



REPUBLIC OF MAURITIUS

**NATIONAL AUDIT OFFICE**

# **PERFORMANCE AUDIT REPORT**

**ENSURING SAFE DISPOSAL OF WASTEWATER**

**Ministry of Energy and Public Utilities**

**JULY 2020**



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## PREFACE

Section 16(1A) of the Finance and Audit Act requires the Director of Audit to carry out performance audit and report on the extent to which a Ministry, Department or Division is applying its resources and carrying out its operations economically, efficiently and effectively.

I am pleased to submit to the Minister of Finance, Economic Planning and Development, and through him to the National Assembly, this Performance Audit Report entitled "Ensuring Safe Disposal of Wastewater". The subject matter was selected for the audit in view of its significance and the difference it can make to the lives of citizens through the enhancement of the operational efficiency and effectiveness in its management.

The objective of audit was to assess whether the measures taken by Ministry of Energy and Public Utilities to ensure the safe disposal of wastewater were effective. The Report contains audit findings, conclusions, recommendations and emphasises on areas of improvements in the safe disposal of wastewater. The Ministry was given the opportunity to comment on the content of the Report.

My Office intends to carry out a follow-up audit at an appropriate time regarding actions taken by the audited entity in relation to the implementation of the recommendations.

I would like to take this opportunity to thank the Permanent Secretary and staff of the Ministry of Energy and Public Utilities and particularly the staff of the Wastewater Management Authority for their cooperation and collaboration. I also wish to express my sincere thanks to the staff of the Performance Audit Unit of the National Audit Office for their commitment.



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22 July 2020



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## **ABBREVIATIONS AND ACRONYMS**

IAEG - SDG	Inter-Agency Expert Group on SDG
KPI	Key Performance Indicators
MEPU	Ministry of Energy and Public Utilities
MoU	Memorandum of Understanding
NAO	National Audit Office
NSP	National Sewerage Programme
SDG	Sustainable Development Goal
WMA	Wastewater Management Authority



## EXECUTIVE SUMMARY

According to the Wastewater Management Authority Act, ‘wastewater’ means ‘water sullied or contaminated by any matter, in solution or suspension, derived from its use in connection with domestic, industrial or other activities’. The safe disposal of wastewater is important as the risks and impacts related to its infiltration in waterways are significant for both human health, biological diversity of aquatic ecosystems and economic opportunities. In Mauritius, the Ministry of Energy and Public Utilities (MEPU) has, as one of its missions, to ensure the availability of reliable services for safe disposal of wastewater. The Ministry has been taking several measures, such as the establishment of the Wastewater Management Authority (WMA) which operates under its aegis, and the formulation of the National Sewerage Master Plan and programmes, but it has been facing challenges in the management of wastewater.

Past reports of the National Audit Office (NAO) and the Public Accounts Committee highlighted several issues relating to the management of wastewater across the country. Over the past seven financial years/period to June 2019, the total amounts disbursed to WMA for several sewerage projects by MEPU as loans and by way of ‘Shares and Equity Participation’ were some Rs 3.3 billion and Rs 250 million respectively.

It is against this background that the NAO has carried out this Performance Audit entitled ‘Ensuring Safe Disposal of Wastewater’ covering the period January 2014 to December 2019. The objective of the audit was to assess whether the measures taken by the Ministry for ensuring the safe disposal of wastewater were effective.

### Key Findings

- 1) Two Master Plans (1994-2013 and 2014-2033), commissioned by the Ministry, gave a long term perspective of the management of wastewater. However, these were not followed by short term periodic implementation plans for WMA with realistic targets and indicators that could have enabled MEPU to monitor the implementation of the Master Plans effectively.
- 2) In the Master Plan 1994-2013, at least 50 per cent of the population were targeted by 2013, but only 25 per cent were connected to the sewerage network. An assessment was not carried out to identify the constraints and challenges that prevented the full achievement of the target or to determine whether the target was unrealistically too high when compared to the resources available.
- 3) According to the Government’s 3-Year Strategic Plan 2018-19 to 2020-21, MEPU was expected to connect 30 per cent of the households by June 2020 with a view to achieving 50 per cent by 2030. In the Master Plan 2014-2033, the objective was to connect 80 per cent by 2033 to be in line with the target set in the National Sewerage Programme. However, as of December 2019, only 28 per cent of households were connected. The average rate in the annual increase in connection to the sewerage system from 2014 to 2019 was some 0.5 per cent. At this rate, only 35 per cent of household will be connected in 2030, and hence, it will not be able to achieve the target of halving the proportion of untreated wastewater by 2030.

- 4) Monitoring is a continuous assessment of the activities of the Ministry and the environment within which it operates with regard to the planned objectives, results, activities and means. Key Performance Indicators (KPIs) are important as they enable effective monitoring and evaluation. Key targets using appropriate KPIs to enable stakeholders to make informed decisions to better achieve intended objectives, as required by the Contrat de Délégation, Convention de Maitrise d’Ouvrage Deleguée and the Memorandum of Understanding (MoU), were not developed. The progress of work achieved could therefore not be evaluated.
- 5) Good management practice requires proper record keeping. Over the period January 2014 to June 2019, WMA had been managing several sewerage projects worth some Rs 4 billion. However, it did not maintain a Project Register and an appropriate asset register.
- 6) MEPU had over the past seven financial years/period consistently over-estimated the budget amount to be granted to WMA. The actual percentage of the budgeted amount disbursed to WMA ranged from 84 per cent for the six-month period January to June 2015 to 30 per cent in 2017-18. This situation should have prompted MEPU to further investigate into the constraints and challenges faced by WMA, the moreso as the percentage of house connections was below expectations.
- 7) WMA was provided a substantial budget, and spent on average some Rs 475 million annually on contracts. Hence, project management is an area with possible exposure to risks that necessitate audit scrutiny on a regular basis. A comprehensive review of contracts was not done, and the adequacy of contract management systems and processes in terms of control and risk management was not assessed by the Internal Audit Unit of the WMA.
- 8) Regarding Industrial Sewerage Connection and Pollution Control, from an examination of a sample of records of industries, the following issues relating to compliance with the Waste Water (Standards for Discharge of Industrial Effluent into a Waste Water System) Regulations 2004 were noted:
  - (i) The frequency of submission of the Effluent Analysis Results was not regular for both classified and unclassified industries;
  - (ii) In some cases, there was no evidence of calculation and application of penalty where a licensee had failed to submit a monthly report;
  - (iii) For recurrent excessive pollutants of some industries, no penalty as prescribed by law was applied; and
  - (iv) The monitoring visits to check industrial activities and compliance with conditions of the Industrial Discharge Permit were not made on a regular basis.
- 9) Preventive maintenance is an important component that checks deteriorations from creeping in and ensures infrastructures are cared for at an early stage. WMA does not have a strategy that balances planned and unplanned maintenance works. The maintenance works were mainly of corrective, reactive and emergency nature.

- 10) To track progress of Sustainable Development Goal Target 6.4, the indicator to be used as agreed in the United Nations General Assembly was ‘Safely treated wastewater in proportion to total wastewater generated by households and economic activities’. Except for data on percentage of population connected to the WMA sewerage system, and on volume of wastewater treated by the WMA wastewater treatment plant, no other data was captured.

## **Conclusion**

The measures taken by the Ministry have been to some extent effective in ensuring the safe disposal of wastewater, but there were shortcomings in their implementation. The Ministry has been facing challenges in ensuring safe disposal of wastewater, and its monitoring of WMA activities has not been effective. It has also been striving to meet its target for household connections. There is no strategy that balances planned and unplanned maintenance works. For the Sustainable Development Goal purposes, data on volume of wastewater generated by the population not connected to the public sewerage network is not available.

