



Photograph by Lismore City Council

2022 Paul Pholeros Architecture Scholarship

Final Report

How can we build-back better?

An exploration of new
housing potential in Lismore
following the unprecedented
flood events of February 2022

By
Victoria King

“Despite the evidence we continue to apply the old recipes of protection. Is that the only possible answer?”

We urgently need a paradigm shift: from protection to negotiation.”

Inaki Alday

Source: Inaki Alday, *Sea Change - Flood Resilient Architecture for the 21st Century*, exhibition curated by Eva Woode at ROCA London Gallery 1 Feb – 16 May 2020

This report has evolved in response to the unprecedented flood event that occurred in Lismore and the Northern Rivers region on February 28, 2022.

It attempts to grapple with both the lack of housing availability and increasing incidence of severe flood events affecting the region as two issues that are inextricably linked.

Within an age of increasing climatic extremes, architects have a role to play in advocating for improved housing diversity in both our urban and regional cities. By exploring the potential for smaller, taller, more collective, or shared ways of dwelling, we can make the most of our existing built environments. In doing so, we may retain and protect important natural and agricultural landscapes as key agents in mitigating the effects of climate change.

Whilst the impacts of the February 2022 flood event are still unfolding, Lismore City Council's *Affordable and Diverse Housing Strategy* makes clear that most of the housing issues identified before the floods remain.

Innovative approaches and exploration are thus urgently required to consider the ways that communities can live with increasing flood risk. Accordingly, this report speculates on a future scenario for Lismore, supported by illustrations and diagrams that might be helpful visual aids for the community.

The following pages collate research, interviews and design speculations undertaken in the second half of 2022 and the first half of 2023.

The report is divided into three booklets:

Booklet A – Site Investigation

What are the links between housing need and flood risk?

Booklet B – Case Studies

What can we learn from past and current practices?

Booklet C – Future Strategies

What opportunities are there to live safely within the floodplain?

BOOKLET A

SITE INVESTIGATION

What are the links between housing need and flood risk?

Can these two elements work to support each other?

How can we build-back better?

Does the elevated single dwelling suit all of our housing needs?

What can we learn from past and current practices?

What can we learn from the recovery and rebuild of Lismore?

How can we retrofit buildings to be more flood resilient?

Are there opportunities to live safely within the floodplain?

what are the links between housing need and flood risk?

The following pages gather key information from some of the publicly available documents produced over the past year to provide a contextual background for the City of Lismore and the recent flood events in the Northern Rivers Region.

It skims the surface on some of the cultural, historical, environmental, and social elements that make up the city and region today. Further reading and information can be found in the references at the end of this booklet.

All maps and diagrams have been produced by the author unless otherwise noted.

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1. **The Richmond River Floodplain and Catchment**
2. **Lismore City Context**
3. **Housing - current and future need in Lismore**
4. **February 2022 Flood Event**
5. **Understanding Floodplain Terminology**
6. **Mapping Flood Risk in Lismore**
7. **Lismore Levee Protection**
8. **Ongoing Recovery and Rebuild**

“Rising temperatures are predicted to significantly increase the likelihood of more frequent and heavier rain events leading to more frequent and severe flooding. This has precipitated a fundamental re-think about how we plan for the future of a regional city that was built in a floodplain at the confluence of two rivers.” Lismore City Council

Figure: Brendan Beirne, Waterlogged - Lismore in Images, Australian Geographic, March 2022 accessed: <https://www.australiangeographic.com.au/news/2022/03/waterlogged-lismore-in-images/>

Quote: Lismore City Council, Lismore Growth and Realignment Strategy (Draft), September 2022, p1

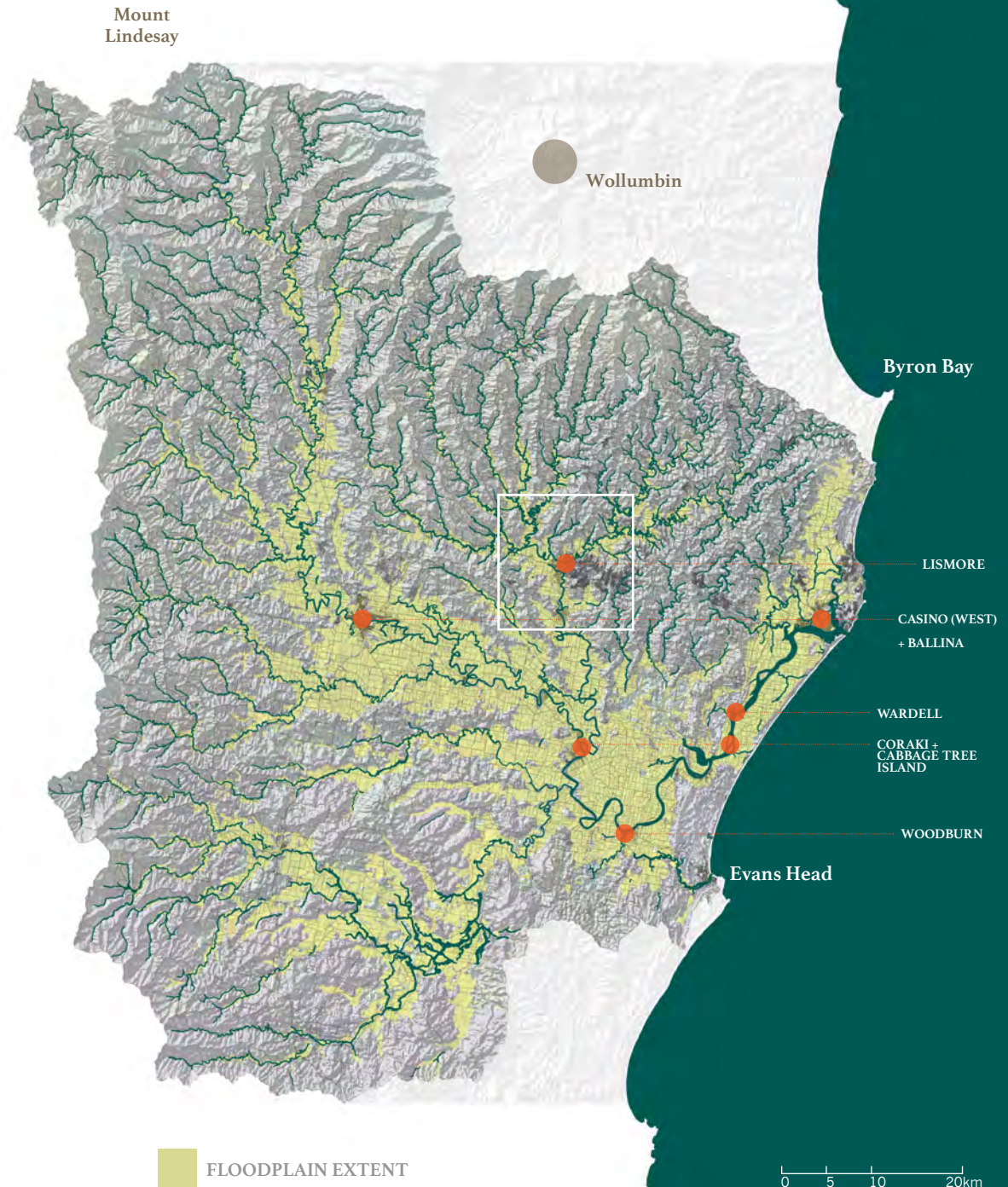
richmond river catchment

The lands and waterways of the Richmond River Catchment are the unceded territories of the peoples of the Bundjalung and Githabul Nations.

The Richmond River is 237 km in length and rises at 256 m to the west of Mount Lindesay in the McPherson Ranges. The river runs south-east, past Casino, until it is joined by various tributaries including the Wilsons River which flows through Lismore. The river enters its estuarine phase just south of Coraki, where it loops north-east to enter the sea at Ballina.

The catchment is around 6,860 square kilometres in area with approximately 15% of land comprising of floodplains adjacent to the river that continue to be regularly inundated during periodic flood events.

Flooding has always been, and will continue to be, a naturally occurring event in this environment.



Aerial View of Lismore showing North Lismore in the foreground, City centre to the left, and South Lismore in the background. Photograph by Skyepics



a regional city at the confluence of two rivers

Lismore sits at the confluence of two tributaries of the Richmond River, the Wilsons River and Leicester Creek. These tributaries sit on the land of the Widjabul people of the Bundajung Nation and have sustained life for more than 60,000 years.

European settlement at this location expanded rapidly in the 1840s with the arrival of cedar cutters making use of the furthest navigable section of the river by vessel. River transport for the movement of material stripped from the 'Big Scrub' rainforest that once blanketed the region established the town as a key trade hub in Northern NSW during the 19th century.

Lismore continued to grow throughout the 20th century as an important agricultural, manufacturing, retail and health centre for the surrounding regions. These industries continue to sustain the community today.

Resident Population

Lismore's estimated resident population is **44,334** (2021 Census). Before the floods, it was projected that the population would increase by 13.6% over 20 years with an anticipated 3,105 new dwellings required to meet growth.

Total Dwellings

There are approximately **19,774** dwellings in Lismore, with approximately 63% of people living in urban areas and 36% of people living in rural or village areas beyond the urban footprint.

Average Household Size

The average household size in Lismore is **2.36** people.

*Figures sourced from Australian Bureau of Statistics, Census of Population and Housing 2016 and 2021

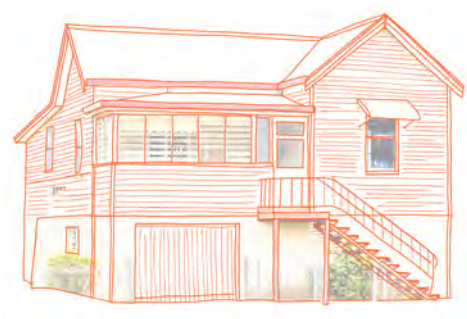
Source: Lismore City Council, Lismore Growth and Realignment Strategy (Draft), September 2022, p 4.
accessed: <https://yoursay.lismore.nsw.gov.au/growth-and-housing>

housing in lismore

In May 2023, Lismore City Council released its *Affordable and Diverse Housing Strategy*. Within this report, statistics derived from the 2016 – 2021 Census describe the mismatch between current housing provision and the housing needs of the population in Lismore.

The report states that whilst the disruption caused by the February 2022 flood disaster means that it is not possible to predict the long-term implications for Lismore’s population, many of the housing issues that existed before the floods still remain.

Some of these issues include: the need for additional low and moderate cost housing, the need for additional rental stock and the need for a more diverse range of housing that is suitable for an ageing and changing population.



“A large portion of Lismore’s homes are occupied by only one or two people...despite the large percentage of dwellings that have three or more bedrooms.”

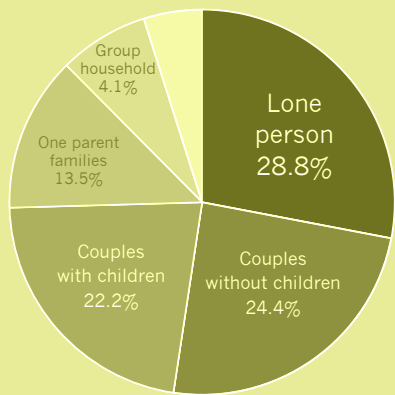
Lismore City Council

Source: Lismore City Council, *The Lismore Diverse and Affordable Housing Strategy* (Draft), September 2022, p23 accessed: <https://yoursay.lismore.nsw.gov.au/growth-and-housing>

KEY FIGURES:

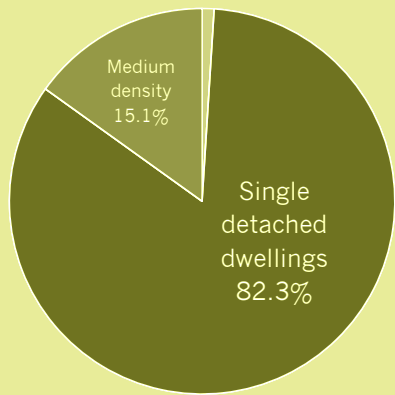
Household Type

The fastest growing household type within Lismore is people living on their own, representing 28.4% of all households. This type is followed by couples without children, representing 24.4% of the population.



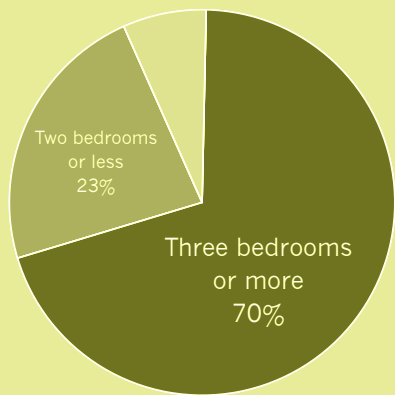
Dwelling Type

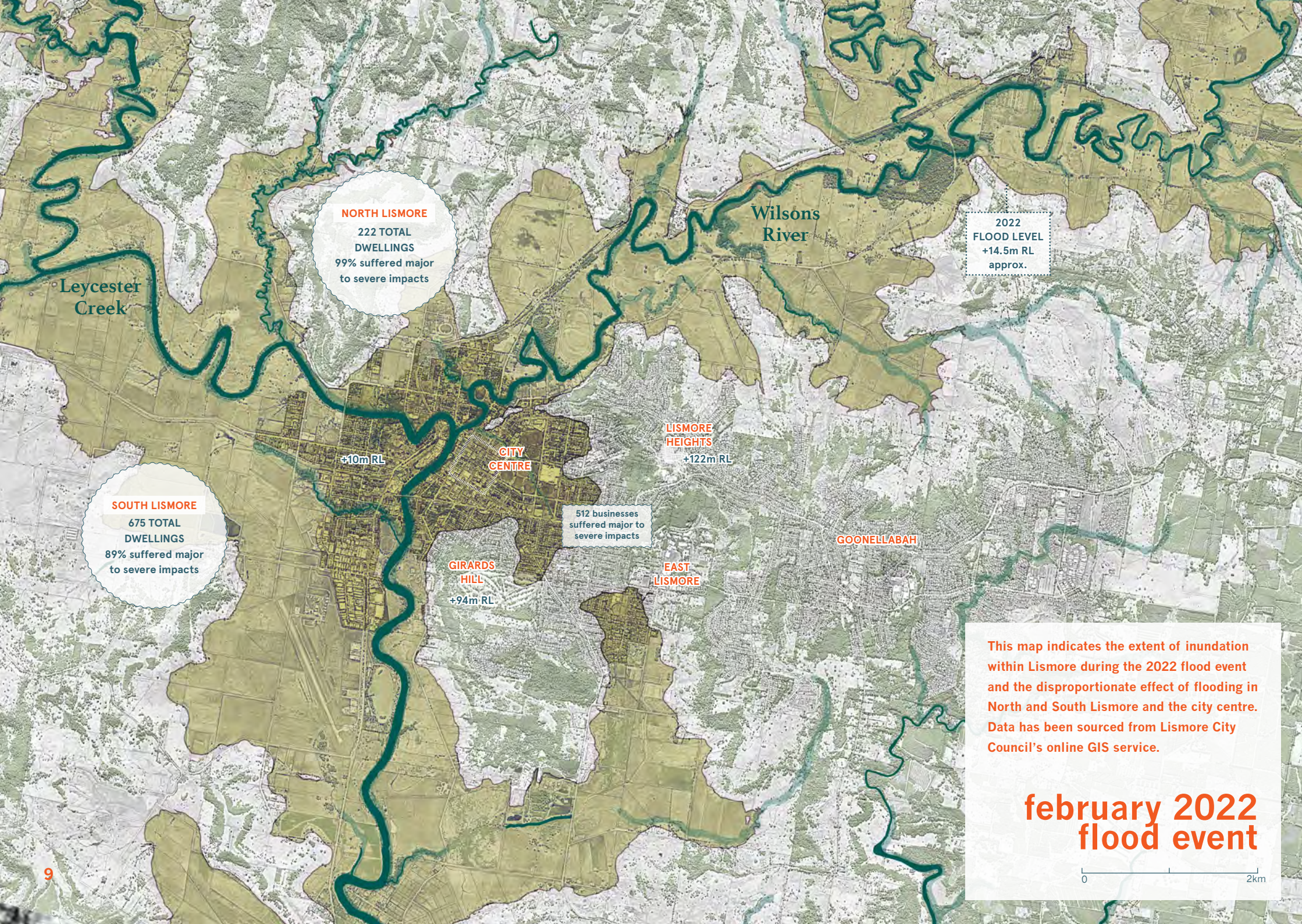
Single detached houses represent a large proportion of dwelling types in Lismore at 82.3%. Only 15.1% of dwellings are considered medium density and 0.5% high density.



