

Drainage Programme **De-silting** 2018

"Let's Work Together to Prevent Flooding
Today for a Sustainable tomorrow"



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FLOODING AND THE CHALLENGES

The truth is that there has been a dramatic increase in rainfall during recent years. For instance in, March of 2018, Piarco recorded 142.1mm of rainfall for the month. This level of rain goes on record as wettest March ever since the Office began recording precipitation levels in 1946. The year 1972 was the last time that thundershowers were even reported during this month.

This time has been marked by excessive precipitation brought on by the unavoidable effects of climate change and the rise in sea levels. Here are some statistics from the T&T Meteorological Office that show the steady raise in the amount of rainfall in Trinidad and Tobago.

RANK	YEAR	RAINFALL AMOUNTS
1st	2018 so far	142.1mm
2nd	2012	133.9mm
3rd	1977	115.1mm
4th	2006	114.2mm

***The average rainfall for March is 31.5mm**

But the problem does not stop there. Yes nature is playing a significant part in this predicament of climate change and ensuing consequences. But we play a significant role in our own flooding as well.

Three major factors that exacerbate flooding:

1. Hazardous Farming Practices

Unfortunately, there are farmers who grow produce on flood plains of rivers. To prop the running crops, they often use bamboo and other sticks. After harvest, the careless have a custom of discarding this material used for support into nearby rivers. As the river's volume increases during heavy rainfall, the rubble is carried further downstream, congesting the flow of water and encouraging another flood.

Ideally, the remnants of such agricultural structures should be returned to the ground where they can properly decompose and enrich the soil.

2. Irresponsible Land Development

Run-off water from development sites carries large volumes of sediment. This is caused by the removal of vegetation and the loosening of top soil. Such practices change the gradient of the channels, which results in a less resistant slope that allows all of the dislodged soil to sweep down into rivers which can lead to blockages and subsequent flooding.

3. Illegal Disposal of Solid Waste (Littering)

This is cement that was dumped in a watercourse. The culprit had no regard for irrigation and the need for water to flow freely. Such behaviour worsens flooding episodes.

It is morally irresponsible to dispose your large solid waste in rivers. It clogs the waterways and contributes greatly to the current flooding problem. Solid waste includes large items like furniture and appliances. It also refers to smaller items like drinking straws and packaging: items that you know needs to be placed in a bin. If you know you sometimes litter, you need to stop!

As the entire world deals with the result of extra precipitation caused by climate change, all of us need to keep in mind that the watercourses should be reserved for water, only. Rivers are not "no man's land" territories. They are shared channels that collect the run off of excess water from our drains and eventually run off into the sea.

Land developers need to be responsible, especially when it comes to the way they handle the waste associated with their projects. They need to submit to the Drainage Design of the Ministry of Works and Transport to the Drainage Division for approval. Visit the Ministry of Works and Transport's website for more details.

The role of the Drainage Division

The Ministry of Works and Transport, through the arm of the Drainage Division holds the responsibility to provide drainage solutions throughout Trinidad. This scope includes developing and maintaining main watercourses and irrigation systems and providing expert advice to control flood erosion, sedimentation, drainage, irrigation and reclamation.

Given the dramatic increase in rainfall during recent years, the Drainage Division has developed a more focused approach to its procedures. Such measures have been designed to combat this new reality we face marked by excessive precipitation brought on by the unavoidable effects of climate change and the rise in sea level.



Desilting the Watercourses: A National Approach

From as early as April 2018, the Comprehensive Desilting of Watercourses Programme was launched. Its objective is to execute maintenance works on major water courses throughout the country to off-set flooding in such prone areas. This undertaking encompasses over 200 critical projects to be carried out in phases across all four districts of the Drainage Division (North, South, East and Central) and includes the:

- Cleaning and desilting of river channels
- Clearing and removal of grass and debris from within the river channels
- Formation/rebuilding of embankments which were previously eroded or prone to erosion.

