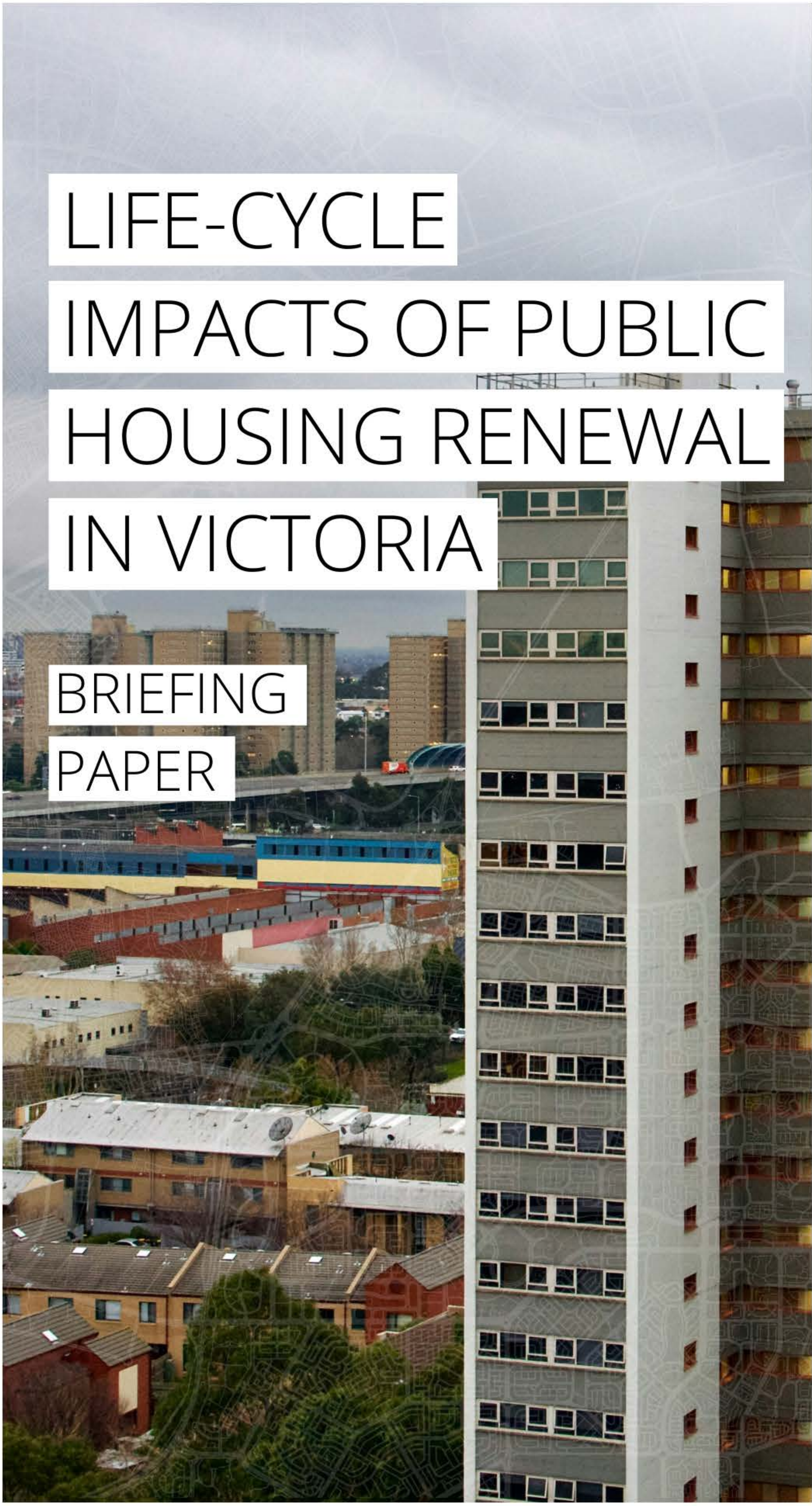
LIFE-CYCLE IMPACTS OF PUBLIC HOUSING RENEWAL IN VICTORIA

BRIEFING PAPER



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LIFE-CYCLE IMPACTS OF PUBLIC HOUSING RENEWAL IN VICTORIA

The Life-Cycle Impacts of Public Housing Renewal in Victoria report is intended to strengthen the evidence-base for a life-cycle approach to public housing renewal strategies in Victoria. Public housing renewal decisions cannot be made in isolation from other social, environmental and economic objectives. Victorian public housing stock is extremely varied in quality and condition, undermaintained, and the majority of buildings are more than 30 years old. The report promotes a life-cycle approach to Victorian public housing which engages with key considerations (Life Cycle Assessment, Circular Economy, Climate Resilience, and Community Health and Wellbeing) and analyses three basic models of renewal of public housing approaches (Demolish and Rebuild, Retrofit, and Retrofit and Infill).

