HOUSING AND BUILDINGS
The Territory’s housing includes 58,000 units. Private units make up 85 percent; public ones, the remaining 15. Most are masonry structures, but most were also built before the Territory adopted stronger building codes in 1996 after the damage done by Hurricane Marilyn.

Hurricanes Irma and Maria damaged the Territory’s housing stock severely: over 22,000 households representing 52 percent of private structures suffered some form of damage. Of those, 12 percent suffered damage that was major or severe. Renters and lower income residents were affected disproportionately. Public housing, strengthened after Hurricane Marilyn, was affected less: only 15 percent of the existing units were damaged (although that damage included several individual communities that were damaged badly enough to be scheduled for complete demolition).

In the future, stronger—though not necessarily more frequent—hurricanes will threaten the Territory’s built structures as much or more as the 2017 storms did. Rising sea levels will contribute to the effects of hurricane storm surge and also create erosion risk for structures near the coast.

Protecting housing in the Territory from future climate impacts will require both strengthening the existing structures and better preparing for dealing with the damage that will inevitably occur regardless of the amount of strengthening that takes place. Specific measures will include improving construction standards and enforcement, developing retrofit programs, and developing buyout programs for abandoned properties. They will also include improving evacuation and sheltering procedures for vulnerable populations, expanding emergency shelter supply, expanding the supply of temporary housing, and improving future temporary housing repair programs.

### Building codes

Buildings in the Territory are required to comply with the USVI building code, which automatically updates every three years when the International Code Council (ICC) releases its updates, to be enforced six months later. Building code in the USVI is also informed by the Construction Information for a Stronger Home guide, which was last thoroughly updated with assistance from the FEMA Mitigation Assessment Team in 1996 after Hurricane Marilyn (see sidebar: Highlights from updated Construction Information for a Stronger Home). Code updates only apply to newly constructed buildings and homes or those requiring renovations of over 50 percent of the structure. There are currently no requirements for retrofitting structures to meet updated codes. The Division of Building Permits (DBP) of the Department of Planning and Natural Resources (DPNR) oversees building code development and permit issuance for new and modified buildings. DBP does not perform compliance checks and relies instead on outside engineers to submit their recommendations for approvals of designs and code issues.

### Insurance requirements

Private rentals, tax credit rentals, and communities are insured with casualty and property policies to protect buildings in the event of a disaster. Insurance for privately owned real estate is only required if properties are mortgaged or their owners have construction loans. In the former case, forced-placed insurance is applied when homeowners do not insure a mortgaged property, and all financed properties must also be assessed for flood insurance requirements (see below). In the latter case, homeowners must purchase builders’ risk insurance during construction. Those owners who are not required to purchase insurance often do not do so: homeowners insurance premiums in the Territory are high, forcing many USVI homeowners with no mortgage...
to underinsure or forgo homeowners insurance entirely. In an effort to ensure homeowners are educated on the risks of remaining uninsured or underinsured, the USVI government issued an emergency order in February 2018 to insurance companies, mandating explanation of the consequences of underinsurance to their policyholders.

FEMA’s National Flood Insurance Program (NFIP) offers flood insurance to businesses, homeowners, and renters, but the coverage is optional. Homeowners can purchase up to $250,000 in coverage, while businesses can purchase up to $500,000; renters can purchase separate contents protection for coverage. Typically, policies can be purchased through homeowners insurance agents, as rates do not differ from one company or agent to the next. The amount a policy holder pays is based on various factors, including the year the building was constructed, building occupancy, number of floors, location of its contents, flood risk (flood zone), location of the lowest floor relative to the Base Flood Elevation on the flood map, the deductible amount, and amount of building and contents coverage. Buildings with federally backed mortgages (e.g., through Fannie Mae) are required to get insurance through NFIP if they are located in FEMA-determined flood zones.

