An aerial photograph of a modern city skyline. In the foreground, a rooftop garden with various plants and palm trees is visible. The middle ground features several glass skyscrapers, some reflecting the sky and water. In the background, a body of water (likely a bay or harbor) is visible under a blue sky with scattered clouds. The overall scene is bright and clear, suggesting a sunny day.

Returns on Resilience

THE BUSINESS CASE



Urban Land Institute Center for Sustainability

Cover photo: A view of the green roof and main office tower at 1450 Brickell Avenue, with Biscayne Bay beyond. *Robin Hill*

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Returns on Resilience

THE BUSINESS CASE

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About the Urban Land Institute

The mission of the Urban Land Institute is to provide leadership in the responsible use of land and in creating and sustaining thriving communities worldwide. Established in 1936, the Institute today has more than 35,000 members worldwide representing the entire spectrum of the land use and development disciplines. ULI relies heavily on the experience of its members. It is through member involvement and information resources that ULI has been able to set standards of excellence in development practice.

The Institute has long been recognized as one of the world's most respected and widely quoted sources of objective information on urban planning, growth, and development.

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The ULI Center for Sustainability is dedicated to creating healthy, resilient, and high-performance communities around the world. Through the work of ULI's Greenprint Center for Building Performance and Urban Resilience Program, the Center advances knowledge and catalyzes adoption of transformative market practices and policies that lead to improved energy performance and portfolio resilience while reducing risks due to a changing climate.

In 2014, ULI's board decided to create the new Center for Sustainability as a logical transition from the organization's previous work under the Climate, Land Use, and Energy (CLUE) program. The Center builds upon the work of CLUE and broadens its scope to address climate adaptation as well as mitigation.

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About the Urban Resilience Program

ULI's Urban Resilience Program works to help communities prepare for increased climate risk in ways that allow a quicker, safer return to normalcy after an event but enable them to thrive going forward. Through careful land use planning, wise investment in infrastructure, and smart building design, we can protect the value we have created in our cities and be more robust in the face of adverse events. More information about the Urban Resilience Program can be found at www.uli.org/resilience.

About the Responsible Property Investment Council

U.S. Product Councils play a key role in ULI's mission of providing leadership in the responsible use of land and creating and sustaining thriving communities worldwide. Through the exchange of information and the sharing of best practices, council meetings offer industry leaders vital opportunities to further ULI's mission. ULI has 49 U.S. councils focusing on 23 areas of activity in development products, development processes, and international issues.

The Responsible Property Investment Council (RPIC) aims to accelerate adoption and firmly embed "triple bottom line" principles as a core part of any real estate investment strategy and decision-making process. What distinguishes the council is a proactive intent to deploy capital that generates risk-adjusted market-rate returns while creating social and/or environmental value.

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Introduction

WHAT STRATEGIES HAVE DEVELOPERS AND OWNERS PURSUED to protect their properties from climate-related risks? Do these resilience investments make business sense as a development objective? What has the market response been? And how have developers and property owners measured their success?

Why Worry about Resilience?

In the first 15 years of the 21st century, real estate development approaches have been altered dramatically by events such as Hurricane Katrina and Superstorm Sandy, which had devastating impacts in terms of lives lost and property damaged. The increasing frequency and intensity of extreme weather—from drought and wildfires on the West Coast to hurricanes and flooding on the East Coast

and costly and time-consuming efforts to restore land and property use and value. Climate risks also present widespread economic effects on other sectors, such as agriculture or tourism, that ripple through real estate markets. Although this report does not directly address certain events such as wildfires, tornados, snow and ice storms, and landslides, many of the same strategies for protecting property and continuing operations featured in this report—such as installing backup systems to maintain power when the electric grid fails—could be applied to enhance resilience in the face of those challenges.

With climate change, the past is not a clear predictor of the future. Weather patterns are changing, and with them the risks faced by developments everywhere. Building for resilience can help developers and property owners adjust to these changing times with some assurance that they are building well and wisely for the future. Development and redevelopment are being viewed as opportunities to reduce disaster-related risks, increase community resilience, enhance livability, and protect natural resources.

