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Urban “Blandscapes”: How the Practical Implementation of Planning Policy Reduces Land Use Diversity

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ABSTRACT

Policies to increase density and diversity in Australian cities have been introduced to remedy the issues caused by the separation and homogenisation of land uses characterising urban development in the post-war period. Generally, the practical implementation of such policies is through rezoning. Here, we analyse zoning and land use data of 10,519 parcels in Brisbane to demonstrate that, despite policy aimed at land use diversification, practice results in large swathes of homogenous uses. Our research highlights how zoning can maintain its current aim of land use separation while mitigating the emergence of “blandscapes” by protecting and enhancing land use diversity.

摘要

已经引入了增加澳大利亚城市密度和多样性的政策，以解决战后时期城市发展特征的土地使用分离和均质化所造成的问题。一般来说，这些政策的实际实施是通过重新分区来实现的。在这里，我们分析了布里斯班 10,519 个地块的分区和土地利用数据，以证明尽管政策旨在土地利用多样化，但实践证明同质用途。我们的研究强调了分区如何保持其当前的土地利用分离目标，同时通过保护和增强土地利用的多样性来减少“景观”的出现。

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Zoning; industry; land use diversity; mixed use; Brisbane

1. Introduction

Since the post-war period, urban growth across affluent and suburban nations such as Australia, the United States and Canada has been characterised by low density and car-dependent urban forms (Duany *et al.* 2010). With the rapid rise in automobility, planners increasingly separated land uses, the implication being that neighbourhoods were no longer self-contained in their residential, commercial, retail, and industrial functions. Geographic separation of land uses was underpinned by rapidly rising car ownership, the assumption being that full automobility would produce the best of both worlds – single land-use landscapes that enhanced efficiency, and rapid motorised transport between them. This model has expanded mostly unabated, with the widely observed outcome being a city where integrated, walkable, and mixed use neighbourhoods are the exception.

Homogenous urban “blandscapes” are the opposite of the dense, localised, and mixed use of urban environments constructed prior to the introduction of the automobile (Kunster 1993). They isolate environments designed for people (“human scale”) to private spaces within auto-scaled landscapes, and are landscapes characterised by offices, shopping centres and tract housing connected by large road and motorway networks (Jackson 1985). Jane Jacobs’ observations in the 1960s suggested this post-war growth model compartmentalised the spatial form that dictated

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daily life (Jacobs 1961). Jacobs posited that urban diversity and economic productivity were linked, and emphasised the importance of intensified, small-grained, and mixed use development (Jacobs 1961). From the 1980s, planning policy shifted to solving the “problem” of suburbia and declining inner-city areas. From New York (Wolf-Powers 2005) to London (Ferm and Jones 2017) to Sydney (Han *et al.* 2021) the rezoning of land for “mixed use” allowed co-location of low impact industry and commercial or residential development. Redevelopment policies, characterised by neoliberal and market-led opportunistic models and urban governance flexibility benefiting of the private sector, often targeted inner-city and waterfront locations containing industry or warehousing (Wolf-Powers 2005). This was in line with global trends towards urban consolidation policies (Leigh and Hoelzel 2012) that sought to contain new urban growth within existing urban areas (Johnson 2010).

While there is a well-established body of research on the practical implementation of urban consolidation policy, existing literature largely focuses on residential dwelling supply (cf. Coffee *et al.* 2016), ignoring the density and diversity requirements of other land uses – particularly those required for employment activities. Nevertheless, a growing body of evidence demonstrates the importance of land use diversity to urban vitality and resilience. There is little literature focusing on the impact of planning policy changes, particularly land use zoning, and its influence on land use (Twinam 2020). Other research investigates the displacement of industrial land uses when regulations alter to allow other forms of development, with studies of New York (Wolf-Powers 2005, Curran 2010), London (Ferm and Jones 2017), Brussels (De Boeck and Ryckewaert 2020) and Barcelona (Camerin 2019) finding that lower-value land uses (industry) are economically vulnerable when competing with commercial and residential uses. However, existing research largely focuses on employment data (cf. Wolf-Powers 2005, Chapple 2014, Ferm and Jones 2017) or impacts on real estate dynamics (cf. Freemark 2020, Kuhlmann 2021). Our research looks to investigate how planning policy can reduce or enhance land use diversity, which is a crucial component of urban consolidation in practice and fundamental for addressing the issues caused by homogenous, and separated, land uses.

We aim to address this knowledge gap by using a large sample of parcel-scale data to investigate how zoning change has influenced redevelopment and subsequent land use conversion, in areas where planning policy seeks to replicate the dense, localised, and mixed use conditions of older urban environments. Our objective is to demonstrate how contemporary application of parcel-based zoning can lead to unintended, and even negative, outcomes in which the land use homogeneity resulting from the separation of uses leads to urban “blandscapes”. These are increasingly difficult to ignore in a post-pandemic environment that has normalised working from home and has drawn the future of single-use office precincts into sharper relief. We suggest that industrial land uses in particular must be recontextualised in a contemporary city, as the changing nature of “industry” means that smaller-format and more community-focused production (e.g. micro-breweries, print shops) no longer precludes their integration with residential and commercial zones. By the same token, however, a uniform approach to “housing” as the key component of residential zones, or offices as the staple of commercial zones, is no longer appropriate either – development must be mixed, and focus on land-use integration.