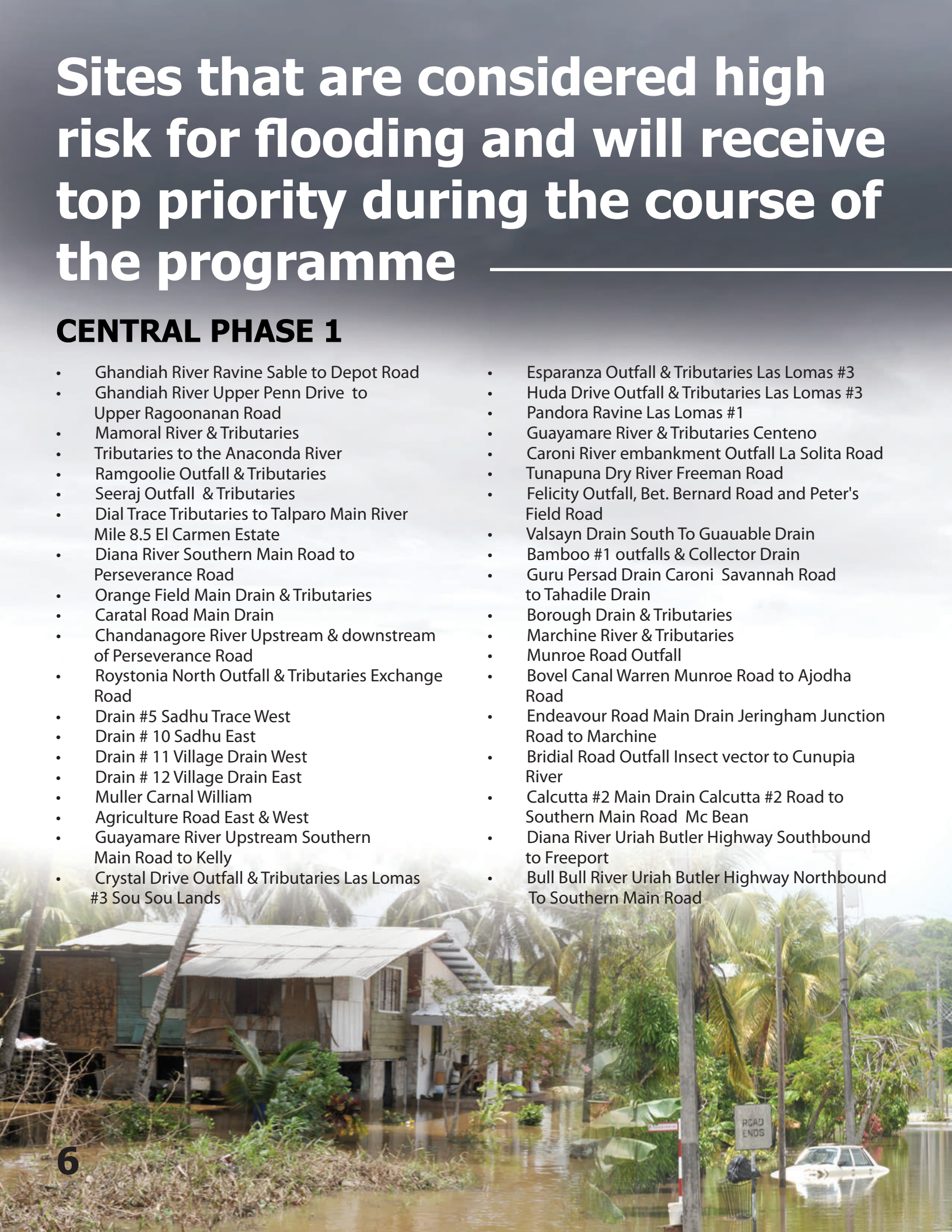
The Drainage Division has scheduled 108 projects in Phase 1 across its four districts. The strategy is to focus resources on water channels that have the greatest potential to cause the most flooding across Trinidad. Perhaps you've seen us in your neighbourhood.



Sites that are considered high risk for flooding and will receive top priority during the course of the programme

