Real estate owners around the world have experienced the impact of increasingly frequent extreme weather events over the past few years. Scientists explain that, although it is difficult to link any single weather event to climate change, there is a high probability that the frequency and intensity of severe weather events will continue to increase as the concentration of greenhouse gas emissions in the atmosphere increases.¹

The aim of this white paper is to share the experience of the Australian commercial real estate community in developing new approaches to address the business risks associated with climate change. By sharing experiences, wider dialogue will be encouraged on the actions that property owners can take to minimize climate-related risks and to maximize opportunities.

The Rationale

Climate change is a relatively new and emerging issue for Australian real estate owners. However, the business risk and opportunities are significant. It has been estimated that Australian Property is worth around AUS$5.7 trillion.² Of this, around $159 billion worth (2.8%) of buildings are considered to be vulnerable to sea level rise and storm surge. This includes more than 8,000 commercial, 6,000 industrial and 274,000 residential buildings around the country.³ Although Australia only accounts for 2% of the global reinsurance market, in the past five years 6% of global losses have been incurred in Australia.⁴ These statistics illustrate why there has been an emerging focus on climate change risk in the Australian property sector.

There are five key business drivers in the Australian market that have focused property owners on climate change. These are: recent extreme weather events; increasing government regulation; changing investor expectations; tenant concerns and corporate reputation. These are summarized in Table 1 and then discussed in more detail below.

<table>
<thead>
<tr>
<th>Emerging issues</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>More frequent and extreme weather events</td>
<td>Recent weather events have highlighted the physical and financial impact of climate change. These can be mitigated through improved planning, building design and preparedness for disasters.</td>
</tr>
<tr>
<td>Increasing government regulation</td>
<td>As government regulations are developed to reduce the community impact of climate change, organizations that anticipate such increases may reduce the financial costs associated with the changes.</td>
</tr>
<tr>
<td>Changing investor expectations</td>
<td>Investors increasingly expect building owners to systematically manage climate change risks. Demonstrating that a firm has a systematic approach to managing the risks can increase investor confidence in an organization’s business management.</td>
</tr>
<tr>
<td>Growing concerns from tenants</td>
<td>Tenants have begun to more comprehensively factor climate change related impacts into their leasing decisions. Demonstrating a clear commitment to address climate change and taking appropriate actions can enhance the marketability of commercial property.</td>
</tr>
<tr>
<td>Corporate Reputation</td>
<td>Greater transparency through public reporting means that property owners must ensure that they deliver on public targets and commitments.</td>
</tr>
</tbody>
</table>

¹IPCC 2007, Climate Change 2007 Synthesis Report, Intergovernmental Panel on Climate Change (IPCC).
²ASBEC 2012, Preparing for change: A climate change adaptation framework for the built environment, Australian Sustainable Built Environment Council (ASBEC).
³DCCEE 2011, Climate Change Risks to Coastal Buildings and Infrastructure, Australian Government Department of Climate Change and Energy Efficiency.
⁴The Climate Institute 2012, Coming Ready or Not: Managing climate risks to Australia’s infrastructure, The Climate Institute, Sydney.
Recent Extreme Weather Events

In recent years, Australian real estate firms have experienced more frequent and severe weather events than have been experienced in the past. For example:

- Flooding in northeastern Australia in 2011 and 2012
- The hottest summer on record in 2012/13 in which 123 weather records were broken\(^5\)
- Severe bushfires in 2012 and 2013

In the United States, Hurricane Sandy and other extreme weather events have placed an important focus on the impacts they have on business. 2012 was the hottest year ever in the United States, and 11 severe weather events led to estimated losses exceeding $1 billion.

According to the Carbon Disclosure Project's 2012 Global 500 Climate Change Report:

> "Recent extreme weather and natural events have tested companies’ business resilience and increased their level of understanding of the timeframes of the physical risks they associate with climate change. Physical risks are viewed as tangible and present, impacting companies’ operations, supply chains and business planning."

The financial impacts of severe weather events can be reduced through improved building design, flood management and disaster preparedness.\(^7\) Table 2 describes some of the key climate considerations for property owners associated with climate change.

