EXECUTIVE SUMMARY
HURRICANES IRMA AND MARIA

Over the span of 14 days in September 2017, two Category 5 hurricanes, Irma and Maria, hit the US Virgin Islands and caused catastrophic damage across the entire Territory and neighboring Caribbean islands. Irma struck first, largely sparing St. Croix and Puerto Rico, but pummeling St. Thomas, St. John, and the British Virgin Islands. Maria came second, striking St. Croix and moving on to devastate Puerto Rico. By the time Maria had passed, US Virgin Islander lives had been lost, and many of the Territory’s 105,000 residents were without power, phones, food, or running water. Ports and airports were closed for weeks. All three major hospitals and critical care centers across the Territory were damaged and patients flown to Puerto Rico after Irma had to again be moved to the US mainland; most have not been able to return.

HURRICANE RECOVERY AND RESILIENCE TASK FORCE

Following the storms, Gov. Kenneth Mapp called for the creation of an independent hurricane task force to evaluate the damage and response and to propose solutions for rebuilding a more resilient Territory to withstand the increasing impacts of climate change. The Task Force was made up of 20 volunteers from the public and private sectors; it included heads of government agencies, business and community leaders, as well as many of the outside experts who helped with the immediate response and long-term rebuilding in the months to follow. This report is the result of their work.

STORM DAMAGE

The storms severely damaged the islands’ critical infrastructure, knocking out electricity and telecommunications for months, blocking roads, shutting down ports and airports, damaging water and wastewater facilities, generating hundreds of thousands of tons of debris, and damaging more than half of the Territory’s housing stock. Total damage is estimated at $10.7 billion: $6.9 billion to infrastructure, $2.3 billion to housing, and $1.5 billion to the economy. Specific damage included:

- **Energy**: More than 90 percent of aboveground power lines were damaged and more than half of all poles were completely knocked down. Customers on all three large islands experienced total service outages, most for at least several weeks. Over 90 percent of customers who could accept power were restored by January 1, 2018.

- **Telecommunications**: Cell service was taken out completely on St. John and 80 percent of cell sites were out of service on St. Croix and St. Thomas. The government phone system went out of service and some government data was lost to server damage. Public radio and television stations were out for months; public safety radio was degraded and only partly operational. 80 percent of customer connections to the viNGN fiber network were damaged or destroyed. Connectivity issues led to problems with administering medical and food assistance programs.

- **Transportation**: Airports on St. Croix and St. Thomas closed for two weeks and reopened with only limited capacity. Seaports closed for three weeks due to the sinking of more than 400 vessels; roads blocked with debris and the loss of power to traffic lights—or the lights themselves—resulted in a more than a sevenfold increase in crashes at intersections.

- **Water**: Potable water reserves dropped to only a three-day volume after production in reverse osmosis facilities stopped for two days on St. Croix and 10 days on St. Thomas; most storage tanks and pumping stations were damaged and water mains throughout the Territory saw widespread leaks. Service was restored within one month.

- **Waste management**: Local landfill capacities were exceeded with more than 850,000 cubic yards of debris caused by the storms; some waste was shipped off-island. Damaged pump stations and sewer lines resulted in raw sewage being discharged into streets and coastal waters.

- **Housing**: 52 percent of all housing stock was damaged (12 percent damaged severely); renters and low- and moderate-income (LMI) households were
disproportionately affected. Senior centers were closed and homes for the elderly were damaged.

- **Health:** Both of the Territory’s main hospitals were severely damaged to the point of becoming non-operational for most services; total daily inpatient capacity across the Territory was down 50 percent and hundreds of patients were evacuated to the mainland and have been unable to return because services like dialysis and cancer treatments are no longer available.

- **Education:** All public schools closed for over a month, with 17 of 31 schools more than 50 percent damaged. Once open, most public schools operated on split sessions until the end of the academic year, and private schools saw steep enrollment drops.

- **Economic impacts:** Hotel reservations saw a 78 percent drop in December 2017 compared to a year before; by June 2018, major airlines were still reporting a 43 percent drop in flight seats available compared to a year before. There were 4,300 additional jobless claims after the storms, with roughly 8 percent of all jobs lost, comparatively marking the third worst job loss from a US hurricane in the last 30 years.

Of the three major islands, the impact was particularly severe on St. John, where restoration of power and cell phone connectivity took the longest. The first customers had power restored 49 days after Hurricane Irma because St. John receives its power from St. Thomas and lines on St. Thomas had to be reconstructed first. Residents in Coral Bay, on St. John’s east end, waited 100 days for the first customer’s power to be restored.

**FACTORS CONTRIBUTING TO THE DAMAGE**

While any place in the world would struggle to handle the damage from two Category 5 hurricanes in 14 days, several existing factors in the USVI made the impact of the storms worse than it could have been. Although not applicable to all sectors, these often included:

USVI residents assess the damage to their home from Hurricane Irma

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• **Physical state of infrastructure:** Decades of underinvestment combined with poor maintenance;

• **Infrastructure standards:** Not stringent enough, not enforced enough, or both;

• **Regulation:** Not addressing storm resilience or not covering some sectors (like private telecom) almost at all;

• **Planning for storms:** No plans, old plans (22 years had passed since the previous devastating hurricane), or failure to follow plans;

• **Dependence on Puerto Rico:** Emergency response plans that assumed that Puerto Rico’s resources would be available;

• **Pre-storm preparation:** Not taking precautions like generator fuel top-up or vehicle dispersion.

By sector, some specific issues included:

• **Energy:** The USVI energy system relies on an overly centralized grid with many single points of failure (if one link fails, many customers are out), and a large amount of its infrastructure is aboveground and connected to old wooden poles. Backup generators were not designed to run for extended periods of time.