Bedrooms Per Dwelling

Dwellings with three or more bedrooms dominate the housing market in Lismore with 70% of all dwellings containing three bedrooms or more. Houses containing less than two bedrooms constitute 23% of the market.





NORTH LISMORE

222 TOTAL
DWELLINGS
99% suffered major
to severe impacts

2022
FLOOD LEVEL
+14.5m RL
approx.

Leicester
Creek

Wilson's
River

LISMORE
HEIGHTS

+122m RL

CITY
CENTRE

+10m RL

SOUTH LISMORE

675 TOTAL
DWELLINGS
89% suffered major
to severe impacts

512 businesses
suffered major to
severe impacts

GOONELLABAH

GIRARDS
HILL

+94m RL

EAST
LISMORE

This map indicates the extent of inundation within Lismore during the 2022 flood event and the disproportionate effect of flooding in North and South Lismore and the city centre. Data has been sourced from Lismore City Council's online GIS service.

february 2022
flood event

0 2km

february 2022 flood event

Large parts of northern NSW and southern Queensland were impacted by unprecedented flooding events during February and March of 2022. On the 28th of February, Lismore experienced a devastating flood event with floodwaters reaching 14.5m, nearly 3m higher than the last major flood event of 2017.

Whilst the impact of this natural disaster was felt across the entire Northern Rivers region, the concentration of damage to the city centre and residential areas of Lismore have prompted a major rethink of the future flood resilience of the city.

KEY FIGURES:

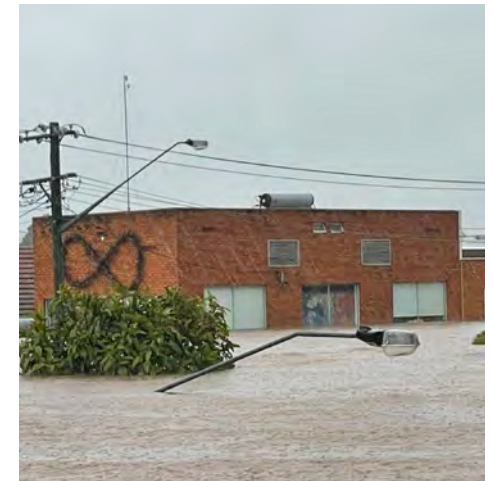
- 1,720 residential properties impacted by flooding (9% of total housing stock in Lismore)
- 1,399 properties assessed with major or severe impact
- 2,000 people estimated homeless
- 3,120 businesses estimated to be directly impacted by flooding

“Some 3,000 homes and commercial buildings were inundated on February 28, including pretty much every house in North and South Lismore.

Most of these homes are empty shells, stripped of their inner walls, insulation, ceilings, carpets and cabinetry...disgorged onto the street in piles almost as high as the flood stood. In all, some 70,000 tonnes of home contents went to landfill.”

John van Tiggelen

Quote: John van Tiggelen, “Rethinking Lismore in the new era of floods”, *The Monthly*, Aug 2022. Flood Impact Statistics: “Flood Response: June 2022”, Lismore City Council, pg 29-30



Images: Brendan Beirne, Waterlogged - Lismore in Images, *Australian Geographic*, March 2022 accessed: <https://www.australiangeographic.com.au/news/2022/03/waterlogged-lismore-in-images/>

understanding floodplain terminology

The Australian Disaster Resilience Handbook, *Managing the Floodplain: Best Practice in Flood Risk Management* provides useful information on the ways in which flood risk is determined in Australia. The following definitions have been extracted to help illustrate flood risk in Lismore.

ANNUAL EXCEEDANCE PROBABILITY (AEP)
Refers to the probability each year of a certain size flood event being exceeded and reinforces that there is an ongoing flood risk every year.

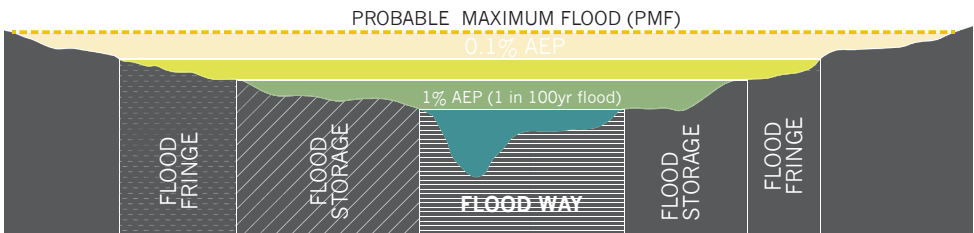
PROBABLE MAXIMUM FLOOD (PMF) is the largest flood event that could possibly occur in a particular location. It exceeds virtually all flood development standards and overwhelms many flood mitigation works. The PMF is generally used for emergency management planning.

LISMORE AEP LEVELS

(*Probability of experiencing flood event in an 80yr period)

| | | | |
|---------------|--------|---|--------------------------|
| 1% AEP | 12.57m | 55.3%* | (1 in 100 year flood) |
| 0.2% AEP | 13.02m | 14.8%* | (1 in 500 year flood) |
| 1:1,000 AEP | 13.79m | | |
| 1:2,000 AEP | 14.02m | | |
| 1:10,000 AEP | 14.39m | | |
| 1:100,000 AEP | 15.47m | 0.8%* | (1 in 10,000 year flood) |
| PMF | 16.55m | Largest flood that could possibly occur | |

understanding flood function



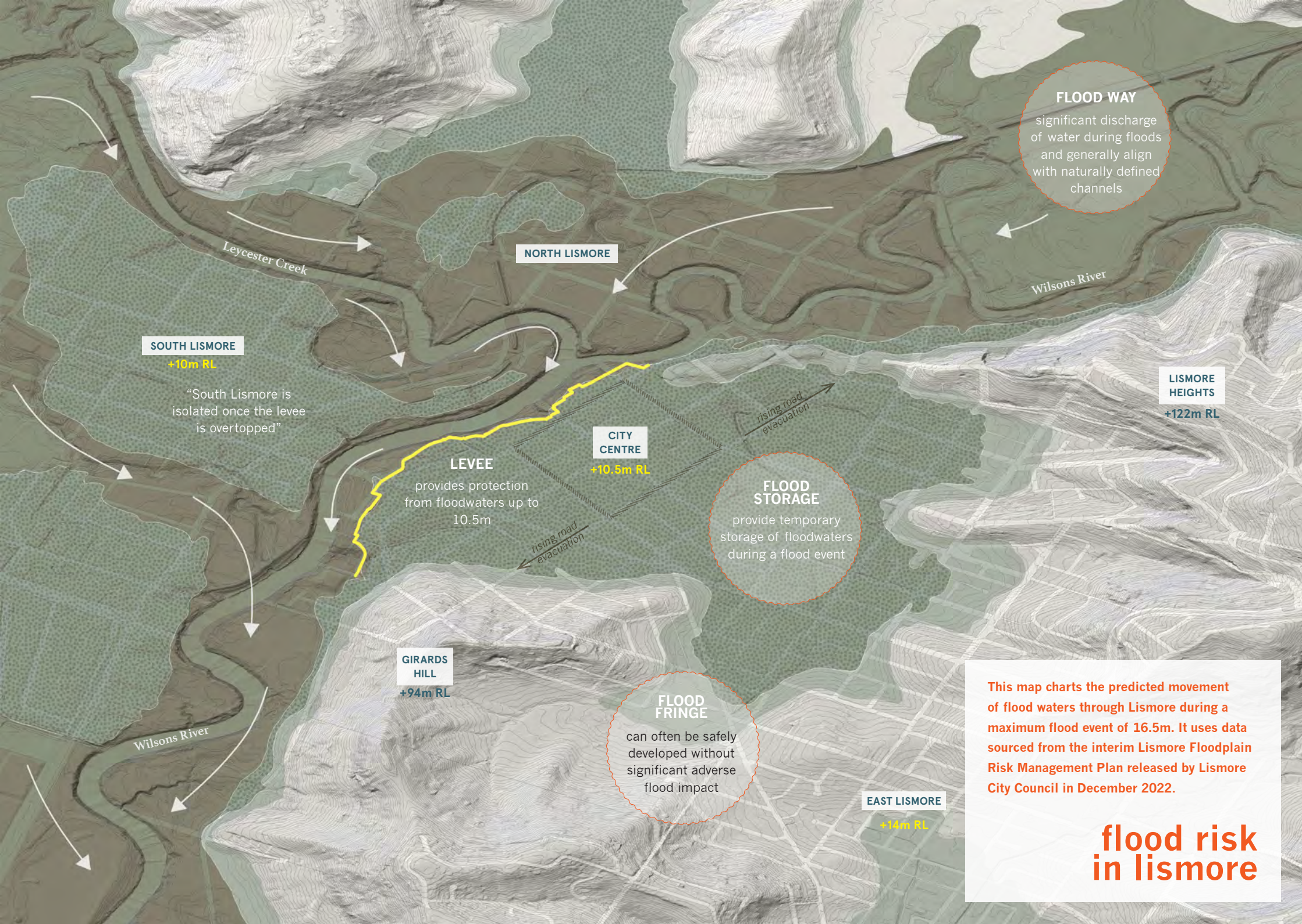
defined zones during a flood event (adapted from the Australian Institute for Disaster Resilience)

“Maintaining the flood function of the floodplain is a key objective in flood risk management. It is essential to ensure that the floodplain can perform its natural functions of flow conveyance and storage.”

Australian Institute for Disaster Resilience

- FLOOD WAY** – floodways convey a significant discharge of water during floods and generally align with naturally defined channels.
- FLOOD STORAGE** – areas of the floodplain that are outside of floodways that generally provide temporary storage of floodwaters during a flood event.
- FLOOD FRINGE** – the remaining areas within the floodplain. That can often be safely developed without significant adverse flood impacts.

Australian Disaster Resilience Handbook 7, Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR 2017) pg 41



FLOOD WAY

significant discharge of water during floods and generally align with naturally defined channels

SOUTH LISMORE

+10m RL

"South Lismore is isolated once the levee is overtopped"

NORTH LISMORE

CITY CENTRE

+10.5m RL

LEVEE

provides protection from floodwaters up to 10.5m

FLOOD STORAGE

provide temporary storage of floodwaters during a flood event

LISMORE HEIGHTS

+122m RL

GIRARDS HILL

+94m RL

FLOOD FRINGE

can often be safely developed without significant adverse flood impact

EAST LISMORE

+14m RL

This map charts the predicted movement of flood waters through Lismore during a maximum flood event of 16.5m. It uses data sourced from the interim Lismore Floodplain Risk Management Plan released by Lismore City Council in December 2022.

flood risk in lismore



Lismore city centre levee wall at Spinks Park, stripped of its stone facing following the 2022 floods

lismore levee protection

A levee is a natural or artificial wall used to prevent rivers from flooding built up areas during a high rain event.

The city centre and South Lismore levees provide protection for flood events up to approximately 10.5m, roughly equating to a predicted 1-in-10 year flood event. This flood level is almost 6m lower than the predicted probable maximum flood (PMF) level in Lismore.

Whilst the levee provides limited protection and hinders the flow conveyance of flood waters, it provides one crucial benefit for businesses and residents:

Longer Evacuation Time

The levee provides businesses and residents within the city centre with a longer evacuation period, helping the community to enact flood plans and prepare buildings for inundation.

“What about raising the levees? This doesn’t work, because water constrained by the levee rises to even greater heights. If we had raised the existing levee to 15m, the February flood would have had its flow restricted by 75%.”

Jerry Vanclay

Source: Jerry Vanclay, It's time to come clean on Lismore's future. *The Conversation*, June 14 2022



City Centre Flood Gates



Pump Station

ongoing recovery and rebuild

While uncertainty remains around the long-term use of the city centre and surrounding suburbs, urgent repair and rebuild works are slowly recovering hundreds of businesses and residences in Lismore. Ongoing recovery work is being undertaken by private building owners, volunteer networks and through state and local government funded programs.

Ultimately, Lismore's strong community network is sustaining a culture of flood resilience.

Many community members are still lending their time each week to support residents directly impacted by the floods. This was directly witnessed while volunteering in March of 2023 with the *Two Rooms Project*, run by Resilient Lismore, pictured beside.

RESILIENT HOMES PROGRAM

Will provide crucial support for flood affected residents, coordinated by the Northern Rivers Reconstruction Corporation (NRRC). The program is anticipated to provide support to approximately 6000 dwellings.

