

How our **small** choices  
make a **big** difference!

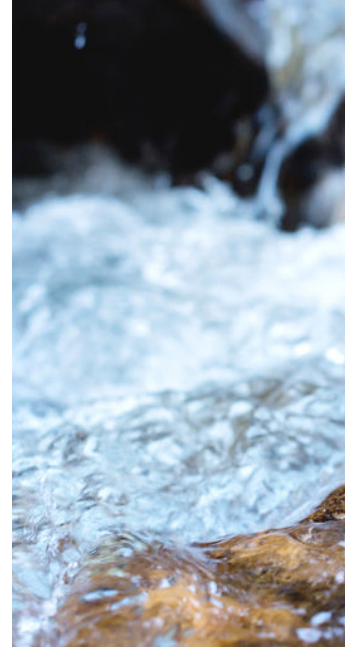


# DID YOU KNOW?

Climate change will impact Jamaica's water supply

Choosing the right appliances can save water

Choose low-flow toilets & showerheads and save our water



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# Introduction

Throughout the next decade, Jamaica will continue to contend with serious climate resilience concerns – from natural disasters to extreme weather events. It has been recognized and accepted that water management issues related to climate change (next to energy) are the most serious threat to sustainable development facing Small Island Developing States (SIDS) such as Jamaica. The biggest existing water and sanitation challenges have more to do with economics and politics than physical availability (United Nations, 2020). In addressing such challenges, JN Bank will be actively promoting water adaptation and climate resilience to the Jamaican public. Driving growth in the uptake of JN Bank products, in addition to contributing to Jamaica's sustainable development, are key performance indicators (KPIs) for JN Bank staff. In this way, JN intends to be a major player in Jamaica's Green Economy of tomorrow with its focus on sustainable infrastructural development today.

**The JN Foundation and JN Bank** have joined the national effort to find ways of adapting to threats posed by climate change through their four-year project titled 'Financing Water Adaptation in Jamaica's New Urban Housing Sector', also referred to as The Water Project Jamaica. This project aims to enhance climate resilience through the use of water adaptation technology in the country's housing sector.

## How to use this playbook

This playbook is designed to raise awareness of the threats posed by climate change among Jamaicans, with the broader aim of presenting practical and impactful measures that each citizen can undertake as they play their part in implementing mitigation strategies to overcome these threats. The first aspect of this guide involves sensitisation, in general, with key issues related to the global water crisis and the issue of water scarcity in Jamaica.

Following this, the playbook will help each reader to become acquainted with the three (3) main types of personas they are likely to be characterized by.

These personas are linked to the three (3) main perspectives on climate change that exist in Jamaica. A description of each persona type and a step-by-step guide on the best way to navigate each, with the goal of become more climate aware and motivated to act, is outlined.





## WHAT IS CLIMATE RESILIENCE?

Climate resilience is the capacity to anticipate, prepare for, and respond to hazardous events, trends, or disturbances related to climate (Centre for Climate and Energy Solutions, 2020). Climate refers to the long-term weather condition typically averaging over 30 years as defined by the Intergovernmental Panel on Climate Change (IPCC) in its fifth Assessment Report<sup>1</sup>. Changes in long-term weather patterns can be seen in the length of the rainy or dry season, and in temperature changes, ocean acidification, or length of storm seasons. Improving climate resilience involves assessing how these climate changes will create new, or alter current, climate-related risks, and taking steps to better cope with these risks. An example of such resilience would be anticipating an earlier (before June 1) and longer (after November 30) North Atlantic hurricane season and updating national responses to this new pattern. Already, we are seeing, from a database of 169 years, five years where two storms were produced before June 1. This could be indicative of changes to come.

1. 5th IPCC Report can be retrieved here: <https://www.ipcc.ch/assessment-report/ar5/>

FIGURE 1

### Storms before Hurricane Season

*Atlantic Seasons with 2 Pre-June Storms*

Year	Storms	Hurricanes	Cat. 3+ Hurricanes
2016	15	7	4
2012	19	10	2
1951	12	8	3
1908	10	6	1
1887	19	11	2
1981-2010	13	7	3

Source: NOAA

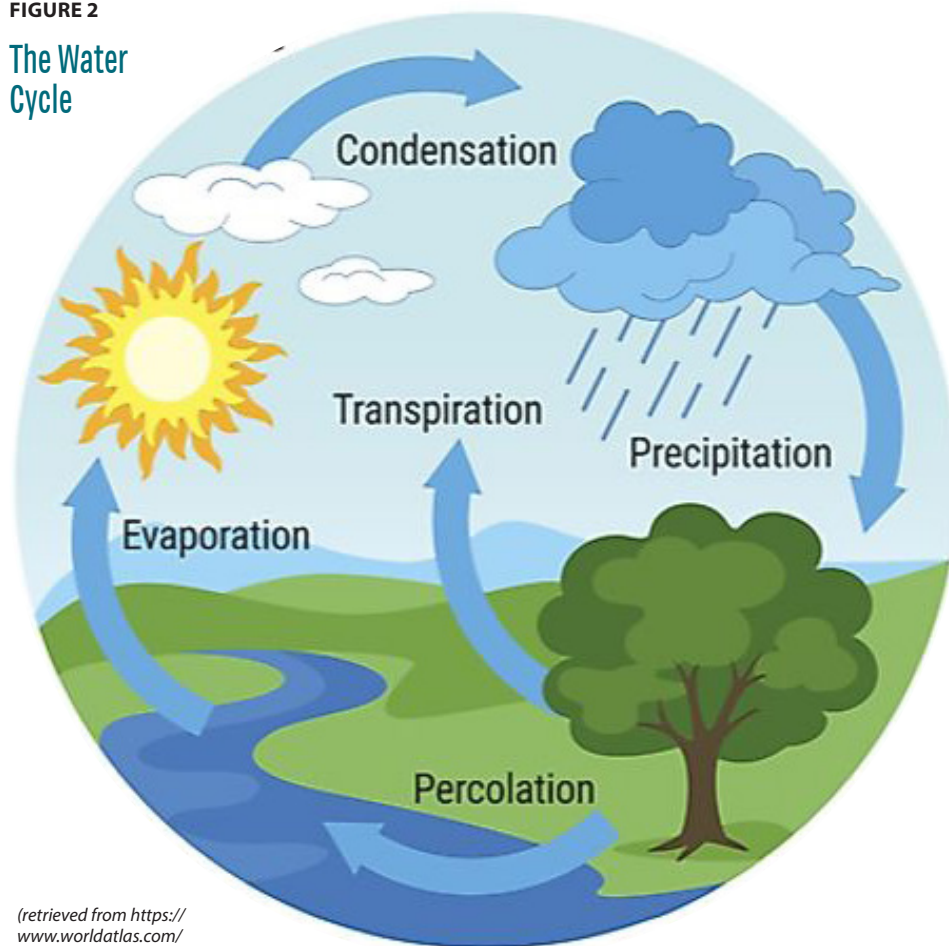
Climate resilience means that Jamaica would not just survive, but thrive under conditions where our rainy season yields less rainfall than we expect. One way to achieve this is by making individual households more self-sufficient in terms of water capacity and usage management. Climate resilience means having systems that can withstand shocks from changes in the climate.

