149.9	-	149.9	16.7	20.0	40.0	53.3	20.0	
External Agency - Loan	300.2	-	300.2	33.4	40.0	80.0	106.7	40.0	
Total	450.0	-	450.0	50.0	60.0	120.0	160.0	60.0	
Others									
Government	274.3	-	274.3	-	35.8	52.8	52.9	68.9	63.9
External Agency - Loan	972.4	-	972.4	-	127.1	187.4	187.4	244.1	226.4
Total	1,246.6	-	1,246.6	-	163.0	240.2	240.2	313.0	290.2
Summary									
Government	1,847.4	151.1	1,622.7	203.4	252.1	340.6	414.5	277.1	135.0
External Agency - Loan	3,150.5	27.3	3,124.1	132.2	482.4	695.3	854.1	625.8	334.3
External Agency - Grant	498.0	10.8	559.9	22.1	56.8	113.6	215.1	152.3	-
Private Sector	30.0		30.0			15.0	15.0		
Grand Total	**5,525.9**	**189.2**	**5,336.7**	**357.8**	**791.3**	**1,164.4**	**1,498.6**	**1,055.3**	**469.3**

AVERAGE COST RECOVERY REQUIRED UNDER VARIOUS OPTIONS **ANNEX 5-03**

(At Mid-1997 Prices)

(Mau Rs/ million)

OPTION/YEAR	1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
1. Operation and Maintenance Cost											
Recurrent - Existing\a	43.28	45.44	47.72	50.10	52.61	55.24	58.00	60.90	63.94	67.14	70.50
Recurrent - Additional		0.00	4.62	9.59	22.49	24.88	144.67	151.57	151.57	151.57	151.57
Total	43.28	45.44	52.33	59.70	75.09	80.12	202.67	212.47	215.51	218.71	222.06
Annual Sewerage Volume estimated (Mm3/y)	15.15	19.32	20.58	23.36	26.42	29.66	33.01	36.24	39.50	42.34	44.79
Sewerage Cost (Mau Rs/m3)	**2.9**	**2.4**	**2.5**	**2.6**	**2.8**	**2.7**	**6.1**	**5.9**	**5.5**	**5.2**	**5.0**
Required Average Tariff (Mau Rs/cum)	**2.5**	**2.0**	**2.2**	**2.2**	**2.5**	**2.3**	**5.3**	**5.1**	**4.8**	**4.5**	**4.3**
2. O&M Cost plus Depreciation											
Recurrent - Existing\a	43.28	45.44	47.72	50.10	52.61	55.24	58.00	60.90	63.94	67.14	70.50
Recurrent - Additional		0.00	4.62	9.59	22.49	24.88	144.67	151.57	151.57	151.57	151.57
Depreciation		8.00	15.11	26.83	39.62	45.60	165.22	181.20	181.20	181.20	181.20
Total	43.28	53.44	67.45	86.52	114.71	125.72	367.89	393.67	396.71	399.91	403.27
Annual Sewerage Volume estimated (Mm3/y)	15.15	19.32	20.58	23.36	26.42	29.66	33.01	36.24	39.50	42.34	44.79
Sewerage Cost (Mau Rs/m3)	**2.9**	**2.8**	**3.3**	**3.7**	**4.3**	**4.2**	**11.1**	**10.9**	**10.0**	**9.4**	**9.0**
Required Average Tariff (RS/cum)	**2.5**	**2.4**	**2.8**	**3.2**	**3.8**	**3.7**	**9.7**	**9.5**	**8.8**	**8.2**	**7.9**
3. O&M, Depreciation or Debt Service (onlending exter. Loans) - Higher of the Two											
Recurrent - Existing\a	43.28	45.44	47.72	50.10	52.61	55.24	58.00	60.90	63.94	67.14	70.50
Recurrent - Additional		0.00	4.62	9.59	22.49	24.88	144.67	151.57	151.57	151.57	151.57
Depreciation		8.00	15.11	26.83	39.62	45.60	165.22				
Debt Service:											
Principal Repayment								180.80	180.80	180.80	180.80
Interest								180.80	171.76	162.72	153.68
Total	43.28	53.44	67.45	86.52	114.71	125.72	367.89	574.06	568.07	562.23	556.54
Annual Sewerage Volume estimated (Mm3/y)	15.15	19.32	20.58	23.36	26.42	29.66	33.01	36.24	39.50	42.34	44.79
Sewerage Cost (Mau Rs/m3)	**2.9**	**2.8**	**3.3**	**3.7**	**4.3**	**4.2**	**11.1**	**15.8**	**14.4**	**13.3**	**12.4**
Required Average Tariff (RS/cum)	**2.5**	**2.4**	**2.8**	**3.2**	**3.8**	**3.7**	**9.7**	**13.8**	**12.5**	**11.6**	**10.8**
4. O&M, Depreciation or Debt Service (onlending total costs) - Higher of the Two											
Recurrent - Existing\a	43.28	45.44	47.72	50.10	52.61	55.24	58.00	60.90	63.94	67.14	70.50
Recurrent - Additional	0.00	0.00	4.62	9.59	22.49	24.88	144.67	151.57	151.57	151.57	151.57
Depreciation	0.00	8.00	15.11	26.83	39.62	45.60	165.22	0.00	0.00	0.00	0.00
Debt Service:											
Principal Repayment								319.67	319.67	319.67	319.67
Interest								319.67	303.69	287.70	271.72
Total	43.28	53.44	67.45	86.52	114.71	125.72	367.89	851.80	838.86	826.08	813.45
Annual Sewerage Volume estimated (Mm3/y)	15.15	19.32	20.58	23.36	26.42	29.66	33.01	36.24	39.50	42.34	44.79
Sewerage Cost (Mau Rs/m3)	**2.9**	**2.8**	**3.3**	**3.7**	**4.3**	**4.2**	**11.1**	**23.5**	**21.2**	**19.5**	**18.2**
Required Average Tariff (RS/cum)	**2.5**	**2.4**	**2.8**	**3.2**	**3.8**	**3.7**	**9.7**	**20.5**	**18.5**	**17.0**	**15.9**

\a: For existing recurrent expenditure a real term increase of 5% has been assumed over the base 1997 estimates