## **Key Recommendations**

- 1) Implementation plans for the execution of Master Plans need to be developed. This should include activities to be carried out, their annual budget, and the implementing units, together with output indicators for each activity in line with the objectives of the Master Plans.
- 2) Monitoring of performance, by developing KPIs for those activities which are related to the safe disposal of wastewater, needs to be improved. Yearly target on the number of households and the proportion of the population to be connected to sewerage system should be set. More time should be dedicated by the Internal Audit Unit to audit projects and give feedback to management for timely decision making. Proper records need to be kept for all projects undertaken by WMA. A central asset register should be kept for good asset management practices, recording information, such as estimated cost of project, actual amount paid, and start and end dates of projects.
- 3) The Ministry should investigate the constraints and challenges encountered by the WMA in the implementation of projects.
- 4) Wastewater re-use should be encouraged and increased to support the achievement of Sustainable Development Goal Target 6.3, as well as to combat water scarcity and protect water resources and make an increasing use of treated wastewater for irrigation purposes.
- 5) The Pollution Control Unit should ascertain that licensees comply with the conditions set out in the Industrial Discharge Permit to ensure that the objective of the Ministry for safe disposal of wastewater is met.

- 6) More preventive maintenance works should be carried out with a view to reducing problems, such as manhole blockages, overflow, odour problem, seepages of wastewater and nuisances.
- 7) WMA should establish an appropriate mechanism to capture sufficient data on wastewater generation around the island to ensure completeness of data and information to monitor progress of work towards Sustainable Development Goal 6, as one of the challenges to monitoring its Target 6.3 indicators is the lack of data relating to aspects of wastewater management.

### **Summary of Ministry's Replies**

- The house connection is directly linked with the implementation of projects which depends on policy of Government and on funds approved.
- As from financial year 2017-18, a Performance Agreement incorporating the KPIs was prepared and submitted to the MEPU along with WMA Estimates and WMA reports on target achieved for house connections on a regular basis.
- The post of Internal Auditor will be advertised shortly to strengthen the Internal Audit functions.
- Since 2005, several shortcomings have been identified in the full application of the different clauses of the existing regulations. In order to address the above shortcomings, WMA, since 2018, has taken the initiative to work on new regulations and after following all the required procedures, same was gazetted on 4 January 2020 and took effect as from 1 January 2020.
- Awareness Campaigns are also conducted during project implementation and as and when required by the Customer Care and Public Relations Unit of the WMA.



# CHAPTER ONE

## INTRODUCTION

*This Chapter provides a background of the subject matter examined and describes the audit approach*

### 1.1 Background

In several reports of International and United Nations organisations, ‘wastewater’ is referred to as ‘a combination of one or more of domestic effluent, consisting of black water (excreta, urine and faecal sludge) and grey water (kitchen and bathing wastewater); water from commercial establishments and institutions, including hospitals; industrial effluent, storm water and other urban run-off; and agricultural, horticultural and aquaculture effluent, either dissolved or as suspended matter’<sup>1</sup>. According to the Wastewater Management Authority Act, ‘wastewater’ means ‘water sullied or contaminated by any matter, in solution or suspension, derived from its use in connection with domestic, industrial or other activities’.

According to the United Nations World Water Report 2017, on average, high-income countries treated about 70 per cent of the municipal and industrial wastewater they generated. That ratio was 38 per cent in upper middle-income countries, and 28 per cent in lower middle-income countries. In low-income countries, only eight per cent underwent treatment of any kind. Globally, around 80 per cent of all wastewater were discharged without treatment.

The risks and impacts related to the infiltration of the wastewater in waterways are significant for both human health, biological diversity of aquatic ecosystems and economic opportunities.

The principal objective of wastewater treatment is generally to allow human and industrial effluents to be disposed of without danger to human health or unacceptable damage to the natural environment (FAO – Food and Agriculture Organisation of the United Nations).

In Mauritius, the Ministry of Energy and Public Utilities (MEPU) has as one of its missions to ensure the availability of reliable services for the safe disposal of wastewater. In spite of the measures taken, such as the establishment of the Wastewater Management Authority (WMA), which operates under the aegis of the Ministry, and the formulation of the National Sewerage Master Plan and programmes, the Ministry faces challenges in the management of wastewater.

### 1.2 Audit Motivation

In order to maintain its rapid economic growth and preserve the country’s fragile environment, Mauritius has to address environmental issues related to demographic growth and rapid changes in the use of water and land resources.

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<sup>1</sup> Source: INTOSAI Working Group on Environmental Auditing, Research Project on Wastewater, January 2019

The way wastewater is managed has a major influence on the status of the environment in the country. Inadequate wastewater infrastructure had been identified as one of the major factors contributing to environmental degradation. The inadequacy of wastewater infrastructure to support self-sustained economic growth and social wealth is a major obstacle to economic development. Thus, the contribution to the economy of an adequate and reliable wastewater infrastructure in any country has far reaching effects in several areas, such as protection of public health, environmental protection, safeguard of water resources and creating the conditions for sustainable economic growth and social welfare.

Past National Audit Office (NAO) and the Public Accounts Committee reports highlighted several issues relating to the management of sewerage projects across the country. In some regions, whenever there were heavy rainfalls, the wastewater overflowed and caused much nuisance to the public, as well as becoming a threat to the environment. Media also reported the regular overflows of wastewater from the networks in several regions. The Pollution Prevention and Control Division of the then Ministry of Social Security, National Solidarity, and Environment and Sustainable Development received several complaints from the general public relating to wastewater issues.

The wastewater is a sector where Government spent significantly. Over the period January 2014 to June 2019, total amounts disbursed to WMA for several sewerage projects by MEPU as loans and by way of ‘Shares and Equity Participation’ were some Rs 3.3 billion and Rs 250 million respectively.

Effective and efficient wastewater treatment has become a necessity in order to meet the growing needs of rapid urbanisation and climate change, and to meet the increasingly strict environmental regulations.

It is against this background that the NAO has carried out this Performance Audit entitled ‘Ensuring Safe Disposal of Wastewater’.

### **1.3 Audit Objective**

The audit assessed whether the measures taken by the Ministry for ensuring the safe disposal of wastewater were effective.

### **1.4 Audit Questions**

The audit was designed by formulating two audit questions derived from the audit objective. The answers to the questions supported the conclusion against the objective. The questions are as follows:

### ***1.4.1 Main Questions and Sub Questions***

- Did the Ministry ensure that the activities for the safe disposal of wastewater from household were effectively planned and implemented?
  - Were the construction and replacement of household sewerage networks adequately planned and implemented within realistic targets?
  - Were the household sewerage networks appropriately maintained?
- Were the activities for the safe disposal of wastewater properly monitored?
  - Were these activities monitored against agreed Key Performance Indicators (KPIs)?
  - Were these activities monitored to ensure compliance with the Waste Water (Standards for Discharge of Industrial Effluent into a Waste Water System) Regulations 2004?
  - Were the projects for the construction of new sewerage networks monitored to ensure they were completed within time, cost and quality, and whether they met the objectives of connecting the desired number of households?
  - Were the activities for the safe disposal of wastewater monitored to ensure they are in line with the requirements of Sustainable Development Goals (SDG) 6.3.1 and 6.3.2?

## **1.5 Audit Scope**

The audit examined the activities of MEPU relating to management of wastewater through the WMA, which operates under its aegis. The audit focused on the activities in Mauritius and excluded Rodrigues and Outer Islands.

It covered the period January 2014 to December 2019 (2014 being the start period of the current Sewerage Master Plan). Data prior to 2014 was included in some cases to show long term trends and to add value to the analysis. The main auditee is the MEPU.

## **1.6 Audit Methodology**

The audit was conducted in accordance with the requirements of the NAO Performance Audit Manual, which is based on International Standards of Supreme Audit Institutions. Different methodologies were used to understand the audit area, along with obtaining sufficient, relevant and reliable audit evidence to support conclusion and recommendations.

### ***1.6.1 Methods of Data Collection***

Data was gathered mainly from files and documents. This was complemented by interviews and site visits to confirm information in files and to ascertain and assess processes being carried out at various departments.

### ***1.6.2 Documents Reviewed***

Information relating to policies, guidelines, regulations, structures, processes, systems, procedures and practices was collected through review of files and documents kept at MEPU and WMA.

### ***1.6.3 Personnel Interviewed***

Interviews were carried out with key personnel at operational, middle and senior management levels at MEPU and WMA. The interviews were used to obtain more information, and also to confirm the information obtained from the documents reviewed, as well as for obtaining explanations where information was not available in the reviewed documents.