Buybacks

Voluntary purchases will be offered to homes that are located within the 20% AEP (1-in-5 year) flood zones.

Home Raising

Houses located within the 5% AEP (1-in-20 year) flood zone will be eligible for \$100,000 of funding towards elevating livable floor levels. This assistance is dependent on the construction of the house (only viable for timber framed houses).

Home Retrofitting

Houses located within the 1% AEP (1-in-100 year) flood zone will be eligible for \$50,000 of funding towards the cost of retrofit and

Information gathered from the booklet - Northern Rivers Reconstruction Corporation, Flood Resilient Design Framework: Resilient design activities for the resilient homes program, NSW Government, February 2023



Common repair works to flood affected houses include strengthening and re-lining timber frame walls



“Guiding principles for any land swap scheme should include that relocation opportunities be offered by street of precinct areas so that existing community networks and connections can be maintained.”

Lismore City Council

Source: Lismore City Council, Lismore Growth and Realignment Strategy (Draft), September 2022, p 4

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BOOKLET B

CASE STUDIES

What are the links between housing need and flood risk?

Can these two elements work to support each other?

How can we build-back better?

Does the elevated single dwelling suit all of our housing needs?

What can we learn from past and current practices?

What can we learn from the recovery and rebuild of Lismore?

How can we retrofit buildings to be more flood resilient?

Are there opportunities to live safely within the floodplain?

what can we learn from past and current practices?

This booklet collects a series of case studies that engage with more affordable, alternative, or smaller footprint models of housing from Australia and around the world. They have been selected as reference points for best practice and provocations that might contribute to the discussion around the future of housing in Lismore.

Each of the case studies highlight an element, system or approach that could be applied to the unique context of Lismore as both a regional and flood prone city. They vary in scale, number of dwellings, age and materials.

The case studies are organised in no particular order and are designed to be read as standalone pieces.

CONTENTS

1. **Housing Diversity: alternatives to the single dwelling**
2. **Nightingale Ballarat**
Ballarat, VIC
3. **Back-to-back Patio Houses**
Amsterdam, NL
4. **Singapore Shophouses**
5. **Habitat Live/Work**
Byron Bay, NSW
6. **Shanghai Lilong**
7. **La Balma Housing Cooperative**
Barcelona, Spain
8. **Amsterdam Canal House**
9. **Nieuw Terbregge**
Rotterdam, NL
10. **Sustainable Housing for Artists and Creatives (SHAC)**
Perth, WA
11. **Dwelling Mounds - Terpen**
12. **Hafencity**
Hamburg, Germany

“Water is not the enemy...we rely on it as much as we have to guard ourselves against it. Changing patterns will force us to both harvest rain water to endure longer periods of dry spells, as well as make space for unpredictable excess.”

Robert Verrijt

Quote: Robert Verrijt, *Sea Change - Flood Resilient Architecture for the 21st Century*, exhibition curated by Eva Woode at ROCA London Gallery, 2020 Figure: Island Hallig Hooge, The Netherlands/Hooge, The Netherlands, <https://frisiacoasttrail.blog/2020/10/08/manual-making-a-terp-in-12-steps/>

housing diversity

Exploring alternatives to the single dwelling house

The make-up of housing in Lismore is currently predominated by large, free-standing dwellings. While this condition is typical of many regional centres, it is increasingly at odds with a nationwide trend towards smaller household sizes. Statistics described in Lismore City Council's *Affordable and Diverse Housing Strategy (2023)* make a compelling case for exploring new ways of dwelling that might be more appropriate for the residents of Lismore.

- Separate houses account for more than 80% of Lismore's total housing stock.
- Most of these houses contain three or more bedrooms.
- More than 50 % of households in Lismore are made up of two people or less.

'Housing diversity' refers to a range of housing options that meet the needs of an evolving and ageing population. A diversity of building types, dwellings and neighbourhood precincts may help to improve housing choice, affordability and flood resilience in Lismore.

"The private sector housing market's continuing preference for larger free-standing dwellings on individual lots also doesn't always meet the housing needs of many other sections of the community"

Lismore City Council

Lismore City Council, *The Lismore Diverse and Affordable Housing Strategy (Draft)*, September 2022, p23 accessed: <https://yoursay.lismore.nsw.gov.au/growth-and-housing>



TERRACE TYPES



THE "SIX PACK" OR WALK UP FLAT



THE DUPLEX OR TRIPLEX



THE QUEENSLANDER

THE TOWN HOUSE OR VILLA CLUSTER



smaller, taller, more collective or shared ways of dwelling



SHOP-TOP



THE NIGHTINGALE MODEL



THE TINY HOUSE



THE GRANNY FLAT



CO-HOUSING OR COOPERATIVE RENTAL

CASE STUDY : HOUSING

Nightingale Ballarat, Breathe, 2022 Ballarat, Victoria

Nightingale Ballarat is a five-storey development occupying a former warehouse site in Ballarat's city centre. The project provides twenty-seven apartments (1,2 & 3 beds) with a shared rooftop garden and laundry. The ground floor street frontage includes a community room, café and office space. The use of locally-sourced, recycled bricks refer to the existing urban context.



With Ballarat's population expected to increase rapidly, this building offers an approach to improved housing density and equity for the region. 40% of dwellings have been allocated to an affordable housing provider, or set aside for key community workers.

Whilst this project embodies many of the principles of good urban development, it intersects with some fundamental questions surrounding medium density housing in historic regional town centres.



ground floor plan



What proportion of infill development can be sustained by regional town centres?

Is this scale of development the right fit for Lismore?

Figures. Breathe, Architect, Kate Longley and Derek Swalwell, photographer. Nightingale Housing, Ballarat. 2022, <https://www.nightingalehousing.org/project/nightingale-ballarat>. Ground floor plan sourced from: <https://frameweb.com/project/nightingale-ballarat>



Light wells and roof patios organise the arrangement of living spaces. A ground floor 'carport' serves as entry portico and outdoor room.

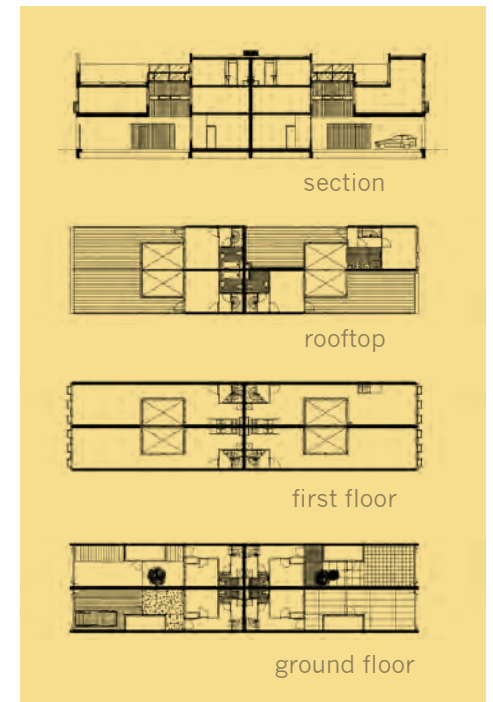


CASE STUDY : HOUSING

Back-to-back Patio Houses, Kohter en Salman, 1998 Amsterdam, The Netherlands

The neighbourhood of Borneo Sporenberg was developed as two peninsula extensions of the Amsterdam Docklands to provide 2,500 new homes for the city in a "high density/low rise" model. In a terrace-row like arrangement, Kohter en Salman designed 50 dwellings in a back-to-back patio typology.

The rooftop patio and central lightwell function as an organizing element of the dwellings, providing cross ventilation, shared views and filtered light. A ground-floor carport serves as entry portico with sliding lattice gate whilst living and kitchen spaces are elevated to the first floor. Bedrooms are located on the second floor adjoining the roof top terrace garden.



Figures. Kenk Architecten, Architect, unknown, photographer. Amsterdam, The Netherlands. 1998, <https://www.kenkarchitecten.nl/borneo-sporenburg-amsterdam.html>

VERNACULAR TYPOLOGY

singapore shophouses

The shophouse is a key part of Singapore's vernacular architectural tradition. The Singapore Master Plan of 1955 first defined the shophouse as a form of housing with a "narrow frontage of 20 feet (6m) or less, built in terraces to a depth of 70 feet (20m)."⁽¹⁾ The typology is essentially multi-purpose, combining business areas on the ground floor with residential quarters on the upper floors.

KEY DESIGN ELEMENTS:

- Internal courtyard
- Central air well for light and cross ventilation
- Exposed structural elements, floor joists and roof beams
- Pitched roof and wide eaves for water shedding
- Tiled surfaces – durable materials applied to ground floor and walls
- Open colonnade on street frontage – "five foot way"

"The shophouse... follows a basic floor plan of narrow frontage and common party walls; with a versatility of being able to serve many functions such as economic, residential and recreational purposes."

Victor Savage

Reference: (1) Victor Savage, "Singapore Shophouses: Conserving a Landscape Tradition," *SPAFA Journal* 11, no.1: 5-22. Figure aside: *ibid.* pg. 19.

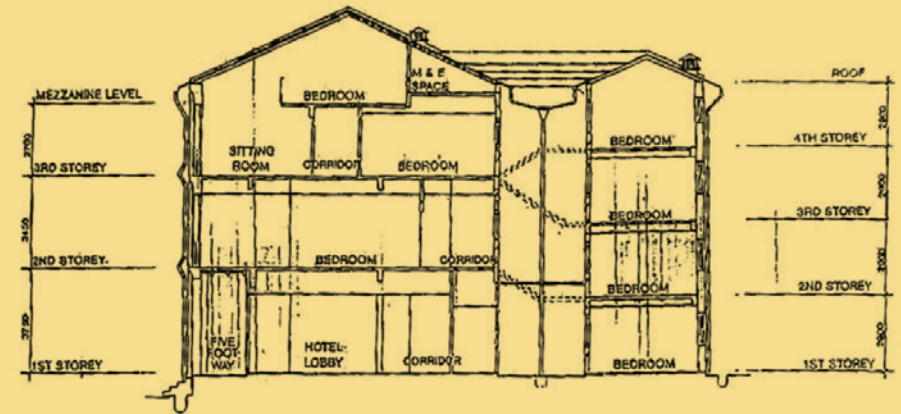
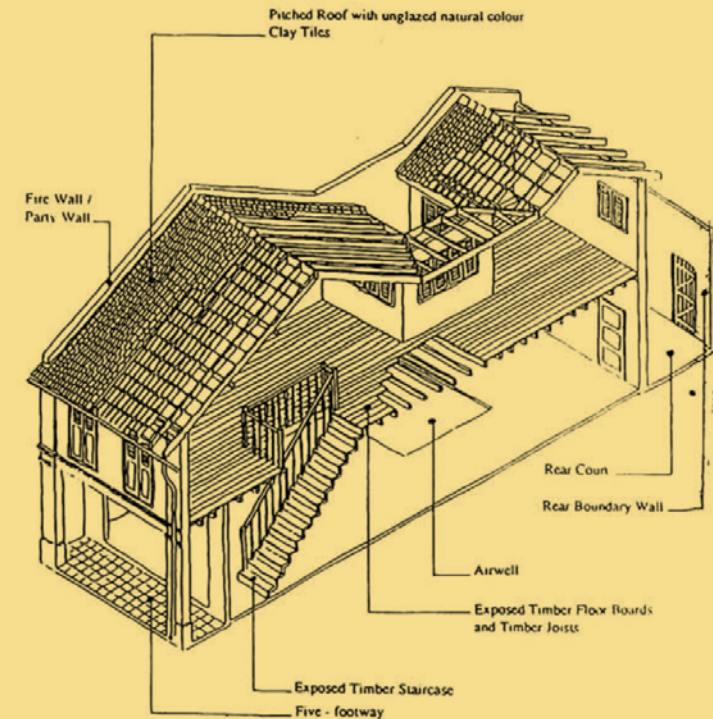


Figure 10: Cross sectional view of the hotel



Source: Historic Districts: Conservation Guidelines for Chinatown Conservation Area

Figure 11: Key Elements of the Shophouse



FLOOD RESILIENT PRINCIPLES

Evolving in the tropical climate of Singapore, the shophouse has had to adapt to frequent incidences of heavy rainfall, flash flooding and high humidity. Parallels may be drawn between this context and the recent weather events experienced in Northern NSW.

durable ground floor materials

such as concrete that has been rendered or tiled, provide a weatherproof foundation that is easily cleaned in the event of a flash flood.



central courtyard/ air wells

assist with cross-ventilation and access to sunlight, key elements for tackling humidity and rising damp. Open courtyards also offer a space for water capture and storage, potentially slowing the movement of water onto the street.

generously sheltered walkways

offer protection for residents and the public from heavy rain and flash flooding.



Figures, National Archives of Singapore, <https://www.miniature-stories.com/singapore-shophouses-then-and-now/>, streetfront: <https://dollarsandsense.sg/things-know-shophouses-singapore-expensive/>



Figure 7: First Transitional Shophouse Style



Figure 8: Second Transitional Shophouse Style



Figure 9: Late Shophouse Style: Chinese Baroque

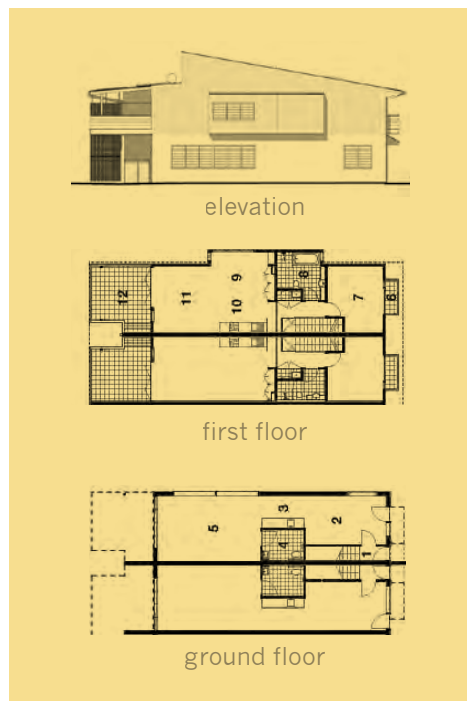
CASE STUDY : HOUSING

Habitat Live/Work, DFJ Architects, 2017 Byron Bay, NSW

Habitat is a mixed-use development located 4km outside of Byron Bay's town centre. The Live/Work terraces respond to an increasing prevalence of self-employment and post-covid 'work from home' arrangements.