Government agencies in charge of housing

The two government agencies in charge of housing in the USVI are the Virgin Islands Housing Finance Authority (VIHFA) and the Virgin Islands Housing Authority (VIHA). VIHFA funds affordable and sustainable housing development for low- and moderate-income (LMI) families and provides counseling services for homeowners at risk of foreclosure or delinquency. VIHA plans, constructs, operates, and maintains public housing properties for LMI and disadvantaged populations directly. The authority oversees 26 public housing communities totaling approximately 3,000 units on St. Thomas (nine communities, 48 percent of units) and St. Croix (17 communities, 52 percent of units). VIHA also assists income-eligible families, the elderly, and persons with disabilities with rent support vouchers under a number of federal programs, including the Section 8 Housing Voucher Program.

VIHFA is financed through municipal bonds and HUD federal housing programs; in turn, VIHFA funds VIHA. VIHA receives 0.1 percent of HUD’s annual budget, which adds up to approximately $42 million annually to provide housing assistance to over 4,000 households.
HIGHLIGHTS FROM UPDATED CONSTRUCTION INFORMATION FOR A STRONGER HOME

After Hurricane Marilyn hit the Territory in 1995, Construction Information for a Stronger Home 3rd edition was developed and released in 1996 with assistance from the FEMA Mitigation Assessment Team, resulting in notable improvements in buildings that implemented the code updates. DPNR staff performing inspections for reconstruction and repair of buildings damaged in Hurricanes Irma and Maria have noted that the adopted code from the 3rd edition worked, and compliant homes sustained little or no damage. The buildings impacted by Irma and Maria were mostly buildings that Hurricane Marilyn stressed but did not destroy, so they were not built to current codes.

Based on what happened in the 2017 hurricanes, the 4th edition was similarly updated and published in April 2018. Changes to recommendations included:

- Basic wind speed increased from 110 MPH to 145 MPH in the 3rd edition; increased to 165 mph in the 4th ed.;
- Wind exposure rating increased;
- Seismic zone rating increased;
- Rafter sizes increased from 2” to 3” thick;
- Plywood required on all roofs, with screws at 6” O.C. (every other corrugation) at joints and 8” in the field (instead of nails);
- Roof overhang reduced to max. of 2 ft.;
- Straps and clips required on all rafters.
IMPACT OF THE HURRICANES

Hurricane Irma made a direct hit on St. Thomas, St. John, and Water Island on September 6, 2017. Irma’s sustained winds of 106 MPH with gusts of up to 137 MPH tore through seemingly strong buildings, and Virgin Islanders emerged 12 hours later to devastation: roofs partly or completely lifted from structures, windows blown out, and walls pushed over by the pressure of the wind. St. Croix, 40 miles south, did not suffer a direct hit and was spared the worst of the damage from Irma. Hurricane José passed far to the north of the Territory on September 9-10, but still created additional rainfall. When Hurricane Maria passed through the islands on September 20, it dumped 5-7 inches of rain on already-damaged St. Thomas, St. John, and Water Island; St. Croix suffered a direct hit of the storm’s winds and rain.

During and after the storms, residents sheltered neighbors whose homes were damaged or who could not return to their homes because of debris-choked roadways. During the storms, people who followed guidance to shelter in place were forced to choose between hunkering down in

- **Homes with Damage (% of households)**
  - 4% - 11%
  - 12% - 15%
  - 16% - 26%
  - 27% - 42%
  - 43% - 74%

- **FEMA**
  Among FEMA Individual Assistance (IA) applicants; percent of 14,189 owner-occupied and 8,338 renter-occupied units total

- **Housing units damaged by severity and occupant type**
  - Owner: 66%
  - Renter: 83%
  - Severe damage: 4%
  - Major damage: 13%
  - Minor damage: 32%

*The Boston Consulting Group, Inc.*
their storm-damaged homes or braving life-threatening wind speeds, flying debris, and torrential rain to run to the safety of the homes of their neighbors.

Impact on housing

Hurricane winds, record-breaking rainfall, and flying debris caused structural damage to building walls, doors, windows, roofing, cisterns, and foundations, as well as to plumbing and electrical infrastructure. Thousands of single-family homes were destroyed, and tens of thousands of owner-occupied, rental, and public housing units were damaged. The southwest end of St. Croix, the northeast end of St. Thomas, and all of St. John were affected particularly severely (see map: Percentage of households with damage).