## **1.7 Assessment Criteria**

Audit criteria are the standards to be met by the audited entity. These were used as a basis for evaluating the evidence collected, developing audit findings and reaching conclusions on the audit objective, and were extracted from the following sources:

### ***Laws and Regulations***

- Environment Protection Act;
- Wastewater Management Authority Act; and
- Waste Water (Standards for Discharge of Industrial Effluent into a Waste Water System) Regulations 2004.

### ***Standards from research, literature, professional and/or international organisations***

- INTOSAI Working Group on Environmental Auditing, Research Project on Wastewater, January 2019;
- United Nations World Water Report 2017; and
- Food and Agriculture Organisation (FAO) definition of wastewater treatment.

### ***Internal Documents***

- National Sewerage Master Plan 2014-2033;
- Convention de Maîtrise d’Ouvrage Deleguée 2001;
- Contrat de Délégation 2001;
- Memorandum of Understanding (MoU) between MEPU and WMA (2008); and
- Budget Documents and Annual Reports of the Accountant General.

Details on the audit criteria used are in the relevant sections in this Report.

## **1.8 Sampling**

A sample of file was selected at the MEPU to review the policies, procedures and the operation of Project Monitoring Committee.

Quarterly Progress Report for the years 2018 to 2019 were scrutinised.

Of the 105 files dealing with pollution control, a sample of 15 was examined.

## **1.9 Data Validation Process**

Management of the MEPU and WMA was provided with the audit criteria, findings and recommendations to confirm their relevance, accuracy and suitability.

## **1.10 Structure of the Report**

The remaining part of the Report covers the following:

- Chapter Two describes the audit area, processes, structures, roles and responsibilities of key players and other stakeholders involved in the management of wastewater.
- Chapter Three presents the audit findings based on the two specific audit questions.
- Chapter Four provides the audit conclusion.
- Chapter Five presents the recommendations based on the audit findings and conclusion.



## CHAPTER TWO

### DESCRIPTION OF THE AUDIT AREA

*This Chapter describes the audit area, processes, structures, roles and responsibilities of key players and other stakeholders involved in the management of wastewater. Key aspects of the current system for the coordinating and monitoring of the wastewater management activities are also described.*

#### **2.1 Wastewater Sector Development**

The first sewer pipes were laid in Port Louis in the late 19<sup>th</sup> century. The present Plaines Wilhems Sewerage System was developed in the 1960's, while major improvements were made to the Port Louis Sewerage System in the late 1960's and early 1970's.

As a result of past projects implemented so far, 28 per cent of the population of the main island of Mauritius have now access to the public sewer network. The main areas under sewer include the capital City of Port Louis and its surrounding areas, parts of Plaines Wilhems and the coastal area of Grand Baie. The public sewerage systems currently comprise 755 km of sewer network, 72 wastewater pumping stations and 10 wastewater treatment plants (Source: WMA Website).

#### **2.2 Legal and Institutional Framework**

The wastewater sector is regulated by two main Acts which are briefly described below:

##### **2.2.1 Environment Protection Act**

The Environment Protection Act provides for the legal framework for environmental protection throughout the country. According to the Act, the primary responsibility for environmental management in Mauritius rests with the then Ministry of Social Security, National Solidarity and Environment and Sustainable Development (Environment and Sustainable Development Division). This Ministry is responsible for policy formulation and implementation, as well as environment law enforcement. Under the Act, MEPU is the enforcing agency for wastewater.

##### **2.2.2 Wastewater Management Authority Act**

The Wastewater Management Authority Act provides for the setting up of the WMA, along with a legal framework for the wastewater sector. The Act establishes the responsibilities, duties and powers of the Authority and its management, among others.

The Act was amended in 2004 to ensure that a maximum number of premises get connected to the public sewer system whenever necessary, to specify environmental and service standards and enforcement responsibility, and to define responsibilities relative to the WMA and other agencies involved in the sector.

➤ *Waste Water Regulations*

Under Section 5.2(g) of the Wastewater Management Authority Act, the WMA is mandated to control and monitor the pollution discharge into wastewater systems by any person.

The Waste Water (Standards for Discharge of Industrial Effluent into a Wastewater System) Regulations 2004 were made under Section 47 of the Wastewater Management Authority Act. The Regulations serve as a legal tool to regulate and monitor industrial effluent being discharged into the public wastewater system from industrial activities.

The Waste Water (Licence for Discharge of Industrial Effluent into a Waste Water System) Regulations 2019 is in force since 1 January 2020 in replacement of the previous Waste Water (Standards for Discharge of Industrial Effluent into a Waste Water System) Regulations 2004 which came into operation on 1 January 2005. Under the new regulations, any licence issued under the previous ones remains valid until the date of expiry of the licence.

In the Waste Water (Standards for Discharge of Industrial Effluent into a Waste Water System) Regulations 2004, it is stated that no person shall discharge or cause to be discharged industrial effluent into a waste water system unless he holds a licence under these Regulations.

Any person who –

- (a) unlawfully discharges industrial effluent into a wastewater system without a valid licence; and
- (b) fails to comply with any of the conditions of the licence

shall commit an offence, and shall, on conviction, be liable to a fine not exceeding Rs 10,000 and to imprisonment for a term not exceeding 12 months.

Under the Regulations 2004, a licence issued under these Regulations was valid for a period of three years and might be renewed for a further period of three years. An application for the renewal of a licence shall be made within three months before the expiry of the licence.

Under the Waste Water (Licence for Discharge of Industrial Effluent into a Waste Water System) Regulations 2019, a licence issued under these Regulations is valid for a period of one year and may be renewed annually. An application for the renewal of a licence made after the date of expiry of the licence is subject to a surcharge of 10 per cent of the renewal fee. The licence may be revoked in case the WMA has reason to believe that the licensee has failed to comply with a condition of his licence.

Any industry holding a licence and generating effluent from its activities can discharge same directly into the public wastewater system or through carting away by wastewater carriers into a public wastewater system. The issue of licence is processed by the Pollution Control Unit of the WMA.

At paragraph 6 of the Waste Water Regulations (Licence for Discharge of Industrial Effluent into a Waste Water System) 2019, it is stated that:



- (1) The permissible limit of pollutant to be discharged as industrial effluent into a wastewater system shall be as specified in the Fourth Schedule.
- (2) A licensee shall install such pre-treatment system, as approved by the Authority to ensure that any discharge of industrial effluent is in compliance with the permissible limit of pollutant as specified in the Fourth Schedule.
- (3) Where it is found that industrial effluent discharged into a wastewater system contains pollutant with concentration or load exceeding the permissible limit as specified in the Fourth Schedule, the licensee shall pay a penalty in respect of each pollutant as specified in the Fifth Schedule.

### **2.2.3 Contracts between WMA and Ministry of Energy and Public Utilities**

The WMA operates under three legal instruments/ contracts between the WMA and the MEPU:

➤ *‘Contrat de Maitrise d’Ouvrage Déléguée’*

The contract was signed in August 2001, whereby Government delegates to WMA the duties to build and operate planned works mentioned in the agreement, and any other new works that may be subsequently planned. All programmes agreed between WMA and Government would be subject to additions/amendments/modifications by Government whenever the need arose. The WMA would receive from Government a bulk remuneration amounting to two per cent of the costs of the works.

➤ *‘Contrat De Délégation’*

The contract was signed in August 2001, whereby Government entrusted to the WMA the operation and maintenance of all Government’s assets pertaining to the public sewerage systems.

➤ *Memorandum of Understanding*

In the MoU, which was signed in July 2008, the framework for working relations under the two above agreements was developed. It provides the frameworks on projects portfolio, preparation and execution, and on operation and maintenance activities and pollution control.

## **2.3 Role and Responsibilities of Stakeholders**

The roles and responsibilities of the main stakeholders are as follows:

### **2.3.1 Ministry of Energy and Public Utilities**

In the wastewater sector, MEPU is responsible for all planning and co-ordination activities.

The Ministry's main activities revolve around the formulation of policies and strategies in the energy, water and wastewater sectors, and the establishment of a responsive legal framework to govern the development of these sectors.

The vision of the Ministry for the wastewater sector is to ensure safe disposal of wastewater, while its corresponding mission is to fulfil its commitment to the nation by ensuring the availability of reliable wastewater disposal services. One of its objectives is to replace as far as possible on-site wastewater disposal systems by public sewer network facilities.

For the wastewater related services, the mandate of the MEPU is carried out by WMA.

