Wastewater Spoken Word Competition 2017

"Wastewater Treatment and My Environment"

INFORMATION BOOKLET

For use in the Wastewater Environmental Education Campaign

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FOREWORD

The Inter-American Development Bank funded Malabar and San Fernando Wastewater Projects represent the largest investment in Trinidad and Tobago's wastewater sector since the Lock Joint Project of the 1960's. The completion of these two projects will provide:

- Improved public health and environmental conditions in the catchment areas;
- Centralized wastewater services for the entire Malabar and San Fernando catchments;
- Integration and expansion of the sewer networks, allowing for the provision of sewer services for all residents in the catchments, totaling 220,300 persons;
- Decommissioning of smaller wastewater treatment plants in the catchment areas.

Completion of these two wastewater projects will see wastewater coverage increase nationwide from 30% to 47%. As such the Authority has embarked on a public education campaign targeting residents of the Malabar and San Fernando catchment areas.

An important aspect of this project is a public education campaign that will seek to build awareness of the importance of these projects among residents of the Malabar and San Fernando catchments.

The Malabar and San Fernando Secondary Schools Wastewater Spoken Word Competition is one element of the campaign that targets children of Secondary School age in the catchments.

CHAPTER 1

WHAT IS WASTEWATER

Wastewater is a complex mixture of physical, chemical, and microbiological compounds that contains billions of microscopic, living organisms. One of the most important objectives of wastewater treatment is to ensure that these organisms are destroyed, to protect the spread of infectious diseases.

Wastewater

This is defined as any water that has been adversely affected in quality due to anthropogenic (human) influence. It comprises liquid waste discharged by domestic households, commercial, industry and agricultural activities.

SOURCES OF WASTEWATER

- **Domestic wastewater** originates from homes. It consists of wastes from toilets, baths, showers, laundry, dishwashers.
- **Commercial wastewater** is usually similar to domestic wastewater. It may be higher in pollutants for example, wastes from laundromats or car washes, or it may contain some "unusual" components such as effluent from a photofinishing operation.
- **Institutional wastewater** from hospitals, schools, penitentiaries, etc. is usually very similar to domestic wastewater.
- **Industrial wastewater** can be very complex and may contain various types of pollutants or toxic substances such as heavy metals, pesticides and other chemicals. Industrial wastewater, usually requires pre-treatment to an acceptable level before entering a sewer collection system.

CHAPTER 2

THE IDB LOAN – WASTEWATER IMPROVEMENT PROGRAMME

The Authority has been overseeing an Inter-American Development Bank (IDB) funded Multi-Phase Wastewater Rehabilitation Programme and Wastewater Infrastructure Rehabilitation Programme, which will see the construction of Wastewater Treatment Plants and associated collection systems in the Malabar and San Fernando areas.

The current outdated wastewater collection and treatment and disposal system that services the Malabar catchment is in dire need of upgrade and expansion, as only 29 percent of the catchment population have access to centralized wastewater treatment facilities.

The Malabar catchment comprises the following sub-catchments:

- Calvary Hill
- Mausica/Olton Road
- Cleaver Road/Andrew Lane
- O'Meara Road
- Arima
- Mt.Pleasant / Maturita
- Upper Pinto Road / Gills View
- Upper Malabar / Tumpuna Road
- Santa Rosa East/West
- Peytonville / Carapo
- La Horquetta / Greenvale

The new plant will be able to treat wastewater from all existing treatment plants in the catchment area, as well as, the un-sewered portions of the catchment.

Similarly only about 30% of the catchment is currently serviced by the existing San Fernando Wastewater Treatment Plant. Even though a receiving station was built in the 1980s, the major growth and development of the catchment area that has occurred over the decades has created this divide. The New San Fernando Wastewater Project will cover a 42 km^2 area including the City of San Fernando and environs. This project will create a system with the ability to deal with both current and future wastewater treatment demands, as the population in this catchment is projected to grow to 111,600 by 2035.

The San Fernando sub-catchments include:

- Marabella
- Tarouba – Cocoyea
- Cocoyea South
- Pleasantville – Corinth
- Vistabella – Gulf
- San Fernando South
- Ste. Madeline
- Bel Air – Gulf View
- Green Acres
- Duncan Village
- Union Hall
- Retrench – Golconda
- La Romain
- Palmiste
- Sunkist

The objective of the construction and commissioning of this new WWTP is to collect and treat wastewater from existing sewer systems in the San Fernando catchment, resulting in an overall improvement of the quality of life for its residents, as much cleaner effluent will be discharged into the waterways, greatly reducing the risk to public health and the environment.

