Developing sites for sea-level-rise and climate-change resiliency

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Successful real estate developers and development attorneys must effectively anticipate and manage risk. Managing visible and known risks seems simple; what separates the great from the good is the ability to anticipate, plan for, and develop contingencies for unknown risk scenarios. Failure to account for these risks can be catastrophic. Hurricanes Harvey and Katrina unveiled the stark consequences of the failure to adequately plan for catastrophic events, showcasing chemical-plant explosions, flooded buildings, and lost real estate assets. Extreme weather conditions are increasing in severity and frequency, and oceans are rising, so resilient real estate developers must adapt and engineer buildings and site configurations that are sustainable under changing climatic conditions.

Scientific journals document the existence of rising sea levels and extreme weather conditions. For example,

> Data collected since 1980 by the insurance industry provide one indicator of trends in extreme events. Although these are not direct measures of extreme weather events *per se*[,] and may not have recorded all perils in the earlier record, they show weather-related catastrophes recorded worldwide . . . have increased from an annual average of 335 events from 1980 to 1989, to 545 events in the 1990s and to 716 events for 2002–2011.

O. Hov et al., *Trends in Extreme Weather Events in Europe*, EASAC Policy Report 22, European Academies' Science Advisory Council (Nov. 2013). Further, journals report that these changes continue to directly impact land occupation and use:

> Weather disasters have increased in number and intensity in recent decades and damage caused by extreme weather events has been on the rise in Europe. This finding results from the increase in the number and size of settlements in areas exposed to extreme weather events, the accumulation of increasingly valuable and vulnerable assets in these areas, as well as the climate and environmental changes that have already taken place.

W. Kron et al., *Changes in Risk of Extreme Weather Events in Europe*, Envtl. Sci. & Pol'y, 100, 74–83 (2019).

Extreme weather conditions, changes in weather patterns, and rising seas affect physical, transactional, and legal aspects of real estate. Physical impacts appear as structural, corporeal, or earthly damages or modifications. Physical impacts present very real safety risks to site occupants, such as failing structures and exposure to life-threatening elements and hazardous substances. Physical damages due to catastrophic events may result in significant costs to repair or replace damaged assets and short- or long-term collateral impairment that may constitute a loan default and present a risk of loan acceleration. Moreover, even if there is no damage to the collateral itself, there is a potential for impact on cash flow due to property down time or permanent loss of use, which again may influence the financing of a project.

Transactional influences appear as a loss of value, market desirability, or deal options. For example, industries and land uses that are at risk for such events may become less desirable—even un-financeable. Insurance may come at a premium, end users may become less prevalent, and deal structures may be more limited or demanding.

Legal risks abound, but, most significantly, fundamental elements of tort liability are undergoing change. Precedent now exists to support the notion that catastrophic events are foreseeable. Previously considered *force majeure*, failure to take the necessary precautions to avoid catastrophic consequences may now support a claim for negligence. Defense to toxic torts based on code compliance and an act of nature may be a thing of the past. Plaintiffs may simply argue that a defendant should have foreseen an increase in extreme weather patterns and rising seas and taken the necessary precautions.

Mitigation taken before natural disasters arise pays great dividends in terms of safety, prevention of property loss, preservation of asset value, and litigation defense. Properly developing mitigation measures requires that a party first understand what they are mitigating against. Although coastal areas are at the frontline of the climate dilemma, extreme weather conditions will affect most areas. Climate-related hazards vary greatly by region and local conditions; resiliency demands that a project developer identify and categorize such hazards during development planning and incorporate mitigation measures into the project design.

While not universal, many mitigation measures take the form of familiar engineering and design elements. Developers are already acquainted with stormwater management through the use of landscaped detention basins and water features, the construction of on-site microclimates to enhance development desirability and user amenities, the use of drought-tolerant plants, engineering of water recapture systems, and the reuse of graywater. These measures have been demonstrated to be achievable on successful projects. Often identified as sustainability features, these design elements suggest a basis for mitigation measures.

Hurricane Harvey dumped 50 inches of rain over a several-day period. One development planned for a flood contingency by assisting the local jurisdiction in constructing a community lake, which was engineered based on a disaster scenario and excavated deep enough to accommodate the drainage needs of the site in an extreme event. The system proved effective during the hurricane and kept the buildings dry in the wake of downpours and flooding.

The notion of managing on-site drainage is basic to development; climate resiliency merely requires that site engineers consider disaster scenarios in designing infrastructure. It is important to note that resilient design may mean managing in excess of requirements of local codes. Designing to code may no longer be effective to protect the asset and may not be protective of tort liability since catastrophic conditions may be considered foreseeable.

In addition to stormwater management, facility operation and proper safety measures should also take disaster scenarios into consideration. Planners must use resilient design and engineer for the catastrophic events typical of the region. These techniques include such things as designing the first floor of the building to be above disaster-flood level and placing all mechanical equipment high enough in the building to ensure operation during flooding. Equipment that must remain below flood level should be encased in a flood-proof vault. Moreover, planners should incorporate appropriate equipment redundancies, such as operable windows for natural ventilation during power outages or backup generation if solar panels fail.

Aside from flooding, extreme weather conditions may include drought, extreme temperatures, and high winds. Common engineering solutions for these conditions often involve exterior fortification. Super insulation with advanced framing techniques have been shown to resist heat and cold. Impacts of heat can be addressed through building components that manage shade and enhance/influence airflow. Building engineering coupled with landscaping designed to create cooler microclimates will increase mitigation effectiveness.

As with stormwater management, sustainability concepts used for drought-prone regions are an important component of extreme weather mitigation. Drought-tolerant plants, water harvesting, green infrastructure, and engineered systems to recapture graywater for reuse will all reduce water dependency for drought areas.

Municipal land use planning should not be ignored. Local governments across the country are developing policies and code requirements to achieve development resiliency. Some coastal jurisdictions have implemented increased freeboard requirements for new or improved structures within a defined location. Minimum requirements for first-floor elevations are working their way into codes. Code structures will begin to see innovation as well. For example, Norfolk has required all new developments to meet a “resilience quotient” based on a system that awards points for measures that builders use for climate-risk reduction, stormwater management, and energy resilience.

Retreat from high hazard areas or total avoidance must also be considered. In some areas, municipal solutions will mean forced regulatory retreat of public infrastructure as well as voluntary (or forced regulatory) retreat of privately owned structures. This is not a new concept.

Development restrictions for floodplains, wetlands, watershed protection, coastal zones, and seismic conditions have existed for some time. These techniques may be utilized to address rising seas and high hazard locations.

Resilience and sustainability must be more than words; they must be wholly embraced in the mindset of all stakeholders involved in the creation of the built environment. More than simply managing risk, to be resilient, all parties must look to regional conditions, evaluate their unique contribution to the creation of hazards, and mitigate those hazards through effective planning and engineering to ensure that we are safe and not left to cry, “we were here.” Liz Newman, “Atlantis,” in *Of Ruin and Renewal: Poems for Rebuilding* (2019).