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Examination of strata building risks from cyclonic weather by utilizing policy claims data (a pilot study)

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Abstract

Strata insurance premiums in the cyclonic regions of Australia have significantly increased over the past 24 months. 170 claims from approximately 1000 policies were assessed to investigate the building form and type of damage. While structural issues have been identified and acted upon, for wind speeds less than the ULS design wind speed the damage from wind driven rain ingress and the damage to ancillary items have taken on increasing importance in claims costs. The failure of ancillary components has also led to damage to the main structure such as penetrations in cladding allowing further water ingress.

Introduction

Findings from damage investigations following severe weather events provide critical information for understanding building performance. CTS damage investigations following cyclones such as Cyclone Larry (Henderson et al, 2006) and Cyclone Yasi (Boughton et al, 2011), have clearly shown a significant improvement in structural performance of housing built after the introduction of the engineered provisions introduced in the early 1980s. The damage investigations did however highlight a few issues with current construction such as loss of soffits and poor performance of roof tiles and roller doors which led to some damage.

Notwithstanding improved structural performance of buildings, the CTS damage investigations of housing construction have shown that wind driven rain water ingress may cause damage in residential construction. The CTS damage surveys found that in some cases wind-driven rain passed through the building envelope at openings such as windows and doors (even if closed), around flashings, through linings or where the envelope has been damaged.

The Insurance Council of Australia (ICA) engaged the Cyclone Testing Station to conduct a review of insurance claims on strata properties that resulted from recent cyclones. The aim of this study was to identify factors that may be contributing to insurable losses. By increasing the awareness of all parties, including insurers, property owners and strata managers, to some of the key factors that affect losses, it may be possible to focus on opportunities to reduce risk and limit premiums.

This pilot study scope examines the ICA provided data for strata properties with claims and those without claims in the NQ/FNQ region during 2010/11. The claims have been taken following Cyclone Yasi. In addition, the data needs to be related to the impacting local wind speeds which are influenced by terrain and topographic features as well as shielding. By incorporating these factors in concert with the loss data, and property information, damage levels relating to building form may then be compared.

Policy and Claims Data

From the supplied policy and claims data, the focus of the project was on the policies during 2010 and 2011 with the claims data coming from those associated with Cyclone Yasi. For the 2010/11 period, a total of nearly 1000 policy records were supplied. Of these, there were approximately 170 claims within the Cairns to Townsville regions. It should be noted that an individual policy record may contain a couple of units (apartments) to over a hundred units (apartments) for that one record.

An important data record for the analysis was the provided "loss description field" where details of damage were recorded. However, the detail in this field varied greatly with entries such as "damage to roof" or "water entry" through to summary lists noting number of windows broken, and damage to elements including sheds, roof aerials and fences. Thus there is no consistency of reporting of damage types. For example, the policy claim record may mention "roof damage from tree" but does not mention either guttering damage or water damage to interior. This does not mean that no guttering or interiors were damaged. Therefore, findings from the claims may identify possible trends but it should be remembered that the recorded data is a subset of the actual damage.

Building types

Damage surveys have shown that different building materials and construction styles can have different performance levels during wind storms. Data groupings of building geometry and construction style were made. As the policy data was limited in regards to many building elements, assumptions were made based on features observed from Google "Street View".

The policies were grouped into;
- H1 and H2 representing single and two storey buildings that appeared to have characteristics of typical house construction and geometry
- LR1 and LR2 representing single or two storey low rise buildings with large footprints of at least several units
- MR representing medium rise construction which were structures of 3 stories and above

The medium rise building type (MR) had a higher ratio of claims to non-claims than the other assumed building types. Also of interest are the higher ratios of claims to non-claims found in postcodes with coastal urban areas to non-coastal suburbs.

Wind speed and damage

A wind speed was calculated for the policies based on their number of storeys, and location with respect to coast, topography and surroundings, with the base wind speeds for the regions taken from the analysis following Cyclone Yasi and detailed in Boughton et al (2011) and Holmes (2012). The wind speeds presented in this study, therefore, are the derived "impacting" wind speeds at the building and not the commonly used wind speed reference standard of "10 m height wind speed in open terrain".

