

Emerging Property Risks & Building Resilience



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Emerging Property Risks and Building Resilience

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Discussion

Water Damage – Failed Hydraulic Services

Water Damage – Water Ingress through the building envelope

Water Damage – Mould and mould mitigation

Asset Resilience – Climate change and natural perils

Asset Resilience – Hail testing and guidance material



A decorative graphic on the left side of the slide. It features a spiral staircase with a wooden floor and a white railing, viewed from above. The spiral is composed of concentric circles in shades of blue and grey. An orange line with a solid orange circle at its end curves around the top and right side of the spiral.

Failed Hydraulic Services

Ageing Buildings and Infrastructure



We're not getting any younger

Increasing proportion of 40-60yr + building stock

Core infrastructure and services are also vintage → increased failure rates

Legacy hazards (eg asbestos) & undocumented modifications surfacing

Assets designed to superseded codes and performance standards

Asset maintenance backlog deficits are an issue

Reactive spend displacing capital renewal opportunities

Component replacements occurring without full system renewal

Partial asset upgrades limit integration of new tech & opportunities

Functionality and utilisation often poorer in older spaces

Flexible spaces increase asset utilisation, but at cost with legacy assets



Water Damage



Seek the leak

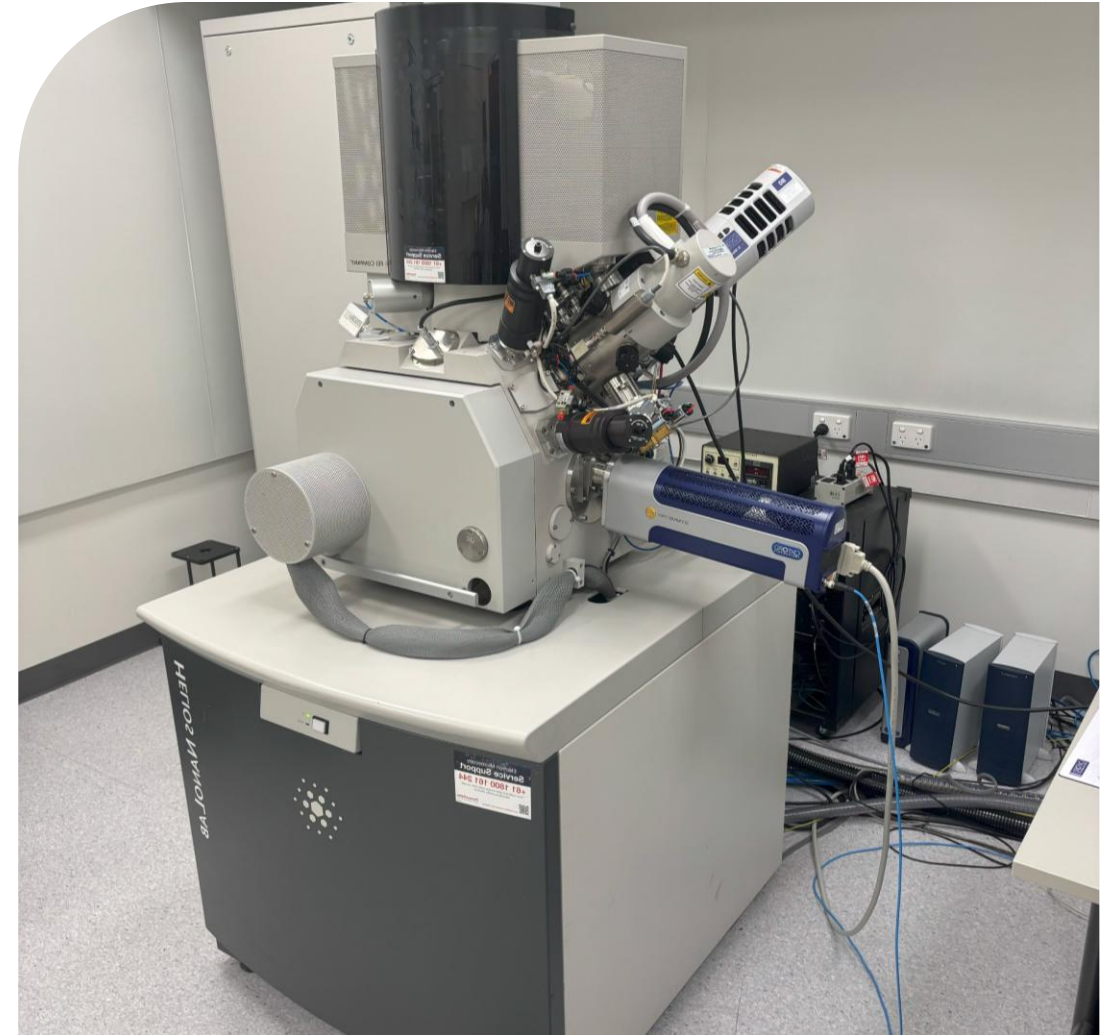
Pipes, ducting and other services are often in the ceiling spaces - out of sight and out of mind