Private housing was damaged severely: over 22,000 households representing 52 percent of private structures sustained some form of damage. Of those, slightly over 5,000 (12 percent of total) suffered damage described

Status of VIHA public housing units

<table>
<thead>
<tr>
<th>Need repair</th>
<th>Little or no damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,315</td>
<td>1,110</td>
</tr>
</tbody>
</table>

St. Thomas St. Croix

Percentage of low- and moderate-income households damaged by neighborhood

The Boston Consulting Group, Inc.

0% - 30%

31% - 40%

41% - 50%

51% - 60%

61% - 75%

Homes with damage (% of households)

- 4% - 11%
- 12% - 15%
- 16% - 26%
- 27% - 42%
- 43% - 75%
as major or severe. Renters were affected worse than owners: among them, 34 percent of households incurred major or severe damage, while only 17 percent of owners did (see chart: Housing units damaged by severity and occupant type). Damage was higher in neighborhoods with higher percentages of low- and middle-income households, partly because those households happened to be in the areas where the storms hit hardest and partly because some of those houses were less strongly constructed than the houses in wealthier areas (see map: Percentage of low- and moderate-income households damaged by neighborhood).

Houses constructed after 1996, when building codes were updated following Hurricane Marilyn, fared relatively well; however, 75 percent of the Territory’s occupied houses (as well as other buildings) were built prior to new building codes and were not required to do retrofits unless they engaged in major renovations.

Public housing was damaged less: after Hurricane Marilyn, much of it was rebuilt to more resilient standards, which resulted in Hurricanes Irma and Maria damaging only 15 percent of existing public housing units: of VIHA’s 3,014 unit inventory, 156 units needed repair on St. Thomas and 433 on St. Croix. The Tutu housing community on St. Thomas, with 300 units (of which 25 percent were damaged), was deemed structurally unstable and is scheduled for demolition (see chart: Status of VIHA public housing units).

Rebuilding programs

The first repairs started soon after the storms, with a focus on restoring damaged roofs to prevent more rain from getting in. The US Army Corps of Engineers (USACE) partnered with FEMA and the Government of the Virgin Islands (GVI) to provide primary residences or occupied rental properties affected by Hurricanes Irma and Maria with free fiber-reinforced blue plastic sheeting to cover damaged roofs until homeowners could make permanent repairs. The Corps installed the first temporary roof on September 23, 2017; 3,700 more roofs followed until the program was completed in mid-January 2018.

Two FEMA programs were also available to private homeowners whose homes were damaged in the storms: Individual Assistance (IA) and Sheltering and Temporary Essential Power (STEP). IA provides assistance of up to $33,000 for basic repairs; STEP funds emergency home repairs for owner-occupied homes where damage exceeded $33,800 or that were not eligible to fund temporary repairs through FEMA IA. STEP is administered locally by the VIHFA as the Emergency Home Repairs VI Program (EHRVI) and is intended to help people remain safely in their own homes, rather than relocating to shelters, rentals, or other paid temporary housing until their homes can be restored. While FEMA’s Full Verified Loss (FVL) assessment includes the cost of “restoring homes to decent, safe, and habitable standards,” STEP’s damage assessment is broader in terms of what it considers “habitable.” As of June 2018, STEP/EHRVI had received almost 10,000 applications, approved almost 5,000, and completed construction on over 1,300 homes. By the time the program wraps up, it will have served an estimated 8,000 eligible households.

Rebuilding challenges and progress

Rebuilding following the hurricanes was complicated by a number of factors, including insufficient contractors in the Territory to rebuild all damaged structures, limited access and manufacture of building materials sourced on- and off-island, and bottlenecks at customs and during distribution.