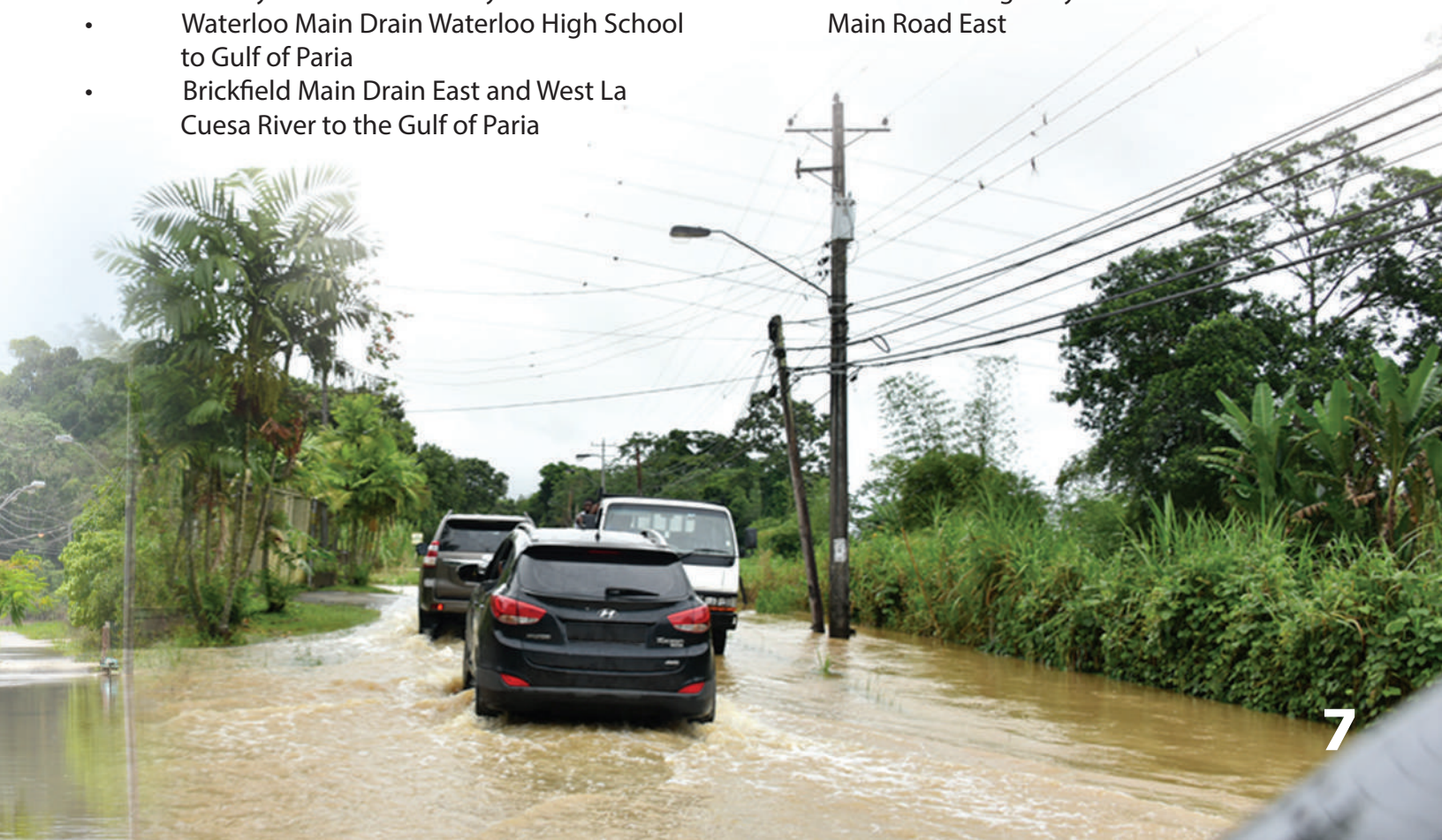
CENTRAL PHASE 1

- Ghandiah River Ravine Sable to Depot Road
- Ghandiah River Upper Penn Drive to Upper Ragoonanan Road
- Mamoral River & Tributaries
- Tributaries to the Anaconda River
- Ramgoolie Outfall & Tributaries
- Seeraj Outfall & Tributaries
- Dial Trace Tributaries to Talparo Main River Mile 8.5 El Carmen Estate
- Diana River Southern Main Road to Perseverance Road
- Orange Field Main Drain & Tributaries
- Caratal Road Main Drain
- Chandanagore River Upstream & downstream of Perseverance Road
- Roystonia North Outfall & Tributaries Exchange Road
- Drain #5 Sadhu Trace West
- Drain # 10 Sadhu East
- Drain # 11 Village Drain West
- Drain # 12 Village Drain East
- Muller Carnal William
- Agriculture Road East & West
- Guayamare River Upstream Southern Main Road to Kelly
- Crystal Drive Outfall & Tributaries Las Lomas #3 Sou Sou Lands
- Esparanza Outfall & Tributaries Las Lomas #3
- Huda Drive Outfall & Tributaries Las Lomas #3
- Pandora Ravine Las Lomas #1
- Guayamare River & Tributaries Centeno
- Caroni River embankment Outfall La Solita Road
- Tunapuna Dry River Freeman Road
- Felicity Outfall, Bet. Bernard Road and Peter's Field Road
- Valsayn Drain South To Guauable Drain
- Bamboo #1 outfalls & Collector Drain
- Guru Persad Drain Caroni Savannah Road to Tahadile Drain
- Borough Drain & Tributaries
- Marchine River & Tributaries
- Munroe Road Outfall
- Bovel Canal Warren Munroe Road to Ajodha Road
- Endeavour Road Main Drain Jeringham Junction Road to Marchine
- Bridial Road Outfall Insect vector to Cunupia River
- Calcutta #2 Main Drain Calcutta #2 Road to Southern Main Road Mc Bean
- Diana River Uriah Butler Highway Southbound to Freeport
- Bull Bull River Uriah Butler Highway Northbound To Southern Main Road