### Table 2: Examples\(^8\)

<table>
<thead>
<tr>
<th>System</th>
<th>Climate Considerations</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVAC &amp; Building Energy Simulations</td>
<td>The size of a heating and cooling system (and its associated energy use) is estimated using typical meteorological year (TMY) data. TMY data provides various annual climate averages based on past weather data.</td>
<td>Designing HVAC systems based on historic weather data will make buildings systems vulnerable to future changes in climate. Building energy use will increase if climate extremes become the norm. Occupants may also experience thermal discomfort.</td>
</tr>
<tr>
<td>Transport Infrastructure</td>
<td>Pavement design and engineering are affected by temperature, precipitation, thermal cycling and solar radiation.</td>
<td>Climate change, including changes in temperature and precipitation trends, may reduce the life expectancy of pavement that is designed based on past climates.</td>
</tr>
<tr>
<td>Stormwater Management</td>
<td>Stormwater management systems, including retention and detention ponds, are sized using past precipitation data and the current definition of 50- or 100-year storm events.</td>
<td>Heavy precipitation events and storms may overwhelm stormwater management systems more frequently in the future. Major storm events may cause serious flooding if stormwater systems are not designed to handle greater quantities and intensity of precipitation.</td>
</tr>
<tr>
<td>Landscape Design</td>
<td>Landscapes are designed with current precipitation patterns, temperature patterns, and plant hardiness zones in mind.</td>
<td>Climate change, including changes in precipitation and temperature patterns, will affect landscape design, including native plants. Climate change will also shift plant hardiness zones northward, affecting plant selection.</td>
</tr>
</tbody>
</table>

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\(^6\) Page 5.

\(^7\) Bosteels, T. 2013, Protecting Value in Real Estate, Prepared for and in conjunction with the Institutional Investors Group on Climate Change (IIGCC).

Box 1: Taking Climate Change into Account

Sandon Point is located 40 miles south of Sydney. This multi-use development was approved by the Government for development, but it was then challenged in the Land and Environment Court. The ruling found that “climate change flood risk was relevant to the site, yet it had not been considered when approval was granted for the Concept Plan.” The Court ordered that the Concept Plan approval was void and of no effect. Subsequently, the developer undertook new flood modeling studies that were based on future climatic projections rather than historical climatic conditions. The NSW government issued a Sea Level Rise Policy Statement, which included benchmarks to support the consistent consideration of sea level rise in land-use planning.

Increasing regulation is also apparent in the United States. For example, the Hurricane Sandy Rebuilding Task Force has recommended that governments at all levels develop guidelines in order to enhance the resilience of buildings to withstand the impacts of climate change.11

Changing Investor Expectations

Severe weather events and growing awareness of the impacts of climate change has highlighted the need for investors to ensure that climate change risks are taken into account within investment portfolios.

The third Global Investor Survey on Climate Change conducted by Mercer12 on behalf of the Institutional Investors Group on Climate Change found that:

- 56% of Asset Owners conducted formal or informal climate risk assessments of their portfolios.
- 25% of Asset Owners have made changes to their investment strategy or decision-making process in 2012 as a result of climate risk assessments.
- In 2012 there was a substantial amount of climate related activity by real estate asset managers, particularly in relation to on-site building improvements. The key focus of these activities was on energy efficiency followed by waste and water management. There was also a strong indication that this activity was expected to continue or even increase in 2013.

Real estate owners can demonstrate their awareness and preparedness to mitigate the impacts of climate change by conducting climate change risk assessments and through careful and systematic planning.

Tenant Concerns

There is growing recognition in Australian businesses for the need to reduce costs and enhance environmental outcomes via more efficient and resilient buildings.13 This has been facilitated by the development of building performance labeling which makes it easier for tenants to select green buildings. Rising energy prices have also played a role. Severe weather impacts over the past few years have also enhanced the focus on the potential for business disruption when tenants select office, retail and industrial space. From a building owner perspective, these factors can impact on tenant retention, void periods and the conditions within a lease contract.14

Corporate Reputation

The factors described above have the potential to collectively impact on corporate reputation. This potential is augmented by the growing requests for information from

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14 Bosteels, T 2013, Protecting Value in Real Estate: Managing investment risks from climate change, Prepared for and in conjunction with the Institutional Investors Group on Climate Change (IIGCC).
various corporate stakeholders including tenants and investors. Easy access to public reports also facilitates comparisons of performance between one business and another. For example, Australian Real Estate Investment Trusts (REITs) report through mechanisms including: the Carbon Disclosure Project, the Principles for Responsible Investment, the Investor Group on Climate Change, the Principles for Sustainable Insurance, the Equator Principles, the UN Environment Program Finance Initiative and the Asset Owner’s Disclosure Project.