Water pipes can fail at joints or in the pipe wall. Braided flexible hoses have a failure history

Other hydraulic service failure potential

- Wastewater pipes can fail
- Hot water systems fail
- Reverse Osmosis systems can fail
- Hose reels and hydrants can fail
- Alloy connectors to chiller coils in HVAC systems can fail

Include High Value Equipment/contents in “clash detection”



Why hydraulic services fail

Material Degradation

- General corrosion, water chemistry, catastrophic end of life failure or equipment malfunction, inappropriate materials

Design and Installation Issues

- Lack of appropriate pipe installation support, poor workmanship, fluctuations in water pressure

Operational Failures

- Human error, ageing infrastructure, insufficient condition assessments. maintenance practices

External Factors

- Ground movement reactive soils, seismic activity, malicious intent and vandalism



Fire Hydrant Failure in December 2025

Flange seal ruptured, causing substantial water discharge and significant water damage.

The hydrant was serviced quarterly, but this did not involve disassembly to check the seal.





Ruptured seal

The lack of external evidence that a failure was imminent, combined with the limited scope of the regular servicing, indicate that there are no third-party recovery prospects.

Fire Hydrant Failure - continued

Extensive water damage

- Damage to two levels of the building
- Damage to electrical switchboard
- Lift pits filled with water
- Damage to carpets, cabinetry and general contents
- Scientific equipment largely undamaged
- No Business Interruption claim at this stage
- Total incurred value of claim is \$600,000



A circular inset image on the left side of the slide. It shows a landscape with a large, dark, stormy cloud formation in the sky, a green bush in the middle ground, and a field of tall, golden-brown grass in the foreground. An orange arc with a solid orange circle at its top end curves around the right side of the circular image.

Water Ingress Through the Envelope

Water Ingress Through the Envelope

Failure of component(s) in the envelope

- Gutters (particularly box gutters)
- Failed or inadequate seals
- Roof uplift for wind
- Hail damage to roof or hail blocking drainage
- Tree damage to envelope

Inundation

- Riverine
- Overland flood
- Stormwater drainage failure / local accumulation



Water Ingress Through the Envelope

Dominant Causes

- Aging
- Blockages (such as for leaf litter and debris in gutters and stormwater pits).
- Impact (such as from trees in proximity or fair condition)
- Design (such as for box gutters; roof securement; surge in fire copper networks from lightning)
- Materials (such as lack of resilience for large hailstone impact)

Contributing Factors:

- High values in subgrade (eg basement art stores or sub-grade instruments rooms)
- Critical electrical infrastructure in flood prone area
- Flow paths
- Deferred refurbishments
- Climate Change



Water Ingress Through the Envelope

Measures to reduce likelihood

- Condition assessments
- Maintenance or tasks ahead of approaching storm
- Design
- Quality of materials & workmanship

Measures to reduce consequence

- Location of high value assets
- Routing of hydraulic lines - especially for high value instruments, collections areas
- Isolation points and access
- Recovery measures to remove water
- Water detection for high value areas or intelligent systems send alert for abnormal flows.





Storms and floods

Gutters

- Back into the ceiling space – box gutters

Wind driven rain

- Window and door seals
- Porous blockwork

Hail damage

- Windows and roofs

Overland flow/stormwater

Riverine flood



Box gutter overflow

- Building has a central concrete box gutter, running the length of the building (about 110 metres).
- Outlets to downpipes about 50mm up sides of gutter.
- History of water ingress issues due to failure of copper membrane.
- Member decided to install a siphonic drainage system, which is far more efficient than conventional downpipes.
- The work involved 48 penetrations to the base of the box gutter.
- During the work, the original downpipes were sealed, meaning that there was effectively no roof drainage.