CENTRAL PHASE 2

- Mamoral River & Tributaries
- Ghandiah River Ravine Sable to Depot Road
- Ghandiah River Upper Penn Drive to Upper Ragoonanan Road
- Mandillon River Uriah Butler Highway to Southern Main Road
- La Cuesa River Joyce Road to Gulf of Paria
- Arena River upstream
- Carolina Main Drain & Tributaries Uriah Butler Highway Northbound to Milton Road
- Pranz Garden Main Drain & Tributaries
- Factory Road Drain Factory to Honda River
- Waterloo Main Drain Waterloo High School to Gulf of Paria
- Brickfield Main Drain East and West La Cuesa River to the Gulf of Paria
- Freeport Main Drain South gate Road
- Freeport to Calcutta #2 Main Road
- Mc Bean Main Drain Southern Main Road to Waterloo Main Road
- Tributaries to El Carmen Main Drain
- Cascabell Ravine upstream and downstream
- Latchu Main Drain, Southern Main Road to Dyette Estate Main Road
- Maraj Outfall & Tributaries
- Vishnu Boys Outfall
- Caroni River Airport 1,2,3&4 Tributaries
- Guayamare River Newcut Downstream
- Uriah Butler Highway West to the Southern Main Road East



DRAINAGE DESILTING PROGRAMME

NORTH PHASE 1

- Tacarigua River
- Arima River
- Malick River - Segment one
- Malick River - Segment two
- La Horquette River
- Bagatelle Ravine - Segment one
- Bagatelle Ravine - Segment two
- Maraval River
- N.U.G.F.W Drain & Tributaries
- Cannings Main Drain
- St. Anns / East Dry River

NORTH PHASE 2

- Maraval River
- Diego Martin River Segment one
- Diego Martin River- Segment two
- Bournes Road Ravine and Tributaries
- Majuba Ravine
- San Juan River
- Santa Cruz River
- Tributary to Arthur Lok Jack Drain
- Tacarigua River
- Tunapuna River
- Blackman Ravine
- St Joseph River
- Macoya Main Drain
- Carapo Ravine
- La Seiva Ravine & Perservance Silt Trap
- Patna Main Drain

EAST PHASE 1

- Bel Air River
- Guaico River & Tributaries
- Tributary to Ortoire River
- Mantacool River & Tributaries
- Samuel River
- Swaha Main Drain
- Bamboo River & Tributaries
- Tributary to Ortoire River
- Guaracara River
- "New Bolt River & Tributaries"
- Lagoon Doux River
- Kernaham River & Tributaries
- Kernaham River & Tributaries
- Oropouche River & Tributaries
- Transport River
- Tributary to Ortoire River
- Canque River & Tributaries
- Cunaripo River & Tributaries
- Guaico River & Tributaries



EAST PHASE 2

- Guarapiche River
- Tributary to Killdeer River
- Tamboulatay River & Tributaries
- Kernaham River & Tributaries
- Tributary to Killdeer River
- Tributary to Salazar River
- La Savanne River
- Black Swamp River [Upstream]
- Tributary to Quare River
- Ocean Sands Drain
- Wynappie River
- Tributary to Bidesse River
- Tributary to Mahaut River
- Nariva River
- Cuchee River & Tributaries
- Black Water River
- Dorsett River
- Ortoire River
- Cunaripo River & Tributaries
- Pettie Poole River & Tributaries
- Mainline River
- Le Branche River
- Caigual River & Tributaries
- Manning Ravine
- Sangre Grande River
- Sangre Chiquito River & Tributaries
- Tributary to Transport River