### **2.3.2 Wastewater Management Authority**

The WMA operates as an autonomous body and became operational in August 2001 with the coming into operation of the Wastewater Management Authority Act. The WMA took over from its predecessor, the Waste Water Authority. The creation of the WMA was one of the major recommendations of the Sewerage Master Plan (1994-2003), and was meant to address institutional weaknesses and to strengthen the day-to-day administrative and financial management capacity of the wastewater sector.

The WMA thus plays a vital role in the protection of the environment and in ensuring the country's sustainable development through the provision of appropriate water pollution standards, wastewater control systems and management services to the entire population of Mauritius.

The WMA has the responsibility to implement capital wastewater infrastructure projects, that is, to operate and maintain the public wastewater system, on behalf of Government represented by MEPU. The Authority generates revenue from domestic and non-domestic tariffs, as well as income from other wastewater services. Domestic customers comprise households, while non-domestic customers refer to businesses, and comprise industries and commercial activities.

#### *Vision of WMA*

- To equip Mauritius with state-of-the art sewerage system so as to preserve public health and to ensure a sustainable and clean environment for maintaining the island's reputation as a dream destination; and
- To protect our water bodies and the environment for future generations.

#### *Mission of WMA*

- To protect the water and marine environment of Mauritius;
- To provide an excellent quality of wastewater services for residential and business customers;
- To achieve financial sustainability; and
- To forge a reliable partnership with all stakeholders sensitive to the cause of the environment.

### *Objectives of WMA*

- i. Responsible for the wastewater sector in Mauritius and to carry out, monitor, supervise, maintain, manage and control wastewater works;
- ii. Promote the treatment and re-use of wastewater;
- iii. Conduct and undertake research and studies for the implementation and development of projects relating to the wastewater sector;
- iv. Ensure the generation of sufficient resources from tariffs to finance the operation, maintenance and depreciation costs of wastewater systems, sewerage and sewage treatment installations;
- v. Ensure the proper functioning, inspection and maintenance of house sewers and wastewater systems;
- vi. Control and monitor pollution, private sewers and the use of equipment in relation to wastewater systems; and
- vii. Advise the Minister to whom responsibility for the subject of wastewater is assigned on any matter relating to the management of wastewater.

## **2.4 Frameworks and Action Plans**

The following frameworks and Actions Plans outline the guiding principles for the management of wastewater activities.

### ***2.4.1 Sewerage Master Plan***

In 1994, the Sewerage Master Plan was drafted. It provided an overall framework and strategy for improvements in the sanitation sector, identifying a series of projects to be realised over the next 20 years (1994-2013), and providing recommendations for setting guidelines for the sector enhancement through institutional, financial, and operational management development.

The current Master Plan 2014-2033 pursued the further expansion and improvement of the wastewater infrastructure, covering the sector's needs over the next 20-year period from 2014 to 2033 in accordance with the general objectives of the National Sewerage Programme (NSP). The objective of this Master Plan was to elaborate a programme for the development and management of the wastewater on the main island of Mauritius and the island of Rodrigues covering the 20-year period 2014-2033.

### ***2.4.2 National Sewerage Programme***

Based on the first Sewerage Master Plan covering the period 1994-2013, the first NSP was prepared in 1998 comprising projects to be implemented over a decade. A list of priority projects (13 in total) was identified for implementation under the NSP Phase I,

and has been supported by a number of development partners, such as World Bank, European Union and Agence Française de Développement.

## **2.5 Organisation of the Wastewater Management Authority**

The Board of WMA sets the long-term strategy of the Authority. The General Manager reports to the Board, and is ultimately responsible for the technical and administration arms. Five units, including the Public Relations and Customer Care Unit, are under the responsibility of the administration arm, and three units under the responsibility of the technical arms, namely the Project Management Unit, Operation and Maintenance Division and the Pollution Control Unit. The Internal Unit and the Corporate Unit are accountable to the Board.

## **2.6 System and Process Description**

Since its setting up, the WMA has been implementing wastewater projects identified in the Sewerage Master Plan and is moving ahead with the mission to extend the public sewer system to provide the Mauritian population with modern sanitation facilities. The following paragraphs give an overview of the key processes, activities and controls at the WMA.

### ***2.6.1 Construction of Public Wastewater Infrastructure and House Connection***

The Project Management Unit is responsible for the construction of public wastewater infrastructure. It is concerned with the supervision of projects at the feasibility and construction phase until completion. The WMA, on behalf of Government, invests in the construction and extension of several projects. The aim is to extend the public sewer system in order to provide the Mauritian population access to modern sanitation facilities and prevent environmental degradation.

House connection involves connecting public, private, religious, commercial and industrial premises within the existing wastewater network after a survey is carried out to determine feasibility of the connection.

In March 2001, Government introduced the Free House Connection Policy for domestic premises in the first instance. At a later stage, that is, in 2008, the policy was reviewed to include religious and charitable institutions, along with commercial premises.

Since August 2016, the WMA has been managing the Framework Agreement where a pool of contractors was selected to carry out house connections and sewer extensions, as well as maintenance work at a fixed schedule of rates. The aim was to connect more houses and to solve nuisance problems more rapidly.

### ***2.6.2 Operations and Maintenance***

This activity is concerned with the operations and maintenance of public wastewater infrastructure and mechanical and electrical equipment.

(a) *Operations and Maintenance of the Public Wastewater Infrastructure*

Operations and Maintenance of the wastewater infrastructure is a core component in the strategic set up of the WMA. The WMA has under its delegated responsibility the operation and maintenance of 755 km of sewer network. The Operations and Management Division works in line with the policy of Government to provide its services to residential units, commercial establishments and industries, and serves some 28 per cent of the Mauritian population. Through the operations and maintenance activities, the Authority provides service to some 90,000 households throughout the island.

The Operations and Management Division operates from the Head Office, and the three sub offices located at Caudan, Beau Bassin and Curepipe. The key task of the section is to ensure that the wastewater collection system is kept in good working condition, that is, the sewer lines are adequately maintained so that they can efficiently accomplish their intended function of collecting and conveying wastewater to the treatment plant under strict sanitary conditions.

It is the policy of the Authority to protect the population from potential health hazards arising from wastewater discharges. In accordance with this, the operations and maintenance activities take on board the following:

- i. Preventive maintenance programme to maintain the integrity of the wastewater collection and treatment systems;
- ii. Regular sewer inspection for the detection of physical damage which is followed by immediate and appropriate repairs;
- iii. Immediate response to all sewer related complaints followed by prompt correction of defective condition;
- iv. Repair, rehabilitation, replacement and raising of manhole covers;
- v. Carrying out sewer deviation works; and
- vi. Issuing of licence to private wastewater carriers that collect septage from premises for disposal at Roche Bois Wastewater Disposal Station.

(b) *Operation and Maintenance of Mechanical and Electrical Equipment*

The Mechanical and Electrical Unit is responsible for the proper operation and maintenance of all electro-mechanical equipment installed, and ensures proper reliability and maintainability of the wastewater infrastructure with prime objective to safeguard public health and sanitation, compliance with environmental discharge standards and maintenance of all Government assets delegated to WMA. The Unit manages and operates 10 wastewater treatment plants and 72 pumping stations.

Over the years, the Unit has been taking actions to meet zero overflows target at all the pumping stations. The operability and reliability of the operation of these wastewater treatment plants, and associated pumping stations have been achieved through the

upgrading/replacement of ageing, inefficient facilities and equipment reaching their end of useful life, along with intensive preventive maintenance of all equipment.

In order to ensure proper operation of the treatment units and all associated equipment with particular care to their efficiency, the Unit, through short and medium term planning, identifies equipment and infrastructures which require renewal or upgrading.

### **2.6.3 Pollution Control**

The Pollution Control Unit ensures that all wastewaters from industrial activities and property development are collected, treated and disposed of in a manner that is environmentally safe. This is achieved through:-

- i. Review and approval of wastewater related infrastructural and industrial development applications at Environmental Impact Assessment, Building Permit or Land Sub Division level.
- ii. Regulating, monitoring and control of industrial effluent discharges to the public sewer network.
- iii. Monitoring and evaluation of public and private wastewater treatment plant effluent in compliance with the Environmental Protection (Effluent Discharge Permit) Regulations 2003.
- iv. Review and approval of applications for disposal of expired liquid products.
- v. Advice and assistance on wastewater related issues and nuisances.
- vi. Participation in environmental committees, forums, seminars and workshops.