A Life-Cycle approach to public housing renewal can provide a comprehensive assessment of the longer-term impacts and benefits of different renewal options beyond the immediate imperative to increase housing supply and performance. Life cycle assessment is a tool which accounts for environmental impacts throughout each phase of a building's life i.e. extraction, processing, manufacturing, transportation, assembly, maintenance, repair, replacement, refurbishment, deconstruction and disposal of the building. It also quantifies embodied carbon emissions, important for informing longer term and often hidden costs of renewal decisions.

A climate resilience framework, by simultaneously mitigating emissions throughout asset life cycles and adapting to climate impacts, can inform decisions to futureproof public housing assets and communities. Futureproofing the current and future housing stock can require significant amounts of emissions and environmental harm, a climate resilient approach considers the trade-offs with mitigation and adaptation to climate change. Important measures to increase energy efficiency, electrify, create material loops, reduce whole life emissions, and adapting assets to deal with climate impacts can increase Victoria's climate resilience.

A circular economy approach to public housing asset renewal can reduce material, emissions, and waste throughout the life cycle of renewal projects, leading sustainable housing development and promoting change across the wider construction industry. This can provide the Victorian construction industry opportunities to develop circular material and service supply chains, skills and capacities, and digitalisation for sustainability, which in turn increases Victoria's climate resilience.

Renewal decisions should comprehensively consider the health and wellbeing of residents, empower communities, and avoid displacement. Housing is an important social determinant of health. Existing studies recognise a variety of ways in which lack of housing or poor-quality or performing housing can negatively affect a person's mental and physical health, numerous case studies have documented the lasting community bonds and social networks which develop in public housing, in the context of relative adversity. These lasting bonds and networks, key to community health and wellbeing, are at risk if renewal decisions mean displacing residents. Involving residents in the design of replacement housing has a long history in community planning and development. The benefits are extensive, not least through the resultant community ownership of the process.

Retrofit, and Retrofit and Infill are two alternatives to a Demolition and Rebuild approach to public housing, which have differing environmental and social life cycle benefits and costs. *Demolition and Rebuild* can increase the number and quality of public housing dwellings, but at the cost of high embodied emission, increased waste and material usage, and negatively impacting communities through displacement. *Retrofit* does not significantly increase the number of dwellings of public housing but can improve dwelling quality and performance, reduce waste and material impacts, increase resilience, and retain existing communities. *Retrofit and Infill* can increase dwellings, improve quality and resilience, retain existing communities, with an significant reduction in materials, embodied emissions, and waste compared to demolition and rebuild. These benefits and costs are listed in the table below.

Click here for the full report :
Life-Cycle Impacts of Public Housing Renewal in Victoria - Full Report

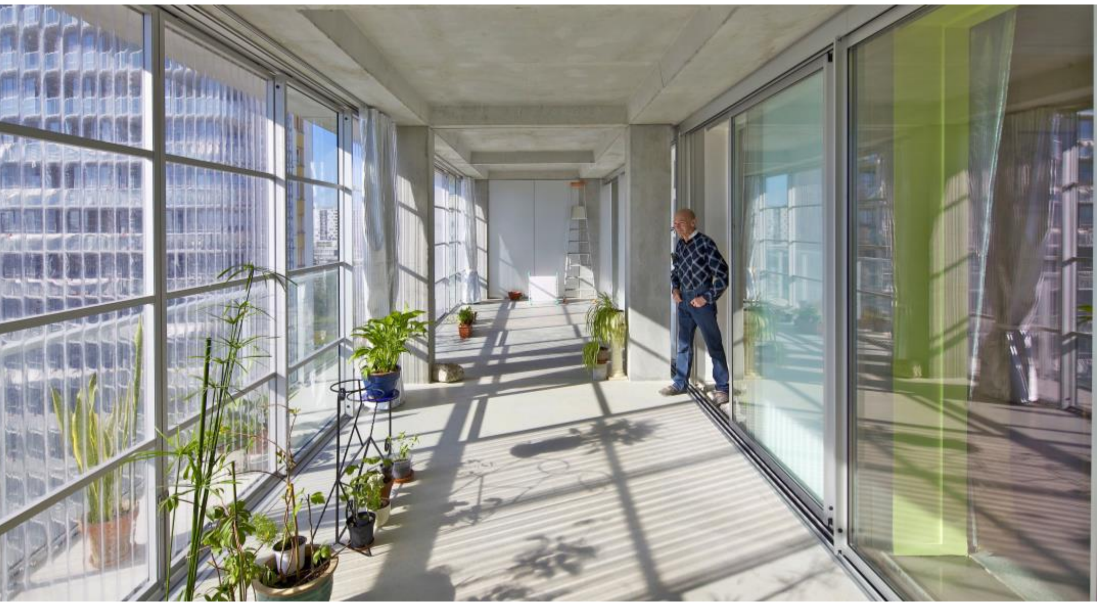

Image: Cité du Grand Parc, Bordeaux, France. Lacaton & Vassal. Via Philippe Ruault