NATIONAL SEWERAGE PROGRAM

ANNEX 5-04

FLOW PROJECTIONS -

	Unit	1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
A. CONNECTIONS (No.)												
1. Port Louis, Lower Basin, Plain Wilhems												
Domestic:					20%							
Population Served		173,000	173,000	250,000	300,000	350,000	400,000	450,000	500,000	550,000	575,000	600,000
Connections Required		31,455	31,455	45,455	54,545	63,636	72,727	81,818	90,909	100,000	104,545	109,091
Existing Connections-Year Begning			31,455	38,455	45,455	54,545	63,636	72,727	81,818	90,909	100,000	104,545
New Connections Required				7,000	9,091	9,091	9,091	9,091	9,091	9,091	4,545	4,545
Regularisation			7,000									
Feasible				3,000	3,000							
Inv. Programme				4,000	6,091	9,091	9,091	9,091	9,091	9,091	4,545	4,545
Estimated Connections-Year Closing		31,455	38,455	45,455	54,545	63,636	72,727	81,818	90,909	100,000	104,545	109,091
Non Domestic:												
Estimated % Area (National)			60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
Required Non Domestic Connections		4,300	6,056	6,229	6,609	6,748	6,852	7,163	7,450	7,748	8,058	8,380
Existing Connections-Year Begning		3,100	3,100	5,100	5,600	6,100	6,600	6,850	7,100	7,350	7,650	7,950
Regularisation			2,000									
New Connections				500	500	500	250	250	250	300	300	300
Estimated Connections-Year Closing		3,100	5,100	5,600	6,100	6,600	6,850	7,100	7,350	7,650	7,950	8,250
Government Agencies:												
Estimated Adm. Connections			1,800	1,818	1,836	1,855	1,873	1,892	1,911	1,930	1,949	1,969
2. Grand Baie												
Domestic:												
Estimated Connections-Year Closing							1,730	3,410	5,110	6,820	9,100	12,142
Non Domestic:												
Estimated Connections-Year Closing							1,430	2,000	2,290	2,860	3,570	4,460
Total Connections-Year End												
Domestic			38,455	45,455	54,545	63,636	74,457	85,228	96,019	106,820	113,645	121,233
Non Domestic			5,100	5,600	6,100	6,600	8,280	9,100	9,640	10,510	11,520	12,710
Government Agencies			1,800	1,818	1,836	1,855	1,873	1,892	1,911	1,930	1,949	1,969
Total Connections			45,355	52,873	62,482	72,091	84,610	96,220	107,570	119,260	127,115	135,912
B. TOTAL SEWERAGE VOLUME	**Mm3/year**											
1. Sewerage Volume possible												
Domestic		8.08	9.88	11.68	14.02	16.35	19.13	21.90	24.67	27.45	29.20	31.15
Non-domestic		7.07	7.07	7.77	8.46	9.15	9.79	10.25	10.65	11.18	11.74	12.34
Government Agencies		0.00	2.37	2.39	2.41	2.44	2.46	2.49	2.51	2.54	2.56	2.59
Total 1.		15.15	19.32	21.84	24.89	27.94	31.38	34.64	37.84	41.17	43.51	46.08
2. Sewerage Volume assumed												
Domestic		8.08	9.88	10.78	12.85	15.18	17.74	20.52	23.29	26.06	28.33	30.18
Non-domestic		7.07	7.07	7.42	8.11	8.81	9.47	10.02	10.45	10.92	11.46	12.04
Government Agencies		0.00	2.37	2.38	2.40	2.42	2.45	2.47	2.50	2.52	2.55	2.57
Total 2.		15.15	19.32	20.58	23.36	26.42	29.66	33.01	36.24	39.50	42.34	44.79
3. Equivalent Water Volume assumed												
Domestic	80%	10.10	12.35	13.48	16.06	18.98	22.18	25.65	29.11	32.58	35.41	37.72
Non-domestic	80%	8.84	8.84	9.27	10.14	11.01	11.84	12.52	13.06	13.65	14.33	15.05
Government Agencies	80%	0.00	2.96	2.97	3.00	3.03	3.06	3.09	3.12	3.15	3.19	3.22
Total 3.		18.94	24.15	25.72	29.20	33.02	37.08	41.26	45.30	49.38	52.92	55.99
4. Equivalent Water Volume considered for revenue generation												
Domestic	90%	9.09	11.12	12.13	14.45	17.08	19.96	23.08	26.20	29.32	31.87	33.95
Non-domestic	95%	8.40	8.40	8.81	9.64	10.46	11.25	11.90	12.41	12.97	13.61	14.30
Government Agencies	95%	0.00	2.81	2.82	2.85	2.88	2.91	2.94	2.97	3.00	3.03	3.06
Total Water Volume for Revenue Generation		17.49	22.32	23.76	26.94	30.42	34.12	37.92	41.58	45.28	48.51	51.30

Estimate National Connections Program	Units	Price	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	Total
Domestic				4,000	9,091	9,091	10,821	10,771	10,791	10,801	6,825	7,587	79,778
Non Domestic				500	500	500	1,680	820	540	870	1,010	1,190	7,610
Government Agencies				18	18	18	19	19	19	19	19	19	169
Total New Connections			-	4,518	9,609	9,609	12,519	11,610	11,350	11,690	7,855	8,797	87,557

Total Investment required	millions Mau Rs	0.025	-	113	240	240	313	290	284	292	196	220	2,189

WASTE WATER AUTHORITY
INCOME STATEMENT
(Mau Rs/million)

ANNEX 5-05

Item/Year	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
ASSUMPTIONS										
Equivalent Water Flow for revenue generation (million/cum)										
Domestic	11.1	12.1	14.5	17.1	20.0	23.1	26.2	29.3	31.9	33.9
Non-domestic	8.4	8.8	9.6	10.5	11.2	11.9	12.4	13.0	13.6	14.3
Government Agencies	2.8	2.8	2.9	2.9	2.9	2.9	3.0	3.0	3.0	3.1
Proposed Average Water Tariffs (RS/cum)										
Domestic		6.3	6.3	7.3	8.5	8.8	9.1	9.6	10.0	10.5
Non-Domestic	-	13.0	13.6	14.2	14.9	15.5	16.2	17.0	17.8	18.7
Wastewater Charges										
(Percent of Water Charges)										
Domestic	0%	45%	45%	60%	75%	85%	100%	100%	100%	100%
Non-Domestic	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Proposed Average Wastewater Tariffs (Mau RS/cum)										
Domestic		2.8	2.8	4.4	6.4	7.5	9.1	9.6	10.0	10.5
Non-Domestic	-	13.0	13.6	14.2	14.9	15.5	16.2	17.0	17.8	18.7
INCOME										
Waste Water Sale:										
Domestic	-	34.4	41.0	74.8	127.2	172.6	238.4	281.5	319.7	355.9
Comercial	-	114.5	131.0	148.5	167.6	184.4	201.1	220.4	242.9	267.7
Government Agencies	-	16.5	17.4	24.5	32.5	38.7	48.1	50.9	54.0	57.2
Other Income		4.0	4.2	4.4	4.6	4.9	5.1	5.4	5.6	5.9
Total	**52.6**	**169.4**	**193.7**	**252.3**	**332.0**	**400.6**	**492.6**	**558.2**	**622.2**	**686.7**
EXPENDITURE										
CWA remuneration on sale		5.8	6.6	8.7	11.5	13.9	17.1	19.3	21.6	23.8
Operation and Maintenance:										
Recurrent - Existing	47.6	52.4	57.6	63.4	69.7	76.7	84.3	92.8	102.1	112.3
Recurrent - Additional	-	4.8	10.6	26.0	30.2	184.6	203.1	213.3	223.9	235.1
sub-total	47.6	57.2	68.2	89.4	99.9	261.3	287.5	306.0	326.0	347.4
Surplus/-Deficit Before Depreciation	**5.0**	**106.4**	**118.9**	**154.2**	**220.6**	**125.4**	**188.1**	**232.8**	**274.6**	**315.5**
Depreciation	8.0	15.1	26.8	39.6	45.6	165.2	181.2	181.2	181.2	181.2
Provision for Ex. Assets Renewal		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Interest										
Surplus/-Deficit For The Year	**(3.0)**	**81.3**	**82.0**	**104.6**	**165.0**	**(49.8)**	**(3.1)**	**41.6**	**83.4**	**124.3**

Item/Year	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
Working Ratio	91%	37%	39%	39%	34%	69%	62%	58%	56%	54%
Operating Ratio	106%	52%	58%	59%	50%	112%	101%	93%	87%	82%
Surplus/-Deficit For The Year/ Revenue For The Year	**-6%**	**48%**	**42%**	**41%**	**50%**	**-12%**	**-1%**	**7%**	**13%**	**18%**
Proposed Average Wastewater Tariff in Mau Rs/m3		6.96	7.03	8.15	9.59	10.44	11.73	12.21	12.71	13.27
Proposed Average Wastewater Tariff in US$/m3		0.33	0.33	0.39	0.46	0.50	0.56	0.58	0.61	0.63
Proposed Average Wastewater Tariff in Constant Mau Rs/m3		6.60	6.38	7.07	7.97	8.29	8.92	8.89	8.86	8.85

ANNEX 5-06-A

WASTE WATER AUTHORITY
SOURCES AND APPLICATIONS OF FUNDS
(Mau Rs/million)

Item/Year	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
SOURCES										
Internal Sources										
Surplus/-Deficit For the Year	(3)	81	82	105	165	(50)	(3)	42	83	124
Add: Depreciation & Provision	8	25	37	50	56	175	191	191	191	191
Total Internal Sources	5	106	119	154	221	125	188	233	275	315
Capital Sources										
Government Contribution:										
Own (Equity Contribution)	355	252	341	414	277	135	-	-	-	-
Grant (External Sources)	33	57	114	215	152	-	-	-	-	-
Loan (External Sources)	159	482	695	854	626	334	-	-	-	-
Total Capital Sources	547	791	1,149	1,484	1,055	469	-	-	-	-
Other Sources										
Total Sources	**552**	**898**	**1,268**	**1,638**	**1,276**	**595**	**188**	**233**	**275**	**315**
APPLICATIONS										
Capital Expenditure	547	791	1,149	1,484	1,055	469	284	292	196	220
Ex. Assets Renewal		10	10	10	10	10	10	10	10	10
Debt Service:										
Principal										
Interest										
sub-total										
Increase/-Decrease in Working Capital	5	19	4	11	13	24	16	11	11	11
Total Applications	**552**	**821**	**1,164**	**1,504**	**1,078**	**503**	**310**	**313**	**217**	**241**
Cash Surplus/-Deficit For the Year	0	77	105	134	197	92	(122)	(81)	57	75
Opening Balance	-	0	77	182	316	513	605	483	402	460
Closing Balance	0	77	182	316	513	605	483	402	460	534