## WHAT IS WATER CONSERVATION?

The foremost impact of climate change is on the Hydrological cycle (water cycle). Wet areas will continue to get more rainfall and dry areas will get even less. Also, extreme weather events like droughts, storm surges and floods are happening more often. Water adaptation speaks to a continuous process of modifying our behaviour in response to these changes (USEPA, 2020). We modify our behaviour because our aim is sustainable development and the continued survival of our communities.

Water conservation is simply one way of mitigating against the risks of climate change. It is the specific means by which Jamaicans can increase the ability of individuals or the national system in general to adjust to water shortages and take advantage of excessively rainy seasons. Water conservation speaks to our ability to cope with sudden changes in the water cycle. Conservation is a more immediate capability to respond to changes one month after the other. Examples like widespread use of household catchments and rainwater harvesting would mean people having a greater ability to cope in periods of water shortage.

**FIGURE 2**  
**The Water Cycle**



(retrieved from <https://www.worldatlas.com/articles/what-is-the-water-hydrologic-cycle.html>)



## KEY MESSAGE

Water is the primary medium through which climate change impacts will be felt by Jamaican people, our ecosystems and economy. The core goal of water conservation is to achieve and sustain water security: ensuring the ability to harness water's social and productive forces and control water's destructive forces.

## REFLECTION...



Q1 - How much did you know about climate resilience before we started?

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Q2 - How much did you know about water conservation before we started? \_\_\_\_\_

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Q3 - Name one way climate resilience can be improved in Jamaica? \_\_\_\_\_

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Q4 - What aspects of climate resilience and climate adaptation do you think you might want more help with?

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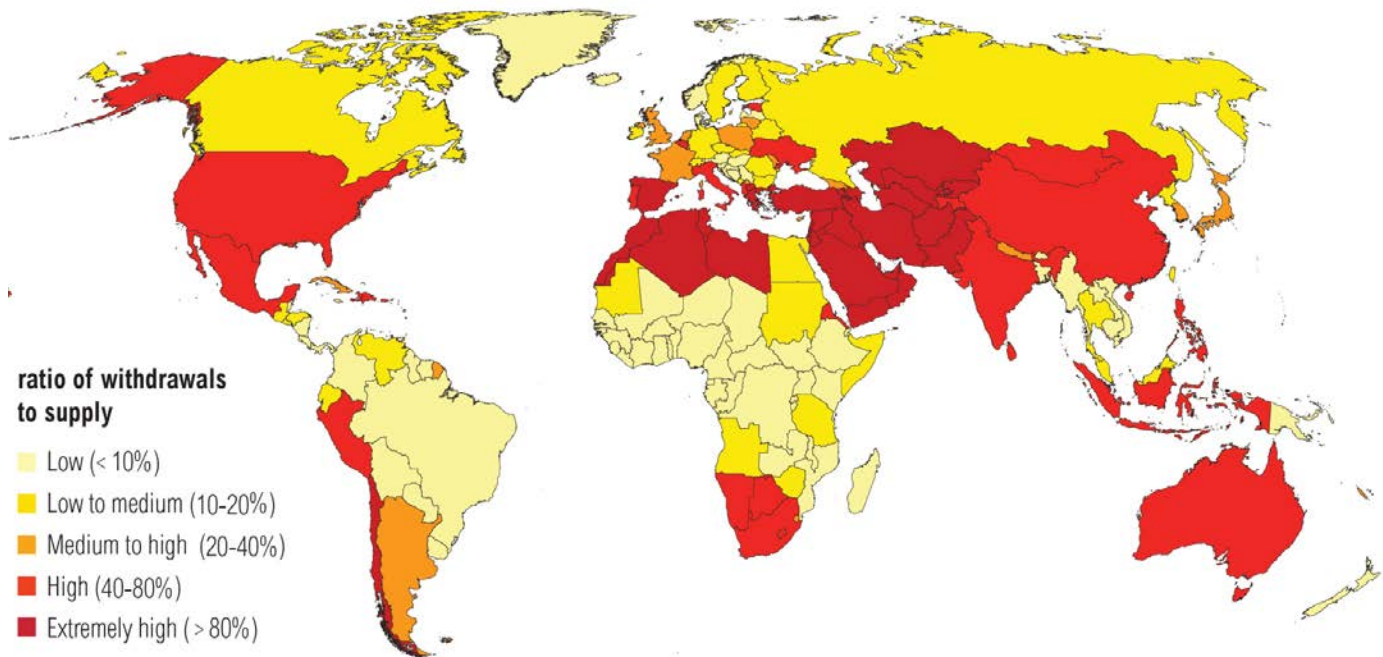


## A GLOBAL WATER CRISIS

We are currently facing a water crisis. It is not just local, but also global. Water shortages are also being experienced in countries like Mexico, Argentina, South Africa, Qatar, Iran, India and Jordan, to name a few. These countries are listed by the World Resources Institute as having high water-stress levels of 40-80% and, in some cases, even higher. Professor Madison Powers' website FEW Resources estimates that by 2020, 1.8 billion people would have experienced absolute water scarcity<sup>2</sup>, meaning there will be little to no water resources to live off. The UN currently estimates that around 700 million people worldwide are experiencing absolute water scarcity<sup>3</sup>.