To complement the monitoring exercise, the Wastewater Laboratory carries independent sampling and analysis.

The WMA Laboratory is the analytical testing laboratory for water and wastewater accredited to the ISO/IEC 17025:2005 involved in the monitoring of the quality of wastewaters and effluent in Mauritius. Samplers from the Laboratory collect wastewater samples from sites, including wastewater treatment plants, industries, hotels and lagoons, and analyse them to check compliance with the various Regulations and Standards in force as per the Wastewater Management Authority Act and Environment Protection Act. It also undertakes testing against payment from organisations/ public/private sectors who are interested to test their samples.

Industries can either have wet process, dry process or an onsite disposal system. Wet process industries are subject to Industrial Discharge Permit under the Waste Water (Standards for Discharge of Industrial Effluent into a Waste Water System) Regulations 2004, and all other industries are subject to Environmental Impact Assessment License under the Environment Protection Act. Classified industries are those as specified in the Waste Water (Standards for Discharge of Industrial Effluent into a Waste Water System) Regulations 2004, such as textile, metal plating and galvanising plant, and slaughter house. Those industries with wet process not specified in the 2004

Regulations are categorised as unclassified. As from 1 January 2020, the Waste Water (Licence for Discharge of Industrial Effluent into a Waste Water System) Regulations 2019 cater for industrial activities that were not previously included in the 2004 Regulations, such as washing plant and printing. Moreover, any activity not classified under the Third Schedule of the new Regulations are classified under a new category named ‘Other Activity’, whereby the parameters to be analysed will be prescribed by the WMA.

Industries after being given a licence must submit effluent analysis results and records of water consumption for ensuring compliance with prevailing standards. Officers of the Pollution Control Unit must carry out post monitoring exercise as follows:

- Verification of effluent analysis results submitted by industries to ensure compliance with Wastewater Regulations;
- WMA Laboratory effects a yearly sampling and testing at industries and submits results to the Pollution Control Unit. Non-compliance is reported and industries are requested to initiate remedial actions;
- Receipt and analysis of records of water consumption on a monthly basis to ensure that the maximum allowable discharge is respected; and
- Post monitoring site visits are carried out on a yearly basis to check compliance with conditions of licence and changes in activities/processes.

## **2.7 Sustainable Development Goals and Wastewater<sup>2</sup>**

On 25 September 2015, 193 member states of the United Nations General Assembly adopted the 2030 Agenda for Sustainable Development with a set of goals to end poverty, protect the environment, and ensure prosperity for all. The Agenda includes 17 SDGs each with specific targets to be achieved over a 15-year period (2015 - 2030). The SDGs are interlinked and indivisible, and build on the progress and lessons learned from the Millennium Development Goals 2000 - 2015.

The cross-cutting importance of wastewater is highlighted in the 2030 Agenda for Sustainable Development, through SDG 6 on clean water and sanitation.

Target 6.3 of SDG explicitly focuses on reducing pollution and improving the disposal, management and treatment of wastewater and its impact on ambient water quality. This SDG target is ‘By 2030, improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe re-use globally’.

The SDG 6 on clean water and sanitation is considered to be one of the central SDGs because of its vital functions related to human health, dignity, environmental integrity and prosperity, and the very survival of the planet. Hence, collecting, treating and reusing wastewater from households and industries are major challenges for this sector.

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<sup>2</sup> Source: United Nations Report on World Water Development Report 2017

Measuring progress in the 2030 Agenda depends on how specific, measurable, attainable, relevant and time-bound (SMART) the indicators are for this task. The Inter-Agency Expert Group on SDG Indicators (IAEG-SDGs) was established to develop an indicator framework for measuring progress towards monitoring the goals and targets of the 2030 Agenda at the global level, and to support their implementation. IAEG-SDGs pointed out that member states will also likely develop their own national and regional-level indicators to complement the proposed global level indicators to be approved by the United Nations General Assembly.

The two global-level indicators that have been proposed to track progress for SDG Target 6.3, which are most closely related to wastewater management are:

- Indicator 6.3.1 – ‘Proportion of wastewater safely treated’: Safely treated wastewater generated by households (sewage and faecal sludge) and economic activities (for example industries) in proportion to total wastewater generated by households and economic activities.
- Indicator 6.3.2 – ‘Proportion of water bodies with good ambient quality<sup>3</sup>’: Proportion of water bodies (area) in a country with good ambient water quality compared to all water bodies in the country. ‘Good’ indicates an ambient water quality that does not damage ecosystem function.

## **2.8 Financing of Wastewater Activities**

The Ministry funded several projects for the extension of the sewerage network, house service connections and repairs/ maintenance/ upgrading of sewerage infrastructure through loans and by way of shares and equity to WMA. Actual capital expenditure incurred for the wastewater sector are detailed in the following paragraphs.

### ***2.8.1 Ministry of Energy and Public Utilities***

Actual capital expenditure of MEPU in connection with Wastewater Services for the past seven financial periods to 2018-19 totalled some Rs 4 billion.

Projects of the WMA relating to the extension of sewer network across the island, and financed from loans and by way of shares and equity included the Plaines Wilhems Sewerage Project, Pailles-Guibies Sewerage Project, Verger Bissambar Sewerage Project, Parisot Sewerage Project, and Tranquebar/Vallée des Pretres Sewerage Project.

### ***2.8.2 Wastewater Management Authority***

Wastewater projects are launched to extend the sewer network across the island in order to provide proper sanitation facilities and prevent environmental degradation. Over the period January 2015 to June 2019, several capital projects were completed by the WMA at a total cost of some Rs 4 billion. Details are as shown in Table 1.

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<sup>3</sup> Ambient water quality refers to natural, untreated water in rivers, lakes and groundwater, and represents a combination of natural and anthropogenic influences. (SDG 6 - Synthesis Report on Water and Sanitation (United Nations 2018))



Table 1 Actual expenditure on wastewater projects by WMA

<b>Sewerage Projects</b>	<b>Rs million</b>	<b>Rs million</b>
<b>Major Projects</b>		
Plaines Wilhems Lot 1A	3,200.0	
Pailles Guibies Phase 1	<u>253.3</u>	3,453.3
<b>Projects in Sensitive Regions</b>		
Parisot Phase 2	74.6	
Verger Bissambar	63.9	
Alfred Gellé Port Louis	5.0	
Marcel Cabon	7.2	
Cipaye Brulé	76.0	
Kensington	73.9	
Tranqhebar/Valleé des Pretres	<u>74.6</u>	375.2
<b>CHA and Low Cost Housing Estates</b>		
Residence Palmerstone	31.0	
Residence La Cure, Port Louis	39.6	
Cité Paul et Virginie, Port Louis	<u>58.0</u>	<u>128.6</u>
<b>Total</b>		<b><u><u>3,957.1</u></u></b>

Source: WMA

## 2.9 Monitoring of Progress

The four documents designed to be used for the management of wastewater are the 'Convention de Maîtrise d'Ouvrage Délégée 2001', 'Contrat de Délégation 2001', the MoU between MEPU and WMA (2008) and the Wastewater Management Authority Act.

### 2.9.1 *Contrat de Delegation*

As per this document, the performance of the sewerage system and wastewater treatment should be measured according to the following performance indicators:

- i. Number of customer's complaints and number of customer's complaints not satisfactorily dealt with;
- ii. Number of overflows;
- iii. Lead time to intervention;
- iv. The number of repairs made per km and per year in the main sewer, branching connections being excluded;
- v. The length of pipes to be replaced per year for each category of pipes;
- vi. The electromechanical performance of sewerage pumps;
- vii. The number and duration of equipment breakdowns;
- viii. The frequency of insufficient yield in wastewater treatment; and
- ix. Weekly returns of works outstanding.

### ***2.9.2 Convention de Maitrise D'Ouvrage Deleguée***

In this document, it is provided that the WMA should submit to Government (through MEPU), before the 15<sup>th</sup> of the month beginning the next calendar quarter, a progress report.

