

**DEVELOPMENT OF A FLOOD EARLY  
WARNING SYSTEM (FEWS) WITH  
FLOOD GATE MICRO-PROJECT  
FINAL REPORT**

SUBMITTED BY: TRINIDAD & TOBAGO RED CROSS SOCIETY

Dated: September 14<sup>th</sup>, 2020



# Trinidad & Tobago Red Cross Society

PATRON: HER EXCELLENCY PAULA-MAE WEEKES O.R.T.T.  
PRESIDENT OF THE REPUBLIC OF TRINIDAD AND TOBAGO

## National Headquarters

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## Contents

Background.....	3
Implementation.....	3-4
Hardware.....	4-6
Software.....	6
Roadmap to Completion.....	8
Flood Gate Micro-Project.....	9
Community Impact.....	10
Financial Summary.....	10
Financial Summary Overview.....	11



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### **Background:**

In November 2018, because of the devastating floods to impact Trinidad in several communities, the Trinidad & Tobago Red Cross Society (TTRCS) received TTD\$300,000 from RBC Royal Bank for flood response. However, TTRCS was well supported through other donors for response, therefore it was proposed to RBC to use the funds to develop a Flood Early Warning System (FEWS) in an effort to alleviate the human suffering of future major flood events by providing communities with ample warning. The TTRCS convened a technical working group comprised of the Ministry of Rural Development and Local Government, Water Resources Agency, and the Met Office to brainstorm and develop a cost-effective system as a pilot project. The WRA proposed using their existing infrastructure of streamflow stations and rainfall gauges across most of the country as a basis for providing data for a FEWS. The TTRCS proposed to expand the monitoring capability of the WRA by donating two additional streamflow stations for the flood prone communities of Greenvale, St. Helena (and environs) and Oropune Gardens. The technical engagement quickly led to ideas of implementation of a national level early warning system with the pilot areas being the communities Greenvale, St. Helena and Oropune.

The success of any early warning system had to involve a strong community engagement and accountability component which was driven by the Ministry of Rural Development and Local Government, through the municipal Disaster Management Unit (DMU) and the TTRCS through intensive Community Emergency Response Team (CERT) training. Through this collaboration we engaged in the development of community risk profiles that highlighted key vulnerabilities and capacities that exist in the pilot communities.

### **Implementation:**

In November 2018, the TTRCS convened the first Technical Working Group (TWG). The initial meeting was to brainstorm the plan of action for implementation as well as to broaden the invitation to other national actors who would be required for successful implementation. It was agreed that the flowing stakeholders were invited to the TWG to ensure its success:



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- Trinidad & Tobago Red Cross Society (Chair)
- Ministry of Rural Development & Local Government
- Water Resources Agency
- Trinidad & Tobago Meteorological Office
- Ministry of Works and Transport (Highways Division & Drainage Division)
- Housing Development Corporation (invited but never attended)
- Office of Disaster Preparedness & Management (invited but never attended)

By February 2019, the TWG had drafted a roll out plan to design and develop the FEWS. We explored several options including using commercial equipment and software from third-party suppliers; however, the long-term recurrent costs would pose to be too high to manage. It was decided to build a unique system to Trinidad & Tobago that could be self-sustainable by the engineers in the various Ministries.

### ***Hardware:***

The FEWS hardware involved two major components, a radar sensor that would measure the height of the river and communications equipment that would send this data via a live feed to the WRA Headquarters where it would automatically be processed by software. The WRA generated a list of required items and the TTRCS launched a tender for the items in May 2019. The TWG met to award the tender based on cost and availability and the company – Control Technologies was awarded the contract. Since all the items had to be imported into the country, we estimated delivery by October 2019. By November 2019, over 70% of the items were delivered, however one key item, the radar sensor, was delayed in shipment and not delivered until January 2020. By January 2020 all the items had been delivered and installation of the two systems began.