TABLE 1: PUBLIC HOUSING RENEWAL LIFE CYCLE BENEFITS AND COSTS

Renewal Approach	DEMOLITION AND REBUILD Existing estate is demolished, and replaced by private, public and community dwellings.		RETROFIT Existing estate is retained and brought up to contemporary living standards		RETROFIT AND INFILL Existing estate is retained, or partially retained, and additional new housing is constructed on the site.	
	BENEFITS	COSTS	BENEFITS	COSTS	BENEFITS	COSTS
BUILT OUTCOME	Meeting contemporary spatial requirements, Provision of specialist disability apartments, incorporating ageing in place principles, Meeting universal access requirements, Increased number of apartments (Wiesel 2020, Homes Victoria 2023, DFFH 2021)	Loss of architectural and social history, Loss of mature landscaping, vegetation, and other biodiversity, Reduction in number of social housing bedrooms, increased resource use (Opoku 2019, Mazzarella 2015, Arthurson et al. 2014, Parliament of Victoria 2018, UKGBC 2019)	Retain public land and public housing, Custom design for individual residents in existing homes, potential replicable circular design process, retained architectural and social history, Potential to increase bedroom numbers within existing building footprint (Brown et al 2019, Porter and Kelly 2019, Mazzarella 2015, Baker et al. 2014)	No significant increase in dwellings, Limited density increase, Spatial and infrastructural limitations with existing buildings.	Increase in number dwellings (new build) and standard of dwellings (retrofit and new build), Custom design for individual residents (retrofit), Retained architectural and social history (Mazzarella 2015, UKGBC 2019)	Spatial and infrastructural limitations with existing buildings, Loss of green open space.
CLIMATE RESILIENCE	Potentially improved community facilities – parks, playgrounds, gardening, recreation. (Homes Victoria 2023, Achieve green energy ratings such as natHERS Energy efficient buildings, decreased operational costs, electrification, climate adaptation strategies and disaster risk reduction (Sayce et al. 2022, COAG 2019, Chandrashekeran et al. 2023, de Vet et al. 2019)	High upfront energy requirements, Increasing embodied emissions, Eexisting hazardous materials (contaminated site) , Increased material extraction and biodiversity loss off-site (Opoku 2019, Paton et al. 2022, Victoria State Government 2020, UCL 2014)	Improved thermal comfort and reduced bills for residents through improved energy efficiency, Ability to meet environmental standards through retrofit, Retention of mature landscaping, vegetation and other biodiversity, Embodied carbon savings, electrification, climate adaptation strategies and disaster risk reduction (Moncaster and Symons 2013, Sustainability Victoria 2019, Opoku 2019, LCLCRC 2020, Grynning, S. et al. 2020, Chandrashekeran et al. 2023, UKGBC 2019, de Vet et al. 2019)	Existing hazardous materials (Paton et al. 2022, UKGBC 2019, Victoria State Government 2020)	Improved durability to extreme weather events, improved thermal comfort and reduced bills for residents through improved energy efficiency, Ability to meet environmental standards, Embodied carbon savings, electrification, climate adaptation strategies and disaster risk reduction (Grynning, S. et al. 2020, AHURI 2023, Bryant 2022, LCLCRC 2020, Moncaster and Symons 2013, Chandrashekeran et al. 2023, Dorr et al 2022, de Vet et al. 2019)	Existing hazardous materials (existing buildings) (Paton et al. 2022, UKGBC 2019, Victoria State Government 2020)