ANNEX 5-06-B

WASTE WATER AUTHORITY
SOURCES AND APPLICATIONS OF FUNDS
Considering Debt Service Obligation (External Loans only)
(Mau Rs million)

Item/Year	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
SOURCES										
Internal Sources										
Surplus/-Deficit For the Year	(3)	81	82	105	165	(50)	(3)	42	83	124
Add: Depreciation & Provision	8	25	37	50	56	175	191	191	191	191
Total Internal Sources	5	106	119	154	221	125	188	233	275	315
Capital Sources										
Government Contribution:										
Own (Equity Contribution)	355	252	341	414	277	135	-			
Grant (External Sources)	33	57	114	215	152	-	-			
Loan (External Sources)	159	482	695	854	626	334	-			
Total Capital Sources	547	791	1,149	1,484	1,055	469	-			
Other Sources										
Total Sources	**552**	**898**	**1,268**	**1,638**	**1,276**	**595**	**188**	**233**	**275**	**315**
APPLICATIONS										
Capital Expenditure	547	791	1,149	1,484	1,055	469	284	292	196	220
Ex. Assets Renewal		10	10	10	10	10	10	10	10	10
Debt Service\a										
Principal							181	181	181	181
Interest							181	172	163	154
sub-total							362	353	344	334
Increase/-Decrease in Working Capita	5	19	4	11	13	24	16	11	11	11
Total Applications	**552**	**821**	**1,164**	**1,504**	**1,078**	**503**	**672**	**666**	**561**	**575**
Cash Surplus/-Deficit For the Year	0	77	105	134	197	92	(483)	(433)	(286)	(260)
Opening Balance	-	0	77	182	316	513	605	121	(312)	(598)
Closing Balance	0	77	182	316	513	605	121	(312)	(598)	(858)

ANNEX 5-06-C

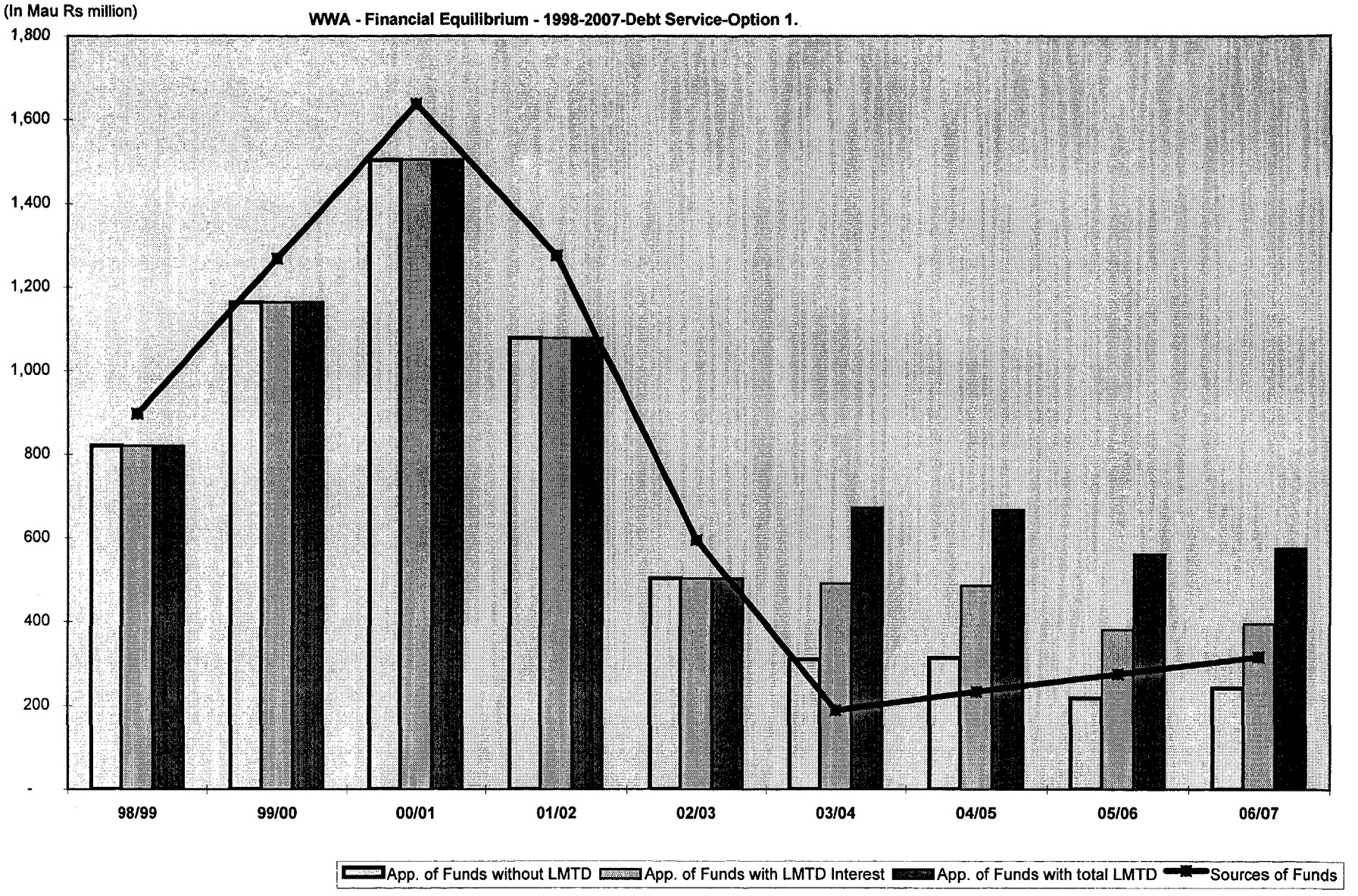
WASTE WATER AUTHORITY
SOURCES AND APPLICATIONS OF FUNDS
Considering Debt Service Obligation (Total Program Costs)
(Mau Rs million)