Figure 1 shows a comparison of the ratio of claim amount versus sum insured with respect to "impacting" wind speed and assumed building type. It can be seen that the majority of claims to sum insured ratio are small. The ratio increases for increasing wind speed after about 35 to 40 m/s.

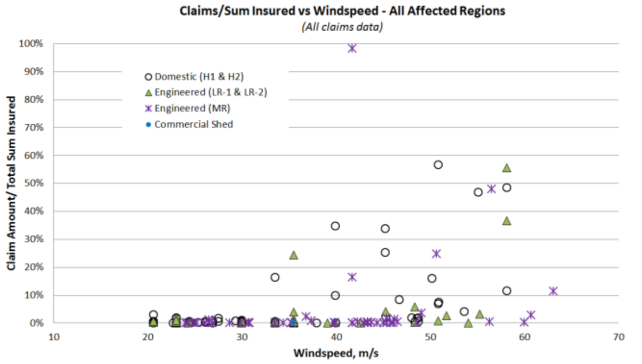

Figure 1. Building type for different years of construction for clams to SI ratio and wind speed

Many of the assessors reports for the medium rise buildings included claims for ancillary elements such pools, fencing, gardens. It may be that the large medium rise complexes also have extensive resort style grounds

Building age

The structural performance of a building can be in part governed by the building regulations at its time of construction (i.e. its age). This has been observed in damage investigations, particularly for house construction (Boughton et al 2011, Henderson et al 2006). Figure 2 shows generalized building parameters for different building ages plotted against claims/SI ratio and wind speed. The trend of increasing claim value to sum insured increases with wind speed for newer construction but there is few pre-1980s buildings in the higher wind speed to enable robust comment. A comparison of ratio of claims to non-claims for the different building ages shows there is a possible trend for a higher claims ratio for newer construction with the ratios being approximately 0.2, 0.25 and 0.35 for the "< 1980s", "1980s to 2000" and "> 2000" periods respectively.

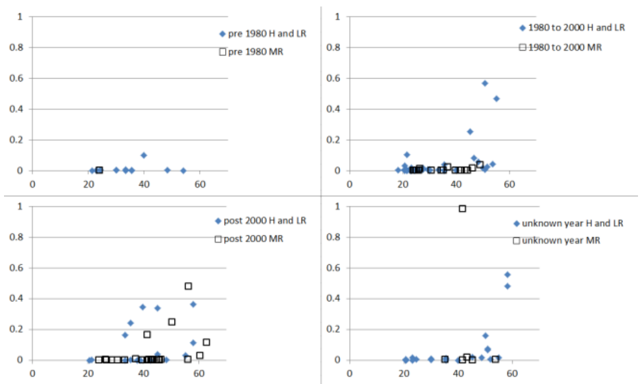

Figure 2. Building type for different years of construction for clams to SI ratio and wind speed

Since the wind speeds are below design event and (accordingly) the primary descriptors of damage are associated with mainly non-structural damage it would be expected that there is less marked difference in damage versus building age. A possible implication of the higher claims versus SI for newer buildings may be the use/introduction of different building materials and styles which could include plaster board linings, metal fascia, larger openings, minimal eaves, large partly enclosed living areas, and complex roof shapes (lots of valleys and ridges). These different features may increase susceptibility to wind driven rain water ingress.

Wind driven rain water ingress (WDR)

Wind driven rain is a major contributor to damage in severe storms. Figure 3 compares the claims that mention WDR damage and those that do not mention it. It can be seen that over 80% of the claims noted some form of damage from water ingress. Also in over half the descriptors, the water ingress was associated with entry via roof or doors/windows. (Note that the claims and assessors data is not a yes/no document so if there is no mention of an item it doesn't mean that it didn't happen – it only means that it wasn't written down.) One of the issues as a result of WDR ingress is an inspection of electrical circuits is required, adding further costs to process.

The value of 80% compares with a survey showing 75% of post 80s houses having envelope damage and water ingress following Cyclone Larry (Melita 2007).