Two buildings with 24 residences combine both living and working spaces across two levels. Forming a terrace type arrangement, ground floor "home offices" of 60 sqm offer a semi-public street frontage whilst the upper level is reserved for private living in the form of a one bedroom 80 sqm apartment. Whilst the apartments have independent access, a commitment has lease holders living above their commercial tenancy to ensure that work coexists with life.

More than 82 dwellings have now been built on the Habitat site with retail, commercial and communal recreational facilities.



Ground floor work spaces offer a positive, semi-public street frontage.

Could this model be adapted to shop top housing design in Lismore's CBD?

Figures. DFJ Architects, Architect, Christopher Frederick Jones, photographer. Byron Bay, NSW. 2017, source: <https://dfj.com.au/project/habitat-live-work/>; <https://www.archdaily.com/933859/habitat-live-work-dfj-architects/>

VERNACULAR TYPOLOGY

shanghai lilong

Lilong housing emerged during a time of rapid urban development and population increase in Shanghai during the late 19th century.

Buildings are arranged in “fish-bone” block structures of streets and lanes, which served as dynamic communal space for dwellers. Neighbourhood lanes recall the internal space of the traditional Chinese courtyard, offering an extension of public/private dwelling space.

Increasing land costs have led to the demise of *lilong* neighbourhoods which no longer provide enough density to be economically sustainable.

KEY DESIGN ELEMENTS:

- Single family houses with party walls
- Narrow lots ranging from 14-8 meters in width
- Semi-private ground floor with programmatic flexibility
- Ground floor service areas including kitchen and bathroom
- System of spatial hierarchy from public to private
- Neighbourhood lanes serving as primary communal space
- Brick bearing or concrete wall construction and timber floor and roof structure



“Not only the lanes themselves become public realm, but also the entire ground floor of the *lilong* neighbourhood”

Non Arkaraprasertkul



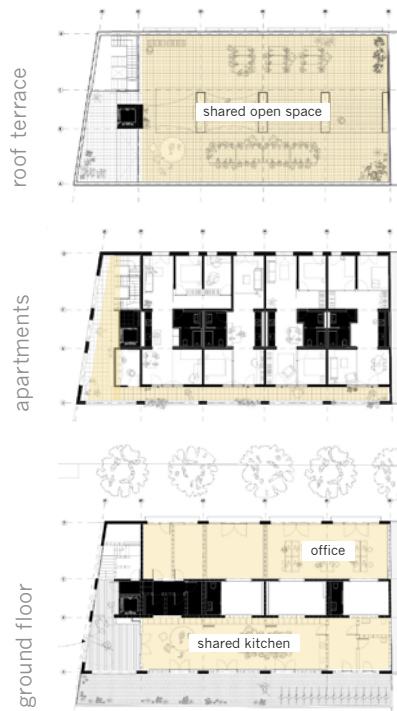
Figures: Sectional study - Non Arkaraprasertkul, “Towards modern urban housing”, *Journal of Urbanism*, 2:1 (2009), Streetscape images by Mintcafe, https://fr.wikipedia.org/wiki/Lilong#/media/Fichier:Bu_gao_li.jpg and Brandon McGhee, <https://www.smartshanghai.com/articles/shanghai-life/walking-into-the-lanes-of-shanghai>



CASE STUDY : HOUSING

La Balma Housing Cooperative,
Lacol Architecture, 2021
Barcelona, Spain

La Balma is the product of a community and government-led competition to designate public land for affordable rental housing. The building was designed and is managed by a cooperative and incorporates 20 apartments with flexible plans to accommodate differing household needs over time. Each unit starts from a 50sqm base, and can progress to house larger groups as needed.



The environmental impact of the durable concrete ground floor is tempered by cross-laminated timber framing of the upper levels.

Figures. Lacol, Architect, Milena Villalba, photographer. Lacol Arquitectura, Barcelona, Spain. 2021, <https://www.lacol.coop/projectes/la-balma/>

The ground floor incorporates a communal kitchen and dining room, bicycle storage, workshops and two commercial tenancies addressing the street. Circulation throughout the building is designed as communal space for gathering, open corridors providing entry to apartments are filled with pot plants and chairs, a social zone for interaction. The open roof terrace provides space for productive gardens, play and events.



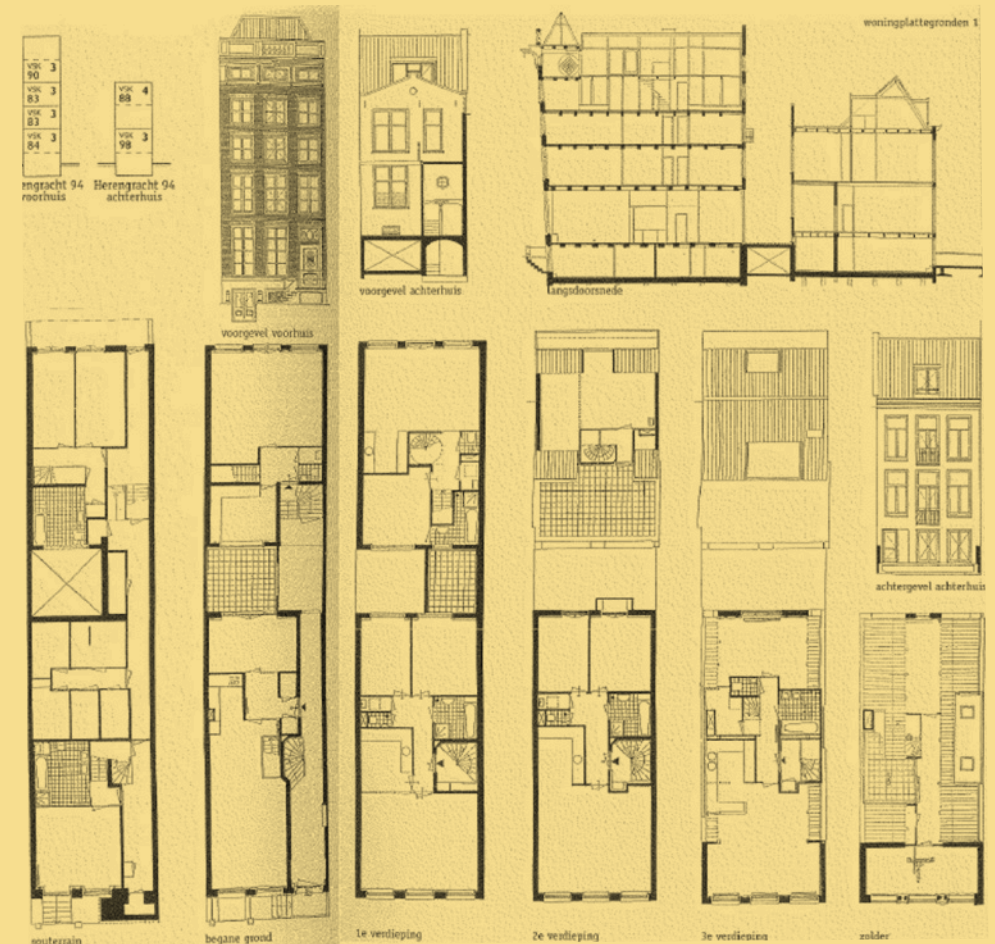
Canal houses emerged in Amsterdam in the 17th century when city was Northern Europe's most dominant port. The typology was developed for merchant traders who required both a place live and store goods. Proliferating along the canals of the city, goods would arrive by boat and then hoisted by crane and winch onto land.

Canal houses thus served as quasi-commercial and residential spaces with up to 50% of internal building space utilised for the warehousing of goods. Small-scale warehousing was abolished in Amsterdam following the occupation of Napoleon in the 19th century.

Hoist beams continue to be utilised in traditional canal houses, predominantly for the movement of large household items.

KEY DESIGN ELEMENTS:

- Deep, narrow lots with elongated floor plans
- Elevated ground floor and front entry (up to 10 stairs)
- Upper floors designated as storage space for goods
- Gable roof with elaborate parapet forms
- Hoist beams
- Large operable windows for movement of goods through street facade

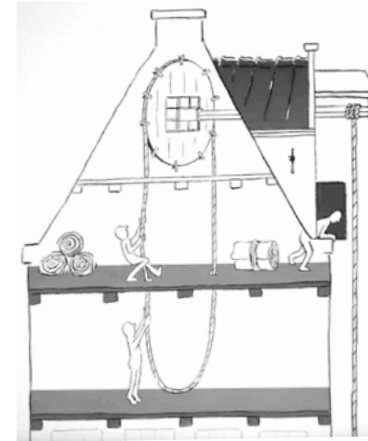


17th century canal house -
typical plans + sections

Figures: Typical Canal House. Herengracht 81. Photographer: Thomas Schlijper. <https://schlijper.nl/120509-01-herengracht-81.photo> Historic plans, Buro De Binnenstad sourced at <https://www.slideshare.net/JozefvanRuiten/presentation-amsterdam-east-harbour>



How can we improve infrastructure to support the mobility of goods between levels within our buildings?



FLOOD RESILIENT PRINCIPLES

Canal Houses served as 'living machines' to support the livelihoods of their occupants. Many features of these quasi/industrial waterfront buildings can interestingly be applied to contemporary principles of flood resilient design.

Mechanisms for Hoisting

Hoist beams were essential working elements within the canal house, ensuring the mobilisation of goods to upper levels without the use of power. This infrastructure can be seen within the warehouse facades of Lismore's city centre and perhaps offer an alternative mechanism for moving objects above flood waters.

Upper level storage space

Goods were typically stored in the uppermost levels and roof structure of canal houses. This allowed the safeguarding of stock from potential water damage. Movement between levels was supported by large operable windows and hoist beam mechanisms. Similarly, provision of rooftop storage zones could provide a safeguard for ground floor retailers in Lismore's city centre.

Figure A: Dutch Canal, Leidsegracht 2017, by C Messier, https://commons.wikimedia.org/wiki/File:Leidsegracht_46-54_7263.jpg

Figure B: Madelievenstraat. Photograph taken in 2017. David Carr Smith, Amsterdam. http://www.davecarrsmith.co.uk/D-WW_APNDX4_arch.htm

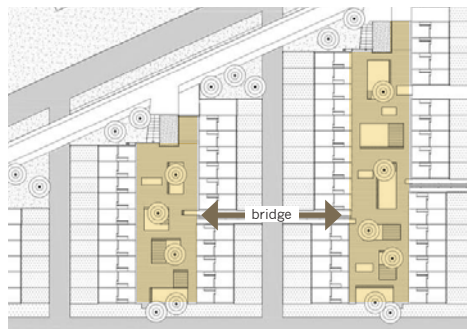
Figures: Various views of hoist beams. Amsterdam Canal Houses, *Our Lord in the Attic Museum*, source: <https://whatsupwithamsterdam.com/canal-houses/> <https://www.alamy.com/stock-photo/amsterdam-pulley.html?cutout=1&sortBy=relevant>

CASE STUDY : HOUSING

Nieuw Terbregge, Mecanoo, 2002, Rotterdam The Netherlands

Nieuw Terbregge arranges 150 dwellings to form a new urban neighbourhood of 'islands and bridges' on a waterfront site in Rotterdam. Private and communal living spaces have been elevated above the ground plane and out of potential flood risk.

Houses are arranged as terrace-type clusters, connected at the elevated living level via broad timber decks and longer draw bridge style walkways. Open cuts into the timber decks frame views to the lower level landscape, car-parking and communal amenities.



site plan



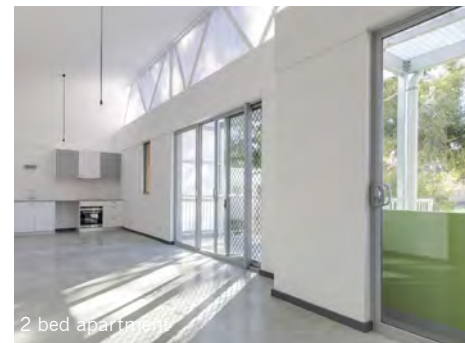
section through houses + communal terrace



Elevated living spaces reduce the risk of flood inundation and encourage interaction between residents.

Could terracing or ramps help improve connections between levels?

Figures. Mecanoo, Architect, Ossip Architectuurfotografie, photographer. Dwelling Nieuw Terbregge Area, Rotterdam. 2002, <https://www.mecanoo.nl/Projects/project/30/Dwelling-Nieuw-Terbregge-Area>



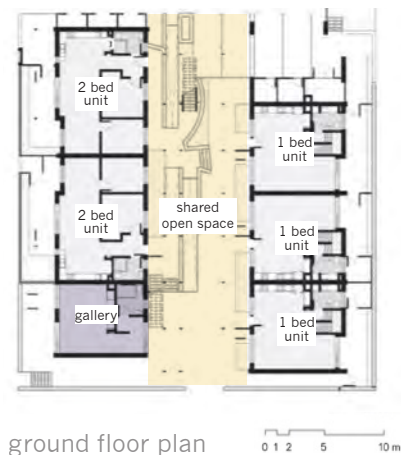
CASE STUDY : HOUSING

SHAC at WGV, With Architecture Studio Perth, WA, 2016

SHAC – Sustainable Housing for Artists and Creatives – is a development managed by affordable housing provider, Access Housing, to support Fremantle’s creative industry. In this development, rent for apartments is calculated as a percentage of an artist-resident’s income.

Twelve apartments are arranged in two buildings which open on to a shared communal garden. Ground floor studio and gallery spaces provide productive workspace and allow for communal exhibitions, performances, and workshops.

SHAC is situated within a broader precinct of innovative housing projects led by the WA Government. Occupying the site of a former school, the precinct serves as a demonstration of high quality infill development.



“The SHAC group came together through a shared realisation that Fremantle’s artists are being priced out of the rental and home ownership market.” SHAC Freo

Figures. With Architecture Studio, Architect, Robert Frith and Edwin Janes, photographer. Perth, WA. 2017, <https://architectureau.com/articles/wgv/#>, <http://www.shacfreo.com/shac-construction.html>

VERNACULAR TYPOLOGY

dwelling mounds “terpen”

A “terp” is a Northern European term for an artificial, raised mound created to provide safe ground for dwellings from flood events and rising sea levels.

Terpen can be found in the coastal zones and floodplains of the Netherlands, Denmark and Germany, and range in width and height to accommodate varying scales of development from single dwelling houses to small settlements.

Whilst the historic practice dates back to 500BC in Northern Europe, similar practices can be found around the world in flood prone countries such as Bangladesh.



Figure A. Niehove, large dwelling mound in the Dutch province of Groningen. photo by Cultural Heritage Agency, Amersfoort.