Box gutter overflow - continued

- On Friday 12 December, the contractor was alerted that light rain over the weekend was forecast.
- The Member and contractor calculated that the sealed box gutter could hold 18,000 litres of water.
- On Sunday 14 December, a severe thunderstorm occurred, involving 40mm of rainfall and about 125,000 litres of water landing on the roof.
- Significant flooding across four levels of the building.
- Total incurred value of claim is \$575,000.
- A recovery against the contractor is being explored.

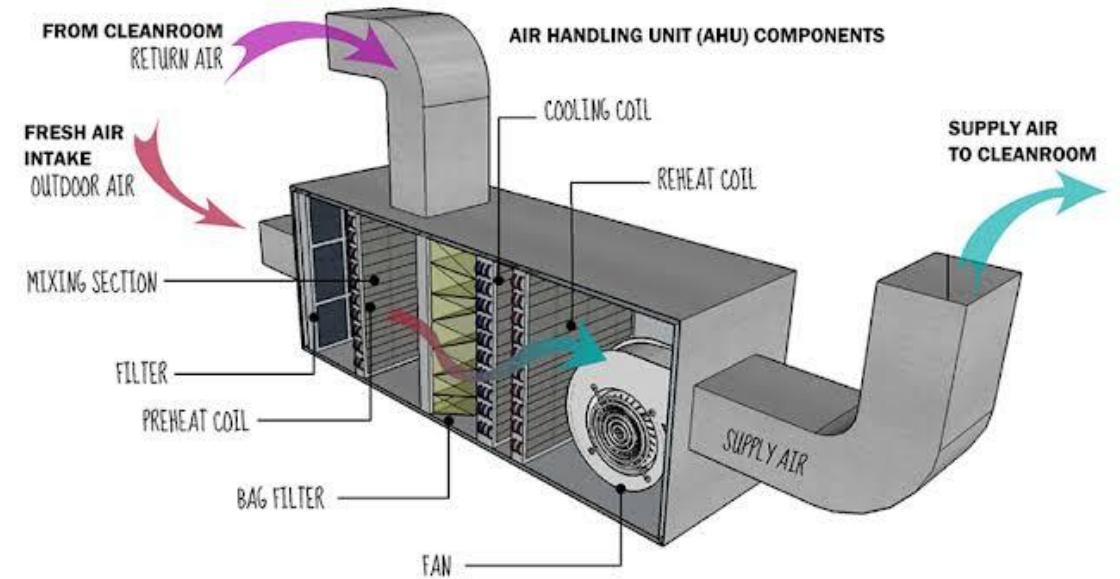


Mould and Mould Mitigation

Mould – Case Study