FIGURE 3

### Water Stress by Country: 2040



 WORLD RESOURCES INSTITUTE

<https://www.weforum.org/agenda/2019/10/water-inequality-developing-world-usa-west/>

2. <https://www.fewresources.org/water-scarcity-issues-were-running-out-of-water.html>

3. <https://www.un.org/waterforlifedecade/scarcity.shtml#:~:text=Around%20700%20million%20people%20in,living%20under%20water%20stressed%20conditions.>



Overall, climate-change models predict that by the end of this century, a significantly higher number of people will be exposed to both floods and droughts, according to the Intergovernmental Panel on Climate Change. Availability of clean water in adequate supply for people and nature is under threat by climate change.

This clear and present danger threatens the prolonged existence of the modern industrial society as we know it. Water, as a resource, enables agricultural processing and food cultivation, power generation, household use and industrial production. With most of the water supply coming from watersheds and produced by rainfall in a continuous cycle, climate change has upset this delicate balance, leading to watershed depletion and reduced water availability.

## IS THERE A WATER CRISIS IN JAMAICA?

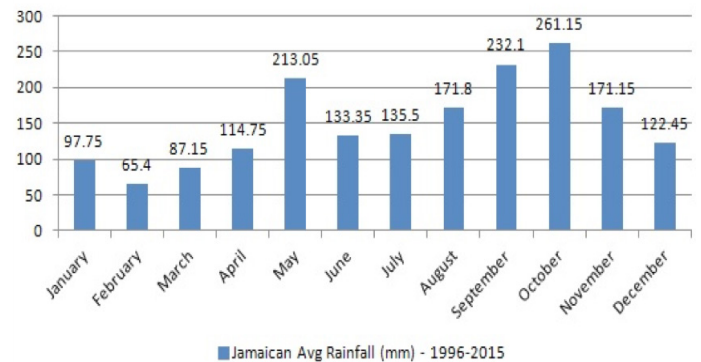
**Yes. Jamaica is experiencing the effects of climate change with prolonged periods without rain.** In recent decades, this has caused the National Water Commission to do scheduled regulation of water supply for some communities, especially those within the Kingston Metropolitan Area (KMA). With the country usually receiving two peaks in rainfall volume annually, there is now a situation where the secondary rain period, May-June, periodically falls below expectations. This results in prolonged dry periods. As a result, Jamaica experienced one of the longest dry periods in recent history, from December 2018 to April 2019 (Jamaica Observer, 2019).

Not only is there a threat of significant water shortage in the future, but there is also concern about the depletion of the watersheds that supply the city. The major watersheds supplying the Kingston metropolitan region are the Yallahs River, Hope River, Rio Cobre, and Wag Water River. These watersheds provide the majority of the supply for the Kingston metropolis. All four have suffered severe degradation, with around 50% of the areas prone to landslides and 65% to erosion.



FIGURE 4

### Jamaica Average Rainfall Peaks (mm) 1996-2015



(retrieved from <https://statinja.gov.jm/Environmentdata.aspx>)

# PERSPECTIVES ON CLIMATE CHANGE

Where are you on the climate change issue? Ask yourself these guiding questions below and see.

## a) A Climate-Change Denialist?

The first perspective of concern is the one of persons who may be in climate-change denial. Your answers to these questions may be an indication that you hold this perspective:



a) Do you think it is warmer now than when you were growing up?

b) Do you think the overall climate will stay the same, get better, or worse as you get older?

c) Do you think humans are responsible for the things you have observed regarding climate over the years?

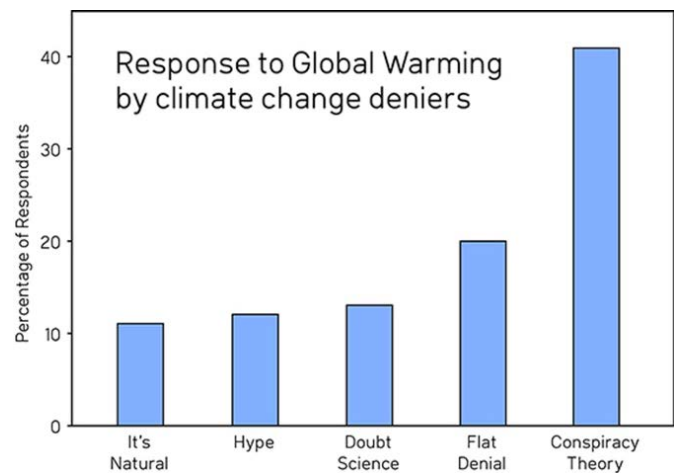


- **Science Denial** – person believes climate change is just part of the natural cycle.
- **Economic Denial** – person believes that climate change is just too expensive to fix.
- **Crisis Denial** – person believes we cannot take action because other countries are not taking action and as such, we should not rush into changing things.

What is happening in Jamaica and globally arms you with information to placate any science denial that you encounter. The financial case outlines the savings that can be generated within a typical home (see page 24), and will help sway them out of economic denial. Finally, the crisis deniers would have a list of fifteen (15) technologies that can be easily implemented now that can make homes more climate resilient – the better-safe-than-sorry approach.

FIGURE 5

## Responses to global warming by climate-change deniers



(retrieved from <https://theconversation.com/the-five-corrupt-pillars-of-climate-change-denial-122893>)

## b) The Climate-Change Acceptor (Unconvinced of the financial case)

Person who hold the perspective of a climate change acceptor often affirm that humans are responsible for the changes in climate observed over the last few decades. Your answers to these questions may be an indication that you holds this perspective:



a) Do you think we can collectively do anything at this point to better live with these changes?

b) What do you think is the main barrier to doing anything about climate change, money or willingness?



Just as how the industrial age made horses obsolete as a public transportation system, and ushered in a totally new economic system, so too will climate change and technology force us to adopt new technology. That process is already under way and will happen gradually. Projects in Jamaica such as Wigton Windfarm, renewable-energy generation plants, and the shift to LNG are examples of this green economic swing in the energy sector. The JN Water Project is one spoke in a larger wheel of the green economy within the water sector.