### ***2.9.3 Memorandum of Understanding***

The MoU signed between the MEPU and the WMA in July 2008 made mention of certain clauses for the efficient management of the wastewater sector. One of these is that the MEPU should monitor the general performance of the WMA at the end of each financial year, against mutually agreed KPIs. The KPIs should include:

- i. Capital investment in line with Programme Based Budgeting;
- ii. House connections achieved;
- iii. Improved access to public sewers;
- iv. Financial sustainability;
- v. Pollution control; and
- vi. Customer Service

It is also provided that MEPU in consultation with WMA should, at the beginning of each financial year, prepare and agree on an annual plan to monitor and evaluate the performance of WMA on the basis of the KPIs. As per the MoU, the Board of the WMA is responsible to monitor the reporting of performance by the WMA's management and to scrutinise the performance of management in meeting agreed goals and objectives.

### ***2.9.4 Wastewater Management Authority Act***

As per the Act, the General Manager of the WMA should submit to the Board, every three months, a report on the activities and finances of the Authority.

## CHAPTER THREE

### FINDINGS

*This Chapter presents the audit findings on whether the measures taken by the Ministry for ensuring the safe disposal of wastewater were effective.*

#### **3.1 Introduction**

One of the functions of MEPU is to ensure the safe disposal of wastewater. The Ministry has been taking a wide range of measures in this regard. These measures were examined, and issues arising thereon are described below.

#### **3.2 Developing Strategic and Operational plans**

Sewerage Master Plans 1994-2013 and 2014-2033 were drafted to provide an overall framework and strategy for improvements in the sanitation sector. The two Master Plans gave a long term perspective of the management of wastewater, and were expected to be implemented each over a 20 year period. Though commendable, the Plans were formulated based on assumptions which might change over the period of 20 years. This made the Plans inherently risky to implement. These Plans provided for a framework for developing short term periodic strategic and operational plans which were more manageable and less risky to implement. However, WMA did not develop any implementation plans, with realistic targets and indicators that could have enabled MEPU to monitor the implementation of the Master Plans effectively.

In the Master Plan 1994-2013, at least 50 per cent of the population were targeted to be served under the entire period of the proposed Master Plan. However, as at end of 2013, only 25 per cent of the population were connected to the sewerage network. An assessment was not carried out to identify the constraints and challenges that prevented the full achievement of the target or to determine whether the target was unrealistically too high when compared to the resources available. As of December 2019, only 28 per cent of households were connected. Lessons learned by the WMA during the implementation of the Master Plan 1993-2014 could have been used to prepare the execution of the Master Plan 2014-2033 more efficiently.

The Ministry explained that implementation of wastewater capital projects depends on the policy of Government and on funds approved.

#### **3.3 House Sewerage Connection**

Sewerage connection concerns domestic, commercial and industrial premises. The trend in the cumulative number of house connections effected by WMA from 2014 to 2019 based on average households of 333,000 across the country is shown in Table 2.

*Table 2 Cumulative Number and Annual Increase in House Connections*

<b>As at 31 December</b>	<b>Cumulative Sewerage Connection</b>	<b>Percentage Connected (%)</b>
2014	84,437	25.4
2015	87,401	26.2
2016	89,847	27.0
2017	91,127	27.4
2018	91,875	27.6
2019	92,512	27.8
<b>Yearly Average</b>		<b>0.5</b>

*Source: WMA and NAO's Analysis*

According to the Government's 3-Year Strategic Plan 2018-19 to 2020-21, MEPU had an objective of connecting 30 per cent of households by June 2020, with a view to achieving 50 per cent by 2030. The objective of the Master Plan 2014-2033 is to connect 80 per cent by 2033 to be in line with the target set in the NSP.

The cumulative number of household sewerage connection had been increasing from some 84,400 in 2014 to 92,500 in 2019. The average annual increase rate in connection to the sewerage system from 2014 to 2019 is some 0.5 per cent (as shown in Table 2). Unless the growth rate of household connection to the wastewater system is increased, only some 35 per cent will be reached in 2030, and hence, it will not be able to achieve the target of halving the proportion of untreated wastewater by 2030.

In 2019, Mauritius was classified as an upper middle-income economy by the World Bank. Some 28 per cent of the Mauritian population were connected to the sewerage system as at end of that year. This is relatively low, compared to other average upper middle-income countries where in 2010, some 53 per cent were already connected as per the United Nations World Water Report 2017.

The Ministry explained that house connection is directly linked with the implementation of projects which depends on policy of Government. Implementations of projects are sometimes delayed due to procurement procedures, procedures of funding agencies, delays in obtaining wayleaves among others. House connection component is the last activity executed under a sewerage project, since the trunk sewer and reticulation sewer need to be constructed and commissioned first.

Nonetheless, since 2016, WMA has adopted a new strategy to connect more households through a Framework Agreement by enlisting various contractors. Thus, more house connections could be effected within a short time frame.

### **3.4 Monitoring by the Ministry of Energy and Public Utilities**

Monitoring is a continuous assessment of the activities of the Ministry and the environment within which it operates with regard to the planned objectives, results, activities and means. It enables a stakeholder to review progress and to propose actions to be taken in order to achieve the objectives, as well as identifies actual or potential successes or failures as early as possible, and facilitates timely adjustments to the operations.

One of the functions of MEPU is to develop policies, strategies and projects for safe disposal of wastewater and ensure that these are implemented.

At paragraph 2.9, mention is made that the relationship between MEPU and WMA is described in the Convention de Maîtrise d'Ouvrage Déleguée 2001, Contrat de Délégation 2001, the MoU between MEPU and WMA (2008) and the Wastewater Management Authority Act. These four documents, which are used for the management of wastewater, define, among others, the roles, responsibilities and obligations of each party. They emphasised on the production of reports, development of KPIs and monitoring of activities of the WMA in relation to these KPIs.

At the end of each quarter, the WMA reports to MEPU on the progress of work achieved. Similarly, the Board of WMA was also regularly apprised of the status of project. The information in the quarterly reports and issues discussed at Board level were mainly on status of projects, number of house connections achieved, the percentage and volume of wastewater treated, together with a status on the activities in different units of the WMA, along with the number of complaints received with regard to wastewater issues. However, feedback and feed forward control from MEPU, WMA management and the Board on the progress achieved with regard to KPIs was minimal.

Indicators describe the project's overall objectives, purpose and results in operational and measurable terms. They enable effective monitoring and evaluation of the project. In order to monitor effectiveness and impact, one requires appropriate indicators. The indicators should give an 'early signal' of progress towards the project's purpose and the overall objective. As an example, the indicators can measure whether the beneficiaries have access to, are using, and are satisfied with the project services. This gives an indication that the project is offering relevant services and the project's purpose is likely to be met.

Key targets using appropriate KPIs to enable stakeholders to make informed decisions to better achieve intended objectives, as required by the Contrat de Délégation and MoU, were not developed. The progress of work achieved could therefore not be evaluated. For example, comparison of annual target with actual house connection was not being carried out, though this could be an important indicator to measure performance of the WMA.

The Ministry informed NAO that prior to financial year 2017-18, yearly forecasts of house connections were being prepared based on ongoing and new projects. Regular meetings of the Project Monitoring Committee are held at MEPU under the Chairmanship of the Permanent Secretary, and progress on project and milestones are reviewed thereon.

Following amendments brought to the Statutory Bodies (Accounts and Audit) Act, the WMA was required to prepare and agree with its parent Ministry a Performance Agreement, incorporating its KPIs on its targeted output. As from financial year 2017-18,

a Performance Agreement incorporating the KPIs was prepared and submitted to the MEPU along with WMA Estimates and WMA reports on target achieved for house connections on a regular basis.

### **3.5 Operation and Maintenance Practice**

Good management practice for the safe disposal of wastewater requires, amongst others proper record keeping. At the WMA, the following records for an effective asset management were not kept.

#### **3.5.1 Asset Register**

An asset register is an important document for good management practices. According to the Physical Asset Management Manual (PAMM), ‘an adequate asset register is integral to effective asset management. It is the basis of an asset management information system and should contain relevant data beyond that required for financial reporting’.

According to the MoU, the WMA was required to submit to MEPU within one month of the end of each financial year an updated asset register. However, no such register was maintained by the WMA.