Failure of Air Handling Unit

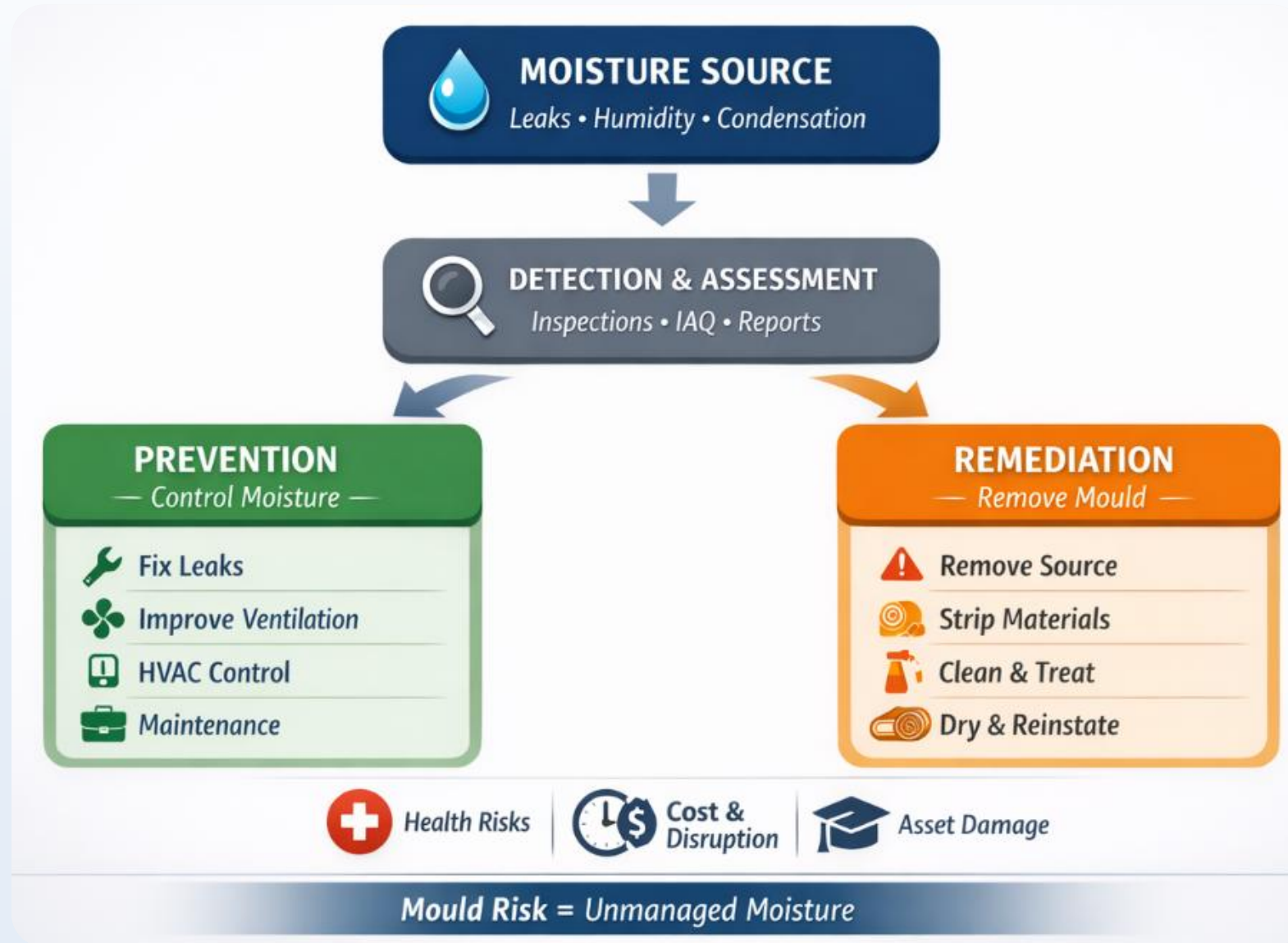
- Failure occurred over Christmas/New Year period in 2025-6
- Resulted in increased humidity while staff were on leave
- This led to significant mould growth.





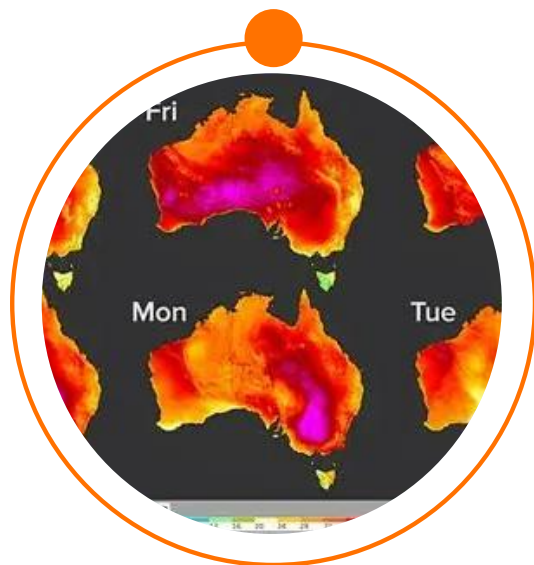
Coverage considerations

- Mould growth on carpets, furniture, ceiling tiles, walls and doors
- Mould remediation costs covered because breakdown of air handling unit is covered
- Initial estimate of mould remediation is \$60,000.
- Mould is not covered under the Property protection if there is no covered event but may be covered under the Environmental protection.