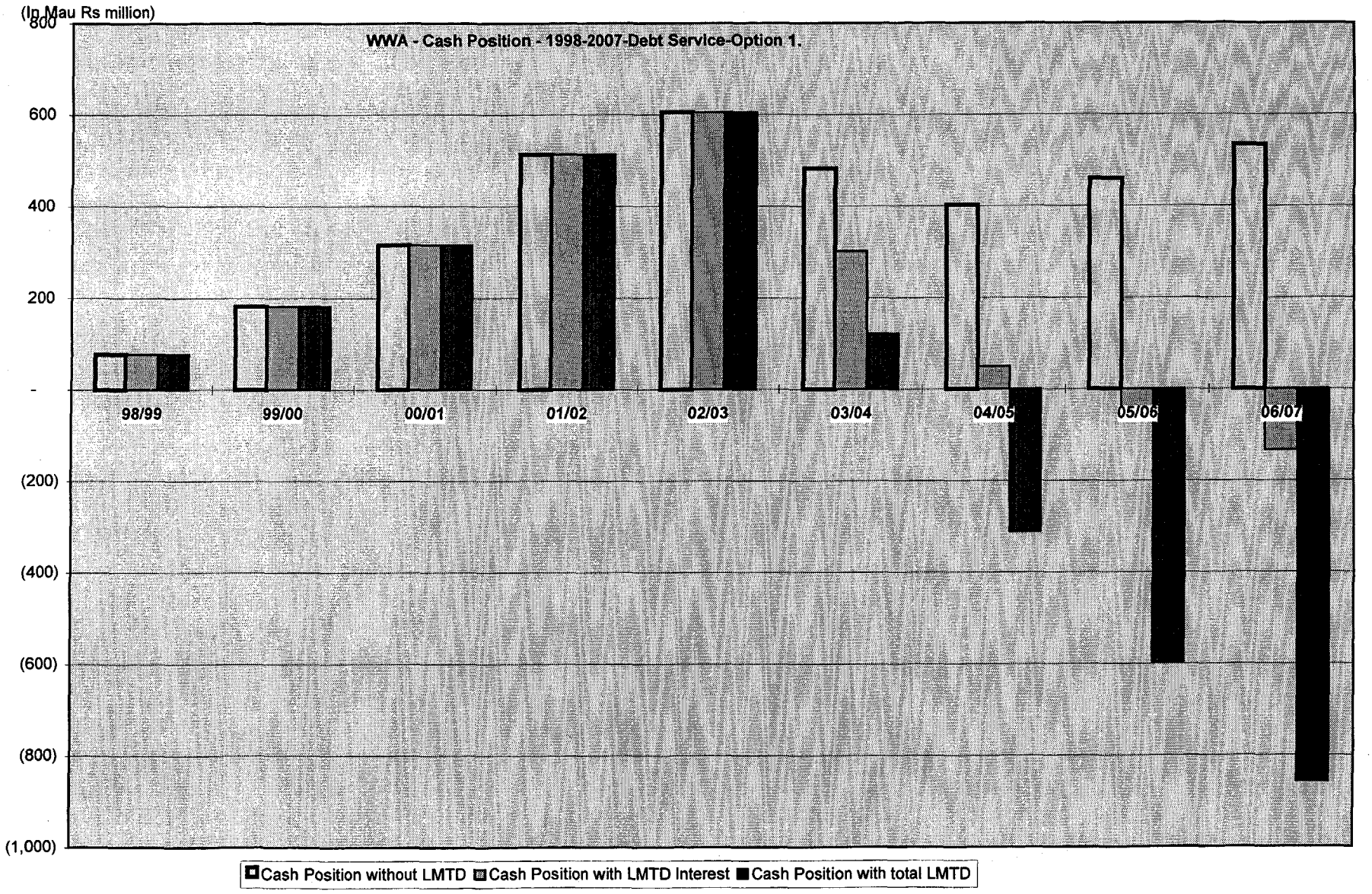
Item/Year	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
SOURCES										
Internal Sources										
Surplus/-Deficit For the Year	(3)	81	82	105	165	(50)	(3)	42	83	124
Add: Depreciation & Provision	8	25	37	50	56	175	191	191	191	191
Total Internal Sources	5	106	119	154	221	125	188	233	275	315
Capital Sources										
Government Contribution:										
Own (Equity Contribution)	355	252	341	414	277	135				
Grant (External Sources)	33	57	114	215	152	-				
Loan (External Sources)	159	482	695	854	626	334				
Total Capital Sources	547	791	1,149	1,484	1,055	469				
Other Sources										
Total Sources	**552**	**898**	**1,268**	**1,638**	**1,276**	**595**	**188**	**233**	**275**	**315**
APPLICATIONS										
Capital Expenditure	547	791	1,149	1,484	1,055	469	284	292	196	220
Ex. Assets Renewal		10	10	10	10	10	10	10	10	10
Debt Service\a										
Principal							320	320	320	320
Interest							320	304	288	272
sub-total							639	623	607	591
Increase/-Decrease in Working Capital	5	19	4	11	13	24	16	11	11	11
Total Applications	**552**	**821**	**1,164**	**1,504**	**1,078**	**503**	**949**	**937**	**825**	**832**
Cash Surplus/-Deficit For the Year	0	77	105	134	197	92	(761)	(704)	(550)	(517)
Opening Balance	-	0	77	182	316	513	605	(157)	(860)	(1,410)
Closing Balance	0	77	182	316	513	605	(157)	(860)	(1,410)	(1,927)