From the review of the text boxes in the claims loss descriptor, examples of damage from the water ingress were from many sources and resulted in damage such as;

- Wind driven rain through louvres with damage to floor
- Water entry via roof with replace and repaint ceilings and check of all electrical systems
- Defective roof allowed extensive water to enter with damage to ceilings, floors and walls throughout.
- Water ingress damaged lift motor room and lift

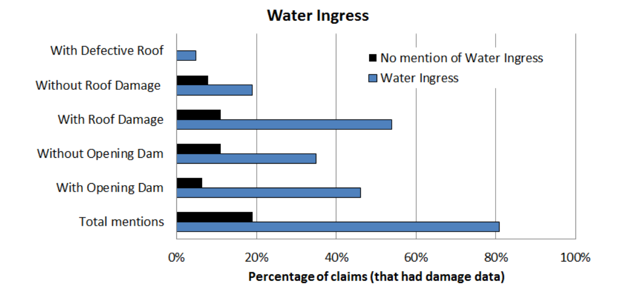

Figure 3. Occurrences of mentions of damage descriptor associated with rain water ingress.

Other damage descriptors

In comparing the different roof materials from the available data there was no standout material (construction method) in terms of claims than the other types. Since the wind speeds were less that the design limit it should be expected that the roof material/structure to not have structural damage due to wind loads. The main descriptor in relation to roof feature was in relation to water damage via roof.

From the notes from assessors reports some common "incidental" damage initiator descriptors were;

- Failure of garage doors
- Fence damage
- Loss of guttering
- Non weather resistant fixtures/kitchenettes with only small eaves or shade cloth for protection from rain and wind in semi-open entertainment areas
- Shade cloth shredded since not taken down prior to event
- Roof mounted antennae damage resulting in damage to roof and subsequent water ingress damage
- Entrance doors blown in as standard lock into jamb could not resist wind loads
- Painted cement render on building sandblasted by winds and small debris

Many of the items such as roof antennas are relatively small cost but if fail can lead to big consequences for further damage.

Conclusions

The aim of this study was to identify factors that may be contributing to insurable losses during cyclonic weather.

Damage investigations have shown that the building regulations in terms of the structural provisions/objectives of the Australian building code generally appear to be appropriate with respect to wind loading for the design strength limit state. Strata property and detached houses are built to the same Australian Building Code and often use the same building materials. Both types of structure have a similar vulnerability in a wind event.

In most respects contemporary houses and strata property should be capable of resisting design wind events if properly designed and constructed. When specific elements are identified that warrant changes to building regulations, an ongoing process is in place to make these changes (e.g. recent changes to Australian standards to improve tile roof, soffit linings and garage doors). It is important to understand, however, that any changes will normally only apply to new properties constructed after the changes are implemented in building regulations.

Older properties will have been built to different standards and different regulations. They have also experienced the effects of weathering and may have been compromised if they have not been properly maintained. However, from the analysis of the claims and policy data which is for impacting wind speeds less than design winds, year of build has less influence on claims than items such as water ingress and damage to ancillary items.

It is recommended that a process of regular property inspections, with intervals of perhaps once every 7-10 years be investigated. The aim of these inspections would be to identify and prioritise any site-specific factors that might affect building performance in future severe storm events. Works carried out would make the building more resilient. It is proposed that providing an insurer with evidence that an independent inspection has been conducted and actions taken will demonstrate a reduction in risk and a corresponding reduction in premiums and excess. If significant defects of a part of the structure are found (e.g. severe corrosion of cladding) then a grace period of continued insurance should apply while rectification works are undertaken. The inspections would need to relate the structural aspects of the inspections to the building regulations at the time of the building's construction.

Water ingress from wind driven rain has been identified as a key factor in insurance claims. It is recommended that a study should commence as soon as possible, to minimize risk by seeking a greater understanding of relationship to intensity of rain and wind gusts and identify possible economic solutions in reducing the amount of water ingress and resultant damage.

The report supported by previous damage investigation reports has identified for wind speeds less than the strength design wind speed, ancillary items have taken on increasing importance in claims costs. As structural issues have been identified and acted upon, the damage from wind driven rain ingress and the damage to ancillary components (e.g. air conditioners, shade cloth attachments, aerials and fences). The failure of ancillary components has also led to damage to the main structure such as penetrations in cladding allowing further water ingress.

Acknowledgments

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