To this end, we selected six precincts contemporaneously targeted for high density and mixed use development, in Brisbane, Australia. By digitising historic land use surveys and planning schemes, we created a comprehensive dataset that followed land use and zoning changes across 10,519 parcels (total combined area of almost 12 km²) within a 70-year period. The observed changes were then systematically compared against purported and intended planning outcomes to assess whether land use conversions met planning goals. Findings indicate that the practical implementation of these policies continues to clinically separate land uses. Results highlight that, despite policy aimed at the contrary, existing planning practice facilitates the homogenisation of land uses through the displacement of industry and manufacturing, in both inner- and middle-ring locations. We posit that this continued separation of land uses, with a preference for the commercial services over other employment activities, is detrimental and that planning policy must be

more nuanced in enhancing (and protecting) the co-location of compatible industries. Our findings are particularly relevant for cities with goals to consolidate new growth but currently characterised by low density, homogenous land use. It is also applicable to cities seeking to integrate the changing employment and work patterns of a post COVID-19 reality into contemporary planning. This includes the potential for commercially oriented areas to require conversion as white-collar workers fail to return to the office in sufficient numbers. These issues present a significant challenge to policymakers, and we conclude by providing recommendations for planning practice and opportunities for further research.

2. Background

2.1. The Importance of Land Use Diversity

The separation of land uses is arguably one of the largest failures of contemporary urban form, created through historical zoning practices (Talen 2005). The spatial organisation of the city in zones that separate home from work were in place in jurisdictions across the United States, Australia, and Canada from the 1920s. Stemming from the lack of comprehensive land use planning during the industrial revolution, zoning sought to protect residential areas from noisy, or toxic, industrial activities by separating them. Likewise, the hustle and bustle of the twentieth century business district was separated from commuter suburbs through a combination of planning tools including land use zones, density requirements, mandated setbacks, road widths, height limits, and so forth. The result was a deliberately homogeneous landscape, particularly in suburbia, that embodied the social values of the aspirational middle-class through physical urban form.

The problems caused by post-war zoning practices have been widely researched, including the lack of land use diversity resulting in limited transport and employment access (Gabbe 2017). On a fundamental level, land use diversity is inherently linked to urban resilience, and evidence suggests that compact cities with a mix of land uses are more resilient than single use, sprawling and car-dependant urban forms (Lehmann 2016, Sharifi 2019). Resilience is understood in a variety of ways. It includes the ability to absorb shocks and adapt to adverse events (Diodato and Weterings 2015, Sharifi and Yamagata 2018) and can be measured by both retaining function following a shock – which can vary from natural disasters to economic disruptions – and maintaining (or increasing) the urban population in the wake of economic, social, and environmental impacts (Capello *et al.* 2015, Glaeser 2022). In fact, cities appear to be more resilient to physical destruction, such as fires, than to disruption that causes economic and/or political change (Siodla 2015, Glaeser 2022). Diversified urban areas are more resilient to economic shocks (Glaeser *et al.* 1992, Fingleton *et al.* 2012, Capello *et al.* 2015). Inversely, an urban economy focused on one sector is vulnerable to economic disruptions (Grodach *et al.* 2017). Diverse small businesses play a significant role in the vitality of urban economies (Raco and Tunney 2010), and homogenisation resulting from the displacement of small local businesses, in favour of large global firms, has been described as the creation of urban “blandscapes” (Duignan 2019).

Improving land use diversity is particularly relevant to addressing some of the challenges presented by the COVID-19 pandemic. The COVID-19 pandemic resulted in disruption of contemporary work arrangements and significant revenue losses for businesses catering to city commuters. Changing work location preferences have been referred to as an existential threat to central city businesses around the world (Maginn and Mortimer 2021, Walsh 2021). Many urban residents with a Bachelor’s degree or higher worked remotely in 2020, whereas those with a high school degree or less did not, reflective of the type of work being undertaken by different urban demographics (Productivity Commission 2021 for Australia, and Parker *et al.* 2020 for the United States). Low office space occupancy rates, and subsequent impacts to businesses and retailers depending on office worker foot traffic, has led to significant lobbying on governments to “attract workers back to the office” (Property Council of Australia 2021). However, a return to pre-pandemic work arrangements is unrealistic (Productivity Commission 2021), and planning policy

must encompass the post COVID-19 reality of remote work for the significant proportion of workers employed in commercial services and public administration (Glaeser 2022). For this reason, developing an understanding of whether (and how) zoning can be used to encourage land use diversity, and by deduction, subsequent employment activity, is crucial.