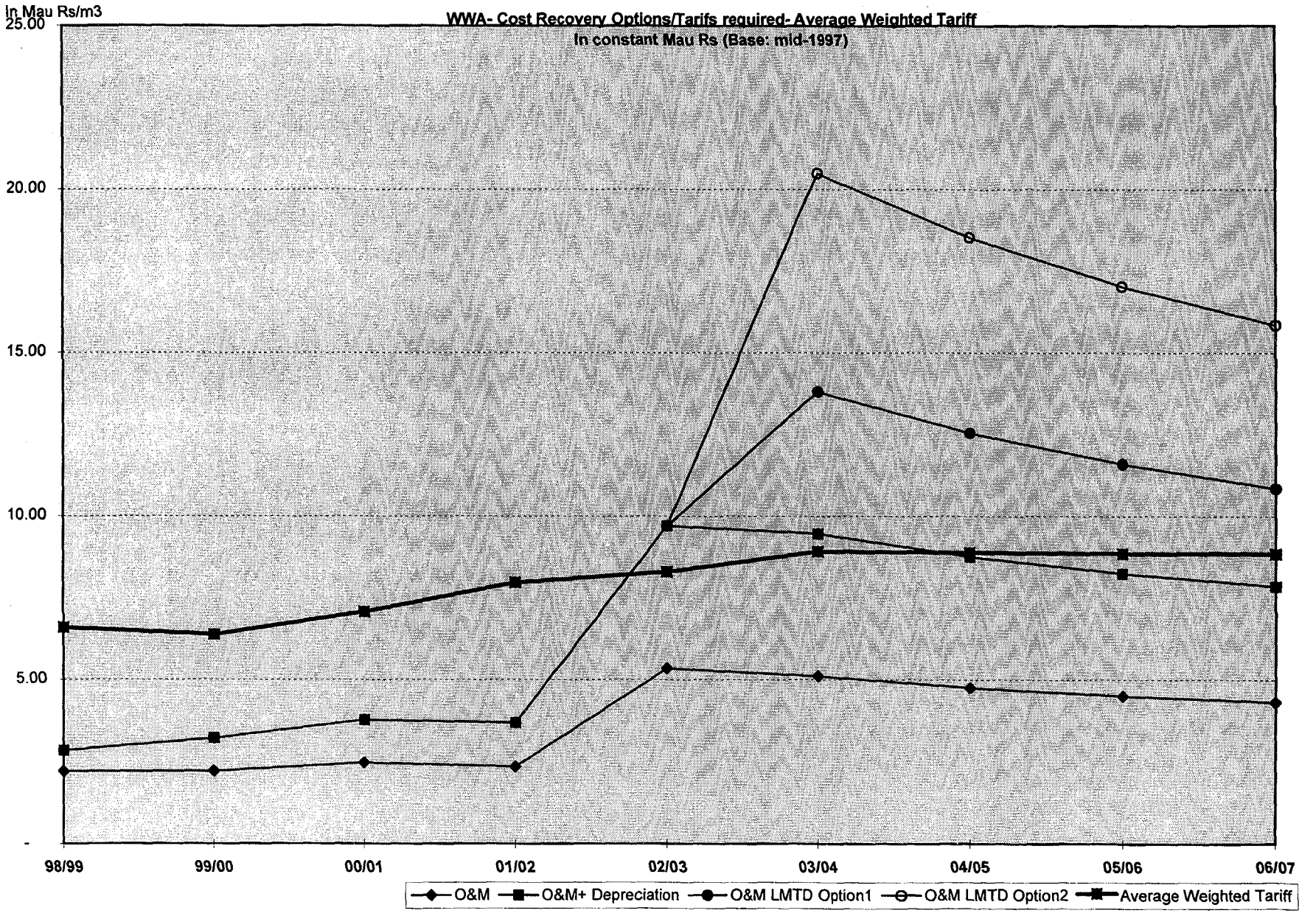
ANNEX 5-07

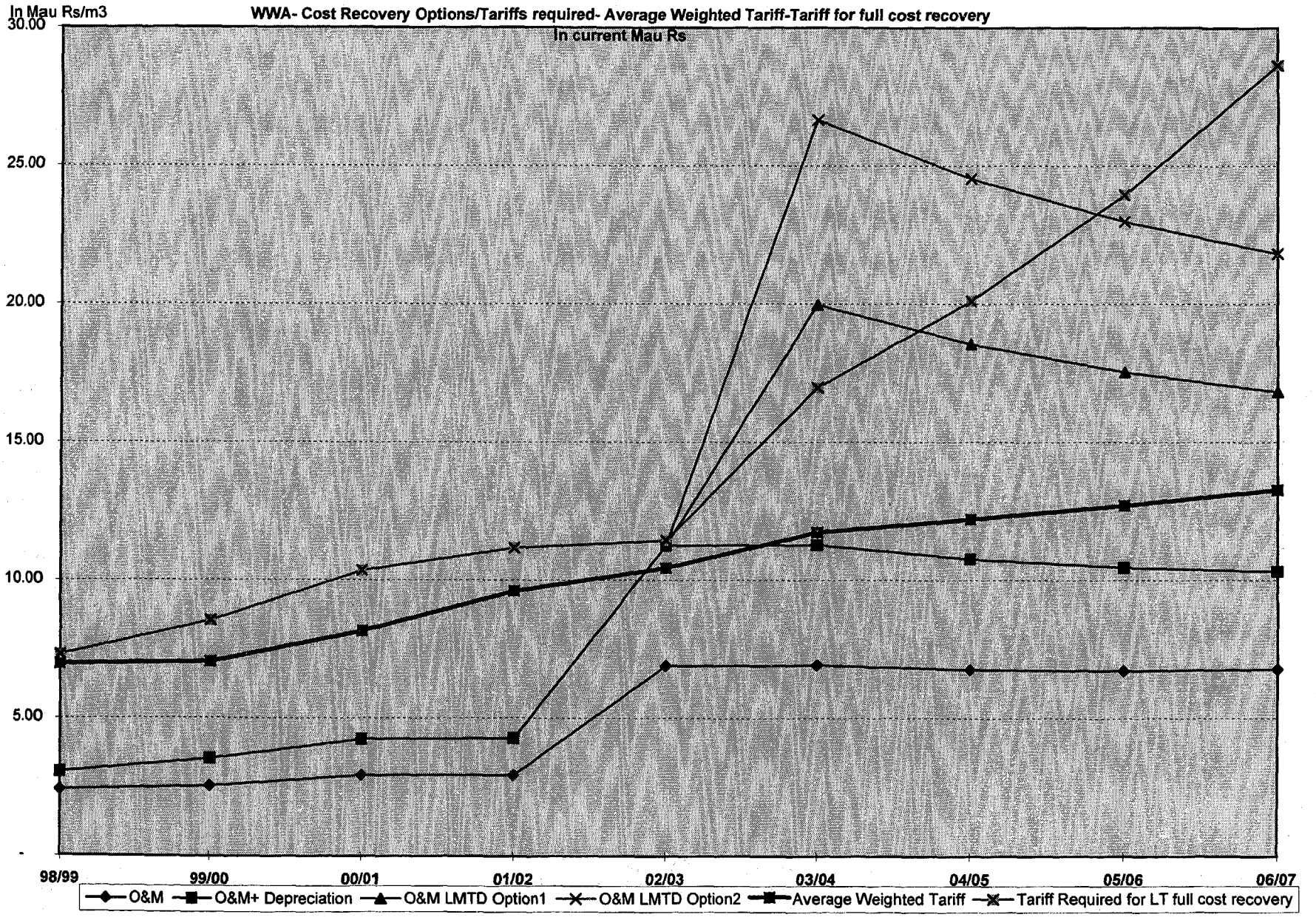
WASTE WATER AUTHORITY
BALANCE SHEET
(Mau Rs/million)

Item/As of June 30 of each Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
ASSETS										
Fixed Assets under WWA management										
Gross Block	334	655	1,180	1,420	4,909	5,696	5,980	6,272	6,468	6,688
Less: Depreciation	8	23	50	90	135	300	482	663	844	1,025
Net Fixed Assets	326	632	1,130	1,331	4,773	5,396	5,498	5,609	5,624	5,663
Work-in-Progress	413	883	1,507	2,751	318	-				
Total	739	1,515	2,638	4,082	5,091	5,396	5,498	5,609	5,624	5,663
Current Assets										
Accounts Receivable	9	28	32	42	55	67	82	93	104	114
Stores & Spares	-	1	2	4	5	31	34	36	37	39
Cash Balance	0	77	182	316	513	605	483	402	460	534
Total	9	106	216	362	573	702	599	531	601	688
Total Assets	**748**	**1,621**	**2,854**	**4,444**	**5,665**	**6,098**	**6,097**	**6,140**	**6,225**	**6,351**
LIABILITIES										
Shareholder Fund:										
Government Contribution:	747	1,538	2,688	4,171	5,227	5,696	5,696	5,696	5,696	5,696
Surplus/-Deficit	(3)	78	160	265	430	380	377	419	502	626
Total	744	1,617	2,848	4,436	5,656	6,076	6,073	6,114	6,198	6,322
Loans										
Current Liabilities:										
Creditors	4	5	6	7	8	22	24	26	27	29
Total	4	5	6	7	8	22	24	26	27	29
Total Liabilities	**748**	**1,621**	**2,854**	**4,444**	**5,665**	**6,098**	**6,097**	**6,140**	**6,225**	**6,351**


(In Mau Rs million)
WWA - Financial Equilibrium - 1998-2007-Debt Service-Option 1.
1,800
1,600
1,400
1,200
1,000
800
600
400
200
-
98/99
99/00
00/01
01/02
02/03
03/04
04/05
05/06
06/07
App. of Funds without LMTD
App. of Funds with LMTD Interest
App. of Funds with total LMTD
Sources of Funds


(In Mau Rs million)
WWA - Cash Position - 1998-2007-Debt Service-Option 1.
800
600
400
200
-
(200)
(400)
(600)
(800)
(1,000)
98/99
99/00
00/01
01/02
02/03
03/04
04/05
05/06
06/07
Cash Position without LMTD
Cash Position with LMTD Interest
Cash Position with total LMTD


In Mau Rs/m3
WWA- Cost Recovery Options/Tarifs required- Average Weighted Tariff
In constant Mau Rs (Base: mid-1997)
25.00
20.00
15.00
10.00
5.00
-
98/99
99/00
00/01
01/02
02/03
03/04
04/05
05/06
06/07
O&M
O&M+ Depreciation
O&M LMTD Option1
O&M LMTD Option2
Average Weighted Tariff


In Mau Rs/m3
WWA- Cost Recovery Options/Tariffs required- Average Weighted Tariff-Tariff for full cost recovery
In current Mau Rs
30.00
25.00
20.00
15.00
10.00
5.00
-
98/99
99/00
00/01
01/02
02/03
03/04
04/05
05/06
06/07
O&M
O&M+ Depreciation
O&M LMTD Option1
O&M LMTD Option2
Average Weighted Tariff
Tariff Required for LT full cost recovery

Annex 6
Mauritius Environmental Sewerage and Sanitation Project
Procurement and Disbursement Arrangements

Procurement Arrangements

The following procurement arrangements will apply to all wholly or partly funded IBRD financed contracts.

General. Works wholly or partly financed by IBRD would be procured in accordance with the Bank's *Guidelines for Procurement under IBRD Loans and IDA Credits,* published in January 1995 and revised in January and August 1996. No goods will be financed under the IBRD loan. Consultancy services wholly or partly financed by IBRD would be procured in accordance with the Bank's *Guidelines for Selection and Employment of Consultants by World Bank Borrowers*, published in January 1997. The borrower's procurement regulations and procedures have been reviewed and have been found acceptable. As soon as possible, and no later than by the time of negotiations, a General Procurement Notice is to be prepared by WWA and transmitted to IBRD for publication in the United Nations Development Businesses to advertise all assignments expected to be financed by IBRD under the project. Standard bidding and other similar documents published by the Bank will be used by WWA for the preparation of International Competitive Bidding (ICB) for works and prequalification documents, and for Requests for Proposals and contracts for consulting services..

Table A below provides information on the project elements and their estimated costs and methods of procurement, including elements financed by the Bank, as well as those financed by other sources (OECF, GOM, and private sector).

Procurement of Civil Works. Civil works contracts for the supply and laying of pipelines and sewers and prequalification of contracts will be procured under ICB in accordance with Bank Guidelines. Procurement for the OECF parallel-financed construction of sewage pumping stations, the treatment plant and the sea outfall sewer will be done according to OECF Procurement Guidelines.