In March 2020, the challenges of COVID19 hampered the installation as the government-imposed restrictions on certain operations prevented construction to take place. The deadline of March 30<sup>th</sup>, 2020 had to be pushed back until restriction allowed construction to resume. Since the restrictions were lifted in June 2020, the Arouca Station has been fully installed and is operational. The second station located at Manuel Congo is still in construction and shall be completed by September 2020.

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No.	Station	Coordinates		Location	Municipal Corporation
		Latitude	Longitude		
1	Arouca	10° 37.570'N	61° 21.036'W	Bridge over Arouca River along Trincity Central Road. (in the vicinity of Trincity Mall and Millennium Park)	Tunapuna/ Piarco Regional Corporation
2	Guanapo Lower (Manuel Congo)	10° 35.354'N	61° 15.925'W	Bridge along Manuel Congo Road	Tunapuna/ Piarco Regional Corporation



Figure 1: Street view of the Arouca Streamflow Station.

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Figure 2: Arouca Streamflow Station located on a bridge over the Arouca River. This streamflow station will provide early warning to the communities of Oropune and part of St. Helena.

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### Software:

The FEWS TWG made a decision in January 2019, that commercial software would not have all the capabilities needed to properly address the complex data processing needed to make informed early warning decisions, since we had to incorporate a series of data including stream levels, rainfall data as well as projections or forecasts from Met Office. In order to effectively analyze these pieces of information, the TWG proposed to design software unique to Trinidad & Tobago. A beta version of the software was released in June 2019 for testing by a sample set of decision makers namely the Disaster Management Units in the MoRDLG and the ODPM as well as the Met Office who officially issues Early Warning Messages. Since the beta launch, improvements are constantly being made to ensure the usability of the software meets the needs of the end users. The software was also live tested during Tropical Storm Karen in September 2019 to actively monitor flood potential and make decisions to issue evacuation warnings.