Storm damage and widespread power outages resulted in the halt of building material manufacturing in the Territory; building materials stores were also closed due to damage and lack of materials. St. Thomas’ single concrete facility had no power to operate, leaving the island without a source for poured concrete and blocks. St. Croix has multiple concrete providers and facilities, but faced similar challenges. St. John and Water Island mainly rely on St. Thomas-produced concrete to be trucked and transported via ferry, limiting delivery and project capacity and taking significantly longer to complete than deliveries on St. Thomas. Building materials intended to shore up homes before more storms arrived were delayed at the ports, leaving residents without access to new materials and causing them to recycle debris from damaged structures into repair material as much as was possible.

Inbound relief and rebuilding supplies led to an increased strain on the ports and customs, both of which were hampered by lack of power, damaged equipment and facilities, and lack of communications services. Customs struggled to process imports without Internet access and with limited authority to waive or defer excise and import taxes. Debris and road damage, the curfew, and limited access to fuel and transportation also slowed the distribution of materials once on-island.
Partly because of these challenges, and despite the support from the federal programs, housing repairs in the Territory have been relatively slow. According to a March 2018 survey by the USVI Department of Health, less than 20 percent of homes had either been undamaged or completely repaired, about 50 percent of households were damaged but had begun repairs, and 31 percent were damaged but had not undertaken any repairs at all. Of those surveyed, about 10 percent of respondents said they “still did not feel safe” in their homes. The survey also found a slight increase in the number of people living in each household—likely the result of insufficient housing following the storms. Mold and mildew were mentioned as problems as well by more than 50 percent of respondents. 42 percent of respondents indicated that they were waiting for funding either from FEMA or insurance claims in order to complete repairs.¹

**FUTURE CHALLENGES RESULTING FROM CLIMATE CHANGE**

In the future, hurricane winds, precipitation, and storm surge will present the greatest risk for the Territory’s housing. Rising sea levels will not threaten many structures by themselves but will exacerbate the effects of hurricane storm surge. Temperature increases will require additional air conditioning, and lower precipitation may increase demand for water and cause some buildings to shift due to the drying of soil.

Hurricane winds, precipitation, and storm surge

In the future, as hurricanes become more intense—though not necessarily more frequent—homes and housing properties may face greater damage. For public housing, the aging 40+ year-old buildings in the territorial public housing communities will continue to deteriorate and sustain more damage if the buildings are not improved and mitigated. For private owners, worse storm damage, combined with an increase in storms and flooding, will also lead to stricter requirements and higher property and homeowners insurance rates, potentially increasing the number of homeowners unable either to get or pay for insurance coverage.

Rising sea levels

Rising sea levels—resulting in higher storm surge—place both private and public waterfront properties at risk of coastal erosion, as well as greater risk of flooding. FEMA’s 100-year floodplain will expand, putting more homes at risk of flooding during storms and requiring more homeowners to purchase flood insurance. In addition to innumerable private homes, five public housing communities located within 250 feet of the coastline are at risk in the face of rising sea levels: Lucinda Millin Home and Michael J. Kirwan Terrace on St. Thomas and Marley Homes/Additions, D. Hamilton Jackson Terrace, and Alphonso Gerard on St. Croix.

Temperature increase

Public housing for the Territory’s elderly—who are at higher risk from temperature extremes—will require more robust cooling systems in addition to ceiling and floor fans, thus increasing operating costs. Likewise, the need for better cooling systems will also drive up costs for family public housing, especially for those with young children or elderly relatives in the unit.

Precipitation changes

The Territory is projected to experience less precipitation both in the wet and dry seasons, presenting a number of potential problems in the housing sector. Homes in the Territory rely primarily on rainwater collected by water cisterns both for plumbing and potable water. Current codes for water cistern capacity are likely to be insufficient for longer dry spells, leading to increased reliance on water purchased from WAPA. Purchased water not only increases expenses for public and private housing alike, but also places added pressure on WAPA’s potable water capacity and infrastructure—including the ability to deliver water throughout the Territory.