Prior and post review by the Bank for Works contracts. All IBRD-financed works contracts above the threshold of US$ 2,000,000 per contract, and all prequalification documents will be subject to prior review procedures in accordance with the Bank's Guidelines. All other contracts under these thresholds will be subject to post review.

Procurement of Consulting Services. Recruitment of consulting firms for the strengthening of WWA, training of its personnel, supervision of works, sectoral expertise and studies will be carried out under the Quality and Cost Based Selection method (QCBS) in accordance with the Bank's Guidelines. Exception to using the QCBS method will apply to financial audits (Least Cost Selection). Consulting assignments that cost less than US$ 200,000 per contract, for which at least three Mauritian firms are capable, will be recruited on the basis of a short list of Mauritian firms. Recruitment of individual consultants for assistance to the WWA and/or MPU to carry out program and/or project implementation will be done on the basis of qualifications and experience in accordance with the Bank's Guidelines.

Prior and post review by the Bank for Consultancy contracts. All consultant contracts expected to cost the equivalent of US$ 100,000 per contract with firms, and US$ 50,000 per contract with individuals will be subject to prior review by the Bank. For contracts above $ 200,000 each, the technical evaluation report will be sent for no-objection to IBRD before opening the financial envelope. All other contracts under these thresholds will be subject to post review.

These procurement thresholds are summarized in Table B below.

Procurement implementation schedule and advance procurement actions. It was agreed that WWA will provide by negotiations a detailed timetable for implementation of the investment. This timetable will be used as a basis for monitoring procurement processing. In particular, the following advance procurement actions have been identified and agreed on with the GOM and WWA as critical milestones to enable signing of major and important contracts soon after Loan effectiveness. The following documents will also be prepared by WWA and transmitted to IBRD for review by negotiations: (a) draft General Procurement Notice; (b) draft Specific Procurement Notice for the construction works, works supervision, WWA assistance and major studies; (c) draft prequalification documents for civil works; (d) draft bidding documents for civil works; (e) TORs, short list, LOI, draft model contract for construction supervision; and (f) TORs, short list, LOI, draft model contract for WWA Program Management Assistance, and important consulting assignments and studies.

Reporting. It has been agreed with WWA that a monthly progress report up to Loan Effectiveness will be prepared in sufficient detail and transmitted to IBRD. During project implementation (after effectiveness), a semestrial report will be adequate. These details will include: major procurement actions dealt with during the previous months and major procurement actions planned for the following months, an update of the Procurement Implementation Table, time taken to carry out specific actions such as prequalification, completion of essential bidding documents, bid evaluation and compliance with aggregate limits on specified methods of procurement.

Disbursement Arrangements

The total estimated disbursement, covering all sources of funding (IBRD, OECF, GOM and private sector) over the project life are summarized in the last of the following tables. The total loan proceeds would be disbursed over five and a half years. IBRD loan disbursements will cover the following percentages indicated below:

Civil Works (US$7.5 million)	13.1% of total expenditures
Consulting Services (US$4.4 million)	57.1% of total expenditures excluding taxes
Training (US$0.5 million)	71.4% of total expenditures excluding taxes

Closing date. The Closing Date is June 30, 2003, six months after completion of project execution (December 31, 2002). The schedule of estimated disbursements is presented in the penultimate table. An aggregate amount of up to US$300,000 has been included in the project costs to refinance the PPF. This is for expenditures on engineering and technical expertise devoted to project preparation.

Minimum disbursements. The minimum application amount for payments directly to the Loan account or for issuance of Special commitments will be US$50,000 equivalent. Disbursements will be fully documented except that withdrawals will be made on the basis of Statements of Expenditures for the items below:

- Civil works contracts not exceeding US$200,000 equivalent;
- Consulting firm contracts not exceeding US$100,000 equivalent, and individual consultant contracts valued at less than US$50,000 equivalent.

Special Account. If requested by the Borrower, and to facilitate disbursements against eligible expenditures for small contracts not exceeding US$250,000 equivalent, a Special Account will be established in the WWA. The Special Account will be opened and maintained in a commercial bank, acceptable to the Bank, with an authorized allocation of US$500,000, corresponding to about four months of expenditures. Replenishment application will be submitted at monthly intervals and will include reconciled bank statements as well as other appropriate supporting documents.

Table A: Procurement Arrangements

Mauritius

Environmental Sewerage & Sanitation Project

Procurement Arrangements

(US$ Million)

Procurement Arrangements (US$ Million)	Procurement Method			
	International Competitive Bidding	Other	Non Bank Financed	Total
Land & Rights of Way	0.0	0.0	2.5 *	2.5
	-	-	-	-
Civil Works	12.4	-	24.8 **	37.2
	(6.8)	-	-	(6.8)
Equipment & Goods	-	-	11.6 **	11.6
	-	-	-	-
Consultant Services & Engineering	-	6.6	7.0 **	13.6
	-	(5.1)	-	(5.1)
Training	-	0.7	-	0.7
	-	(0.5)	-	(0.5)
Total	12.4	7.3	45.9	65.6
	(6.8)	(5.6)	-	(12.4)

Note: Figures in parenthesis are the respective amounts financed by IBRD

* Wholly financed by GOM

** Under parallel financing by OECF under its own procurement procedures

*** Under parallel financing by OECF, GOM (US$ 1.9 million)
and Private Sector (US$ 1.9 million) under their own procurement procedures

Table B: Thresholds for Procurement Methods and Prior Review

Mauritius

Environmental Sewerage & Sanitation Project

Thresholds for Procurement Methods and Prior Review

(US$)

Expenditure Category	Contract Value (Threshold)	Procurement Method	Contracts Subject to Prior Review **
A. Civil Works*	> 2,000,000	I.C.B.	2,000,000 Aggregate value: $14.5 million
B. Consultant Services & Engineering			
Firms		Q.C.B.S./L.C.S.	100,000 ***
			Aggregate value: $4 million
Individual		Individuals	50,000
			Aggregate value: $1 million

Note: * Civil works contracts above US$ 2,000,000 each will be subject to Prequalification.

** All Prequalification documents will be subject to prior review.

*** For contracts above $ 200,000, the technical evaluation report will be required by IBRD for no objection.

Table C: Allocation of Loan Proceeds

Mauritius
Environmental Sewerage & Sanitation Project
Allocation of Loan Proceeds
IBRD
(US$ Million)

Expenditure Category	Suggested Allocation of Loan Proceeds	
	Loan Amount	Financing %
1. Civil Works	6.6	55
2. Consulting Services & Training	5.0	80
3. Refunding of PPF	0.3	
4. Unallocated	0.5	-
Total	12.4	

Loan amounts financed by IBRD

Mauritius

Environmental Sewerage & Sanitation Project

Project Components by Year-Totals Including Contingencies

(US$ Million)

Estimated commitments (US$ Million)	**Totals Including Contingencies**						
	97/98	**98/99**	**99/00**	**00/01**	**01/02**	**02/03**	**Total**
A. Montagne Jacquot Sewerage System							
Land Acquisition & Compensation	2.5	-	-	-	-	-	2.5
Pipelines & Sewers	-	4.0	4.1	4.4	-	-	12.4
Pumping Stations	-	-	3.8	3.9	-	-	7.7
Treatment Plant	-	2.2	3.8	3.9	4.1	1.7	15.7
Sea Outfall	-	-	2.2	4.5	2.3	-	9.1
Industrial Pretreatment	-	-	0.9	1.0	-	-	1.9
Supervision of Works	-	1.3	2.0	2.0	1.8	0.7	7.9
Subtotal Montagne Jacquot Sewerage System	**2.5**	**7.5**	**16.8**	**19.8**	**8.2**	**2.4**	**57.2**
B. Waste Water Sector Equipment & Expertise							0
Sector Expertise	0.2	0.2	0.1	-	-	-	0.5
Sector Studies	0.1	1.2	0.6	0.2	0.0	-	2.1
Equipment to support CWA/WWA joint billing system	-	1.0	1.0	-	-	-	1.9
Subtotal Waste Water Sector Equipment & Expertise	**0.3**	**2.3**	**1.7**	**0.2**	**0.0**	**-**	**4.6**
C. WWA Institutional Building	-	-	-	-	-	-	-
WWA Program Management Assistance	0.1	1.0	0.9	0.8	0.1	-	2.8
WWA Personnel Training	-	0.2	0.2	0.2	0.0	-	0.7
Industrial Waste Management Program	-	0.2	0.1	0.1	-	-	0.3
Subtotal WWA Institutional Building	**0.1**	**1.4**	**1.1**	**1.1**	**0.2**	**-**	**3.8**
Total PROJECT COSTS	**2.8**	**11.1**	**19.7**	**21.1**	**8.4**	**2.4**	**65.6**