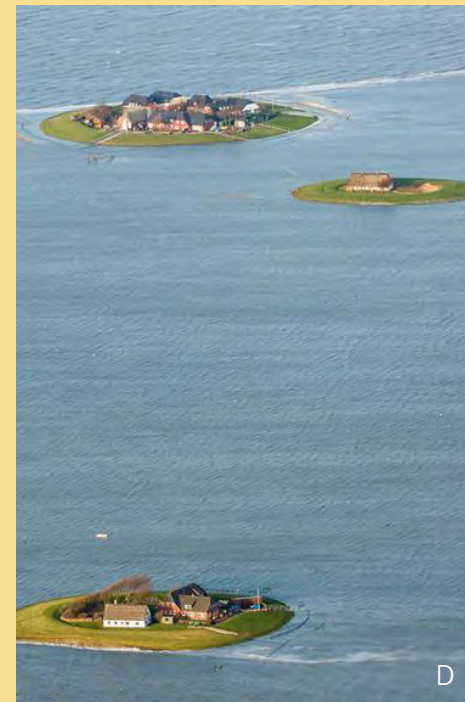
Figure B. Hamburger Hallig, by Olaf Kosinsky. <https://www.wikiwand.com/en/Terp#Media/>

Figure C. dwelling mound in Bangladesh. Marina Tabassum, Architect, FACE Bangladesh, photographer. Dhaka, 2022, <https://facebangladesh.org>

Figure D. Island Hallig Hooge, The Netherlands, <https://frisiacoasttrail.blog/2020/10/08/manual-making-a-terp-in-12-steps/>



raised dwelling mound in Bangladesh



“dwelling mounds (terpen) were havens of refuge for humans and livestock in the centuries before the dikes were built” Safecoast

Source: Safecoast (2008), Coastal flood risk and trends for the future in the north sea region, synthesis report. Safecoast project team. The Hague.

CASE STUDY : CITIES

**HafenCity,
GmbH, 2000 - current
Hamburg, Germany**

HafenCity is a waterfront urban redevelopment of an industrial dock on the River Elbe. As the district lies outside of the main dike-line of the city, a series of innovative flood protection strategies have been employed at the urban scale.

Lofting new development

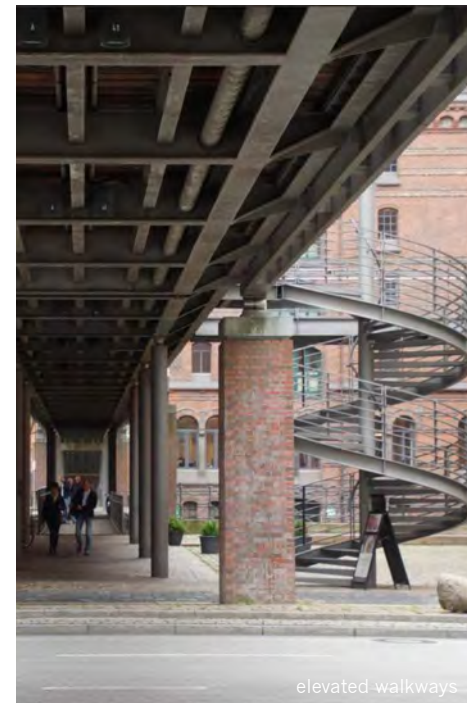
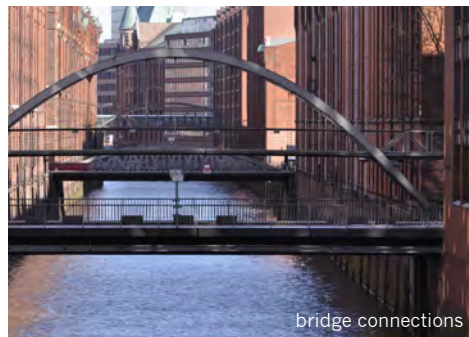
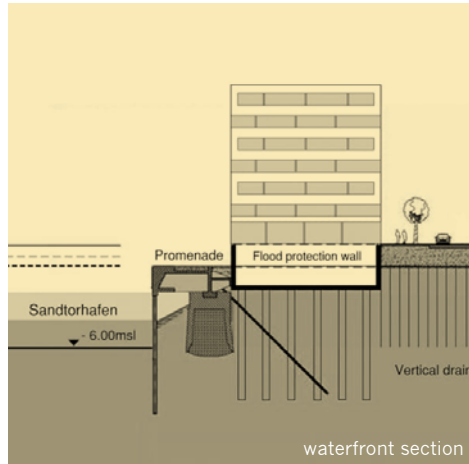
A new peninsula has been built on top of a sand terrace terp that lofts new buildings, roads and public spaces 7 meters above the high-tide line.

Retention of heritage warehouses

Parts of the district remain at flood prone levels (3.5m) to retain UNESCO protected Speicherstadt warehouses. These buildings have been retrofitted to withstand inundation at their lower levels, with seal-able and reinforced openings.

Elevated walkways and bridges

A system of elevated public promenades provide access and safe evacuation routes from the historic warehouses to higher ground.



“The boundary between water and land is flexible ...promenades are low lying and flood prone, whilst building plinths are equipped with flood gates”

CRC For Water Sensitive Cities

Figures sourced from: GMBH, photographer Fotofrizz, <https://www.hafencity.com/en/search?search=gmbh>, and Nicolas Janberg, <https://structurae.net/en/structures/kibbelstegbrucken>

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BOOKLET C

FUTURE STRATEGIES

What are the links between housing need and flood risk?

Can these two elements work to support each other?

How can we build-back better?

Does the elevated single dwelling suit all of our housing needs?

What can we learn from past and current practices?

What can we learn from the recovery and rebuild of Lismore?

How can we retrofit buildings to be more flood resilient?

Are there opportunities to live safely within the floodplain?



“The building of a culture of resilience includes processes of re-skilling, skill sharing, social networking and mutual learning.”

Doina Petrescu

Source: Fredrik Nilsson (ed.) *The Changing Shape of Architecture - Further Cases of Integrating Research and Design in Practice*. Routledge, Abingdon Oxon, 2019. p 67

are there opportunities to live safely within the floodplain?

This booklet explores strategies for improving housing resilience in Lismore and similar regional cities across the Northern Rivers Region. The term ‘resilience’ refers in this instance to improving robustness against the increasing threat of flood inundation but also in terms of improving liveability and amenity for residents.

The strategies are presented as a collection of concept ideas that range in scale and potential timeframe. They have been developed in tandem with the site research and case studies that are presented in booklets A and B.

Within the scope of this report one concept idea has been selected for further development. It focuses on the potential of the shop/house as a building typology that could be adapted to help revitalise Lismore’s existing city centre.

CONTENTS

1. **Community and industry consultation**
2. **Planning for flood resilience**
3. **Balancing flood risk and the need for housing**
4. **Industry advice: Cave Urban**
5. **Imagining future scenarios for flood resilience in Lismore**
6. **Shop/house potential: testing a new type of infill housing**
7. **Community advice: Living Lab Northern Rivers**
8. **Revitalising the city centre: imagining the future of Keen Street**
9. **Appraisal of Value: identifying potential benefits and challenges**
10. **Future Directions**

conversations with the community

The generous contributions of many individuals have helped to shape the content of this booklet.

Formal and informal conversations with local government, built environment practitioners with experience working in the region, local volunteers, community members and family members residing in Lismore have helped to inform the design ideas presented.

Conversations took place during the second half of 2022 and the first half of 2023 and were conducted both online and during several visits to Lismore. Several of these conversations will be elaborated in the following pages and appendix.



Imagery: Timbre Coffee Bar and Community Library in Lismore; on site with *Two Rooms Project* Volunteers in South Lismore, March 2023; Love Lismore heart banner in city centre, Sept 2022.

The following individuals contributed to the information presented in this booklet:

Michelle King and Peter Barnard
Lismore Residents

Tom Wolff - Environmental Advocate
Revive the Northern Rivers

Mel Garcia - Local Business Owner
Timbre Coffee + Community Space

Sharryn Lee - Local Business Owner
Fairmarket Lismore Antique Centre

Madeleine Mead - Project Engineer
Post-Flood House Assessor

Jed Long - Architect at Cave Urban
Lismore Living School Projects

David Hatherly - Architect at Vee Design
Lismore Laneways Project

Two Rooms Project Volunteers
Resilient Lismore - Volunteer Organisation

Attendees at the Living Lab Discussion: March 2023

Dan Etheridge - Director
Northern Rivers Living Lab

Margaret Ward - Local Architect
Margaret Ward Architect

Andy Parks and Jamie van Irsel
Lismore City Council Strategic Planning Team

John de Manicor - Local Architect
Possible Studio

Paula Newman and Laura Oakley
Northern Rivers Reconstruction Corporation

planning for flood resilience

When thinking about the reconstruction of Lismore's city centre, a myriad of issues arise that reflect the environmental, social, economic, cultural, and political nature of development in environments vulnerable to extreme weather events. The Australian Institute for Disaster Resilience (AIDR) outlines some of the key challenges that impact the timeline for post disaster reconstruction and recovery.

KEY CHALLENGES:

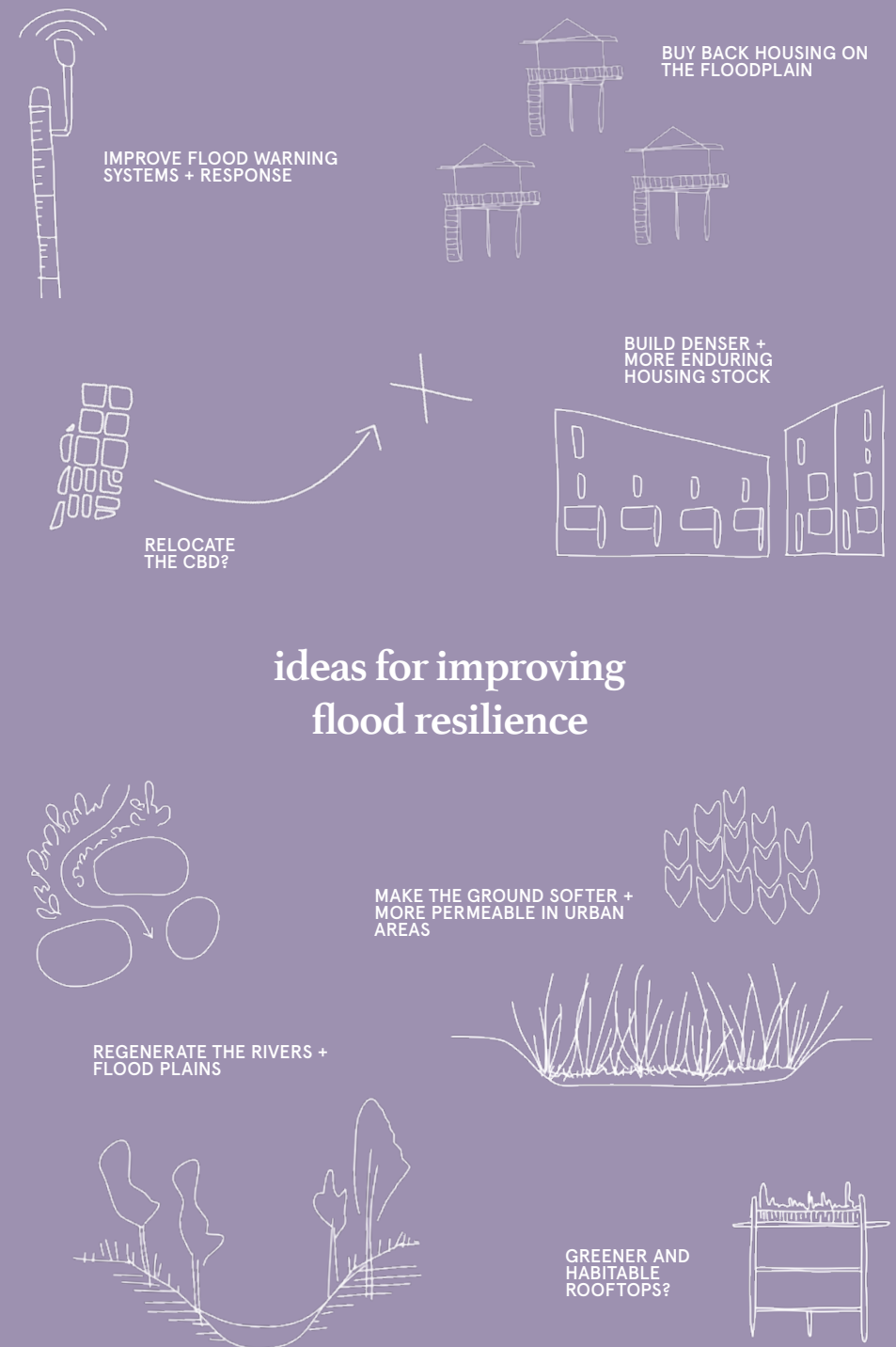
- Timing of reconstruction
- Conditions and standards required for assets to be reconstructed
- Cost implications of reconstructing to required standards
- Political and social implication of whether heavily impacted areas should be reconstructed
- Emotional impact of reconstruction in a post-disaster context

“Unfortunately, it is often the case that the opportunity to ‘build back better’ after a disaster is missed and risks are recreated.

Planning for more disaster resilient standards can help navigate some of these issues, increasing the chance to reconstruct communities that are safer and stronger.”

Australian Institute
for Disaster Resilience

Source: Land Use Planning for Disaster Resilient Communities, Australian Institute for Disaster Resilience, Canberra: Commonwealth of Australia, 2020, 47



balancing flood risk and the need for new housing

Whilst there is uncertainty surrounding the future of Lismore's existing city centre, the need to address housing scarcity in the region remains a pertinent issue. Where such development will be located and what form it will take is subject to ongoing debate around acceptable 'flood risk'.

In late 2022, Engeny Water Management, engaged by Lismore City Council, released a draft Floodplain Risk Management Plan. The report provides flood risk advice to guide future development controls in Lismore. (mapped beside)

In a review of its Land Use Management Strategy, Council recommended that it protect and 'de-risk' the CBD against frequent inundation through mitigation measures. It claims that once such measures are delivered, there may be opportunities for future residential development above the 1:500 AEP or PMF levels.

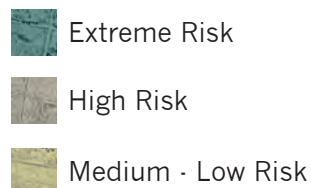
Potential CBD Exemption Area

There is significant risk to life and property damage due to browns creek conveyance once the CBD levee is overtopped. There is however a rising road evacuation route and a longer evacuation time due to the levee.