It stands to reason that if you are going to build a hospital next to Boston Harbor, you should be thinking about what happens when the storm surge comes up over the harbor wall. Planning a mixed-use town center in San Antonio, a part of the country prone to drought and extreme heat, means you would do well to conserve and recycle water typically wasted in buildings to nurture attractive amenities such as landscaped parks. Such strategies not only make sense, but they also make money for developers and owners. Resilience plays out not just in managing risk, but also in maintaining value.

Defining Resilience

ULI defines resilience as “the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.” This definition was approved by ULI and organizations representing 750,000 industry professionals in the land use, planning, and development fields, including the American Institute of Architects, the American Planning Association, and the U.S. Green Building Council. This definition is part of a statement that also affirms that “the promotion of resilience will improve the economic competitiveness of the United States.”

and various natural disasters in between—have raised awareness of climate risks and have given rise to a new notion of “building for resilience,” so that buildings and sites can survive and thrive despite such threats.

Building for resilience involves following emerging best practices and lessons learned in land use, design, and construction to protect buildings and sites from increasing climate change risks. Climate-related threats—including those discussed in this report related to hurricanes, sea-level rise and coastal flooding, drought, wind, and extreme heat—can cause catastrophic property damage

There may be many drivers for these investments, including policy changes—all levels of government increasingly are recognizing climate risks and demanding that those risks be addressed in planning, design, and development through codes and ordinances requiring flood mapping, drought management plans, and other tools that indicate resilience preparedness. Both public and private sector involvement in resilience planning is essential for the creation of innovative solutions.

Investors and insurers are also demanding proof that assets are protected adequately. As noted in ULI San Francisco’s 2015 report *Tackling Sea-Level Rise: Best Practices in the San Francisco Bay Area*, building for resilience “is already being considered in new developments around the Bay Area because investors acknowledge the risks posed by climate change.” Consumer awareness and preferences for safe and sustainable homes, offices, and vacation destinations—and the competitive advantage resilience provides in the marketplace—argue for investments that help buildings and sites buffer and more successfully adapt to adverse weather.

The payback for resilience efforts can be measured in many ways, including cost savings from preventing damages and reducing operating costs, as well as revenue enhancements from improved marketing, company brand, and project image. These efforts also demonstrate the private sector commitment and leadership that is necessary for strong public/private collaborations in tackling climate change, including in reducing buildings’ contributions to global warming.

Returns on Resilience: The Business Case

ULI’s Center for Sustainability and members of ULI’s Responsible Property Investment Council undertook this report to identify real estate projects designed to perform well in the face of climate-related threats and to illuminate ways in which investments in resilience strategies provide financial and other returns. The Center for Sustainability issued a call for case studies to ULI members and partners. Staff members then collaborated with council members to select projects; to interview project developers, property owners, and consultants; and to obtain supporting data about the business case for resilience.

This report includes ten detailed case studies based on interviews with developers and property owners about their motivation to protect buildings and sites against climate-related threats, their resilience strategies, their design and development processes, and their projects’ performance. It also includes one example of a solution that goes beyond the building scale to leverage collaboration on resilience efforts between the public and private sectors.

The case studies span a diverse range of geographical locations and climate-related risks, from inland flooding in Nashville to heat and drought in Tucson and San Antonio, to hurricane, wind, and storm surge on the coasts of Boston and Miami. The following table indicates the diverse types of projects and the risks addressed:

Project	Type	Location	Risks Addressed
Spaulding Rehabilitation Hospital	Medical institution	Boston, Massachusetts	Coastal storms, storm surge, sea-level rise
6 New Street	Residential, mixed use	Boston, Massachusetts	Coastal storms, storm surge, sea-level rise
Arverne by the Sea	Residential, mixed use, transit-oriented development	Queens, New York	Coastal storms, storm surge, sea-level rise
1450 Brickell	Office, mixed use	Miami, Florida	Hurricanes, tropical storm, storm surge
Ritz-Carlton, Grand Cayman	Resort, residential	Grand Cayman, Cayman Islands	Hurricanes, tropical storm, storm surge
South Florida Resort	Resort	South Florida	Hurricanes, tropical storm, storm surge
Gaylord Opryland/Grand Ole Opry	Resort, entertainment	Nashville, Tennessee	River flooding
The Residences at La Cantera	Master-planned community	San Antonio, Texas	Drought, heat
ENR2	Academic institution	Tucson, Arizona	Drought, heat, flooding
KB Home Double ZeroHouse	Residential	Lancaster, California	Drought, heat