SOUTH PHASE 1 & 2

- Duck Pond River
- Blackwater Channel
- Bhagmania River & Tributaries - Segment one
- Bhagmania River - Segment two
- Cumuto River
- Blackwater River
- Gucharon River
- Papourie River
- Alligator Channel
- Vistabella River (Paved Section)
- Seebarrack River
- Magretoute Drain
- Fairfield River
- Jaipaulsingh River
- Jokhan River
- Moroquite River
- Cunapo River
- Moolai River
- Bay Bay Drain
- Nagessar River
- Tarouba River
- Congo River
- Cipero River
- Marabella River Paved Section
- Marabella River Paved Section
- Tributaries (3) To Marabella River
- Silverstream River
- School Drain
- Dunlop River
- Light Bourne River



The Ministry of Works and Transport's Drainage Desilting Programme 2018

Here are a few highlights of the tour of Drainage projects conducted by Senator the Honourable Rohan Sinanan, Minister of Works and Transport and the technical team from the Ministry.





The Ministry of Works and Transport's Drainage De-silting Programme 2018



Ciperio River, San Fernando, South



Cunapo River, Sangre Grande, East



Malick River, North



Maraval River, North



Marchine River, Central



El Socorro River



Beetham River, Port of Spain



Fourteen Gates



Bagatelle River Petit Valley, North



Calcutta No.2 Main Drain, Central



Penal River, South



Tacarigua River, North



Vistabella River , South



Cunapo River, Sangre Grande, East



La Horquetta, Arima, East

DRAINAGE DIVISION

DO'S AND DON'TS

There has been a dramatic increase in rainfall during recent years. For instance, March of 2018, 142.1mm of rainfall was recorded making it the 'wettest recorded March' in our history. Occurrences like these make it even more important to keep the water courses and drains clean.

To help us effectively do our part, here are some Drainage Do's and Don'ts.

DO'S and DON'T'S

Households Do's

- Do make sure your garbage goes in the proper place
- Do check that your latrine or cesspit is not on the edge of, or draining into a river or drain.
- Do be careful when building or extending your house to prevent sand, earth and silt from washing into the drain.
- Do plant trees and shrubs to keep a "green scene".
- Do inform the authorities if there is a blockage of a drain near you.
- Do be a good example to your children
- Do assist with neighbourhood clean-up activities. Remember, it really is true that 'many hands make light work'.

Household Don'ts

- Do not throw garbage and garden clippings in the drain.
- Do not ignore things which might block the drain. At least phone the sanitation workers to clear them away, or organize a group from the neighbourhood to clear them.
- Do not light rubbish fires in the dry season which could get away, creating more debris to fall into the drain.
- Do not scrape off all the vegetation when you prepare land for building.

Farmers Do's

- Do prevent waste from getting into drains
- Do build animal pens away from drains and use a cesspit and soakaway for the sludge from pens
- Do leave a protective filter strip of land with some trees and bush between your field and the river or drain
- Do use all precautions when clearing your land so that debris does not fall into the drain

Farmers Don'ts

- Do not allow animal waste to flow into drains and rivers



Industry Do's

- Do respect the water courses and drains and the people who work in them
- Do make sure the garbage and waste leaving your compound are taken to the landfill and not just tipped into the nearest drain
- Do make sure that any effluent reaching the drain is clean and contains no toxic or solid material
- Do give assistance to neighbourhood clean-up activities

School Do's

- Do teach students about the proper use of drains
- Do hold competitions in art or storytelling to highlight drainage and littering problems to raise awareness.
- Do organize periodic clean-up activities for older students and invite parents, community members, local corporations and businesses to take part

School Don'ts

- Do Not set a bad example for students by allowing janitorial staff to dump garbage in the drains

Community Groups and Leaders Do's

- Do take care not to do anything which blocks or clogs the drains.
- Do organize major community wide clean-up activities. Just before the rainy season starts is a prime time to initiate these projects to remove furniture, appliances and large items along with day to day garbage
- Do encourage clean-up crews to ask for help from the Ministry of Works and Transport, their Regional Corporation and neighbouring businesses to provide transport and other equipment to assist in major clean-up ventures
- Do talk to members of the community who are guilty of littering and polluting drains and rivers and educate them on proper waste disposal methods
- Do let people know how to arrange their heavy household garbage (mattresses, furniture, appliances etc.) for collection
- Do publicise and discuss the issues related to drainage and flooding
- Do use approved design standards for drain construction
- Do notify the Drainage Maintenance Supervisor if garbage has been dumped next to a drain



Be Responsible!