For Further Information

The Wastewater Rehabilitation Programme webpage is now live on the WASA website! This can be accessed using the link: http://www.wasa.gov.tt/WASA_WastewaterMultiphase.html The webpage provides information on the projects.

CHAPTER 3

WASTEWATER TREATMENT PROCESS

A well managed wastewater system provides protection against diseases, while a poorly functioning system can adversely impacts on the health, sanitation and well-being of humans and the environment.

The disposal of poorly or untreated wastewater into the environment may:

- Disease causing bacteria/viruses;
- Discomfort from foul odors;
- Infestation by rodents;
- Damage to marine life;
- Reduction in recreational activities;
- General damage to the environment and waterways.

The first step in understanding wastewater treatment is understanding what it is and how the treatment process works. Wastewater collection systems are the network or pipelines, manholes and pump stations designed to effectively collect and transmit the wastewater from households and businesses to a wastewater treatment plant. The treatment plant is designed to receive wastewater from the collection system where it is treated before being released back into the environment.

Figure 1: Manhole cover

This treatment process removes undesirable substances, which can cause pollution of rivers and streams and ultimately cause water-borne diseases in humans and other animal life. The treatment plant uses living organisms (mainly bacteria) together with mechanical equipment to reduce pollution in wastewater. The treated wastewater, called effluent, is then discharged into the environment. Sludge is defined as solids collected in the wastewater treatment process. It must be treated,

dewatered and disposed of in a safe and effective manner. In Trinidad and Tobago sludge is usually dried on the treatment plant compound then trucked to a landfill site.

COLLECTION, TREATMENT AND DISPOSAL

Wastewater treatment, which begins once used water enters the sewer system, can be broken into the following steps: Preliminary Treatment, Primary Treatment, Secondary Treatment and Tertiary Treatment.

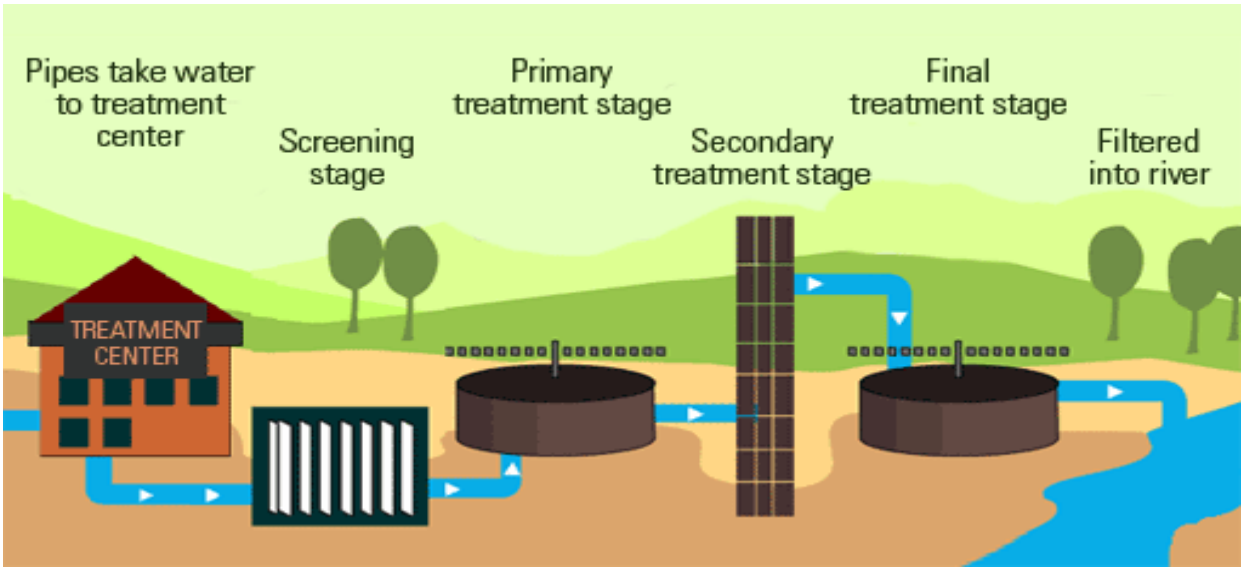

Figure 2: Stages of the treatment process at a typical Wastewater Treatment Plant.

Preliminary Treatment

Screening of large objects e.g. wood, rubber, cans, other large metal & plastic objects are prevented from entering the Wastewater treatment plant. It then goes to a Grit chamber where the wastewater slows down to allow heavy products such as sand to settle to the bottom.