Beyond-the-Building Approach

Building Occupancy Resumption Program (455 Market Street)

Highlights from This Report

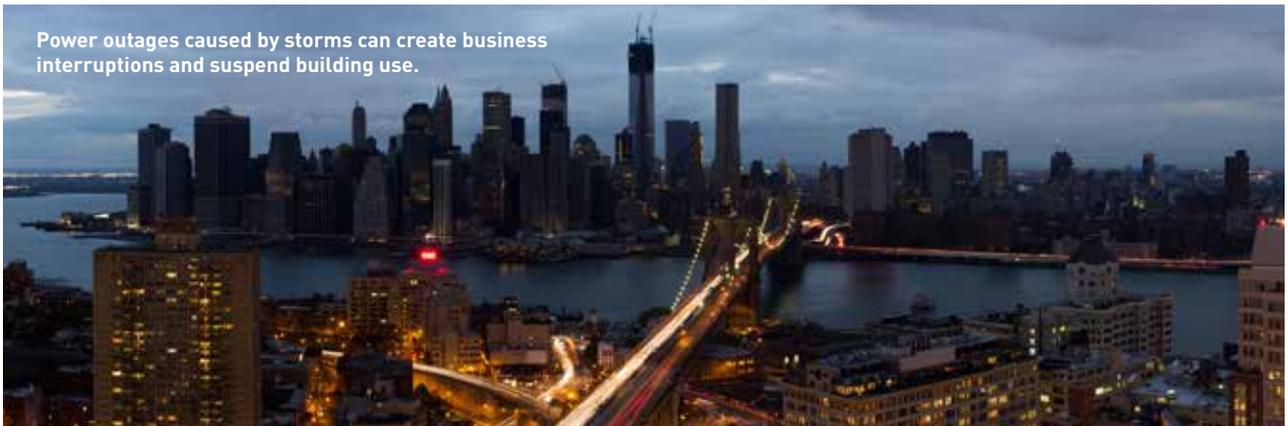
Common themes emerged from the profiled projects:

- * **Code is not always adequate—be innovative:** City planning and construction codes generally evolve over time and do not always offer appropriate protection for sites and buildings, especially when environmental conditions are changing. Installing wind- and impact-resistant windows for a whole building or a generator that will run the power and air conditioning, even though the code requires less, could be the factor that protects people and property and allows operations to continue after a storm.
- * **Learn from your own and others' experiences:** Choice locations that may be vulnerable to climate risks, such as harbor, beachfront, or riverfront sites, still have great value, but they may require additional layers of planning, construction, maintenance, and expense to improve their resilience. Doing your homework—learning from experience and from others who have dealt with climate-related events—can help developers and property owners understand and assess the value of strategies to deal with risks.
- * **Taking a long view changes your perspective and actions:** Many of the case studies profiled are “long-holds” in which the desire of the developers and owners to maintain an investment over time has prompted a commitment to strategies that increase the probability that the asset will endure and increase in value. The likelihood of extreme weather is increasing, and these risks are nearly certain if you hold the property a long time. But a long hold period is not required for resilience strategies to generate value. While climate change unfolds over a long

time and impacts such as sea-level rise may creep in, extreme weather events should be a near-term wake-up call. Investing in prevention measures that generate value quickly and avoid catastrophic losses is a smart bet, and those measures can add to an asset's value regardless of the investment horizon.