In some parts of the three main islands where the construction is slab-on-grade foundation (such as the William’s Delight community on St. Croix), soil already becomes so dry that buildings begin to shift, which causes interior structural issues. Without sufficient rainfall, housing sites in low-lying coastal areas will also lose crucial wild and landscaped grass, plants, and shrubbery, leaving the ground vulnerable to erosion. Structures weakened by dried-out soil may also be more susceptible to earthquake damage.
INITIATIVES FOR INCREASING RESILIENCE IN HOUSING

These initiatives will strengthen existing buildings through a focus on codes, retrofits, and buyouts, and prepare the Territory’s structures for the consequences of future storms through a focus on evacuations, shelters, temporary housing, and post-storm repairs.

STRENGTHEN EXISTING BUILDINGS

While some homeowners will repair their properties to strong standards by themselves, many will have neither the means nor the knowledge to do so. These initiatives will focus on existing structures to make sure that they can incur less damage in future storms.

Initiative 1

Improve construction standards and enforcement to Category 5 standard

DPNR, with the support of FEMA, released new building codes and the accompanying Construction Information Guide for Stronger Homes (4th edition) in April 2018. The new publications reflect the 2017 hurricanes’ damage to the Territory and include stronger building criteria for future storms. These updated codes will only be effective if enforced, but Territory authorities currently have neither the funds nor the staff to ensure compliance and enforcement. The Governor’s Office will work with DPNR to expand DPNR’s staff and enforcement efforts, subject to the availability of funding.

Initiative 2

Develop retrofit programs for buildings not built to post-Marilyn codes

The Territory’s current codes—especially after their 2018 update—provide strong protection against storms. However, most buildings in the Territory are not built to post-Marilyn codes, and those of them that were not damaged in the 2017 storms could easily be damaged in future storms. DPNR will develop a voluntary retrofit program for such properties, incentivizing the retrofits through financial assistance or property tax refunds. For certain building types, the agency may require mandatory retrofits.

Initiative 3

Protect housing in coastal and waterfront areas

Some housing—including at least five public housing complexes—is located close enough to the coast to be vulnerable to erosion, especially in the face of rising sea levels. VIHA will work with DPNR to identify and add new barricades where necessary to protect those areas (some retaining wall dimensions would need to change to reflect sea level rise). VIHA will also work with DPNR to identify and execute temporary measures, such as sandbagging, before storm events.

Initiative 4

Develop programs to reduce volume of abandoned properties

Some homes in the Territory are damaged in one storm after another, whether because of where they are located, because of the way they are constructed, or both. Others have never been rebuilt after having been damaged years ago—or will not be rebuilt after the 2017 storms. In either case, these structures are a potential hazard in future storms as a source of potential debris. Demolishing some of those properties and returning the land to nature is an option that should be considered.

The Governor’s Office will work with the USVI Legislature to review and amend the VI Code to permit the government to buy out properties abandoned as a result of slow repairs or lack of funding. These voluntary buyouts would be implemented in limited, high-risk situations when they are more cost-effective than other options. The program would support homeowners who cannot shoulder the financial responsibility of repairing or rebuilding substantially damaged and/or high-risk properties; an example of eligible homes would include those in high-risk areas subject to demonstrated repetitive loss. As part of its
development, this program will consider the expense of buying out properties at pre-storm values, including additional support for eligible moving expenses for displaced homeowners. In cases where the owners of properties cannot be contacted or are not interested in participating in a buyout program, the Governor’s Office will evaluate the benefits of setting criteria and enforceable timelines for demolition or forced sales of abandoned properties.

**Initiative 5**

**Create program to repair housing damage among vulnerable populations**

After a major storm, vulnerable populations face the greatest difficulty with rebuilding their homes. The Governor’s Office will create a Residential Support for Vulnerable Populations program to cover eligible costs to repair or replace damage to residential environments for the Territory’s most vulnerable. The program will also allow funds to be allocated for the creation of new temporary and supportive housing, and for the expansion or development of support services.

**IMPROVE PLANNING AND RESPONSE FOR FUTURE STORMS**

Regardless of the amount of hardening that takes place, future storms will cause some damage. These initiatives will improve the Territory’s response to the consequences of future storms.