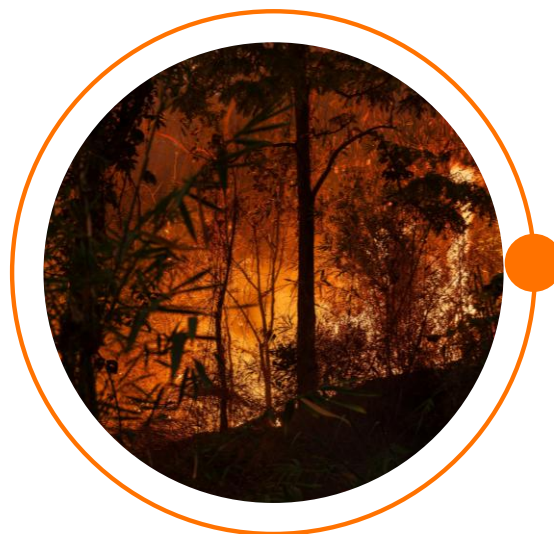


Building Resilience



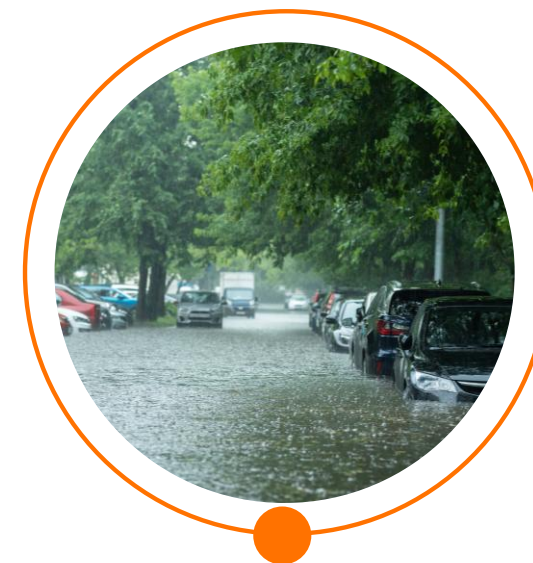
Extreme Heat

- Increasing frequency, duration & intensity.
- Heat related stress.
- Disruption to power and productivity.
- Emergency plans.



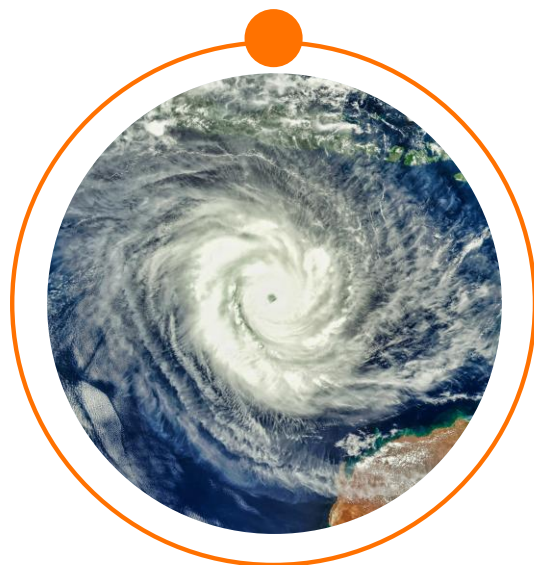
Bushfires

- More frequent & extreme.
- Heat & wind patterns combining for megafires.
- Fire resistive construction & vegetation control.



Flood

- More frequent & extreme. Back-to-back events.
- Urban flash floods with more intense rainfall events.
- Location of critical infrastructure.



Tropical Cyclones

- Less frequent landfall but stronger intensity.
- May be experienced further south.
- Construction requirements.



Convective Storms

- More frequent severe thunderstorms for east & north Aust.
- Larger hailstone events.
- Roofing & glazing requirements.



Drought

- Longer and more widespread.
- Water shortages.

Infrastructure Stress & Cascading Risks

Risks can be compounded:

- Saturated soils, flooding
- Saturated soil, wind
- Hail then rain
- Power grid outages.
- Access issues.
- Supply chain disruption.
- Health system overload.

Aging Infrastructure

- Buildings more susceptible to damage.
- Services more prone to breakdown.
- Higher maintenance requirements / costs.
- Often lack integration with modern tools (smart systems) slowing response.
- Compliance & sustainability deficiencies.
- Reputation.



BUILDING AND INFRASTRUCTURE REFURBISHMENT & CLIMATE HARDENING STRATEGIES





Hail Testing and Resilience Guidance Material

Hail is Getting Bigger



Unimutual, TEFMA and JCU CTS

Convective storms are becoming more intense and hail is getting bigger.

Unimutual and TEFMA have engaged the CTS at JCU to undertake material damage threshold testing on a range of materials commonly used across college and university campuses.

Test results will

- Improve awareness of the damage hail can cause
- Provide empirical data for modelling
- inform appropriate material selection and protection strategies moving forward
- Form the basis of an open-source research paper

Just one piece of work to ensure resilient campuses for the future



Resilience Guidance Material



A positive Intergenerational legacy

Yesterday was the time to be thinking about future resilience – but better late than never

The guidance material covers issues such as:

- Understanding how natural perils and climate change impact your location
- Adaptation and sustainability strategies
- Design standards for buildings and infrastructure to withstand future conditions – NCC focusses on people safety not building resilience
- Energy and water security
- The role of campus master planning now to create a strong resilience base for 50 years down the track





Q & A



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