Reputation may impact on market position, ability to attract and retain tenants as well as employees and relationships with regulators. As real estate firms use their climate change position and sustainability more widely as a point of differentiation in the marketplace, it becomes particularly critical that any commitments that are made are honored. Assessing and mitigating climate change-related risks make up an important component of those activities. Although the physical impacts have perhaps been neglected for the focus on greenhouse gas reduction, recent weather events have put them strongly under the spotlight for both property owners and their stakeholders.

Conducting a Risk Assessment

Like other emerging business issues, the risks associated with climate change need to be clearly understood by managers. Strategies then need to be developed to mitigate the risks and to realize any potential business opportunities associated with climate change.

Over the past few years a growing number of real estate owners in Australia have been conducting climate change risk assessments. These assessments provide a systematic and transparent process for identifying climate change risks and mitigation options.

Three key design features of climate change risk assessment processes are:

1. The use of standardized risk management processes. Firms typically use their own enterprise systems or the International Standard ISO30 family of standards on Risk Management. In June 2013 a new Australian Standard 5334-2013 was released to provide principles and general guidelines for identifying and managing climate change related risks.

2. Combining desktop research with a collaborative workshop process. This approach helps to ensure that a range of perspectives from across the functional areas of a business, such as legal, engineering, operations, planning and human resources, are incorporated. This approach also helps to educate personnel throughout the process and build ownership for the outcomes.

3. Integrating the findings into an organization’s strategic and operational planning process. This helps to ensure that outcomes inform wider business decisions and are accessed in a timely and consistent manner.

Figure 1 outlines a typical workshop-based climate change risk assessment process. The first step is to establish the context. Risks are then identified and evaluated within a workshop process prior to finalizing risk mitigation options post-workshop. It is important to communicate and consult through this process as well as to monitor and review progress along the way. The final step is to integrate the risk mitigation options into the strategic direction of an organization and its operating strategies. Each of these steps is discussed in more detail below.


The Climate Institute 2012, Coming Ready or Not: Managing climate risks to Australia’s infrastructure, The Climate Institute, Sydney.
Establishing the Context

The rationale for conducting a climate change risk assessment should include consideration of each of the key business drivers discussed earlier in this paper (See Table 1). The relative importance of each business driver will vary from one organization to another depending upon the location of each property and other factors such as the level of interest and concern of key stakeholders including investors and tenants. This information may be written up in a document that can be used to access funds and gain support from senior management to conduct a climate change risk assessment. The same document may then be adapted and sent out to participants prior to conducting a risk assessment workshop. This can help participants prepare for the workshop by considering the issues that are of most relevance to each individual and their functional division.

Contextual information should introduce the key concepts of climate change and provide climate projections and scenarios that are applicable to the entity being assessed – whether that is a particular building, a portfolio or the organization overall.

It is important to carefully establish the appropriate sources of weather and climate data. Figure 2 illustrates the relationship between average and extreme temperatures. As well as increasing average temperatures, the number of extremely hot weather events is expected to increase. This has been reflected during the summer of 2012/13 in Australia. New records were set when the average temperature across the continent reached 104 degrees Fahrenheit for the first time. Many individual locations saw new records. For example, Sydney experienced its hottest day on record (114 degrees Fahrenheit) in January 2013.18

The increase in both average temperature and the number of hot weather days is also reflected in the changing nature of rainfall events. For example, in February 2013, the Burnett river catchment in Queensland experienced rainfall in one day that was 70% greater than the previous record. Warmer sea temperatures contribute towards more intense rainfall events and storms.

Extreme weather events also combine to exacerbate damage to buildings. For example, sea level rise together with increasing storm intensity augments inundation through storm surge in coastal areas. This combination of factors is encouraging local governments to review and redevelop flood maps that may affect the zoning of commercial property.

Planning and design considerations are traditionally estimated using typical meteorological year (TMY) data. This data provides annual climate averages based on past weather data. A major challenge to planners, managers and organizations is that this historical weather data has been used to design buildings in ways that are unlikely to be sufficient to meet the demands of future weather events.