**Initiative 6**

**Develop plans for evacuating and sheltering vulnerable properties and populations**

Among the Territory’s structures, many of the weaker ones also house poorer and/or more vulnerable populations (as became clear based on the variation of damage after the 2017 storms). People living in those structures are at special risk of being hurt during major storms and need to be evacuated in advance. The Governor’s Office will work with VIHFA, VIHA, VITEMA, and DPNR to identify characteristics of least-stable public and private houses, create a list of these properties with contact information, and require evacuation from them in advance of major storms. DPNR will own this list, in part to encourage owners to retrofit their properties. VITEMA will establish procedures for evacuation to shelter from these listed homes.

**Initiative 7**

**Expand number of emergency shelters**

There were limited locations for individuals, families, and the most vulnerable to seek shelter from the September 2017 hurricanes. Unlike the contiguous US, only a small fraction of the Territory’s population is in a position to evacuate the islands in advance of a natural disaster, further exacerbating the need for shelters and homes hardened to withstand potential disasters. During Hurricanes Irma and Maria, school buildings served as makeshift emergency shelters despite their frequent incompatibility with emergency shelter standards. Shelters were required to remain open after the storms passed in order to accommodate individuals and families whose homes were rendered uninhabitable, which, in some cases, delayed the reopening of schools by up to one month.

The Governor’s Office will launch the Emergency Shelter Development program to harden and upgrade existing community, public, or private infrastructure to bring it up to sheltering standards (for example, by constructing safe rooms in stronger homes or by hardening school gyms), as well as to create new emergency sheltering stock.

**Initiative 8**

**Create and implement accurate data collection methods on structure status**

After disasters, it is critical to collect data on the status of built structures, both to understand the scale of need for future repairs and to understand the exact types of damage in order to review building codes. The Territory currently has no formal process in place for doing so. VIHA will work with DPNR and VITEMA to develop a property assessment tool and process in
In order to assess housing structures following disasters, the process will be based on the first deployment of the Federal Interagency/State Field Assessment Team following Hurricane Marilyn in 1995; the Team provided quick and accurate early damage assessments. The process to develop better data collection methods will include coordination efforts with local and federal agencies and authorities.

**Initiative 9**

**Build and/or designate sufficient supply of temporary housing**

In any strong storm, some structures will be damaged enough that repairing them quickly will not be possible. In those cases, temporary housing is required. The Territory has some units of such housing available; however, most are occupied by residents who moved into them after previous storms and never moved out. VIHA and VIHFA will work with the Governor’s Office and DPNR to build resilient emergency housing units. The Governor’s Office will also coordinate with hotels to identify hotel and timeshare availability in the event of a disaster and update vacancies at regular intervals; similar coordination with cruise ships will provide additional temporary housing resources. As part of this process, VIHA and VIHFA will work with the Governor’s Office to assess sheltering needs for renters, homeowners, and public housing tenants in advance. VIHA may also need additional support to enforce temporary housing time limits.

**Initiative 10**

**Develop Blue Roofs program for future storms**

The Army Corps’ Blue Roofs program, once under way, helped residents with damaged roofs prevent further damage to their property. However, the program took some time to get off the ground as contracts were being finalized and contractors were being found. There were also concerns about the strength of tarps installed and whether they were adequate for the Territory’s conditions. The Governor’s Office will work with FEMA and local government agencies to acquire and distribute tarps for effective blue roofs immediately following an emergency. This Blue Roofs program will include purchasing stronger tarps, maintaining accurate inventory, and advance staging at distribution sites (along with other commodities).

**Initiative 11**

**Improve temporary repairs and clarify rules for permanent repairs**

After the 2017 storms, some homeowners encountered issues with the quality of temporary repairs that their homes received. VIHA and VIHFA will work with DPNR, FEMA, and private contractors to expedite and ensure quality of temporary repairs, as well as to establish protocols for determining whether to make a quick temporary repair or wait for permanent repair. DPNR will work with relevant agencies to provide training for emergency contractors to ensure quality repair, conduct pre-storm certification courses, establish a registry of certified providers, and enforce standards for emergency contractor training and work. VIHA will coordinate with DPNR to ensure construction efforts also adhere to protocols within the Emergency Housing Disaster Plan.