## c) The Climate-Change Acceptor (Convinced of the financial case)

Many persons who hold a climate change acceptor perspective may think the main barriers to combating the effects of climate change is people's unwillingness, and not necessarily money. Your answers to these questions may be an indication that you hold this perspective:



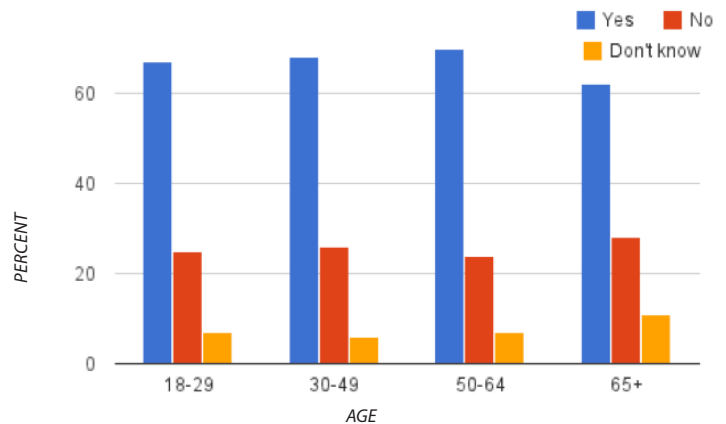
a) If given the opportunity, what measures would you take to guard yourself against climate change?

b) How important is water security to you or your family?

c) Who do you think is best suited to protect you from water shortages, you or the government?

FIGURE 6

### Climate Change Acceptance by age



(retrieved from <https://grist.org/climate/the-surprising-reasons-why-people-ignore-the-facts-about-climate-change/>)



## CHANGING MINDSETS ON CLIMATE CHANGE

### **For the denialists, focus first on savings, self-sufficiency (independence).**

- Considering that the denialist may think that climate change is part of the natural cycle, from a sales perspective, the aim here need not be to counter their scientific understanding of the world but rather to use it in such a way that acts in their own self-interest. The pitch in such a case then is to have them prepared for a rapidly changing natural world by being self-sufficient in the most economically viable way possible (saving money).

### **For the acceptor unconvinced of the financial case, focus on savings.**

- While this person may believe that climate change is too expensive to fix, there are however things within their grasp that aren't too costly. Here, water conservation technology would complement what they already have in place. Just as how one updates a phone, they are merely updating their home or business in such a way that makes them more efficient and generates immediate cost savings (within one year).

### **For the acceptor convinced of the financial case, emphasize the prospects of being ahead as an early adopter.**

- Persons who are at this stage mainly battle with the specifics of what they should do. Immediate actionable outcomes, rather than promises, are what motivate them. Outline the technologies offered and the consequences of their implementation for the far future. Action now will have great impact later – be ahead, be a pioneer.





# THE BUSINESS CASE FOR WATER CONSERVATION

(Developers and Construction Companies)

Water conservation measures are to be integrated in new and existing Jamaican homes, with the larger goal of increasing climate-resilient housing in Jamaica and improving the reliability and efficiency of water supply to Jamaican households. Below are the listed benefits for developers and householders when water adaptation measures are implemented in home construction.

FIGURE 7 Beneficiaries of Water Adaptation





## KEY MESSAGE

A paradigm shift is needed from water supply management, wherein water resources are managed to satisfy water needs, to water demand management, in which water use is adapted to the availability of water.



## SELF-ASSESSMENT

Rate yourself on each question on a scale of 1-4: 1=Disagree, 2=Slightly Disagree, 3= Slightly Agree, 4=Agree

1 - We have already lived through the warmest decade of the last 100 years.

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2 -The last 100 years were warmer than the last 1,000 years.

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3 - The major changes in climate recorded so far are caused by humans.

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4 - Electricity and factory production explains global warming.

---

5 - Cheaper ways to power modern society are still left to be invented.

---

6 - We can afford a Green Economy NOW.

---

7 - Major climate-related disasters are already happening in the world.

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8 - Beach erosion, more active hurricane seasons, an increase in the intensity of Sahara dust are all examples of a new normal.

---

9 - I am worried about a water crisis.

---

### Total Score

CLIMATE CHANGE DENIER : 9-18 POINTS

MODERATE: 19-27 POINTS

CLIMATE CHANGE ACCEPTOR: 28-36

# Available Solutions

## SOLUTIONS TO THE WATER PROBLEM IN JAMAICA – A CONCISE GUIDE



Currently, Jamaica faces rapid urbanization, with most of the expansion happening around the Kingston Metropolitan Area into the neighbouring parish of St Catherine. The entire Jamaica has seen a stark jump in commercial and housing developments over the last five years, with taller high-rises and an overall increase in housing stock. All this development activity puts further strain on water resources, which were already under pressure because the vast majority of the population lives in sections of the island with the least amount of rainfall. As such, infrastructural development must be done with water resilience in mind, through the adoption of technological innovations within water conservation and demand management.

A list of solutions that are available on the market that can address present and future water challenges now follows.



## 9 ways to save water at home

There are fifteen (15) water adaptation solutions that can be easily implemented at the household level. A combination of these solutions has been packaged to provide J\$22,560 of yearly savings in a typical Jamaican household.

### 1. Water-efficient Toilet

Given the sheer volume of water that home toilets have on the consumption habits in Jamaica, the promotion and installation of low-flow or dual-flush toilets in homes could be the single most cost-effective move that can be immediately made within the housing sector. To be deemed 'water efficient', the effective flush volume of a toilet shall not exceed 1.28 gallons (4.8 litres).

**Cost: J\$45,000**



### 2. Water-efficient showerheads

Regular non-efficient showerheads can use as much as 15-25 litres of water per minute. High-efficiency showerheads (HES) should use a maximum 7 litres per minute (from USEPA's WaterSense®).