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Table 3: Key Climate Change Related Risks

<table>
<thead>
<tr>
<th>Risk</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainfall events and flooding</td>
<td>Rainfall events and flooding may cause physical damage to a building and equipment and cause disruption to the use of the building.</td>
</tr>
<tr>
<td>Electricity supply disruptions</td>
<td>Electricity supply may be disrupted due to local area impacts or constraints on the distribution network. Potential impacts include safety and business continuity.</td>
</tr>
<tr>
<td>Higher temperatures</td>
<td>The capacity of air-conditioning systems may be insufficient for extremely hot days impacting on building use, operating costs and the comfort of tenants.</td>
</tr>
<tr>
<td>Storm surges combining with sea level rises</td>
<td>Storm surges may increase flooding impacts considerably impacting on safety and business access.</td>
</tr>
</tbody>
</table>

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The impact of future climatic conditions is highly uncertain as they may be influenced by the interaction between technological change, demographics and social-economic development. Due to this high level of uncertainty, it is appropriate to use scenario planning. Scenario planning involves developing alternative descriptions of what the future might look like before considering the implications associated with each different scenario. Typically, two to three different scenarios are examined. Scenarios are also essential in a workshop setting in that they provide an important focal point for discussion between professionals and staff. Together, they bring a range of expertise and experience to the table.

Since there is some level of uncertainty, some care needs to be taken in selecting appropriate scenarios. Credible information is essential. For example, 2011 climate risk assessments at Mirvac considered 11 physical climate impacts: temperature, extreme weather events, precipitation changes and increases in sea level over time were among those considered. The assessment used climate scenarios from the Intergovernmental Panel on Climate Change. Scenarios were further enhanced.

Box 2: An Asset Level Risk Assessment

Stockland is Australia’s largest diversified property group. One of the properties that they own and operate is the shopping center in Cairns, which is a regional city on the coast in far north Queensland. The city has a population of 156,000 people. It services agricultural industries and its close proximity to the Great Barrier Reef makes it a popular tourist destination. In February 2011, Cyclone Yasi, a category 5 storm, was tracking towards Cairns. The food court section of the Stockland shopping center had been deemed most able to withstand the impact of severe weather events. Knowing this, local authorities declared the area an emergency evacuation center.

By the time the storm hit the town there were 2,400 people occupying the food court. As the cyclone hit, power was lost to the center. Effects of the power outages were mitigated by the Stockland center management team and those occupying the center were well cared for by the local retailers, volunteers and authorities.

The storm disrupted retail trade in the center for several days. However, the manner in which the Stockland staff managed the situation was widely acknowledged and Stockland’s overall response earned them a high level of credibility with the community and local authorities. The staff was also directly involved in the clean-up efforts in the town and the company made donations to the State flood relief fund.

Following this event, Stockland has continued to develop their climate change planning approach in conjunction with the local businesses, communities, governments and non-governmental organizations (Figure 3). As well as highlighting their role in the community, the experience from cyclone Yasi confirmed the importance of regular planning with local authorities to ensure that severe weather events are addressed in an efficient and effective way.

Figure 3: Organizational Stakeholders Involved

- Tenants
- Local Community
- Local, State & Federal Governments
- Non-governmental Organizations

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20 The Climate Institute 2012, Coming Ready or Not: Managing climate risks to Australia’s infrastructure, The Climate Institute, Sydney. P. 34.
21 Sources: Stockland 2011, Stockland Corporate Responsibility & Sustainability Report Stockland and personal communication with Greg Johnson, National Environmental Sustainability Manager, Stockland.
INTEGRATING CLIMATE CHANGE INTO STRATEGIC PLANNING

by using more localized data including coastal planning guidance that is provided by each Australian state government.

Once the appropriate contextual information is gathered, it should be communicated to participants in the form of a brief background paper or a set of PowerPoint slides.

**Identifying and Evaluating the Risks**

Risk assessment workshops may run from 4-hours to a couple of days, depending upon the scope of the assessment. Background information including climate change scenarios are typically presented to participants. Then, in small groups or as a whole group, participants work through the potential impacts associated with each risk, the relative importance of each risk and potential mitigation options. Some may be well-known with understood mitigation options – whereas others may not have been well considered previously. It is important to maintain an open and non-threatening setting to allow ideas and options to come forward.

In the Stockland case (Box 2), a recent severe weather event motivated stakeholders to improve co-ordination. Another important point that emerges from this case example is that in some circumstances property owners themselves may be in the best position to coordinate a group of local stakeholders.