Primary Treatment

A Bio Reactor is a mechanism for bacteria and air or oxygen to be added to the wastewater to purify it. The micro-organisms or sludge produced from the trickling filter, are allowed to settle and in the secondary clarifier. The pumps at the secondary clarifier remove the sludge to the digester for processing. The sludge from both the primary and secondary clarifiers are treated in the digester and then sent to a drying pit for disposal.

Secondary Treatment

The next step is the Primary Clarifiers. Untreated wastewater contains materials which will either settle to the bottom or float to the surface when the wastewater flow becomes very slow. Here, the heavy materials known as sludge settles, while lighter materials known as floc floats. Skimming arms at the bottom of the clarifier collect sludge and pumps it to a digester for processing.

Tertiary Treatment

This step removes stubborn contaminants that secondary treatment was not able to clean up. It involves the disinfection to kill the harmful bacteria. Disinfection can be either the use of chlorine or ultra-violet light. The treated wastewater is the discharged into a nearby river course and eventually flows into the sea.

Figure 3: Aerial view of the Beetham Wastewater treatment Plant

CHAPTER 4

WASTEWATER, PUBLIC HEALTH & THE ENVIRONMENT

Treatment of sewage is essential to ensure that the water returning into the environment meets the accepted regulatory standards.

HOW WASTEWATER AFFECTS YOU?

Wastewater may contain many disease-causing organisms and bacteria, harmful chemicals and heavy metals. If untreated this waste would seep into our groundwater or drain into our rivers and would eventually spread diseases and pollute drinking water sources. The following are the potential impacts of untreated wastewater use on the environment:

Impact Areas	Potential Impacts of Wastewater Use
Human & Animals	Use of untreated wastewater is harmful to human health and other animals as it contain bacteria which can cause diseases. Additionally, untreated wastewater can encourage the proliferation of rodents and other vermin, which is also a public health concern.
Plants & Soil	Wastewater (treated and untreated) is used in planting crops because it is a rich source of nutrients and reduce the need for chemical fertilizers. However, these nutrients affect the agricultural soil if they contain heavy metals and salts, which may be added to the soil over time that can cause smaller crops.
Groundwater Resources	Untreated wastewater can seep into the ground and contaminate groundwater supplies. Groundwater is a major source of drinking water.
Ecological	When untreated wastewater enters surface water such as rivers, the bacteria present can change the amount of oxygen in the water which can lead to fish deaths and reduced fishery.

Table 1: Potential impacts of wastewater use



(a) Human Impacts **(b) Crop Damage** **(c) Fish kill**

Figure 4: Examples of impacts of poor wastewater management practices

PROTECTING OUR WASTEWATER SYSTEM

Do's

- Connect to the Public sewer system if one exists in your area. Very often, homes are allowed to build septic tanks when sewers are absent. However once sewers are introduced to your area, you are required to make the changes needed to connect to the system.
- Ensure that your internal plumbing is not clogged and that water can flow freely at all times.
- Report broken sewer mains or overflowing manholes to the relevant authorities.
- Educate all the members of your household on the proper use of internal plumbing fixtures.
- Use a strainer in the sink to catch food scraps and other solids.

- Use Baking Soda instead of harsh chemicals like Bleach or Lye to clean sinks and toilet bowls. Harsh chemicals kill the bacteria that are needed to treat waste at the sewage treatment plant.
- Pay your sewerage rates.

Don't

- Make unauthorized connections to the existing system. Faulty connections will give rise to plumbing problems in the home.
- Pour substances that are poisonous or flammable down the drain. Flammable substances can easily ignite and cause explosions in the sewers if sparked. Poisons can seep into the ground and enter your ecosystem or flow to the treatment plant.
- Pour used cooking oil down the sink. Cooking oil changes into hard waxy substances resembling lard, which block the sewers and can cause sewerage to divert to the streets or into our homes.
- Pour liquids that are highly acidic or alkaline and paints or solvents down the plumbing fixture at your home. Paints or solvents should be disposed of at proper hazardous waste disposal sites.
- Flush sanitary pads, diapers or condoms down the toilet. They cause blockage in the plumbing and the collection system.
- Uncover manholes or pour any substances or place any objects into them.
- Throw solids or slow flowing substances such as, ash, cinders, mud, straw, shaving, metal, glass, fabric, wood, garbage, hair etc. into the sanitary sewers. These can clog sewer and cause sewage to backup into the streets and homes.