Note: Figures may not add up to total due to rounding

IBRD Disbursement

(in US$ million)

Bank FY	1998	1999	2000	2001	2002	2003
Annual	0.1	2.3	4.2	3.8	1.9	0.1
Cumulative	0.1	2.4	6.7	10.4	12.4	12.4
Percentage	1%	20%	54%	84%	99%	100%

Note: Figures may not add up to total due to rounding

Total Project Disbursement

(in US$ million)

Bank FY	1998	1999	2000	2001	2002	2003
Annual	2.8	11.1	19.7	21.1	8.4	2.4
Cumulative	2.8	13.9	33.6	54.7	63.1	65.6
Percentage	4%	21%	51%	83%	96%	100%

Note: Figures may not add up to total due to rounding

Annex 7
Mauritius Environmental Sewerage and Sanitation Project
Project Processing Budget and Schedule

A. Project Budget (US$000)	Planned (At final PCD stage)	Actual
	304.2	238.7

B. Project Schedule	Planned (At final PCD stage)	Actual
Time taken to prepare the project (months)		
First Bank mission (identification)	01/12/1996	01/12/1996
Appraisal mission departure	06/29/1997	06/29/1997
Negotiations	12/081997	01/07/1998
Planned Date of Effectiveness	05/15/1998	__/__/19__

Prepared by: Waste Water Authority

Preparation assistance: PPF and Japanese PHRD Grant. Utilized studies financed by FAC (French cooperation)

Bank staff who worked on the project included:

Name	Specialty
Abdelmoula Ghzala (AFTT1)	Engineering (Task Team Leader)
Philippe de Naurois (AFTT1)	Financial Analyst (Team member)
Alison Cave (AFTT2)	Urban Planning (Team member)
Andrea Heggen (AFTT1)	Project Assistant (Team member)
Elizabeth Monosowski (AFTE1)	Environment
Klas Ringskog (LATAD)	Economics - water and sanitation sectors
Augusta Dianderas (TWUWS)	Institutional analysis - water and sanitation sectors
Elizabeth Adu (LEGAF)	Legal aspects
Said Al Habsy (LEGAF)	Legal aspects (negotiations)
Guillermo Yepes (TWUWS)	Water and sanitation
Yves Guillou (LOAAF)	Disbursement
Betrand Ah-Sue (AFTS2)	Procurement

Annex 8
Mauritius Environmental Sewerage and Sanitation Project
Documents in the Project File*

A. Project Implementation Plan

Draft Government Project Implementation Plan (6/13/97)
Draft Government Project Implementation Plan (October 1997)
Government Project Implementation Plan (1/10/98)

B. Bank Staff Assessments

Final Initial Executive Project Summary (IEPS) and Departmental Review Meeting Minutes (6/28/96)

Draft Project Appraisal Document (PAD) and Minutes of Appraisal Decision Meeting (6/27/97)

Draft PAD and Minutes of Technical Discussions (12/22/97)

Draft PAD and Minutes of Negotiations (1/10/98)

C. Other

- Identification mission BTO including aide-mémoire and implementation schedule (2/27/96)
- Preparation mission BTO including revised timetable, aide-mémoire (6/5/96)
- Draft IEPS(6/24/96)
- Japanese Grant Agreement (PHRD) (signed) (7/3/96)
- Transmittal form for PPF request (including procurement plan and inital executive project summary) (8/8/96)
- Preparation mission BTO (9/3/96)
- Countersigned letter of agreement for PPF 298-0 MAS (incuding amendment letter dated 9/13/96) (10/4/96)
- Bank preparation mission with OECF observer participation BTO and aide-mémoire (2/27/97)
- Prefeasibility Report
- Feasibility Report (June 1997)
- Institutional Study (July 1997)
- Appraisal Mission BTO including aide-mémoire (August 1997)
- Environmental Impact Assessment (August 1997)
- Draft Sector Policy Letter (October 1997)
- Draft Institutional Action Plan (October 1997)
- Post-appraisal mission BTO with aide-mémoire

*Including electronic files.

Annex 9
Status of Bank Group Operations in Mauritius
IBRD Loans and IDA Credits in the Operations Portfolio

Active Loans

Project ID	*Loan or Credit No.*	*Fiscal Year*	*Borrower*	*Purpose*	*IBRD*	*Cancellations*	*Undisbursed*	*Difference between actual & expected disbursements*[4]*:*	*Last ARPP Supervision Ratings*[5]	
									Development Objectives	*Implementation Progress*
MU-PE-1906	L33330	1991	GOM	Agric Services	10.00	6.00	2.48	8.21	S	S
MU-PE-1914	L32770	1991	GOM	Environ Monit. & Dev	12.37	0.00	2.26	2.26	S	S
MU-PE-1899	L34010	1992	GOM	Ind And Vocat Traini	5.40	1.00	1.27	2.03	S	S
MU-PE-1920	L35780	1993	GOM	Education Sector	20.00	0.00	11.11	5.45	S	S
MU-PE-1918	L37360	1994	GOM	Tech Asst.	7.70	0.00	4.19	3.32	S	S
MU-PE-1926	L39090	1995	GOM	Port Dev. & Env Prot	23.40	0.00	13.62	-9.78	S	S
MU-PE-1923	L38590	1995	GOM	H & T Education	16.00	0.00	13.72	6.49	U	U
MU-PE-1926	L39080	1995	GOM	Port Dev. & Env Prot	7.10	0.00	7.10	3.73	S	S
		Total			101.97	7.00	55.76	21.72		

	Active(8) Loans	*Closed (29) Loans*	*Total*
Total Disbursed (IBRD and IDA)	39.21	274.63	313.84
of which has been repaid	2.06	186.65	188.71
Total now held by IBRD and IDA	92.91	87.98	180.89
Amount sold	0.00	4.95	4.95
Of which repaid	0.00	4.95	4.95
Total Undisbursed	55.76	0.00	55.76

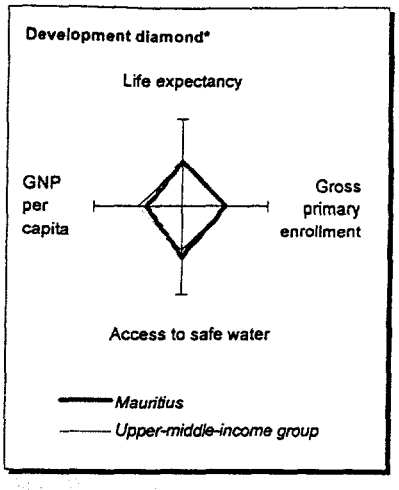
[4] Actual disbursements to date minus intended disbursements to date as projected at appraisal.

[5] Rating of 1-4: see OD 13.05. Annex D2. Preparation of Implementation Summary (Form 590). Following the FY94 Annual Review of Portfolio performance (ARPP), a letter-based system will be used (HS = highly Satisfactory, S = satisfactory, U = unsatisfactory, HU = highly unsatisfactory): see proposed improvements in Project and Portfolio Performance Rating Methodology (SecM94-901), August 23, 1994.