- * **Sustainability and resilience are good partners:** Some of the design and construction choices that can qualify a project for LEED certification or another green-building program do double duty for resilience and even triple duty for the project's bottom line. Multilayered impact-resistant windows can protect the building from the high winds and projectiles common to hurricanes and tropical storms while also saving energy and reducing electricity bills. Installing green roofs, recycling graywater, and using cisterns can help conserve precious water in dry climates, can enable projects to prepare for extreme or extended drought, and can also save on water costs for irrigating the landscape. Sustainability and resilience efforts, working in tandem, offer a high level of assurance that developers and owners are doing what they can to reduce their project's negative effect on the natural environment, including reducing their contribution toward climate-changing greenhouse gas emissions.
- * **Resilience makes a property more attractive:** Projects built and maintained with resilience in mind enjoy advantages such as greater marketing, sales, and leasing success by offering assurance about the integrity of the project and its ability to continue to function through or recover quickly from severe weather. More resilient projects also can benefit from better financing options, more competitive insurance rates,

Power outages caused by storms can create business interruptions and suspend building use.



greater long-term savings on maintenance, and higher overall value compared to more vulnerable properties.

Resilience Strategies in This Report

Strategies for select risks discussed in this report include the following:

- * **Hurricane and Tropical Storm:** Installing impact-resistant glass can avoid exploding or imploding windows and doors during conditions of high winds and flying debris. A desalination unit and an underground water storage tank can provide potable water as well as water needed for cooling towers. Extra on-site and backup power capacity can help run the air conditioning that is essential to protect interior finishes from mold damage.
- * **Storm Surge, Sea-Level Rise, and Flooding:** Locating the building's power center on an upper floor or rooftop (above the storm-surge elevation or floodplain) and providing a backup generator with fuel reserves can enable building operations such as lighting and air conditioning to continue or to recover quickly after extreme weather. Landscape features such as berms can act as natural barriers, whereas wetlands, mangroves, and swales with native plants can buffer wave energy and absorb water on site.
- * **Extreme Heat and Cold:** Siting and shading a building to reduce heat gain is an important passive-energy solution to keep buildings cooler in hot climates. Super-insulated building envelopes and openings protect inhabitants from extreme heat or cold if building operations fail. Operable windows allow for ventilation in hot climates during power outages. Glass that deflects heat also keeps a building cool for additional resilience (and lower energy bills) in hot climates.
- * **Drought and Lack of Water:** Graywater recycling—capturing water from showers, washing machines, bathroom and kitchen sinks—and rainwater cisterns used for irrigating the landscape help conserve precious treated water. Xeric landscapes with native trees and shrubs also conserve water compared with conventional lawns and gardens.



Value Creation

ULI selected the projects in this report because they demonstrate that resilience strategies can create value. In this relatively new field of resilience, developers and property owners may not have solid metrics and clear financial analysis on the cost-effectiveness of their efforts because their design and construction strategies may not have had extensive testing by the elements. The case studies include some compelling metrics but also demonstrate emerging best practices for addressing climate risks. Not surprising, what many of these projects show is that, where resilience efforts are planned in tandem with sustainability measures, the results are likely to lead to success in better financing, faster and higher lease rates, more competitive insurance premiums, lower utility costs, and greater returns on investment.

As this publication shows, making the choice to build resilience into land use planning, site development, and building design and construction also demonstrates leadership. The developers and property owners of these projects agree that strategies that prepare for and mitigate climate risks are wise choices that lead to successful projects—and should be done “for all the right reasons,” including demonstrating good stewardship of the land and a commitment to reducing our contribution to global warming. For multiple reasons, building for resilience is establishing a new standard for the real estate industry and one that can lead to higher value for investments.

On-site power supplies can ensure business continuity in the face of power outages caused by extreme weather.

The Residences at La Cantera

San Antonio, Texas

IN SAN ANTONIO, TEXAS, resilience means being able to prepare for, recover from, and adapt to drought. So when USAA Real Estate Company, San Antonio, and the Cambridge Development Group, Dallas, were planning a resort-style destination town center at La Cantera, a master-planned community on land owned by USAA, they committed to developing a project that conserved and recycled water. “Drought in San Antonio is a way of life, and addressing that within the building design made total sense to us,” says Hailey Ghalib, managing director of the USAA Realty Company and national director of its multifamily development program.