DO NOT LITTER

A message from the Drainage Division of the Ministry of Works and Transport



DID YOU KNOW?

Weather Patterns: Trinidad and Tobago

Our weather changes as the angle of the sun shifts from north to south of the Equator.

The Dry Season is from January to May.

The Wet Season is from June to December.

The Inter-tropical- Convergence Zone brings showers, some of which are heavy and thundery.

A Tropical Wave can develop into a Tropical Depression which can intensify into a Tropical Storm and even further into a Hurricane.

A message from the Drainage
Division of the Ministry of Works
and Transport



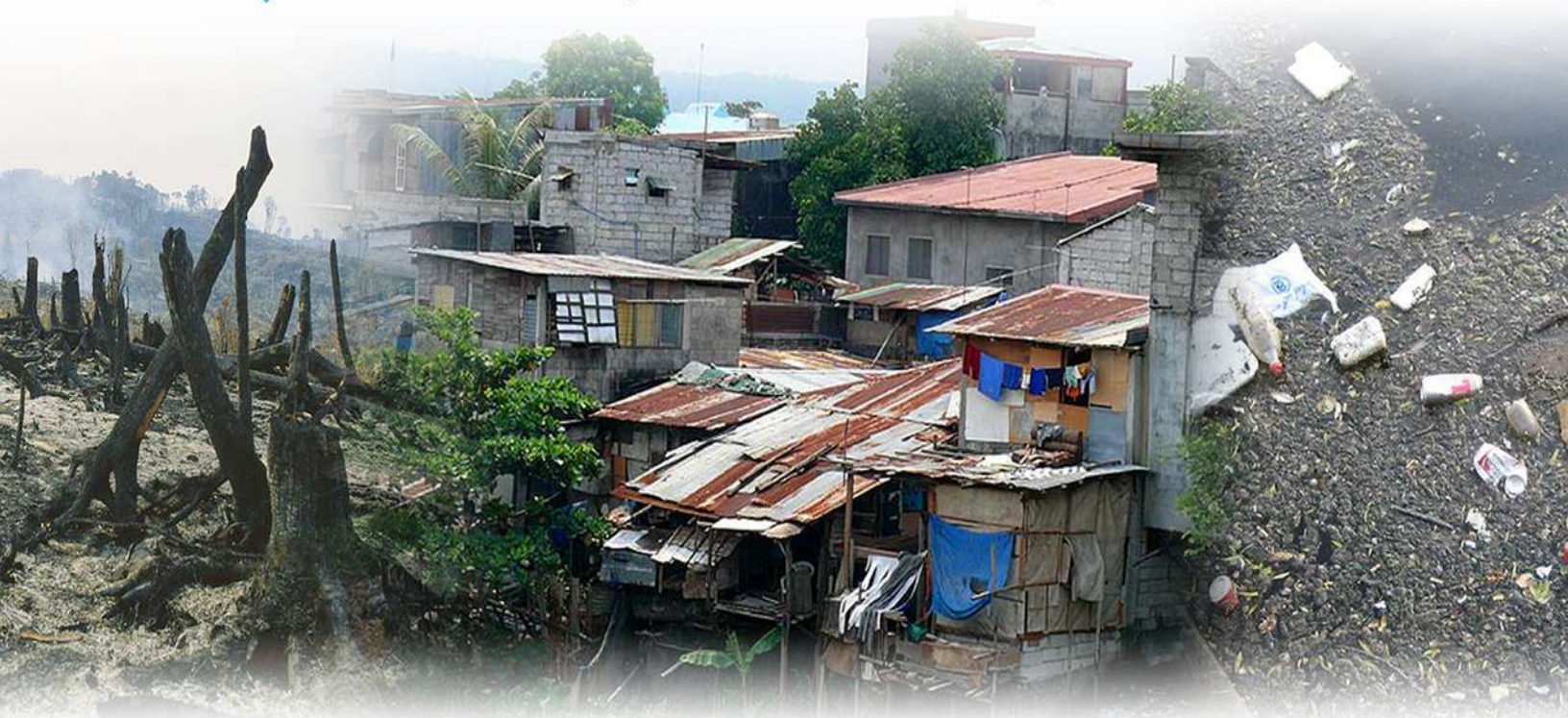
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DID YOU KNOW?