Annex 10
Mauritius at a glance

8/28/97

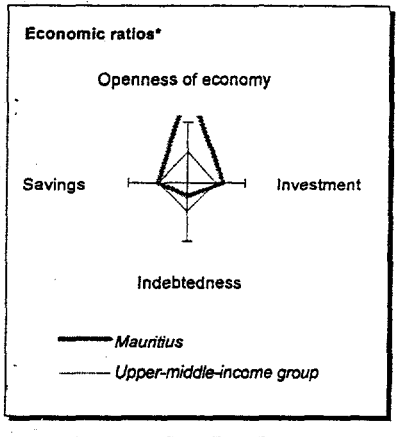
POVERTY and SOCIAL	Mauritius	Sub-Saharan Africa	Upper-middle-income
Population mid-1996 *(millions)*	1.1	600	479
GNP per capita 1996 *(US$)*	3,690	490	4,540
GNP 1996 *(billions US$)*	4.2	294	2,173
Average annual growth, 1990-96			
Population *(%)*	1.3	2.7	1.5
Labor force *(%)*	1.8	2.6	1.8
Most recent estimate *(latest year available since 1989)*			
Poverty: headcount index *(% of population)*	11	..	..
Urban population *(% of total population)*	41	31	73
Life expectancy at birth *(years)*	71	52	69
Infant mortality *(per 1,000 live births)*	16	92	35
Child malnutrition *(% of children under 5)*	..	..	..
Access to safe water *(% of population)*	100	47	86
Illiteracy *(% of population age 15+)*	17	43	13
Gross primary enrollment *(% of school-age population)*	107	72	107
Male	107	78	..
Female	107	65	..



KEY ECONOMIC RATIOS and LONG-TERM TRENDS

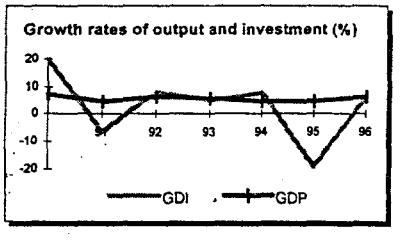
	1975	1985	1995	1996
GDP *(billions US$)*	0.7	1.1	3.9	4.3
Gross domestic investment/GDP	26.3	23.5	25.3	25.8
Exports of goods and services/GDP	56.7	53.5	59.6	61.1
Gross domestic savings/GDP	27.3	21.6	22.7	21.9
Gross national savings/GDP	29.5	20.9	24.7	23.3
Current account balance/GDP	2.7	-2.8	-0.6	-2.2
Interest payments/GDP	0.2	2.6	1.4	..
Total debt/GDP	7.9	58.4	45.7	..
Total debt service/exports	4.5	23.4	8.5	..
Present value of debt/GDP	..	..	41.4	..
Present value of debt/exports	..	..	64.5	..

	1975-85	1986-96	1995	1996	1997-05
(average annual growth)					
GDP	3.1	5.6	4.3	6.1	..
GNP per capita	1.0	4.7	2.8	4.5	..
Exports of goods and services	4.3	6.4	7.6	6.1	..

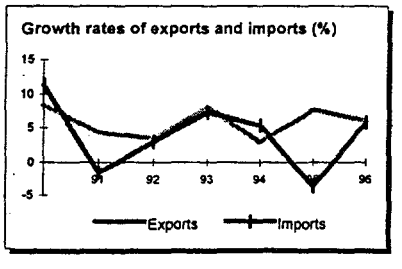


STRUCTURE of the ECONOMY

	1975	1985	1995	1996
(% of GDP)				
Agriculture	22.3	15.3	9.4	9.7
Industry	24.7	29.2	32.9	32.1
Manufacturing	16.3	20.6	23.7	23.3
Services	53.0	55.5	57.6	58.2
Private consumption	61.6	66.9	65.1	68.3
General government consumption	11.1	11.5	12.2	9.8
Imports of goods and services	55.6	55.4	62.3	64.9



	1975-85	1986-96	1995	1996
(average annual growth)				
Agriculture	-0.7	-0.2	7.4	11.5
Industry	3.9	6.9	4.1	5.1
Manufacturing	5.1	6.5	5.7	5.7
Services	3.8	6.6	5.2	6.0
Private consumption	1.4	6.0	4.4	6.1
General government consumption	3.7	4.7	3.2	4.6
Gross domestic investment	-2.5	4.2	-19.2	6.0
Imports of goods and services	-1.3	6.2	-3.6	5.8
Gross national product	2.5	5.8	4.2	5.6

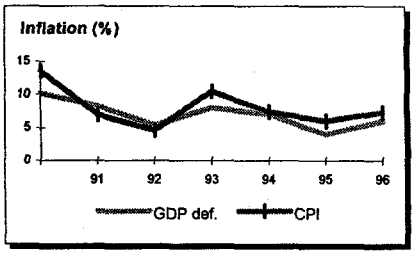


Note: 1996 data are preliminary estimates.

*The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

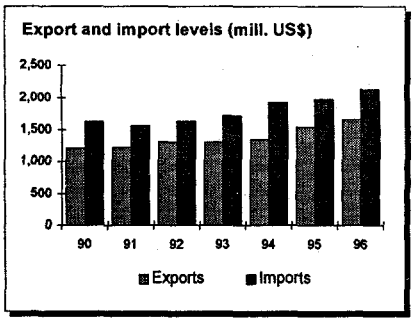
PRICES and GOVERNMENT FINANCE

	1975	1985	1995	1996
Domestic prices				
(% change)				
Consumer prices	14.8	6.7	6.0	7.3
Implicit GDP deflator	5.3	8.2	4.0	6.0
Government finance				
(% of GDP)				
Current revenue	..	22.0	18.6	18.9
Current budget balance	..	-1.0	-1.7	0.0
Overall surplus/deficit	..	-5.6	-6.1	-6.0



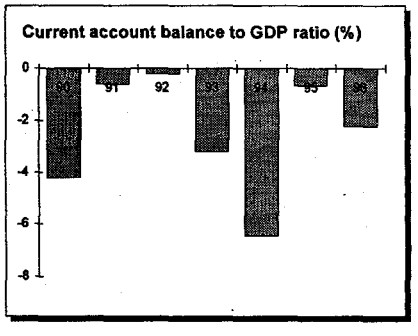
TRADE

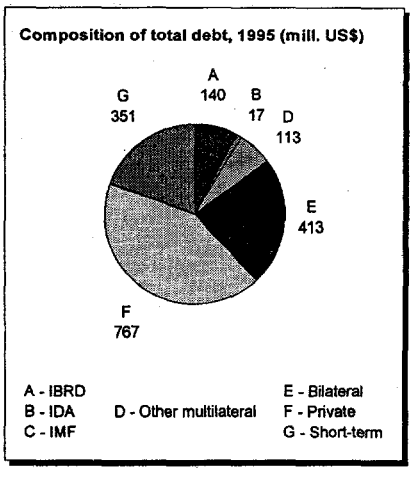
	1975	1985	1995	1996
(millions US$)				
Total exports (fob)	..	430	1,539	1,652
Sugar	..	186	364	396
Textiles	..	..	7	8
Manufactures	..	170	852	908
Total imports (cif)	..	526	1,976	2,135
Food	..	87	307	325
Fuel and energy	..	74	138	148
Capital goods	..	72	397	433
Export price index *(1987=100)*	..	64	105	106
Import price index *(1987=100)*	..	59	135	138
Terms of trade *(1987=100)*	..	109	78	77



BALANCE of PAYMENTS

	1975	1985	1995	1996
(millions US$)				
Exports of goods and services	369	576	2,349	2,490
Imports of goods and services	366	596	2,454	2,646
Resource balance	4	-20	-104	-156
Net income	3	-49	-26	-49
Net current transfers	12	40	105	110
Current account balance, before official capital transfers	18	-30	-25	-95
Financing items (net)	34	48	169	131
Changes in net reserves	-52	-18	-144	-36
Memo:				
Reserves including gold *(mill. US$)*	166	42	887	919
Conversion rate *(local/US$)*	6.0	15.4	17.4	17.9



EXTERNAL DEBT and RESOURCE FLOWS

	1975	1985	1995	1996
(millions US$)				
Total debt outstanding and disbursed	52	629	1,801	..
IBRD	8	117	140	124
IDA	8	20	17	16
Total debt service	17	140	216	..
IBRD	1	14	34	30
IDA	0	0	1	1
Composition of net resource flows				
Official grants	13	14	22	..
Official creditors	12	37	-17	..
Private creditors	-4	-19	285	..
Foreign direct investment	4	8	15	..
Portfolio equity	0	0	4	..
World Bank program				
Commitments	8	0	39	7
Disbursements	7	31	11	14
Principal repayments	0	6	24	21
Net flows	7	25	-13	-7
Interest payments	0	8	11	9
Net transfers	7	17	-24	-17