**Cost: J\$2,100**



### 3. Bathroom low-flow aerators

An aerator is an accessory that one can add to the tip of a faucet to create a stream delivering a mixture of water and air. They function in multiple ways that maximise the efficient use of water. With the standard bathroom faucet having a flow rate of greater than two gallons per minute, the addition of low-flow aerators can reduce that flow rate down to around 0.5-1.5 gallons per minute. **Cost: J\$400**



Water-sense washing machine (from [www.epa.gov/watersense](http://www.epa.gov/watersense))

### 4. Water-efficient washing machines

The USEPA's Watersense® and Energy Star® set out design specifications for water-efficient washing machines. Clothes washers with these standards (or equivalent) should be adopted within the Jamaican marketplace.

**Cost: J\$75,000**



Energy Star Washing Machine (from [www.energystar.gov/](http://www.energystar.gov/))

### 5. Fill-cycle diverter

This is a plastic device that directs more water to the tank and less to the bowl while they refill so that they finish filling at roughly the same time. When a toilet is flushed, both the tank and the bowl need to be refilled, and in many cases the bowl will fill sooner than the tank. In this case, the water will continue to run into the bowl until the tank water level is high enough to shut off the fill valve. Once installed, a fill-cycle diverter will save about 0.5 gallons of water with each toilet flush. **Cost: J\$500**



## 6. Kitchen low-flow aerators

An aerator is an accessory that one can add to the tip of a faucet to create a stream delivering a mixture of water and air. They function in multiple ways that maximise the efficient use of water. With the standard kitchen faucet having a flow rate of 7-9 litres per minute, the addition of low-flow aerators can reduce that flow rate to around 6 litres per minute. **Cost: J\$650**



Faucet aerators (from <https://www.plumbingsupply.com/>)

## 7. Water-efficient dishwashers

As a general guide, water-efficient dishwashers should use no more than 3.8 litres (approximately 1 gallon) per cycle.

**Cost: J\$70,000-J\$80,000**

Water-efficient dishwasher (from <https://www.lg.com/common/index>)



### How much water does it take to wash one place setting?\*

Full size dishwasher\*



Best  
0.5 litres

Worst  
1.8 litres

Slimline dishwasher\*



Best  
0.9 litres

Worst  
2.1 litres

By hand\*\*



Best  
9 litres

\*Based on a place setting = 10 items \*\* Based on volume of a typical washing up bowl

Which?

Dishwashing options and water usage Retrieved from <https://www.which.co.uk/reviews/dishwashers/article/which-dishwasher/how-to-buy-the-best-dishwasher>

## 8. Garden hose nozzle with auto shutoff



**Cost: J\$1,200**

(from [www.plumbingsupply.com/](http://www.plumbingsupply.com/))

## 9. Garden hose timer

For homes with daily irrigation needs, a garden hose timer is a simple piece of equipment that can be installed to generate significant savings in water usage.

**Cost: J\$2,200**





# Water-Saving systems

## 1. Drip irrigation systems (0.25 acre)

Considering that housing developments use a considerable amount of water for landscaping purposes, the use of drip irrigation would offset the quantity of water used for landscaping and even increase the efficiency by which household plants get water.

With drip systems being one of the more preferred methods of irrigation, technologies have been developed to encompass four main types of the system. There is the porous hose system that has holes along the entire hose structure and sweats water in the lawn areas where it is placed. Then there is the emitter drip that has evenly spaced holes, typically around 15 inches apart, and drips water into the soil. More advanced types such as the watermatic have micro-spray heads that minimise evaporation, thus conserving more water. Lastly, there are the micro misting sprinklers, which water roots evenly and help to keep the surrounding environment cool.

**Cost: One- (1) acre drip-irrigation kits cost approximately J\$34,000, excluding installation costs** (Source: Isratech Jamaica Limited)



Types of drip irrigation systems porous hose (left), drip emitter, watermatic spray, micro-misting sprinklers (right) (Source <https://www.doityourself.com/stry/4-types-of-drip-irrigation-systems-explained>)

## 2. Leak detection technology

Leaks can be considered one of the largest obstacles to mitigating water loss in Jamaica. According to the National Water Commission, at least 10% of water loss in homes is due to water leaks. Leak

detection technology can improve the ability of water utilities to respond quickly and repair leaks. Also, households can generate significant savings on water bills by addressing household leaks.

Numerous technologies are available for leak detection. The main categories of these which are available are: acoustic,

infrared thermography, chemical tracer, and mechanical methods.

At the household level, several varied design options are available. The simplest action to detect a leak in the home is to observe if the water bill suddenly goes up when the circumstances in the home have not changed. It is a sign that perhaps

there is a leak in the water system. A way of confirming this is to turn off all the water appliances and observe the water meter. If the dials on it are turning, there is a leak somewhere. It may be possible to hear the hissing noise of water escaping. A search for the source of the sound will reveal the leak.

Water-flushed toilet systems can be checked by putting a few drops of food colouring in the water tank of the cistern, and 30 minutes later checking the water in the toilet bowl. If it has colour in it, the cistern is leaking.

Acoustic logger technology should be considered for leak detection within large housing developments. They do not require any 'installation' and are affixed directly on to the fittings of a water pipe. This should ideally be done during construction of a housing development in order to prevent re-excavation.

**Cost:** Basic household leak detection is behavioural and, therefore, has no cost. An individual acoustic logger will cost approximately J\$55,000. Large housing developers should be mandated to ensure these are supplied and installed along with the water-supply network of each development.



Acoustic logger for leak detection (from <https://www.lg.com/common/index>)

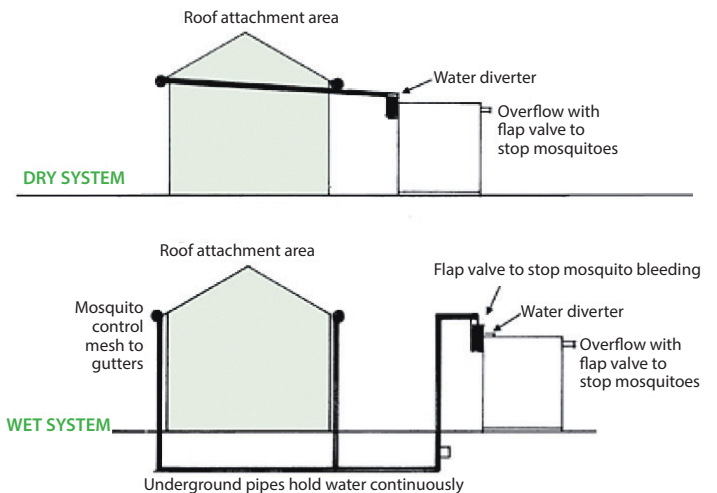
### 3. Rainwater harvesting system (7,000-gallon storage)

Rainwater harvesting (RH) is the collection of runoff from a structure or other impervious surface in order to store it for later use. Rainwater harvesting systems can replace or complement grid-supplied water, and require careful installation and treatment. RH has been a means of conserving household pipe water use in many countries. This water can be used to flush toilets, shower, and for irrigation purposes. There are two (2) main types of RH systems: wet and dry.