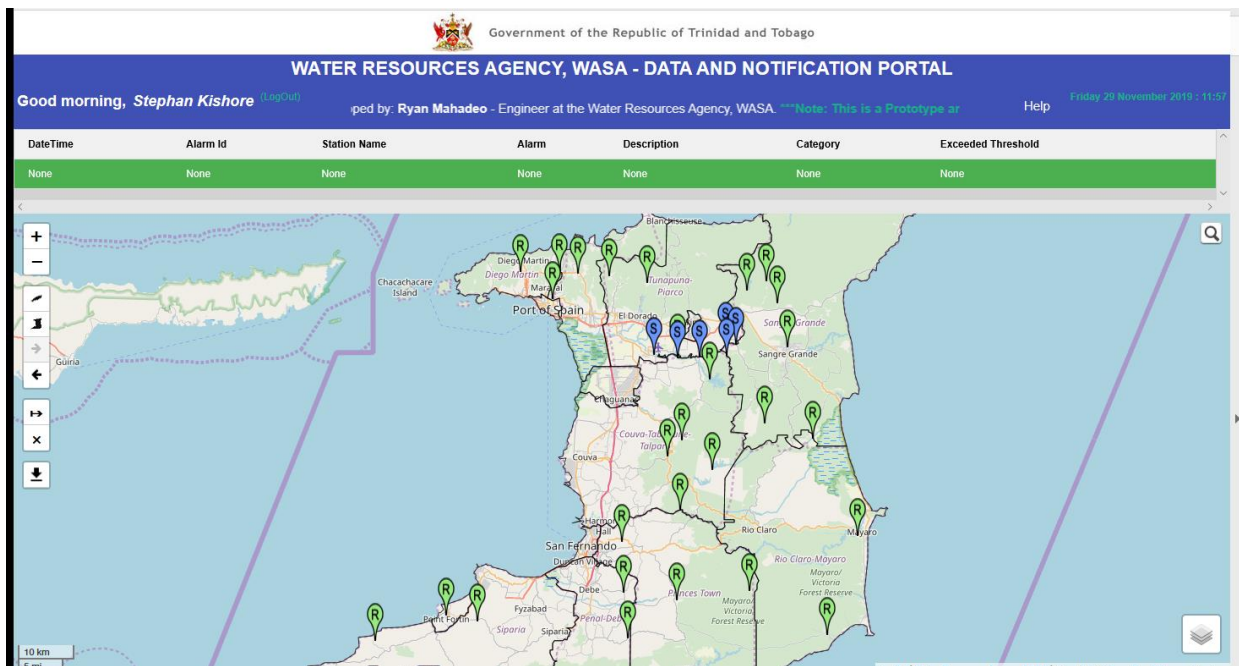


Figure 3: Screenshot of the data notification portal. All EOCs will have access to this web portal that can monitor the live river levels as well as be alerted when they cross four potential threshold levels.

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### *Roadmap to completion:*

Once the second station located at Manuel Congo is fully commissioned, the TTRCS proposes a ribbon cutting ceremony to officially declare the FEWS active. We anticipate construction to be completed by September 2020 with the system becoming fully functional by October 2020. The TTRCS has already procured signage as per RBC specifications which are to be installed on both stations at the time of their commissioning. In addition, four fifty-inch monitors were procured for installation at the EOC of the TTRCS, at the DMU of the Tunapuna/Piarco Regional Corporation and at the WRA which will be used to monitor the systems.



Figure 4: 50" Monitor and Computer installed at TTRCS Conference Room which is used during emergencies as the EOC, this computer system lets us monitor the FEWS software in real time.



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### ***Flood Gate Micro-project:***

Based on the proposal, the TTRCS suggested conducting a flood gate micro-project to complement the FEWS project. While an early warning system provides a community with ample time to initiate preventative actions such as evacuations and moving valuable items to heights, there may be situations where a home or facility will not be able to initiate the right actions. During our research of the 2018 flooding in St. Helena we were alerted to a case of an old-aged home where the Trinidad & Tobago Fire Service was called to provide rescue services to several elderly people during the floods, however they were not able to move them out of the facility due to the rapidly rising waters. All they could have done was put the elderly persons including one who was in a wheelchair to sit on top of cupboards out of the water.

Based on this situation the TTRCS saw it necessary to also educate communities about flood barriers. In most cases during flood events, sandbags are an option, but they are energy and time consuming especially if you must go out and get them. Flood gates are one of the best solutions to keep water out. They require proper planning and are costly, but they provide the best option to protect a home from floods. To equip the old-aged home required five gates to be custom made to be installed at four doors and one low window. Since the installation, the owner of the property has indicated the flood gates have protected the property from three major flood events.



Figure 5: One of the Flood gates installed at the old-age home, St. Helena.



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### Community Impact

Item	Action	Population Served
Community Disaster Training in three communities within the Tunapuna/Piarco Regional Corporation	Community Resilience building	Direct - 200 trained CERT Indirect - 30,000 residents can be served by these CERTs responding to future events.
Arouca Station	Early Warning	15,000 residents total within Oropune Gardens, parts of St. Helena and Kelly Village.
Manuel Congo Station	Early Warning	30,000 residents total with La Horquetta, Greenvale, Brazil Village, Las Lomas, and St. Helena.