The Residences at La Cantera.

USAA Real Estate Company, Mark Humphrey’s Studio, and LRK

Project data

PROJECT TYPE
Residential, mixed use

OWNER
USAA Real Estate Company,
Cambridge Development Group

DEVELOPMENT TEAM
Looney Ricks Kiss, J. Robert
Anderson Landscape Architecture,
Jordan Foster Construction

PROJECT SIZE
150-acre master-planned
community, 425,697-square-foot
multifamily and mixed-use building

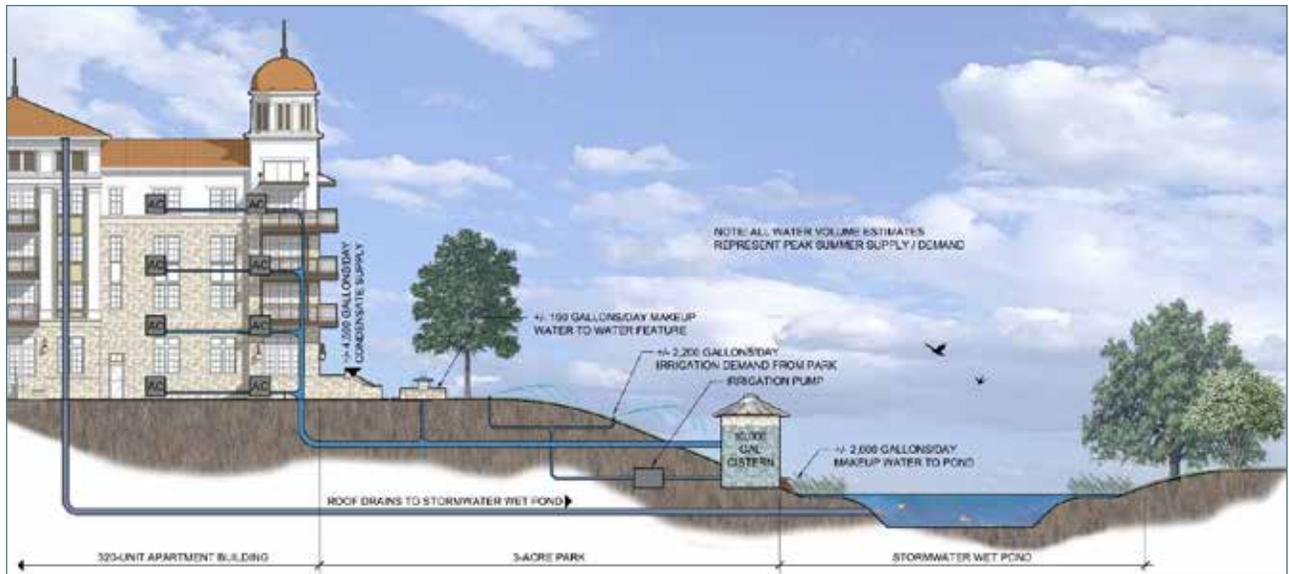
PROJECT COST
\$47 million

RESILIENCE FEATURES
Water conservation and recycling,
cistern to capture stormwater
runoff and condensate, native and
drought-tolerant landscape

RESILIENCE INVESTMENTS
Not available

RESILIENCE RETURNS
Protection of \$1.4 million park,
rental premiums, enhanced asset
value of \$500,000, \$8,840 in
annual water savings, marketing
advantages





A rendering of the water conservation efforts at the Residences at La Cantera.

USAA Real Estate Company, Mark Humphrey's Studio, and LRK

Completed in 2014, the \$47 million Residences at La Cantera is a four-story, 425,697-square-foot multifamily building with 323 apartments and 3,700 square feet of retail space. Located next to the Shops at La Cantera and the La Cantera Hill Country Resort, the Residences include amenities such as a clubhouse, cyber café, fitness center, resort-style pool, and Jacuzzi. The 150-acre master-planned community is being developed with 1 million square feet of Class A offices, upscale shops, restaurants, and lifestyle amenities and will be connected by a pedestrian greenway, a network of urban parks and natural areas, and a hike and bike trail.