**i. Dry system** - The dry water catchment system channels water from the roof into tanks typically located some distance away from the house. It is called a dry system because all the water is emptied from the pipes into the catchment area, thus leaving the pipes dry. This particular method is favoured for its large storage capacity and the ability to prevent flooding by reducing surface water by sequestering excess water underground.

FIGURE 8

#### Wet System vs Dry System Catchment



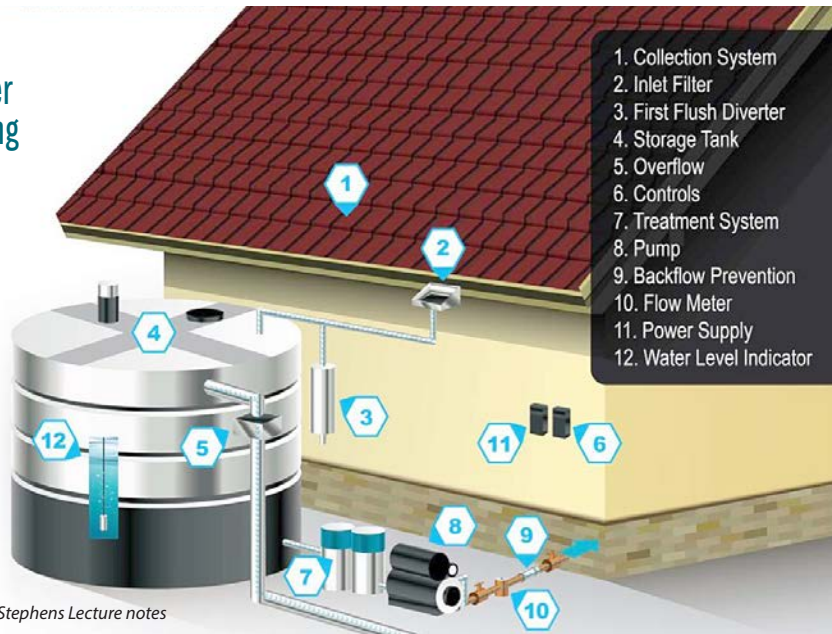
Retrieved from <https://tankulator.ata.org.au/siting-a-tank.php>



ii. **Wet system** - the wet system has underground pipes that can be grounds for breeding mosquitoes if a proper control mesh isn't installed on gutters. However, either method requires some amount of water treatment. Water can be contaminated by micro-organisms, chemicals, or debris. To avoid contamination by micro-organisms and debris, ensure appropriate filters are used. Avoid copper or lead roof surfaces for harvesting to prevent any chemical contamination. To further treat water, other methods can be used, such as chlorination, boiling, and UV light penetration for the killing of viruses and bacteria.

FIGURE 9

## Rainwater Harvesting System - Detailed



Source: Robert Stephens Lecture notes

**Cost:** Cost estimates for a rainwater harvesting system for a typical Jamaican home (house size: 810 sq. ft. house, 2 bed-1bath, 7,000-gallon storage) can range between J\$150,000-J\$250,000. The major components are summarized in chart.

### Cost estimate Basic 7,000-gallon RWH System

Item	Cost
PVC guttering installation	25,000
Metal bars for screen	12,000
Assorted PVC piping installation	15,000
Chlorine treatment system	75,000
1,000-gallon plastic tank	40,500
Assorted DN piping	10,000
Labour	25,000
Materials delivery	4,000
<b>TOTAL</b>	<b>\$206,500</b>

## Rainwater Harvesting System Components

- Assorted pipes and fittings (raw rainwater and treated rainwater piping and fittings)
- Catchment surface
- Guttering
- Downpipes or downspout
- First flush and cleanout system
- Washout installation on existing storage tank
- Conveyance to storage tank
- Gutter screens/pre-tank debris filtration and removal
- Storage tank
- Pump (optional)
- Post-tank filtration and treatment
- Distribution system to end uses (gravity flow and/or pressurised flow)
- Post-filtration equipment
- Chlorination equipment