**Integrate Response into Planning**

Following the climate change risk assessment process, it is important to integrate the outcomes into strategic and operational planning processes. The risk assessment may have identified a number of

**Table 4: An Integrated Approach at Mirvac**

<table>
<thead>
<tr>
<th>Mitigation</th>
<th>Adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Considering key climate impacts in the acquisition of new sites or assets, and in the design or upgrade of new and existing buildings</td>
<td>Continued focus on reducing energy and carbon intensity of applicable Mirvac-operated assets</td>
</tr>
<tr>
<td>Considering climate impacts within the site planning and construction management process</td>
<td>Encouraging the uptake of low carbon design and technology where feasible</td>
</tr>
<tr>
<td>Response readiness - assisting users of Mirvac owned or managed buildings, including tenants during extreme weather events</td>
<td>Monitoring the performance of existing assets and continuing to seek opportunities to curb emissions</td>
</tr>
<tr>
<td>Continuing to meet statutory disclosure obligations and regulatory design requirements</td>
<td>Maintaining transparent disclosure of greenhouse gas emissions profile and performance</td>
</tr>
<tr>
<td>Engagement in public and industry dialogue in formulating responses to climate change.</td>
<td>Providing staff training to manage assets more efficiently.</td>
</tr>
</tbody>
</table>

*Box 3: Mirvac’s Integrated Strategy*

Mirvac is an integrated real estate group that was established in 1972. Listed on the Australian Securities Exchange, Mirvac conducts business activities across the investment and development spectrums. The Investment Division holds 68 assets worth US$5.9 billion. Investments are held in the office, retail, industrial and hotel sectors.

In 2011, Mirvac conducted a climate change risk assessment across all assets in its Development and Investment Divisions. The assessment considered the physical impacts of climate change as well as regulatory and operational risks. Temperature extremes were identified as one of the more significant climate change related risks to the portfolio. This was due to the expected increase in energy consumption and operational costs which had direct financial implications for Mirvac and its tenants. Specifically, it is expected that there will be increased run times, higher energy demand and costs, potential black and brown outs during peak electricity spikes and higher exposure to the building façade. Further, increased use of shopping centers in summer may increase the challenge of maintaining comfort levels.

This risk highlights the overlap between Mirvac’s efforts to adapt to climate change as well as to reduce Mirvac’s own greenhouse gas emissions. In existing buildings, Mirvac has identified and is progressively implementing a range of energy efficiency measures. Mirvac has reduced the energy intensity of its assets by 34% and carbon intensity by 36% over the past 4 years. At the same time, group revenue and the size of the property portfolio has increased. Initiatives that have been implemented to achieve this outcome include upgrades to building management systems and the installation of new chiller plants and other HVAC related equipment.

Following the climate change review, Mirvac is reviewing the way in which risk is evaluated for new projects including site selection and evaluation. This process will quantify any costs associated with site modifications or design to increase the resilience of the asset with regard to climate change related impacts. Mirvac has integrated climate change risk assessment and mitigation actions into their overall climate change and strategic business planning process. Key actions are listed in Table 4.
corrective actions that need to be incorporated into maintenance plans and budgets. For example, one organization identified that the type of roofing that had been installed on many of their buildings in tropical areas would not easily handle the high winds associated with the expected increase in the frequency and intensity of storm events. The property owner was able to improve the resilience of existing roofing systems by incorporating additional screws and tie-downs. Strategic and operational plans may also be amended or enhanced across different functional areas of the organization including procurement, design, planning and maintenance.

The case in Box 3 provides an example of how Mirvac, one of Australia's largest REITs, is developing an integrated approach to mitigate their greenhouse gas emissions at the same time as they prepare to adapt to the challenges of a changing climate.

Conclusion

As the frequency and intensity of extreme weather events are influenced by climate change, real estate owners are improving the way in which they systematically assess risk and integrate climate change considerations into their strategic and operational planning processes. Weather events have also influenced the growing interest of organizational stakeholders such as governments, investors and tenants who are putting pressure on property owners to improve the resilience of their buildings.

Australian property owners are increasingly conducting climate change risk assessments to understand the risks associated with climate change and to develop strategies to address them. These assessments typically involve bringing together a range of internal and external stakeholders to identify the business and physical implications of various climate change scenarios. Risk mitigation options are then prioritized and integrated into strategic and operational planning processes.

Climate change risk assessments need to be conducted on a regular basis as better information becomes available on potential impacts and as property owners experience and respond to significant weather events. Integrated approaches, incorporating both climate change mitigation and adaptation, can ensure that property owners not only reduce the impact of physical risks, but that they also reduce operating costs and build resilience in at the same time.

Note: This paper will be followed by a paper on Change Leadership and how to accelerate energy efficiency improvements in commercial real estate.

About Sustainable Business Pty Ltd.: Over the past decade, the firm’s associates have worked on energy efficiency projects that span training, capacity building, organizational change and energy efficiency policy development.