#### **3.5.2 Project Register**

A Project Register is an important record that contains summarised details of contracts that an organisation is managing. A good Project Register includes a list of the contracts awarded, description of what that contract provides, contractor’s information, the start and end dates of the contract, and whether there are any extension options for that contract, for example ‘contract can be extended for 12 months’.

The Register also provides, among others, the following benefits to an organisation:

- It ensures all the information of the different contracts are kept in one easy and accessible place;
- It gives forewarning as to when contracts are due to expire;
- It provides an auditable record of the contracts; and
- It enables benchmarking the contracts with others.

Over the period January 2014 to June 2019, WMA had been managing several sewerage projects worth some Rs 4 billion. However, it did not maintain a Project Register.

In the absence of the Register, analysis, which would have helped to quantify projects not completed on due time or which were still not completed or those budgeted projects not started as at end of December 2019, was not possible.

The Ministry informed NAO that as from 2019, the WMA has implemented an Enterprise Resources Planning System, with a view of streamlining departmental procedures and

reducing reliance on manual processes, thereby leading to accelerated business cycles. The System comprises various modules which include a Project Register (Contracts and Framework Agreements) and Fixed Asset Register.

### 3.6 Monitoring of Expenditure – Capital Expenditure on Wastewater Services

This item of expenditure is made up of construction, extension and rehabilitation of sewerage infrastructure. Budget estimates and actual expenditure of this item for the past seven financial periods to 2018-19 are shown in Table 3.

*Table 3 Capital Expenditure on Wastewater Services*

<b>Financial Year/Period</b>	<b>Budget (Rs million)</b>	<b>Actual (Rs million)</b>	<b>%</b>
2013	1,437	921	64
2014	1,217	702	58
January to June 2015	337	282	84
2015-16	1,056	402	38
2016-17	1,055	537	51
2017-18	1,200	364	30
2018-19	1,145	320	28

*Source: Budgeted Estimates and Annual Reports of the Accountant General*

MEPU had over the past seven financial years/period consistently overestimated the budget amount to be granted to WMA. The actual percentage of the budgeted amount disbursed to WMA ranged from 30 per cent in 2017-18 to 84 per cent for the six month period January to June 2015. The objective for which funds were budgeted was not fully met. This may indicate insufficiencies in project preparation and implementation. This situation should have prompted MEPU to further investigate into the constraints and challenges faced by WMA, the moreso as the percentage of house connections was below expectations.

The Ministry informed NAO that funds which were budgeted could not be fully met for various reasons:

- Delays in award of contracts after allowing for procurement procedures/funding agencies approval;
- Slow progress of works due to unforeseen conditions (for example soil condition);
- Adverse climatic conditions; and
- Delay in obtaining wayleaves from Local Authorities which negatively impacts progress of works.

### **3.7 Internal Audit Function at Wastewater Management Authority**

Internal Auditors need to assess and provide assurance to management that the control systems it has set in place are working well, that rules, procedures and regulations are complied with, and that operations at the entity are efficiently carried out to meet its objectives. Moreover, the Amsterdam School of Business published a research study on the Role of the Internal Auditor in July 2008. The study identified a shift from the more traditional audit roles of providing assurance to a more proactive audit role in projects.

WMA was provided a substantial budget, and spent on average some Rs 475 million annually on contracts. Hence, project management is an area with possible exposure to risks that necessitate audit scrutiny on a regular basis to ensure that precious taxpayers' monies are well employed.

According to the Audit Plans of WMA and actual audit work carried out for the period 2015 to 2019, most of the works were on auditing support functions, for example overtime, maintenance of vehicles. Little audit resources were devoted to risky areas, such as contract management. A comprehensive review of contracts was not done, and the adequacy of contract management systems and processes in terms of control and risk management was not assessed by the Internal Audit Unit of the WMA.

In addition, according to the Organisational Structure of the WMA, the Internal Audit Unit is to be headed by an Internal Auditor and supported by three other officers, namely one Senior Internal Control Officer, one Internal Control Officer and a Management Support Officer. The post of Internal Auditor was vacant since July 2018, and this had adversely affected the extent of work carried out by the Unit and weakened its assurance function.

The Ministry informed NAO that the post of Internal Auditor will be advertised shortly to strengthen the Internal Audit Functions.

### **3.8 Industrial Sewerage Connection and Pollution Control**

Data from the Master Database of the Pollution Control Unit for the year 2019 was analysed. The Master Database comprised a total of 252 industries as at November 2019, of which 105 were wet process (52 unclassified and 53 classified), 73 were dry process, 71 had closed down, and three had onsite disposal system.

Records for the period 2015 to 2019 for a random sample of 15 industries out of 105 with wet process which are subject to an Industrial Discharge Permit were examined to identify whether industries had submitted to WMA effluent analysis results, to ascertain that the annual laboratory reports had been prepared by WMA, and whether yearly monitoring was carried out in compliance with the Waste Water (Standards for Discharge of Industrial Effluent into a Waste Water System) Regulations 2004. The annual laboratory reports were reviewed to ensure compliance with parameters set in the Standards.

The following shortcomings have been identified in the full application of the different clauses of prevailing regulations.



- Of the 15 files reviewed, eight concerned industries whose activities were classified under the 2004 Regulations, while the remaining were related to industries whose activities were not classified. The latter industries, though not covered by the Regulations had been issued a licence by WMA. Both the classified and unclassified industries were required to submit Effluent Analysis Results which could be either monthly, quarterly or any other interval as determined by the WMA. However, the frequency of submission of the Effluent Analysis Results by the 15 industries was not regular, and as such, results of certain months or quarters were missing though reminders were sent to the industries.
- According to prevailing Regulations, where a licensee fails to submit a monthly report, the maximum water consumption and the maximum concentration level of pollutant shall be determined by WMA on the basis of any past record or typical values reported for similar type of activity and shall be applied for the reported calculation of the penalty. However, in the files reviewed, there was no evidence of calculation and application of penalty.
- Permissible limits of pollutants to be discharged as industrial effluent into a public wastewater system are regulated by prevailing Regulations. Where industrial effluent discharged contained pollutant with concentration or load exceeding the permissible limits, the licensee must pay a penalty as specified in the Regulations in respect of each pollutant.

From the 15 files selected, yearly laboratory reports issued by WMA, where available, were examined. Several industries were not complying with existing Regulations, and several pollutants exceeded established parameters. Moreover, the non-compliance had been on-going as the industry did not have the required technology to minimise the risk of contamination. In these cases of recurrent excessive pollutants, penalty as prescribed by law was not applied.

- As per the Wastewater Management Authority Act, the WMA is responsible to control and monitor pollution in relation to wastewater systems. To discharge this responsibility a yearly programme of visits is prepared at the start of each year and officers of the Pollution Control Unit are delegated to carry out post monitoring visits to check industrial activities, and also compliance with conditions of the Industrial Discharge Permit. As per the reviewed files, the monitoring visits were not made on a regular basis. In nine cases, no monitoring was carried out in 2018.

The actual and planned number of monitoring visits for industries discharging effluents into the public wastewater systems from 2017 to 2019 is shown in Table 4.

*Table 4 Actual and Planned Number of Monitoring Visits from 2017 to 2019*

<b>Year</b>	<b>Planned</b>	<b>Actual</b>
2017	110	48
2018	62	8
2019	100	90

Source WMA

For each of the three years, the actual number of visits was below that planned. There is risk that industrial discharge can affect the environment.

The Ministry explained that since 2005, several shortcomings have been identified in the full application of the different clauses of the existing regulations as mentioned below:

- Enforcement was not legally possible for industries that do not fall under the categories listed in the Third Schedule of the Wastewater (Standards for Discharge of Industrial Effluent into a Waste Water System) Regulations 2004;
- There was no provision for parameters to be tested for the unclassified industries;
- Many industries were not submitting the required monthly report of the result of analyses of industrial effluent; and
- Some industries were reluctant to implement corrective measures in case of compliance of the industrial effluent with the set standards.

In order to address the above shortcomings, WMA, since 2018, has taken the initiative to work on new regulations and after following all the required procedures, same was gazetted on 4 January 2020 and took effect from 1 January 2020. A close monitoring is now being effected by the Pollution Control Unit.