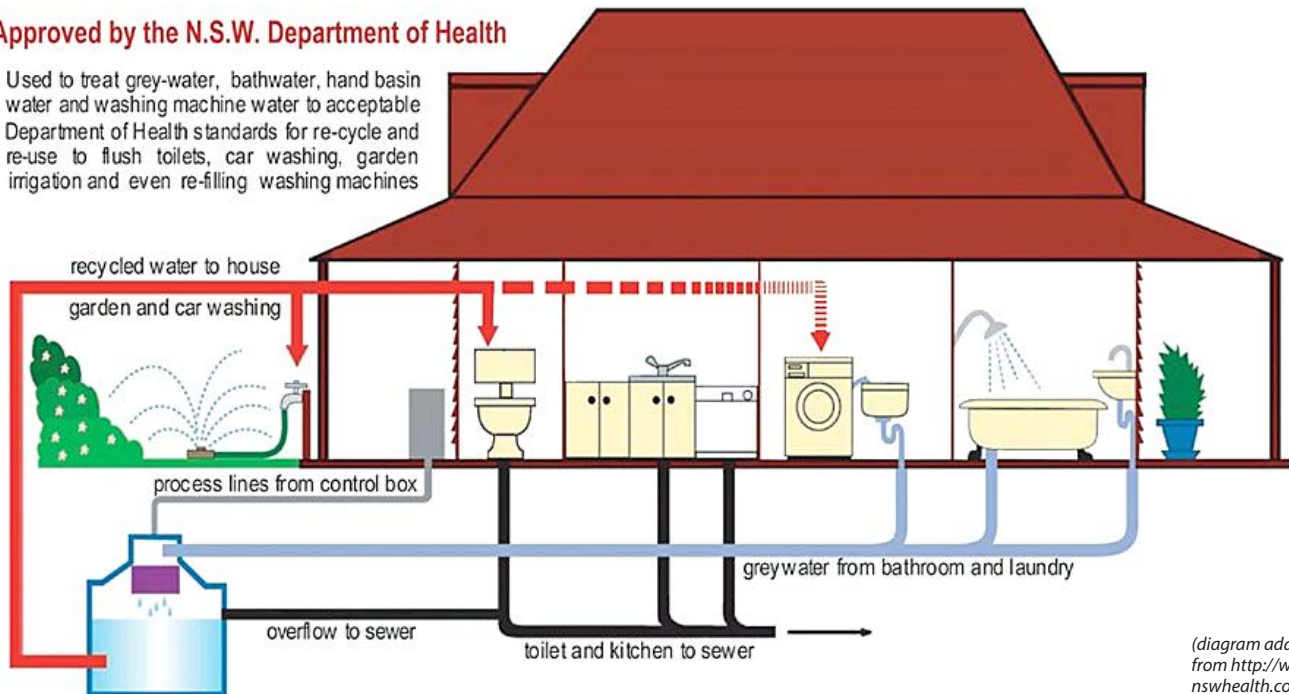
## 4. Greywater recycling system

Greywater is typically water that has already been used within the home. Specifically, it refers to 'low polluted' water within the home with the exception of kitchen water. Low-polluted wastewater includes that from bathtubs, showers, hand-washing basins, and sometimes washing machines.

FIGURE 10 Simple Greywater Recycling System

### Approved by the N.S.W. Department of Health

Used to treat grey-water, bathwater, hand basin water and washing machine water to acceptable Department of Health standards for re-cycle and re-use to flush toilets, car washing, garden irrigation and even re-filling washing machines



**Cost:** A simple greywater recycling system can be installed at minimal cost within a Jamaican household. Greywater from bathroom sink, shower and washing machine can be piped using PVC fittings, adapters and hoses, and used for the watering of plants and lawns. Typical costs for a simple system are shown in chart.

### Cost estimate Simple greywater recycling system

Materials	Source	Cost
Elbows, PVC pipe fittings	Jamaica Plumbing Supplies	\$1,500
Adapter	Jamaica Plumbing Supplies	\$500
Hose	Jamaica Plumbing Supplies	\$2,020
<b>TOTAL</b>		<b>\$4,020</b>

# Summary of water conservation technologies

The Water Project Jamaica has a list of providers which can be viewed at website at [www.thewaterprojectjamaica.com](http://www.thewaterprojectjamaica.com)

Water Efficient Technology	Water savings per year (approximate gallons, compared to conventional use)	\$ Savings Per Year	Implementation costs (New Construction)	Implementation Costs (retrofit)	Qty	Total (New Construction)	Total (Retrofit)
1. Water-efficient toilets	13,000	7,800	45,000	55,000	1	45,000	55,000
2. Water-efficient shower heads	2,700	1,620	2,100	2,100	1	2,100	2,100
3. Water-efficient bathroom faucets	500	300	13,700	15,500	1	13,700	15,500
4. Bathroom low-flow aerators	700	420	400	400	2	800	800
5. Kitchen low-flow aerators	1,000	600	650	650	1	650	650
6. Water-efficient washing machines	2,000	1,410	75,000	80,000	1	75,000	80,000
7. Water-efficient dish washers	400	240	75,000	75,000	1	75,000	75,000
8. Leak detection technology	800 <sup>^</sup>	480	N/A	N/A		N/A	N/A
9. Rainwater harvesting systems (2,000-gallon storage)	2,500	1,710	130,000	130,000	1	130,000	130,000
10. Greywater recycling system	8,000	4,800	4,020	4,020	1	4,020	4,020
11. Drip-irrigation systems (0.25 acre)	2,000	1,200	44,000	44,000	1	44,000	44,000
12. Fill-cycle diverters	1,500	900	500	500	1	500	500
13. Garden hose nozzle with auto shutoff	1,000	600	1,200	1,200	2	2,400	2,400
14. Garden hose timer	800	480	2,190	2,190	2	4,380	4,380
<b>TOTAL</b>	<b>37,600*</b>	<b>\$22,560</b>				<b>\$397,550</b>	<b>\$414,350</b>

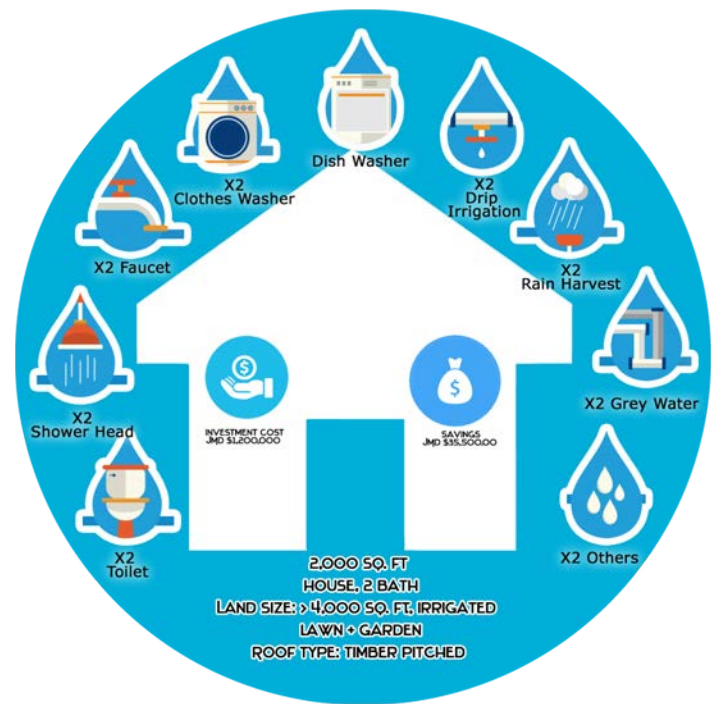
<sup>^</sup> Figure may vary \* Approximate Figure