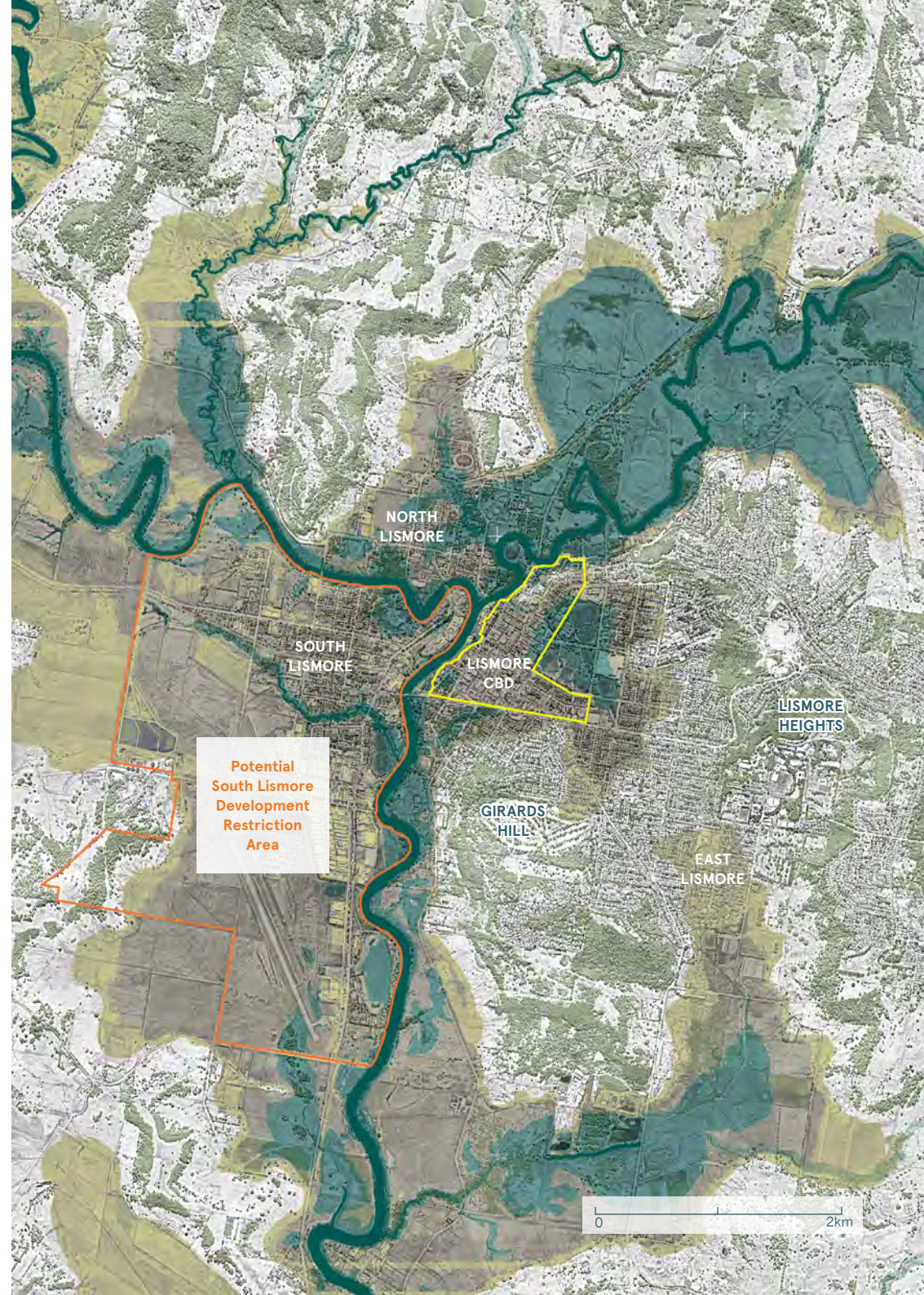
Potential South Lismore Development Restriction Area

Significant risk due to restricted evacuation. South Lismore is isolated once the South Lismore Levee is overtopped.

Flood Risk Area



Source: Lismore City Council and Engeny Water Management, Lismore Floodplain Risk Management Plan – Land Use Planning and Development Control Draft Interim Report, 22 December 2022



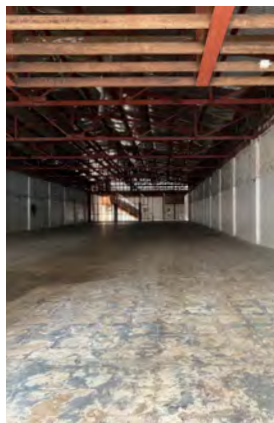
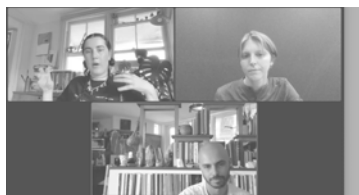
industry advice

The Lismore Living School Conversation with Jed and Nici Long of Cave Urban

Plans for the new Living School campus by Cave Urban may serve to catalyse future investment in Lismore's existing city centre. Occupying a prominent site on Woodlark Street, the new campus will adaptively re-use the historic Brown and Jolly Building, a former retail shopfront and warehouse.

Jed and Nici, co-founders of Cave Urban, outlined some of the flood resilient principles that are driving the project, listed beside. They describe a code of practice that could be implemented in future adaptive re-use projects in Lismore.

Imagery: Zoom with Genevieve Quinn, Victoria King and Jed Long, Feb 2023 + Empty shops in the city centre, Lismore, Sept 2022



flood resilient principles

Recycling waste materials + UV as decontaminant

Utilise available resources left over from flood clean-up recovery where possible. Hardwoods and durable claddings can be cleaned and left to dry in the sun for re-use.

Open up the building

Deep building footprints benefit from the insertion of voids and courtyards to allow for light and air to penetrate the building. This improves the porosity of the ground plane to soak up water through gardens and also helps to dry out the site following heavy rain events.

Mechanisms for easy movement

The installation of hoists and platforms to raise objects during flood events.

Wide openings and doors

Further allow the ease of movement of objects to be loaded on to trucks during a flood event.

Reinforcement of existing walls and structure

Most of the buildings in Lismore city centre are double brick or face brick construction. Strengthening the durability of brick walls can be achieved through the treatment of lime mortar, replacement of old brick ties with stainless steel fixings, and rendering face brickwork to provide an impermeable skin.

Allow the ground floor to be submerged using impervious materials

Clad the ground floor in impervious materials for easy washout.

Create lofty ground floors

Raise the first floor to a safe flood free level – this provides a safe flood free level above the ground floor.

Wide Eaves and Verandahs

Provide rain protection and collection through generous eaves and verandahs/balconies.

imagining future scenarios of flood resilience in Lismore

Throughout this project, design speculation has served as a key method for quickly synthesising research and testing ideas. The following ideas examine some future scenarios of flood resilience in Lismore. They are organised into three scales of thinking, the scale of the house, the scale of the street and the scale of the city.

Recognising that the work of rebuilding a city following an unprecedented flood event is both complex and multilayered, these ideas (among hundreds of other potential solutions) will require further testing and above all feedback and support from the Lismore community beyond the pages of this booklet.

One future scenario (the street scale) has been developed further and will be elaborated in the following pages.

Further information on the scenarios (the house and the city scale) can be found in the appendix.

THE HOUSE



RETROFIT EXISTING HOUSES

This concept scenario imagines an affordable and easily deployed safety refuge platform for houses at risk of flood inundation.

THE STREET



REVITALISE THE CITY CENTRE

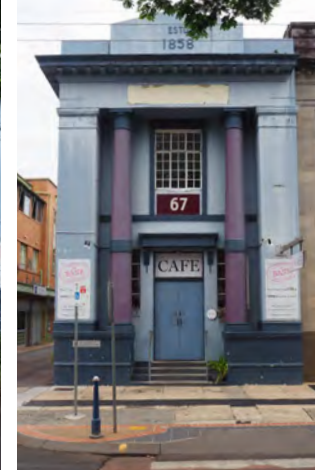
This scenario tests the potential for flood resilient housing typologies along Keen Street in the city centre.

THE CITY



RETREAT FROM THE FLOODPLAIN

This scenario looks at the development of new urban blocks away from the floodplain to support 'micro-city' pockets of medium density housing.

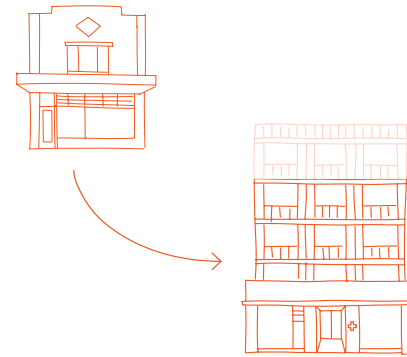


Survey of shopfronts in Lismore's city centre
(photos taken by author in March 2023)



shop/house potential

“shop-top” = shop/house



A shop-top development or shop/house building refers to housing (of one or more dwellings) located above a ground floor retail, business, or community-oriented premises.

Shop-top development is embedded within the built fabric of Lismore's city centre. Lining the streets of the historic city grid, they present a multitude of styles across time and contribute to the unique local character of the city.

Often referred to as shop/houses, this typology is a common and often uncelebrated feature of the 'main street' environment that exists in many urban and regional town centres across NSW.

The shop/house can be found in many different countries around the world (see *case studies in booklet b*). Howard Davis describes their prevalence as the result of the two cross-cultural economic conditions, “it puts commerce on the street, and it lets people live where they work”. Mixing two primary uses in the same building, the myriad of different shop/house arrangements represents a flexibility of use in which spaces can take on different functions at different times.

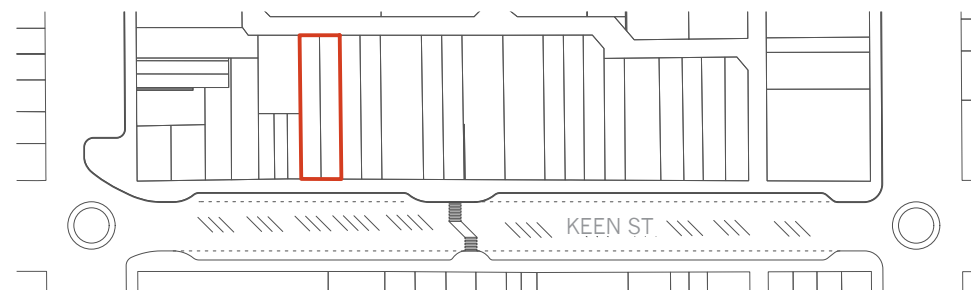
shop/house potential

Testing a new type of infill housing in Lismore city centre

Shop/house buildings have inherent features that may be adapted to address the threat of periodic inundation. The following concept drawings test how flood resilient strategies may be integrated into this building type on a typical lot in the city centre.

- 1 **Ground floor retail/commercial/ community space**
design ground floor spaces to have as little obstruction as possible. Internal mezzanines may be incorporated. Ensure wet-proofing of surfaces and easily dismantled fitouts.
- 2 **Residential Entry**
ramps elevate the ground floor by 1m to help minimise risk of flash flooding and protect elevator shaft
- 3 **Internal Courtyard Gardens**
Improve porosity of the urban ground plane by storing water in the earth
- 4 **Community Kitchen**
flexible zone for use by residents or community, accessible from the lane. ensure joinery is easily dismantled.
- 5 **Elevated Dwellings**
Habitable rooms should be ideally be set above the PMF level, in Lismore city centre this level is 16.5m (see section)

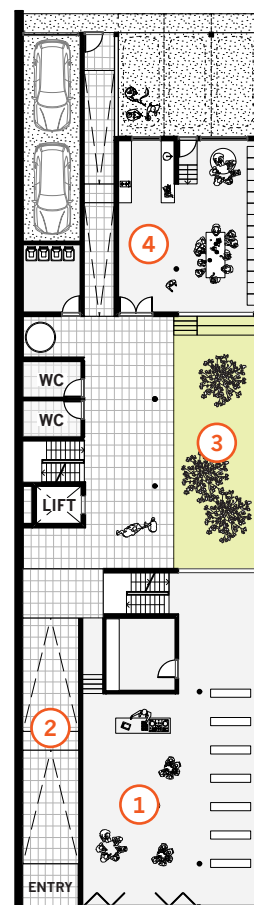
- 6 **Flood storage rooms**
Integrated storage rooms for ground floor retailers. Minimum dimensions of 4x4m. Allow wide doors and openings for easy manoeuvring of objects.
- 7 **Vertical connecting voids**
For movement of goods to upper levels and to bring light and ventilation into the building core.
- 8 **Hoist Mechanisms**
Install beside voids for easy movement of goods to upper levels.
- 9 **Rooftop Terrace Emergency Zone**
Sheltered rooftop space for residents to gather during a flood event. Install warning systems and services in this space.
- 10 **Rooftop Garden**
For use by residents or community.