HEALTH, WELLBEING AND COMMUNITY	Potentially improved community facilities - parks, playgrounds, gardening, recreation, improved thermal comfort and health implications, reduced energy stress (Rao 2021, Homes Victoria 2023, Brotherhood of St. Laurence 2022)	Low return rates for relocated residents, removal of houses from the public sector during construction, Impact on wellbeing, health and community connections from displacement, Increased rental payments for tenants in the transition from public to social housing (Porter et al 2023, Atkinson et al. 2011, Levin et al. 2014, Parliament of Victoria 2018, ACT Auditor-General 2017, Arthurson et al. 2014, Parliament of Victoria 2018)	Improved resident well-being by being able to stay in their homes, avoiding displacement impacts, improved thermal comfort and health implications, reduced energy stress (Sendra et al. 2020, Atkinson et al. 2011, Brotherhood of St. Laurence 2022)	Disruption during construction on site. (UKGBC 2019)	Residents stay in homes through staging of building works, improved thermal comfort and health implications, reduced energy stress (Sendra et al. 2020, Brotherhood of St. Laurence 2022)	Changes to patterns of movement and activity within the estate, Disruption during construction on site. (UKGBC 2019)
ECONOMIC IMPACTS	Job creation in the building industry, aligned with public-private partnership delivery model, reduced bills for tenants, avoiding obsolescence, disaster risk reduction (Homes Victoria 2023, SGS 2020 Buitelaar et al. 2021, de Vet et al. 2019)	Potential loss of public land and assets, financial cost to relocate and house residents, Construction time length and delays, Gentrification effects, and tendency towards unaffordable housing market, (Pawson and Pinnegar 2018, Atkinson et al. 2011, Porter and Kelly 2019, UCL 2014)	Retain public land and public housing, Reduced construction time, Reduce ongoing maintenance costs, Job creation and skill development in retrofit, reduced bills for tenants, avoiding obsolescence, continued operation by phased refurbishment, disaster risk reduction (Page et al. 2022, LCLCRC 2020, Buitelaar et al. 2021, UCL 2014 UKGBC 2019, de Vet et al. 2019)	Potential to reduce demand for construction labour during times of labour shortage, Infrastructural upgrade costs (fire, HVAC), unforeseen construction costs. (UCL 2014)	Job creation in the building industry, shorter construction time length, maintaining public land and public housing, Job creation and skill development in retrofit, reduced bills for tenants, avoiding obsolescence, disaster risk reduction (Brown et al. 2019, Buitelaar et al. 2021, de Vet et al. 2019)	Limit on density increase, Infrastructural upgrades for existing buildings.

CASE STUDIES

Before Retrofit (Top) and After (Bottom) Retrofit - Cité du Grand Parc, Bordeaux, France.

RETROFIT CASE STUDY: CITÉ DU GRAND PARC, BORDEAUX, FRANCE

Architect: Lacaton and Vassal, Frédéric Druot, 2017

The project at the 'Cité du Grand Parc' in Bordeaux involves the retrofit of three modernist social housing buildings containing 530 dwellings constructed in the early 1960s. The renovation strategy centred on preserving existing attributes while introducing new features such as wintergardens and balconies, bathroom upgrades, and lifts. A crucial advantage of this approach was that residents could remain in their homes during the renovation, eliminating the need for disruptive relocations.

Each of the 530 apartments underwent refurbishment in just 12 to 16 days. With a cost of approximately €50,000 per unit, the renovation proved to be significantly more cost-effective than constructing entirely new buildings and allowed for reinvestment of the savings back into other state-owned housing. Half of the budget was allocated to facades, with the remainder dedicated to more comprehensive upgrades.

DEMOLITION AND REBUILD CASE STUDY: HEYGATE ESTATE, LONDON, ENGLAND

Developer: Lendlease, Demolished 2014

The 'slum demolition' (Lees and Ferreti, 2016) of Heygate Estate in Elephant and Castle (South London) was part of a 2004 masterplan developed by the Southwark Council. The Estate was sold to Australian developer LendLease for £50 million to establish a 'mixed income community', after the council spent £44 million in relocating the 3,000 council tenants and leaseholders from the site, and £22 million in redevelopment plans (Lees, 2014). The existing 1,200 dwellings on the site were demolished, after council housing residents were relocated and owner-occupiers had their properties compulsorily purchased. Lendlease's plans delivered only 82 social housing dwellings, resulting in a loss of over 350 social-rented homes. Additionally, the private units which were promoted in plans as for local families and essential workers, were primarily purchased by international investors, and were made available in Singapore to speculators before being advertised to London families. This 'state-led gentrification of council estates' resulted in only one in five council tenants living in the local postcode after being relocated for the demolition (Lees and White, 2019).

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RETROFIT AND INFILL CASE STUDY: ELLEBO GARDEN ROOM, COPENHAGEN, DENMARK

Architect: Adam Khan Architects, 2018

The Ellebo Garden Room, north of Copenhagen, is a regeneration project of a 1950s public housing estate. The square blocks of 284 dwellings were originally designed around open green space and have been upgraded with wintergardens and balconies on the garden-facing side of the blocks.The sustainable retrofit model has retained the existing structure and introduced minor interventions for energy efficiency through passive energy strategies and ventilation solutions with heat recovery. Studio flats have been replaced by a mixed typology of dwellings, including larger flats to encourage family living and generational stability. The retrofit has also been designed to minimise impacts on residents through avoiding rehousing during renovations. In addition to retrofitting the existing dwellings, the architects have extended one of the blocks to create an enclosed and protected interior garden, as well as added a penthouse level to provide additional housing. The retrofitting project has been designed with a low-embodied energy focus and projected lifespan of 80-100 years for the concrete panel system. Additionally, the garden space has been transformed into a productive and ecologically diverse shared communal space.

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