### Financial Summary

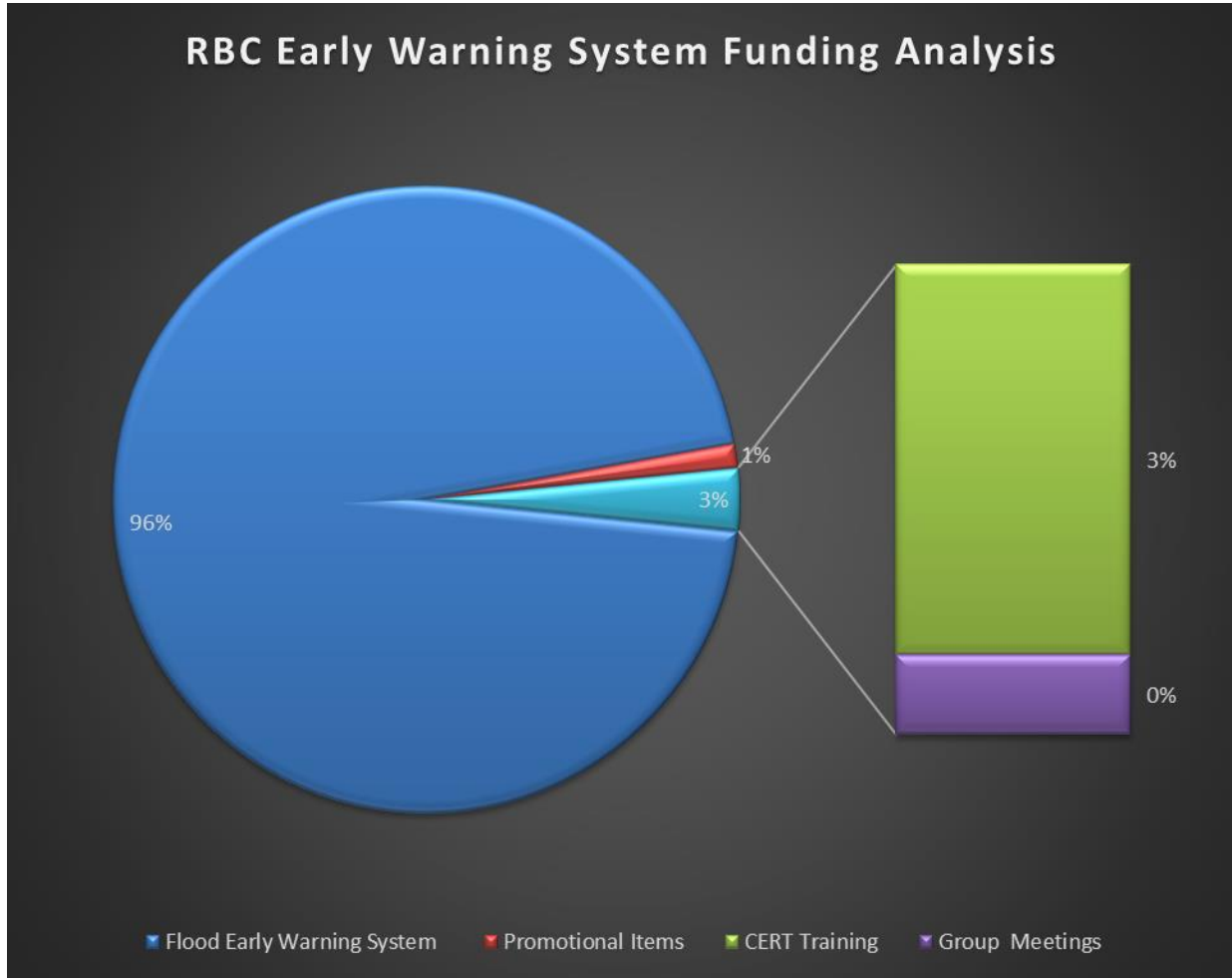
Financial Statements in T.T. Dollars

REVENUE	AMOUNT	COMMENTS
Project Funding - RBC Early Warning System	300,000.00	
<b>Total Income</b>	<b>300,000.00</b>	<b>300,000.00</b>
EXPENSES		
Promotional items	998.00	
Printing of Banners/signs	2,700.00	
Refreshments at meetings	1,617.05	
Disaster Training - CERT Simulation	8,000.00	
Purchase of Desktop Computers	25,188.00	
Purchase of Flood Early Warning Systems	229,617.14	
Purchase of Flood Gates	31,888.00	
<b>TOTAL EXPENSES</b>		<b>300,008.19</b>
<b>PROJECT FUNDING BALANCE</b>		<b>-8.19</b>

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### Financial Summary Overview



Thematic Area	Amount
Flood Early Warning System	286,693.14
Promotional Items	3,698.00
CERT Training	8,000.00
Group Meetings	1,617.05
<b>Total Funding</b>	<b>300,008.19</b>