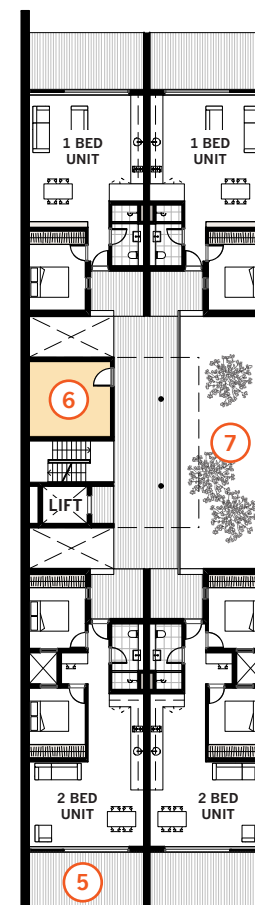
SHOP

HOUSE

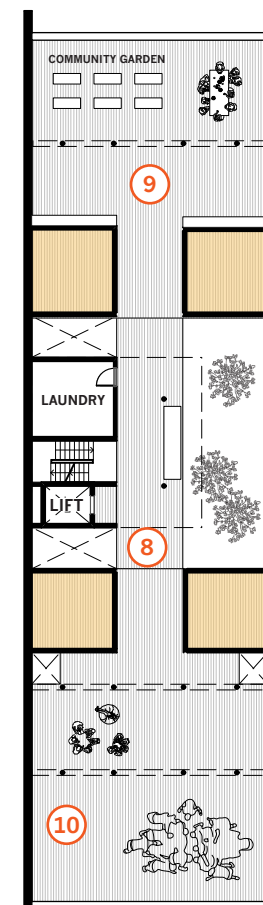
REFUGE



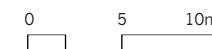
ground floor plan



first floor plan



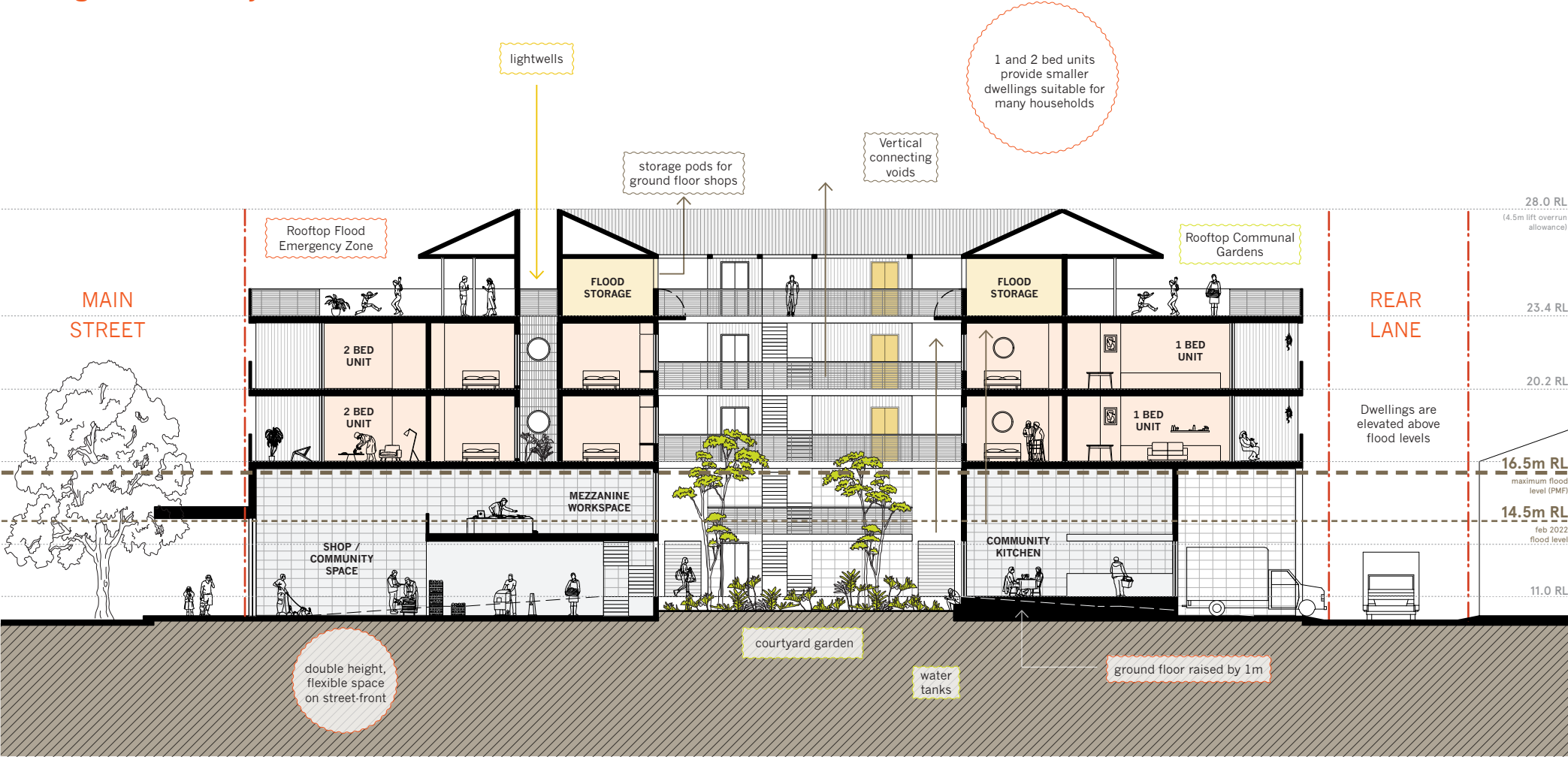
rooftop plan



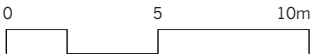
shop/house potential

Testing a new type of infill housing in Lismore city centre

NOTE:
Many of the flood resilient strategies shown here have been drawn from the extensive work of James Davidson Architect Co. Further information can be found in *Flood Resilient Building Guidance for Queensland Homes*.



concept section through potential shop/house showing flood resilient principles



community advice

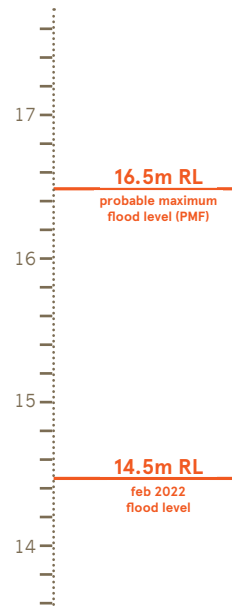
Discussion at the Living Lab with local government and community representatives

The Living Lab Northern Rivers is a space for knowledge exchange; mediating between community, industry, and government following the unprecedented floods.

In the spirit of this space, I was given an opportunity to discuss infill housing development in the city centre with a group of local government representatives and local practitioners. The discussion was facilitated by the Living Lab's director, Dan Etheridge, and was held on March 10, 2023.

Key points discussed are listed beside offering an insight into the challenges unfolding. Minutes of the conversation can be found in the appendix.

Imagery: Flood level gauge on Molesworth St, the city sits at 10m RL (approx), March 2023



key challenges

CBD as potential flood risk exemption zone

Draft flood risk management plan outlines the potential for future development in the CBD with the levee protection barrier allowing time for people to prepare, move goods to higher levels within building, and to evacuate.

Cost as a limiting factor to infill development

Despite many planning incentives, shop-top housing has not been very popular in Lismore. Cost to refit/redevelop versus the financial benefit for the builder owner or developer.

New development control plan – raising the flood planning level

Proposed habitable floor level for CBD of 1:500 year flood/ 0.2% or 13.02m. This is higher than the current flood planning level but significantly lower than PMF at 16.5m. This will mean that many existing buildings within the CBD will not comply, making adaptive reuse difficult, promoting new development.

More economic data is needed

If there were economic data available to illustrate the cost vs benefit of a

particular design and yield, it may be possible to modify planning controls such as building height. Currently the max building height in CBD is 20m.

Ground floor use and activation

How to deal with the ground level is a design challenge. There is a need to consider scale and activities of human interaction at street level when adapting buildings. The risk is that the ground level may be sacrificed as car parking which would be an undesirable outcome.

History of radical housing in the Northern Rivers

The region is known for “radical” solutions to housing.. subsequent to Aquarius Festival in the 1970’s. e.g. multiple occupancies; shared rights to properties; communal living... leading to the suggestion that Lismore is a place where “outside the box” solutions may be supported?

Need for built demonstrations

“paying it forward” philanthropic opportunity for building developers engaged in the Lismore reconstruction program to build a demonstration.

revitalising the city centre: new linear parks and lanes?

This scenario imagines a future in which the city centre is retained and adapted for greater flood resilience. Here, opportunities for new infill development are combined with a broader urban strategy for opening up new open spaces and parks in the city centre.

“we understood (urban) ‘commoning’ as a way of ensuring the sustainability of a shared pool of resources.. but also as a way of practicing commonality as a social practice.”
Doina Petrescu



Perspective of potential new park link between Molesworth and Keen Street



Plan of Lismore City Centre showing potential pocket parks

Pocket parks strategically inserted in the city centre could provide new lane connections between blocks, support local biodiversity and help to improve porosity of the ground plane for water retention.

Source: Helene Frichot (ed.) "Architecture and Feminisms Ecologies, Economies, Technologies". Routledge, Abingdon Oxon, 2018. p 222

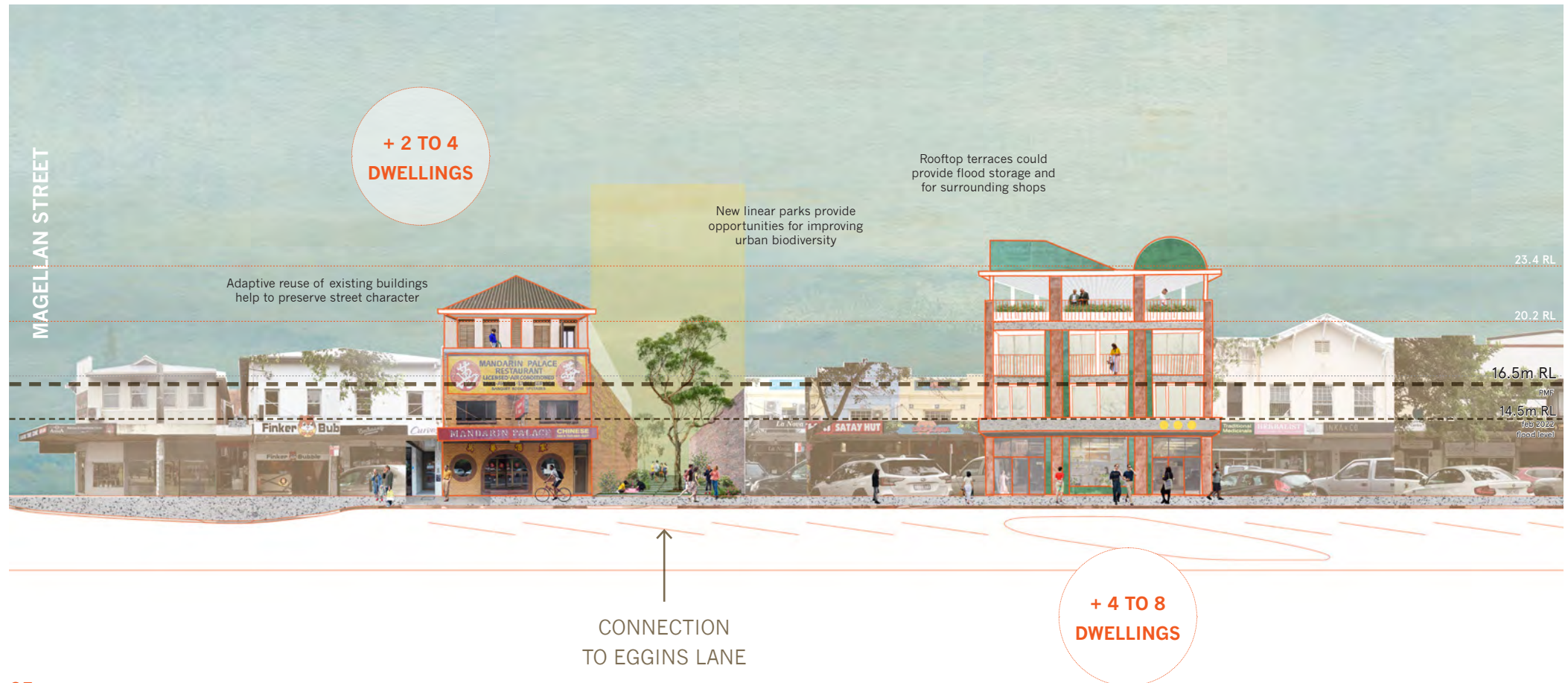
imagining a future Keen Street

PART A

This scenario tests the potential of the shop/house by visualising how it may be implemented on a familiar streetscape in Lismore.

lane connections between blocks, support local biodiversity and help to improve porosity of the ground plane for water retention.

DRAWING CONTINUES →



imagining a future Keen Street

PART B

“There was general support for protecting the heritage values in older buildings and in trying to adapt through the use of flood resilient building materials in the CBD.”

Lismore City Council

DRAWING CONTINUES →



imagining a future Keen Street

PART C

This scenario tests the potential of the shop/house by visualising how it may be implemented on a familiar streetscape in Lismore.



appraisal of value potential opportunities

Innovative shop/house, mixed use development has the potential to address many of the challenges currently impacting Lismore. Some of the potential benefits and opportunities are listed below:

social:

- Provides smaller dwellings appropriate for increasingly smaller households, encouraging local populations to stay in Lismore
- Increases housing stock in locations close to existing employment, schools and public transport
- Supports casual surveillance and nighttime use of the city centre

environmental:

- Reduces environmental footprint of greenfield development through more compact development
- Elevates habitable dwellings above potential maximum flood levels
- Offers safe storage space above the flood level in close proximity to existing retail premises

economic:

- Makes use of existing services and infrastructure in the city centre
- Reduces the potential land, service and build costs for relocation
- Encourages a diverse mix of uses, activities and street foot traffic
- Provides flexible space to support small business opportunities

cultural:

- Allows for the retention and responsible reuse of well-loved existing building stock within the city centre
- Respects the urban fabric and cultural memory of the city
- Provides flexible rent-able spaces to support the creative economy



Living Lab Northern Rivers
Shopfront on Woodlark Street



Newly Opened Antiques Emporium
Keen Street, March 2023

appraisal of value potential challenges

Many challenges have the potential to impede the development of new buildings in the city centre. These challenges are notably financial, and thus could potentially be mediated with support and funding from government and industry:

social:

- Community resistance to increases in density and alternative housing
- Community concerns regarding overshadowing, local traffic congestion and overcrowding
- Potential for dwellings to be unaffordable without the support of community housing providers

environmental:

- Sewage and service capacity constraints on flood prone land
- Flood risk management challenges during times of inundation and the isolation of residents, such as power and service outages
- Restricted site orientation and potential for poor solar access and single oriented dwellings

economic:

- Potentially higher costs of land and fragmented site ownership
- Developer risk capacity to support adaptive reuse and alternative housing developments
- Additional costs required to meet fire, accessibility and flood standards
- Industry capacity to deliver a different type of housing product
- Potential high-risk exposure in the city centre resulting in an inability for businesses to obtain insurance

cultural:

- Difficulty in balancing perceived changes to the 'character' to an area with the realities of new medium density development

Future directions + supplementary work

This report aims to advocate for “building back better” in a way that respects the urban fabric of the city and cultural memory of place. It looks at the shop/house as a common building type that could be adapted to provide housing diversity and improved flood resilience.

While this report is focused on the city of Lismore, it could be applied to many regional cities. The shop/house will not solve all of the housing challenges facing Lismore but this building typology offers one approach to the potential future use of the city centre. Future supplementary work could include:

Cost Benefit Analysis

To better understand the cost to re-use existing buildings and retain the city centre. This should be compared with the full costs of relocation, and include the environmental impacts of demolition, and social/cultural impacts on residents.

Recommendations for New Planning Controls + Guides

To support new, high quality flood resilient shop/house development.

Built Demonstration Project

To present methods of resilient construction and material re-use.