The three main manmade causes of flooding are:-

- ✓ Irresponsible Farm Practices
- ✓ Illegal Land Development: Run-off water from development sites carries large volumes of sediment.
- ✓ Indiscriminate disposal of waste (Littering)



ADDITIONAL CAUSES OF FLOODING :

Drains are also clogged and blocked by: Natural debris like tree branches, bush growing in the drain, silt and sand clogging the drain, the structure of the drain: square bends, dips and humps, and lack of slope.

DID YOU KNOW?

Not all flooding is caused by clogged drains. There are days when there is heavier rainfall than the drains can be expected to hold and the water rushes by any way it can find to the lowest possible level. When water cannot move quickly enough down the drains because they are blocked, the problem becomes even worse. A drain blockage can turn a minor event into a disaster since the excess water flows out of the drains, over the land and into places where it is not wanted.



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DID YOU KNOW?

It is an offence to dump any kind of solid or liquid waste into drains. Under the Litter Act Chapter 30:52 of The Laws of Trinidad and Tobago, you can be charged for this offence (Sec3. (1),(a.) and (b.). Under the Public Health Ordinance also, obstructing of drains can cause a public nuisance and a threat to public health (Part ix, Section 70, Nuisances).



DID YOU KNOW?

Types of drains

**There are two main types of drains:
Primary and Secondary Drains.**

PRIMARY DRAINS

Primary Drains are the country's main water courses including rivers. In fact, some rivers which have been straightened and paved look very much like drains.

Most of the Primary watercourses in Trinidad and Tobago flow to the sea, carrying with them the water from smaller streams and from the Secondary drain self-cleansing to some extent as the heavy Wet Season flow sweeps everything away, and so they need less maintenance than Secondary drains. The exception to this is near the river mouths where there is often a build-up of silt and garbage, some of which has been brought down by the Secondary drains.

SECONDARY DRAINS

Secondary Drains are smaller than Primary Drains. Surface water from villages, towns and cities flow into Secondary Drains, which in turn flow into the Primary drains. The average size of a Secondary drain is about 0.5 to 3m wide and up to 2m deep. If we compare this to the Diego Martin River, a primary drain is 62m wide in places.

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DID YOU KNOW?

RECEIVING WATERS

Receiving Waters are large bodies of water like oceans, lakes, or reservoirs. We have no real lakes in this country, but there are reservoirs at Navet, Arena and Hollis in Trinidad, and Hillsborough in Tobago, each of which holds large amounts of water for drinking and other household purposes. The reservoirs act like the sea in that they have large surfaces where evaporation takes place, so although their purpose is to store water, they also recycle water into the atmosphere. Our main Receiving Waters are the Gulf of Paria, the Caribbean Sea, and the huge basin of the Atlantic Ocean. The oceans seem never-ending because of their great size, but even they have become polluted by all kinds of wastes, which includes the garbage washed down through our Primary and Secondary drains.

DID YOU KNOW?

The main authorities for Drainage Maintenance in Trinidad and Tobago are the Drainage Division of the Ministry of Works and Transport, and the Regional, Borough and City Corporations under the Ministry of Local Government.

Primary Drains or Major Drainage Channels

The Ministry of Works and Transport Drainage services or maintains primary drains or major water courses in Trinidad.

Secondary Drains or Minor Drainage Channels

The Ministry of Local Government and Rural Development services secondary drains in 14 corporations:



Two cities:

- Port of Spain City Corporation
- San Fernando City Corporation

Three Boroughs:

- Arima Corporation Borough Corporation,
- Point Fortin Borough Corporation,
- Chaguanas Borough Corporation
- Nine Regional Corporations:
- Couva / Tabaquite / Talparo Regional Corporation

- Diego Martin Regional Corporation
- Mayaro /Rio Claro Regional Corporation
- Penal/Debe Regional Corporation,
- Princes Town Regional Corporation
- Sangre Grande Regional Corporation
- San Juan/Laventille Regional Corporation
- Siparia Regional Corporation
- Tunapuna / Piarco Regional Corporation

Drains in Tobago

- The Tobago House of Assembly is responsible for the maintenance of drains in Tobago

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