# Saving water saves money

## Financial Case for Single-family Households

Water conservation solution packages for two (2) household types are summarised below:



## Financial Case for Large Developers

Water conservation solution packages for three (3) different large developer ranges are summarised below:

Construction Details	Water Adaptation Equipment	Loan Amount
10-unit Construction	1-13 above included for each unit, plus leak detection technology for the complex	J\$6 million (Maximum)
11-20-unit Construction	1-13 above, plus leak detection technology and drip irrigation system	J\$12 million (Maximum)
> 20-unit Construction	1-13 above, plus leak detection technology and drip irrigation system	Greater than J\$12 million



## Water Conservation Service Providers

Water conservation service provider loan packages are proposed below:

Tier	Loan Value (Maximum)
1	500,000
2	1,500,000
3	> 1,500,00

## THE PITCH

### Why is taking the loan as a single family a good decision?

- Savings (37,600 gallons or J\$22,560)
- Increased reliability of supply from onsite harvesting and storage

### Why is taking the loan as a developer a good decision?

- Over \$22,560 savings generated per unit
- Reliability of water supply (especially if centrally designed)
- Unique value proposition using the promotion of 'green'/'Sustainable' building innovations

### Why is taking the loan as a business owner a good decision?

Early market share penetration. Becoming an early adaptor means that you take advantage of opportunities in the future due to the accumulated experience in the market.

## REFLECTION

Q1 - Which parts of this playbook do you particularly like?

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Q2 - List one goal this document has inspired you to have?

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Q3 - Do you think this prepared you to deliver on the goals of the JN Water Project?

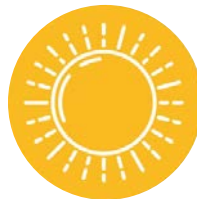
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Q4 - What do you think can be improved upon in this document?

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## KEY MESSAGE

With an investment of J\$500,000 in a suite of water conservation technologies, a typical Jamaican home can generate approximately J\$22,000 of yearly savings.

## GLOSSARY

**Acoustic logger** - A device that is used to detect water leaks within water-supply networks of large developments.

**Adaptation** - Adjustment in natural or human systems (including businesses) in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

**Catchment** - The action of collecting water, especially the collection of rainfall over a natural drainage area.

**Climate** - Average weather over a period of time, usually 30 years.

**Climate change** - Any change in climate over time, whether due to natural variability or as a result of human activity.

**Climate-change adaptation** - In human systems, the process of adjustment to actual or expected climate and its effects in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate.

**Climate-change risk** - Additional risk to investments (such as buildings and infrastructure) and actions, from potential climate-change impacts.

**Dependency** - 'Environmental dependency' is a term that can be applied to a company's operations and activities (direct or indirect) which are significantly dependent upon the state of the environment and the services it is providing (including weather and climate).

**Dry rainwater harvesting system** - This system channels water from the roof into tanks typically located some distance away

from the house. It is called a dry system because all the water is emptied from the pipes into the catchment area, thus leaving the pipes dry.

**Efficiency** - The ratio of the work done or energy developed by a machine, engine, etc., to the energy supplied to it, usually expressed as a percentage.

**Energy Star**<sup>®</sup> - is the government (USA)-backed symbol for energy efficiency, providing simple, credible, and unbiased information that consumers and businesses rely on to make well-informed decisions.

**Fill-cycle diverter** - A small device that, when fit on to a conventional toilet, directs more water to the tank and less to the bowl while it refills so that both finish filling at roughly the same time.

**First-flush diverter** - This is a critical component in any rain-water harvesting system. These devices divert and capture the most contaminated, sediment-laden water that washes into your pipes from your roof during the first initial millimetres of rain.

**Green economy** - A green economy is defined as low carbon, resource efficient and socially inclusive. In a green economy, growth in employment and income is driven by public and private investment into such economic activities, infrastructure and assets that allow reduced carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services.

**Greywater** - All the wastewater generated in households or office buildings from streams without faecal contamination, i.e., all streams except for the wastewater from toilets. Sources of greywater include sinks, showers, baths, washing machines or dishwashers.

**Hydrological cycle** - Cycle that involves the continuous circulation of water in the Earth's atmosphere. Of the many processes involved in the water cycle, the most important are evaporation, transpiration, condensation, precipitation, and runoff. Although the total amount of water within the cycle remains essentially constant, its distribution among the various processes is continually changing.

**IPCC** - Intergovernmental Panel on Climate Change is the United Nations body for assessing the science related to climate change.

**Low-flow aerator** - A device attached to faucets which creates a stream delivering a mixture of water and air. They function in multiple ways that maximize the efficient use of water.

**Low-flow toilet** - A toilet that has an effective flush volume not exceeding 1.28 gallons.

**Mitigation** - the action of reducing the severity, seriousness, or painfulness of something.

**Ocean acidification** - worldwide reduction in the pH of seawater as a consequence of the absorption of large amounts of carbon dioxide (CO<sub>2</sub>) by the oceans. Ocean acidification is largely the result of loading the Earth's atmosphere with large quantities of CO<sub>2</sub>, produced by vehicles and industrial and agricultural processes.

**Rainwater** - Water from natural precipitation that was not contaminated by use.

**Rainwater harvesting (RH)** - is collecting the runoff from a structure or other impervious surface in order to store it for later use.

**Resilience** - Ability of a system and its component parts (e.g., a business) to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions.

**Sustainable Development** - is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It has economic, social, and environmental dimensions.

**USEPA's Watersense®** - Is a US Environmental Protection Agency (EPA) programme designed to encourage water efficiency in the United States through the use of a special label on consumer products.

**Water crisis** - A situation where the available potable, unpolluted water within a region is less than that region's demand. Water scarcity is being driven by two converging phenomena: growing freshwater use and depletion of usable freshwater resources.

**Water-efficient showerhead** - A showerhead that uses a maximum seven litres per minute.

**Wet rainwater harvesting system** - The wet system has underground pipes which can be grounds for breeding mosquitoes if proper control mesh isn't installed on gutters.

**Vulnerability** - The propensity or predisposition to be adversely affected.

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