Swiss Re
Corporate Solutions

Risk Engineering Services
Sustainability Series: Green Roofs

With increased urbanization, there is a growing trend for green roofs on buildings. Green roofs offer many advantages to building owners and occupiers, the general public, and the environment. These include better insulation, reduced power consumption, stormwater retention, improved air quality, and a biodiverse environment offering aesthetic diversity. However, green roofs may introduce property considerations and concerns that owners and occupiers should be aware of when reviewing their property and business risks.

Typically, green roofs comprise specific vegetation designed and installed on a series of components, including moisture retention material, a drainage system, a root barrier, and a protective layer for both the insulation and underlying roof surface.

Property Risk Considerations

If a building has a green roof or if a green roof is proposed, consider how this might impact the property or enterprise. The following features and considerations will likely be of interest to commercial property insurers when evaluating the building's overall risk profile:

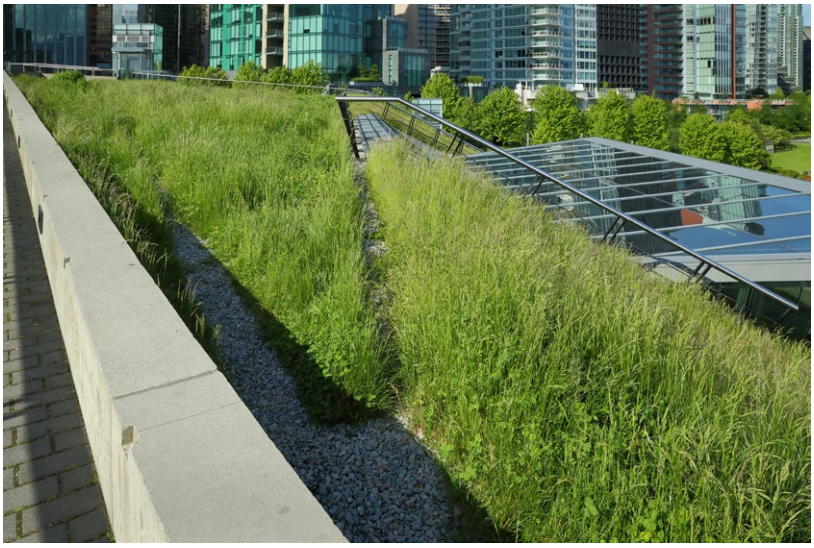
Potential for Water Leakage Damage: Green roofs may be provided with irrigation pipework susceptible to freezing. Leaks in waterproofing membranes due to root growth or temperature fluctuations may expose the underlying roof structure to damage or corrosion. Drainage systems may become blocked by soil and vegetation. These risks are particularly relevant in the construction phase.

Considerations: Penetrations in the roof should be minimized. Include leak detection systems below the waterproofing membrane. Gutters should be sized to accommodate both rainfall and irrigation runoff and maintained regularly, with inspection points included. The impact of roof gradient on the density of growth media and its propensity to shift or slide should be considered for heavy rain events.

Fire Load: Green roofs and their supporting components (e.g., vegetation and waterproofing membrane) typically add combustible loading to a roof and increase the potential for ignition from exposing fires or other ignition sources. In some cases, the design of a green roof may encompass space for recreational activities, introducing ignition sources such as lighting, electrical installations, barbecues/grills, and smoking.

Considerations: Limit the overall fire risk by maintaining adequate moisture content of vegetation, regular removal of dead vegetation, and careful design and placement of noncombustible fire breaks. Include manual firefighting equipment such as fire hydrants, fire hose reels, and portable fire extinguishers, along with access provisions for the fire brigade. Potential ignition from electrical equipment, smoking, or other sources should be identified and carefully managed.

Susceptibility to Collapse: Green roofs introduce live loads associated with landscaping, precipitation, induced saturation due to irrigation, and periodic replacement of new soil and growth of vegetation.



Considerations: The load carrying ability of concrete roofs versus all other types (e.g., long span steel) should be considered over the roof lifecycle. Some roofs may be susceptible to deformation over time, affecting the operational efficiency of certain components that originally functioned properly. Future changes may affect the structural integrity and should undergo formal review. Concrete roofs are generally more resilient than other roofs to changes that increase live loading.

Damage from Natural Hazards: Green roofs are susceptible to natural hazard perils such as seismic forces and wind uplift pressures. Vegetation or potentially the entire roof system may be damaged, requiring replacement.

Considerations: The system, including any moisture/root barriers, should be properly secured to structural elements (growth media should not be relied upon). Green roofs should not generally be installed in areas with elevated wind exposures such as coastal areas subject to hurricanes.

Swiss Re Corporate Solutions Risk Engineering Services recognizes the environmental benefits associated with green roofs. However, careful consideration should be given to all aspects of the design, installation, and maintenance to reduce the likelihood of loss.

Contact your Swiss Re Corporate Solutions risk engineer for additional information or assistance.

References:

FM Global Property Loss Prevention Data Sheet 1–35, Vegetative Roof Systems, February 2020

Department for Communities and Local Government, "Fire Performance of Green Roofs and Walls," London, August 2013

FLL Green Roof Guidelines, "Guidelines for the Planning, Construction, and Maintenance of Green Roofs," 2018 edition

The GRO Green Roof Code (Green Roof Code of Best Practice for the UK 2014), Groundwork Sheffield (2014)