### 3.9 Preventive Maintenance

Presently, WMA does not have a strategy that balances planned and unplanned maintenance works. The maintenance works were mainly of corrective, reactive and emergency nature.—Preventive maintenance is an important component that checks deteriorations from creeping in and ensures infrastructures are cared for at an early stage. Problems tackled at a later stage are most likely to aggravate causing nuisance and are more costly to deal with later.

Complaints relating to wastewater issues are recorded at Head Office and the three sub-offices of the WMA. The complaints pertained to operations and maintenance problems which were mainly due to manhole blockages, overflow, odour problem, seepages of wastewater and nuisances. The number of complaints received during each of the past five calendar years is as per Table 5.

*Table 5 Number of Complaints received at WMA*

<b>Year</b>	<b>Number of Complaints</b>
2015	2,000*
2016	2,672*
2017	3,605*
2018	8,050
2019	14,061

*Source: WMA*

*Note \* Figures did not include complaints recorded at the three sub-offices.*

In April 2019, the Board of the WMA highlighted that with a view to reducing complaints cases, it was imperative to carry out preventive maintenance works.

However, as of December 2019, maintenance works were mostly reactive rather than preventive, and the number of complaints from year 2018 to year 2019 had increased by more than 6,000 cases.

The Ministry explained that the WMA has a preventive maintenance plan for its sewer lines, and that preventive works had been carried out on a priority basis. The Preventive Maintenance Plan is prepared by the Operation and Maintenance Unit. Complaints are received mainly from areas which have an ageing wastewater network (for example Port Louis). Awareness Campaigns are also conducted during project implementation, and as and when required by the Customer Care and Public Relations Unit of the WMA.

### **3.10 Sustainable Development Goals and Wastewater**

Target 6.3 of SDG 6 explicitly focuses on reducing pollution and improving the disposal, management and treatment of wastewater, and its impact on ambient water quality. This SDG targets to improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe re-use globally by 2030.

To track progress of this SDG target, the indicator to be used as agreed in United Nations General Assembly was 'Safely treated wastewater in proportion to total wastewater generated by households and economic activities'. From Statistic Mauritius SDG database (2010-2018), about 28 per cent of actual population were connected to the public sewerage network, and the remaining had other means (septic tanks, absorption pits, cesspits and leaching fields) of wastewater disposal systems. However, statistics on the total volume of wastewater generated by household and economic activities (commercial and industrial) throughout the island were not captured, and hence, assessing achievement towards this target was not possible. Only data on percentage of population connected to the WMA sewerage system, and on volume of wastewater treated by the WMA wastewater treatment plant was available. As at end of December 2019, some 28 per cent of the actual population were connected to the sewerage system, and for 2019, some 47 million m<sup>3</sup> of wastewater were treated.

The SDG also calls for substantial increase of recycling and safe re-use of wastewater. As per United Nations World Water Development Report 2017, irrigation accounts for the majority of the treated, untreated and partially treated wastewater used worldwide. Globally, 52 per cent of water after tertiary treatment is used for irrigation purposes. Other re-uses of wastewater after tertiary treatment consist of industrial re-use (19 per cent), environmental enhancements (eight per cent), and the remaining 21 per cent for other purposes, such as recreational, urban use and ground water recharge.

On average from 2015 to 2019, annually, some 49 million m<sup>3</sup> of wastewater from the public wastewater system were treated through the wastewater treatment plant of the WMA, and 10 per cent of the treated wastewater were used for irrigation. The remaining treated water was released in the environment. Table 6 shows the percentage of treated wastewater used for irrigation purposes over the past five years from 2015 to 2019.

*Table 6 Wastewater used for Irrigation after Treatment*

<b>Year</b>	<b>Wastewater Treated (million m<sup>3</sup>)</b>	<b>Treated Wastewater used for Irrigation Purposes (million m<sup>3</sup>)</b>	<b>Percentage %</b>
2015	49.4	4.7	9.5
2016	50.6	6.0	11.9
2017	52.6	6.4	12.2
2018	43.5	4.5	10.3
2019	47.0	2.5	5.3

*Source: Digest of Environmental Statistics, Statistics Mauritius and WMA*

## CHAPTER FOUR

### CONCLUSION

*This Chapter concludes against the audit objective based on the analysis and findings supported by audit evidence as elaborated in the previous Chapter.*

One of the responsibilities of the Ministry is to ensure the safe disposal of wastewater. In fulfilling this responsibility, the Ministry has been guided by the recommendations in the Master Plans. The measures taken by the Ministry has been to some extent effective in ensuring the safe disposal of wastewater, but there were shortcomings in their implementation.

As of December 2019, as a result of past projects implemented by the Ministry, through the WMA, 28 per cent of the population had access to the public sewer network compared to 2007 where some 19 per cent of household were connected to the sewerage system. However, the Ministry has been facing challenges to fully meet its target. Target set to reach 50 per cent of the population connected to the sewerage system in 2014 under the Master plan 1994-2013 was not achieved. In 2014, only some 25 per cent of the population were connected. The Ministry is targeting 30 per cent in 2020, and the target of 50 per cent is now set for 2030. At that pace, it is less likely that the target can be reached. An assessment has not been carried out to identify the constraints and challenges that prevented the full achievement of the target or to determine whether the target was unrealistically too high when compared to the resources available.

The role and responsibilities of MEPU and WMA are well defined. MEPU is required to monitor the activities of WMA. However, there was indication that monitoring of WMA by MEPU has not been to the desired level. Appropriate KPIs in respect of the Master Plan 2014-2033, Contrat de Delegation, Convention de Maitrise d'Ouvrage Deleguée and MoU have not been developed to facilitate effective monitoring.

The WMA is facing difficulty in applying the conditions set in Waste Water (Standards for Discharge of Industrial Effluent into a Waste Water System) Regulations 2004 in instances, such as non-renewal of licence, and discharge not being within established parameters which would help to further meet the objective of safe wastewater disposal. With the passing of the Regulations 2020, improvements are expected on the application of conditions set in the new Regulations.

Government is struggling to meet the SDG Target 6.3 which calls for substantial increase of recycling and safe re-use of wastewater. Mauritius has other sources of wastewater, other than that from the sewerage system, for example from septic tanks, absorption pits and cesspits, the volume of which is not captured by Statistic Mauritius.



## CHAPTER FIVE

### RECOMMENDATIONS

*This Chapter presents the recommendations based on the findings and conclusions.*

To meet the above challenges and to enable further progress in the wastewater sector, the following are recommended

- i. Monitoring of performance, by developing KPI for those activities which are related to the safe disposal of wastewater, needs to be improved. Yearly target on number of households and the proportion of the population to be connected to sewerage system should be compared to the actual results, and regular feedback should be provided to the Ministry so that corrective actions are taken on a timely basis.
- ii. The Ministry should investigate into the constraints and challenges encountered by the WMA in the implementation of projects.
- iii. Internal Audit should play an important part in the monitoring mechanism of an organisation. More time should be dedicated by the Internal Audit Unit to audit projects and give feedback to management for timely decision making. Projects should be assessed to determine whether they meet their intended objectives.
- iv. Proper records need to be kept for all projects undertaken by WMA. A central asset register should be kept for good asset management practices, recording information, such as estimated cost of project, actual amount paid, start and end dates of project.
- v. Implementation plans for the execution of Master Plans need to be developed. This should include activities to be carried out, their annual budget, and the implementing units, together with output indicators for each activity in line with the objective of the Master Plan.
- vi. Wastewater re-use should be encouraged and increased to support the achievement of SDG Target 6.3, as well as to combat water scarcity and protect water resources and make an increasing use of treated wastewater for irrigation purposes.
- vii. The Pollution Control Unit should ascertain that licensees comply with the conditions set out in the Industrial Discharge Permit to ensure that the objective of the Ministry for safe disposal of wastewater is met.
- viii. Preventive maintenance works should be planned and carried out with a view to reducing complaint cases pertaining to operations and maintenance problems due to manhole blockages, overflow, odour problem, seepages of wastewater and nuisances.
- ix. The Ministry, in collaboration with the WMA, should put in place appropriate mechanism to capture maximum data on wastewater generation around the island to ensure completeness of data and information to monitor progress of work towards SDG 6, as one of the challenges to monitoring its Target 6.3 indicators is the lack of data relating to aspects of wastewater management.

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