USAA Real Estate Company and the Cambridge Development Group sought to provide an attractive resort landscape while respecting the need to conserve water. San Antonio periodically has instituted water-use restrictions in response to drought. During La Cantera planning in 2011 and 2012, Texas experienced one of its worst droughts ever, which it recovered from only in 2015 with excessive rains that briefly helped restore water levels. Just months later, San Antonio had water restrictions back in place, limiting the use of irrigation systems and water features.

Mitigating Risks

USAA worked with Looney Ricks Kiss, an architecture firm based in Memphis, Tennessee; Austin-based landscape architect J. Robert Anderson; and Dallas-based Jordan Foster Construction.

With this team, USAA focused on resilient design and construction strategies for the building, which meets Texas Green certification standards. The developers' planning and design choices have had the most effect on water conservation. They installed Energy Star-certified dishwashers and high-performance kitchen faucets and shower heads and located water heaters close to fixtures in most units, thus reducing the amount of water wasted while the resident waits for hot water.

The developers also addressed drought through the design of the landscape and its focal point, a 1.5-acre park that features an urban plaza, great lawn, adventure playground, pond, and picnic areas shaded by preserved live oak trees. They installed native and other drought-tolerant plants and mulched landscape beds at least four inches deep to retain moisture from irrigation. They constructed a 10,000-gallon cistern next to the wet pond to store rooftop stormwater runoff and condensate from air conditioning equipment, which are piped from the buildings; this recycled water is then used to irrigate the park and renew the pond.

The developers have begun focusing more on resilience metrics. For example, the cistern, which was sized to hold enough water to irrigate the park daily, was retrofitted to monitor water levels and the amount of water being added daily. Thus, they know that watering requirements range from 1,000 gallons a day to 4,000 gallons a day. Because the cistern collects up to 4,500 gallons a day (when all the units are filled) and is constantly being refilled, the owners know they can meet irrigation needs.

Creating Value

Protecting the value of the amenities of the park and the plantings—even under drought conditions—was key to USAA’s decision making. “Part of the motivation was being a responsible corporate citizen and ensuring that the landscaping and public park would be irrigated with limited use of potable water,” says Ghalib. The park alone cost \$1.4 million to build and would cost at least \$425,000 to replace if damaged by drought. The value of the park translates to rent premiums for park views of between \$35 and \$50 a month per apartment, or \$25,560 of additional annual revenue, resulting in about \$500,000 in added asset value.

Resilience savings so far include lower maintenance costs and an immediate beneficial effect on operating income. As Ghalib says: “We saw the cost efficiencies in cutting back on the water bills and being able to maintain the park through drought conditions and water restrictions by capturing water that otherwise gets wasted.” The landscaping for the park requires between 30,000 gallons of water a month in winter and 118,700 gallons of water a month during the summer—a total annual water requirement of 878,400 gallons. On the basis of San Antonio Water Service’s 2015 water rates, water charges would total approximately \$3,840 annually. Additional fees, including a service availability fee

and a stormwater fee, would add \$5,000 a year to the water bill. The Residences consequently save an estimated \$8,840 in annual water charges by using the air-conditioning condensate and stormwater collection system to irrigate the landscape.

“Drought in San Antonio is a way of life, and addressing that within the building design made total sense to us.”

—Hailey Ghalib

The water recycling system also has marketing advantages, says Ghalib. “Whenever we tell tenants, residents, and visitors about the water reclamation, people receive it really well. It is definitely a distinguishing feature.”

USAA’s resilience efforts for the Residences at La Cantera are part of a company commitment to “build every asset as if we are going to own it long term,” says Ghalib. “With this one, we’re making sure every decision about materials and equipment makes sense for us and anyone else.”



Drought-tolerant plants and a cistern that recycles water for irrigation help protect the park amenity.

USAA Real Estate Company, Mark Humphrey's Studio, and LRK



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