• **Telecommunications:** On the private side, some national telecom carriers have long treated the USVI as a lower priority for hardening and restoration efforts compared to bigger markets and continued to do so after the storms. On the public side, an obsolete public radio system and limited availability of satellite phones hindered response operations. A lack of communications backup also hindered continual administration of programs like Medicaid and food assistance (SNAP).

• **Transportation:** Roads have been poorly maintained and there is an over-reliance on traffic lights instead of more efficient roundabouts. Lack of facilities to safely store boats onshore led to large numbers of boats being damaged, and insufficiently hardened air-traffic control towers and terminals resulted in major airport cancellations and delays.

• **Water:** There was a major lack of backup generators at water pump stations and extremely old and fragile pipes in the distribution system; running water from private cisterns is also dependent on electric pumps.

• **Waste management:** Wastewater pump stations are old and require electric power where gravity feeds could be used instead. Landfills were overflowing before the storms—partly because there is no meaningful recycling or composting infrastructure.

• **Housing:** Most buildings were not strong enough to withstand Category 5 storm damage—they had been built before Hurricanes Hugo and Marilyn and were not required to do retrofits to meet updated codes. That was also the case for the main hospital buildings and schools.

• **Economy:** The Territory was already in economic decline before the storms: between 2006 and 2016, real gross territorial product (GTP) dropped 27 percent, and 6,000 jobs and 11,000 population were lost. The Territory also relies heavily on tourism as its biggest industry, especially on St. Thomas and St. John.

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**FUTURE RISKS FROM CLIMATE CHANGE**

As the climate changes, hurricanes will become stronger and hurricane-associated rainfall will increase. By 2050, sea levels are estimated to rise by 1.5 to 2 feet, the number of hot days will increase, rainfall will vary more than in the past, and seasons overall will become drier. That all means a greater risk for USVI residents, as built structures face the impact of hurricane winds and low-lying infrastructure (including buried power and communications cables) is hit with storm surges. Higher temperatures will increase energy demand, and changes in rainfall will create water supply problems for those reliant on cisterns.
TASK FORCE RECOMMENDATIONS: INCREASING RESILIENCE AND SPEEDING RECOVERY

To help the USVI in its rebuilding, this report outlines four major strategies, many of which are already in the implementation process.

The first calls for hardening and fortifying existing physical infrastructure by strengthening buildings, roads, communication towers, power lines, and other facilities against hurricane winds and storm surge. Specifically:

- Bury power lines where feasible and use composite poles otherwise; fortify power plants and substations against storm surge and hurricane damage;
- Strengthen telecom towers against high winds and bury the remaining aerial portions of viNGN network;
- Rebuild seaports; expand container ports and Red Hook customs clearance;
- Expand, strengthen, and modernize both airport terminals;
- Harden and rehabilitate the existing water distribution system, including replacing old pipes;
- Rebuild schools and hospitals to endure future storms;
- Develop a housing retrofit program for buildings built prior to the stronger building codes adopted in 1996.

The second strategy recommends several ways the Territory can reconfigure systems and create new ways of delivering critical services. Specifically:

- Diversify the energy system by adding 50 megawatts of renewable generation supported by battery storage onto the grid by 2025 (with a 20 megawatt goal in the near term); make St. John independent of St. Thomas for energy supply; tie critical infrastructure like hospitals and telecom towers into microgrids that can operate independently even if another part of the system fails;
- Set up cloud-based backup for government data and applications; switch to buried fiber cables instead of aerial cables of any sort; install a new public safety communications system;
- Increase options for pedestrians and alternative transit; install roundabouts instead of traffic lights;
- Conduct a Territory-wide drainage study;
- Add redundancies to the wastewater system, eliminate some pump stations, and separate wastewater from storm water systems;
- Close Anguilla landfill, with Bovoni landfill to follow;
- Mandate a Territory-wide recycling program;
- Expand water system to serve isolated communities;
- Introduce electronic health records (EHRs) Territory-wide.

The third strategy includes strengthening governance, regulation, and planning, focusing especially on energy, buildings, and health care. Specifically:

- Reform the energy purchasing process, update tariff structures, and improve and clarify system governance;
- Update building codes based on what was learned in the hurricanes and improve capacity to enforce them;
- Lobby Congress to pass a better Medicaid reimbursement rate with the federal government; reform the system for hospital boards and reconsider creating a territorial health care exchange;
• Update the Territory’s 2015 Comprehensive Economic Development Strategy to propose ways of strengthening and diversifying the USVI’s economy that go beyond hurricane recovery and resilience.

Finally, the report suggests ways to **better plan and prepare for future storms**. Specifically:

• Install backup power generation at critical facilities designed to function over long periods of time; make sure generators are filled up and maintained;

• Create an Emergency Operations Center (EOC) for the Territory as a whole; review agency emergency plans; develop pre-hurricane checklists that agencies must follow; equip key government workers with satellite phones.

**FUNDING AND IMPLEMENTATION**

Most of the initiatives will be paid for with federal recovery funding. The two major sources are Community Development Block Grant Disaster Recovery (CDBG-DR) from the US Department of Housing and Urban Development (HUD) and various funds from FEMA. As of June 2018, the USVI is counting on $1.86 billion in HUD money ($1.09 billion for unmet needs and $0.77 billion for mitigation) and $2.47 billion in FEMA money.

Implementation of the report will be led by a separate office. The office will release annual progress reports discussing the status of implementation of initiatives in this report through 2021.

*USVI residents walking to get fuel after the storms*

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