“Demonstration projects are important in showing communities what good quality infill housing looks like and how it can be effectively integrated into a local area... it can be incremental, and achieved without undermining the core fabric of a suburb. ”

Place Design Group



Source: Place Design Group, *Toward Infill Housing*, Department of State Growth Tasmania, August 2019.p 22

Eggins Lane
Lismore, September 2022

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See Appendix for detailed minutes of meeting conversation.

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APPENDIX

1. Future scenario:
retrofit existing houses
2. Future scenario:
retreat from the floodplain
3. Living Lab Discussion:
detailed minutes



appendix

future scenario

Retrofit Existing Houses

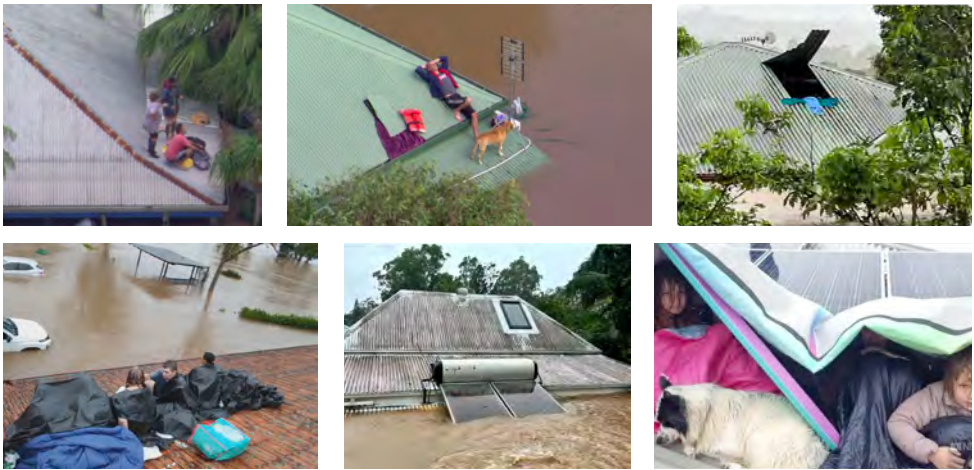
Roof Refuge Platform

The detached house represents the most prevalent housing option in Lismore and the Northern Rivers Region. Considering the likelihood that many residents will continue to live in this type of dwelling in flood prone areas, strategies must be implemented to improve safety for residents. This concept design imagines an affordable and easily deployed safety refuge platform for houses at risk of flood inundation.

Could be installed on dwellings where residents in flood prone areas wish to remain in place. Hatches and proprietary platform structures for air conditioning and plant units could be adapted and retrofitted to existing houses.



ROOF REFUGE
RETROFITTED PLATFORMS FOR EMERGENCY SHELTER ?



Scenes of residents taking refuge during the devastating floods, February 28, 2022
(images sourced from ABC News, Nine News, Courier Mail, Facebook and Twitter)

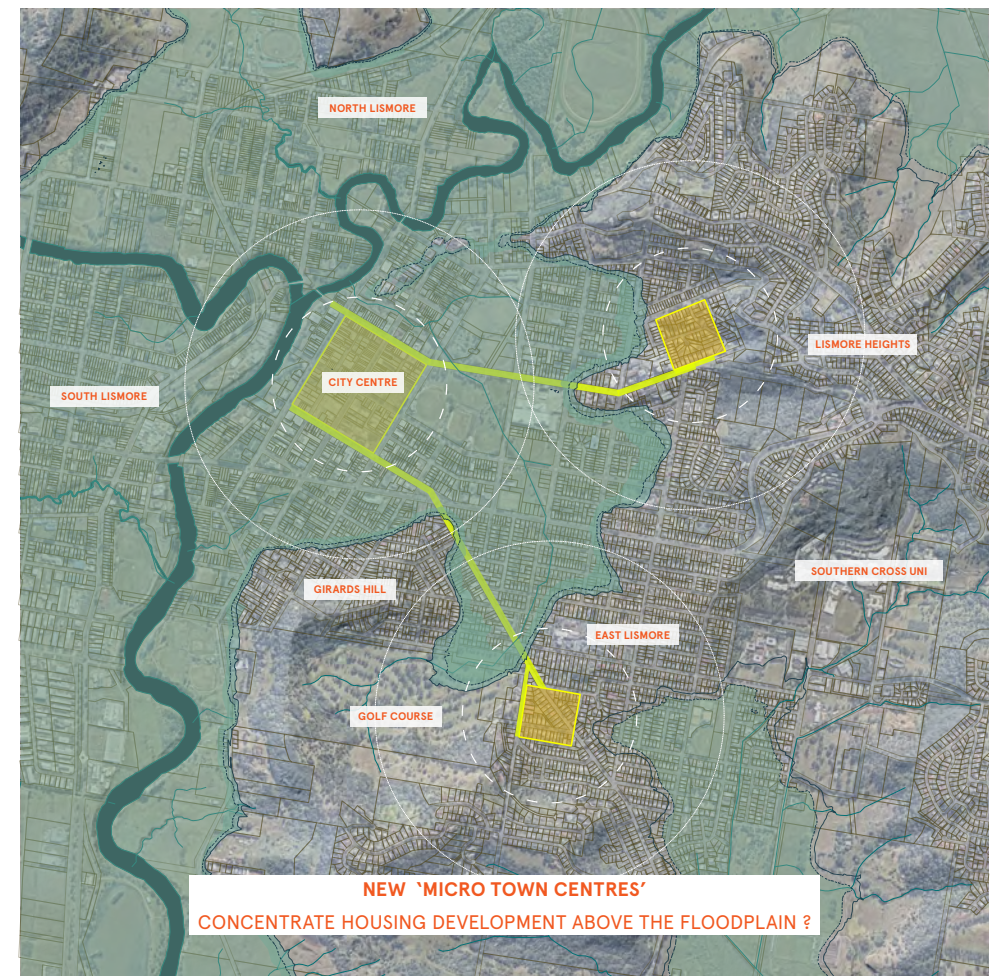
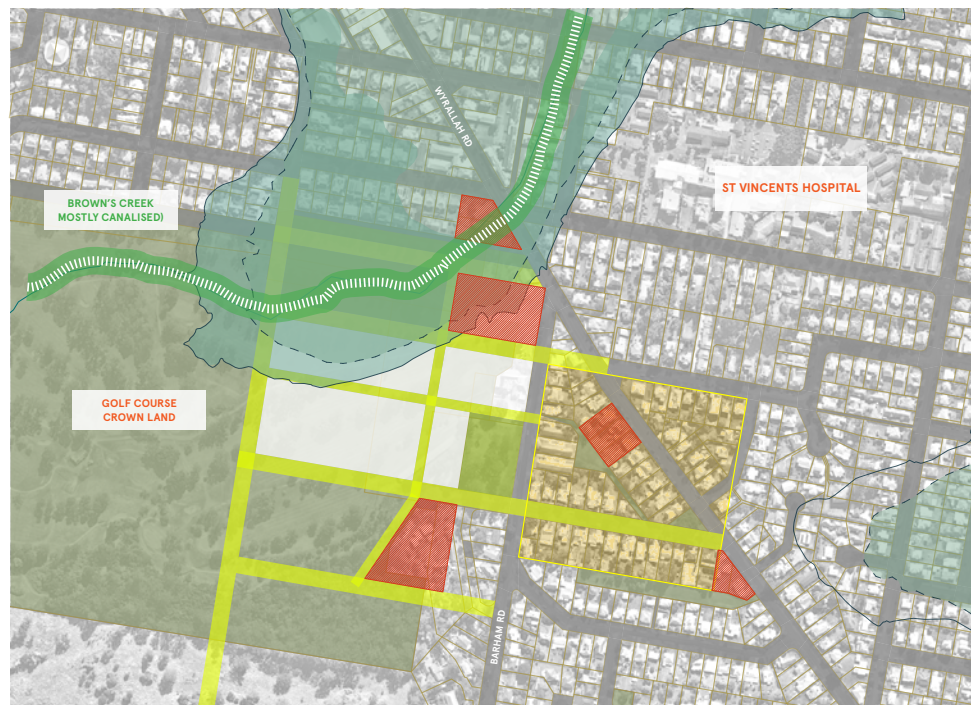


Proprietary Roof Systems
Scaffolds, Hatches and Platforms
(images from various suppliers - NBS Source, Monkeytoe Group, Eurotowers, Simplified Safety)

appendix future scenario

Retreat from the Floodplain New micro town centres

Many community members support the re-location of the city to higher land. Lismore City Council has also shown support with zoning uplifts around Lismore Base Hospital and exploration of uplift at the East Lismore golf course and Southern Cross University site. This scenario looks at the development of new urban precincts to support pockets of medium density housing. The plan however poses serious economic, environmental and cultural challenges for the viability of the existing city centre.



Above:

Concept plan of Lismore's urban footprint, showing potential connections between the existing city centre and new potential town centres. Five and ten minute walking radii are shown dotted in white.

Beside:

Concept structure plan of potential East Lismore town centre. This plan occupies a section golf course. Potential demonstration housing sites have been indicated in red.

RECORD OF DISCUSSION

Draft Issue to Victoria King & Dan Etheridge 10.03.2023

This document has been prepared as a general record of discussion had by participants in response to Victoria King's Presentation "Living over the Shop". This document is for the sole use of Victoria King study and is not to be transmitted beyond the participant group without the approval of Victoria King.

| | |
|------------|--|
| Date: | 10.03.2023 |
| Topic: | Victoria King presenting "Living over the Shop" |
| Venue: | "LIVING LAB" Woodlark Street, Lismore |
| Attendees: | Victoria King (author and presenter) Dan Etheridge – Director Lismore Living Lab Peter Barnard -Lismore Resident Andy Parks – Co-Ordinator Strategic Planning Lismore City Council Jamie van Iersel – Senior Strategic Planner Lismore City Council Tiger Brampton – Living School Student (as part of LCC group) John de Manincor - Architect Possible Studio – Upper Cooper Creek Minyon Falls Margaret Ward – Sole Practitioner Margaret Ward Architect – Clunes Paula Newman - NRRR Co-Ordinator- Strategic Planning Northern Rivers Reconstruction Corporation Laura Oakley - Senior Strategic Planner Northern Rivers Reconstruction Corporation. |

Introduction for today's discussion:

Victoria King as joint recipient of the inaugural Paul Pholeros Architectural Scholarship in 2022 presents her interim report for discussion and review. The scholarship was established to honour the lifelong commitment of Paul Pholeros to "improving people's living environments and investing in the professional growth of young and emerging architects." The aim of today's discussion is to draw on local knowledge sources to obtain feedback on her interim report to provide direction for further exploration of the topic. "Living over the Shop". The topic investigates the opportunity to re-use, adaptation, or expansion existing CBD buildings for top shop housing.

Victoria initial ideas for her research topic is to investigate the diverse housing needs and issues in Northern NSW after the 2022 flood. Victoria has developed a report based on information which she is gathering as it is being released including Lismore City Council Draft Strategic Planning Documents.

Background Information:

Of the 44 000 people living in the Lismore Shire, 50% of households are of 2 people or less. There is an apparent mismatch of housing types with a large proportion of Lismore homes being detached dwelling of 3 to 4 bedrooms, suitable for larger groups or families on offer. The housing typology does not reflect the diverse housing needs of people in the area.

Floodplain terminology may influence planning regulations & what can be achieved in terms of redevelopment. Lismore CBD is defined as a flood storage area, with the levee a protection barrier allowing time for people to prepare, move goods to higher levels within building, and to evacuate. In December 2022, LCC released a draft report for the Floodplain Risk Management Plan based on a study by Engeny Water Management.

Andy Park from LCC Strategic Planning provided explanation regarding Hazard Classification High, Medium, Low.

While the CBD may be a high-risk zone, the position of council is that the CBD should remain available for residential development above the flood zone. "don't want to sterilize the CBD". The CBD is an exemption zone offering opportunity for future residential development. The Draft DCP being developed will outline the parameters by which residential development can be approved within the CBD. Many planning obstacles have been removed to enable this to happen and incentives offered for redevelopment. Essentially it comes down to the cost to refit/redevelop versus the financial benefit for the builder owner or developer.

Victoria continued with presentation of Part B of her interim report which draws on case studies of similar developments around the world. Examples include: SHAC at WGV Perth WA; Habitat Live/Work Byron Bay NSW. Nieuw Terbregge, Mecanoo Rotterdam, the Netherlands; La Balma Housing Cooperative Barcelona, Spain; Back to Back Patio Houses Amsterdam, The Netherlands; Singapore Shophouses; Amsterdam Canal Houses.

These examples focus on new development rather than re-fit or adaptive re-use. Victoria touched on discussions she had had with the Living School and how to translate the information available from another place to the Lismore situation.

Andy asked if the study was only looking at top shop housing typology. Victoria explained that with the limited time left and resources available in her scholarship that she is focusing on this housing typology only at this stage.

Victoria went on to discuss the impression that top shop housing was not as celebrated in Australia as it is in other countries, however it is the predominant typology in most regional towns.

Examples from Singapore case studies used voids for light and ventilation where buildings extended to boundaries, a central walkway provided access and connection to mixed uses, commercial and residential. Voids are used for the transport of goods up to higher levels by use of hoists.

Looking around Lismore there are many examples/remnants of historical high-level hoist which would not have relied on power to operate. (Living Lab is housed in this building with a hoist accessible from inside and out for example).

Victoria went on to discuss her own case study of a building in Keen Street, (possibly the former WorkWear shop) whereby she presented a re-design of the building for commercial at the ground level & communal space for residents, a void joining all levels, 4 x residential units at 1st level with 3m wide balconies, (mixture of unit types 1 or 2 bedrooms), with recreation space on a level above. A cross-section through the proposal identified flood level data in relation to the proposal.

Discussion Phase – Question posed:

What is the output of this report and how can it be used?

Who should Victoria be speaking to, to further her proposal?

How do we adapt/ restore existing CBD building and make fit for residential use.?

How do we develop ideas to build new in combination with adapting existing building stock?

Responses from Attendees:

The design options are endless, but the cost is the limiting factor. At this stage there is very little information regarding the cost to re-fit existing CBD building for top shop residential purposes. LCC planning barriers are less restrictive to encourage developers/ building owners to repurpose building, however the cost to comply with building regulations for fire, access/egress may be a deterrent to building owners.

Further work providing a method of calculating the cost associated with compliance would provide a point at which a conversation could be started. While Victoria has limited access to cost consultants, through her workplace she may be able to source consultants who can provide high level broad costings. Other sources were suggested e.g., Cordell's Rawlinson's Costing Guides.