2.2. Planning Policies that Encourage Diversity

Despite the issues caused by separating land uses being widely researched, less research investigates the practical implementation of planning policies aimed at remedying or reversing low density, sprawling urban growth patterns. As early as the 1960s, the quality of urban environments created through post-war zoning practices was questioned (Jacobs 1961, Duignan 2019) and by at least the 1980s, numerous planning initiatives targeted homogenous urban sprawl (Kunster 1993). Cities ranging from New York to Sydney introduced policies favouring diversity and recognising that mixed use precincts, with a combination of residential, industrial, and commercial uses, were fundamental for well-functioning human settlements (Talen 2005). On a practical level, cities introduced development schemes and enacted zoning changes to encourage a mix of residential and employment uses in existing urban areas. Industrial and manufacturing land in central and waterfront locations was targeted for redevelopment, under the belief that these locations were obsolete and such uses were more appropriate on largescale sites on the urban periphery (Leigh and Hoelzel 2012, Grodach and Gibson 2019). Rezoning initiatives coincided with the decline of urban manufacturing and the rise of the commercial services, especially finance, technology, retail, and real estate (Glaeser 2022). As a result, urban real estate values were maximised, and cities subsidised the growth of professional jobs by restructuring the urban economy to focus on consumption rather than material production (Grodach *et al.* 2017).

Additional enhancements to planning occurred when sustainable development entered the planning lexicon by the 1990s, followed closely by new urbanism, which also argued for a blend of housing types and land uses. The smart growth movement then integrated some of the core principles of new urbanism and sustainable development (Grant and Perrott 2009) and attempts to contain sprawling development led to policy and legislative mechanisms termed urban consolidation or containment. Urban consolidation mechanisms seek to prevent urban sprawl by containing new growth to existing urban areas (Johnson 2010). It was recognised by policy makers that urban containment required both land use density and diversity; the former seen as an important tool for economic growth and ensuring employment opportunity in proximity to where people live (Florida 2002). Across the globe the practical implementation of these planning policies is generally through land use zoning (Wolf-Powers 2005, Grodach and Martin 2021).

2.3. The Influence of Zoning on Land Use

Despite an abundance of literature on the importance of land use diversity for urban resilience and vitality (Sharifi and Yamagata 2018, Sharifi 2019), and the fact that planning instruments aimed at increasing land use diversity have been in place in some jurisdictions for over three decades, there is little evidence to suggest that contemporary attempts at rezoning have catalysed the transformation of homogenous landscapes into truly mixed use urban environments. Land use zoning proliferated in the United States from the 1920s and became influential in guiding the emerging field of urban planning in nations like Australia (Freestone 2010). Early zoning ordinances generally replicated existing land use patterns, while attempting to reduce land use conflict by separating “incompatible uses”, particularly polluting industry, and residential areas (Twinam 2020). Both growing passivity from the public sector, and growing power of the private development industry, occurred as zoning in its contemporary form developed with the planned suburbs of the post-war period. Early zoning schemes entrenched land use patterns in many contemporary cities. In a study of Seattle, Twinam (2018) found that less restrictive zoning in 1923 was associated with more land use conversions

(such as industrial to commercial) by 2015, whereas residential areas were static, with little change observed. Historic zoning was the most influential predictor variable in determining contemporary land use, even when accounting for an extensive number of other demographic and land use factors (Twinam 2018, 2020).

3. Study Areas, Data, and Methods

Brisbane was selected as a case study city as its planning instruments seek to densify and diversify key areas across the city (Limb *et al.* 2020). Consolidation presents a particular challenge for this city, as it lacks a tradition of higher density development (Raynor *et al.* 2017) and has instead historically catered for urban growth through peripheral expansion.

3.1. Brisbane, Australia

Brisbane is located on Australia's east coast, and during the COVID-19 pandemic, overtook Melbourne as having Australia's fastest growing urban population, largely due to interstate migration (ABS 2021). The Greater Brisbane region has a population of 2.5 million (ABS 2021). Ensuring sufficient new dwelling supply is a significant challenge for a region dominated by low density and auto-centric development. In the 1950s, all Brisbane suburbs were zoned for low density residential development (single family homes) and industrial uses were concentrated along the riverfront of the inner-city – a settlement pattern replicated in many Anglo-American cities. Brisbane City Council (BCC) undertook a comprehensive survey of land uses across the local government area (LGA) in 1951, creating parcel-specific land use data prior to the introduction of a formal planning instrument in 1965. This data provides an opportunity to analyse the impact of successive policy changes across the city. During the 1980s BCC planned the relocation of industrial uses from the inner-city to the urban periphery to enable mixed use redevelopments, including light industry, commercial and residential development. In Brisbane's current planning scheme (periodically amended since 2014), mixed use zoning is common across the inner-city and activity centres. The purpose of the mixed use zone is to provide for a variety of uses, including "low impact industrial", which is defined as an activity with negligible emissions (aerosol, fumes, particles, smoke, odour, and noise). However, this zone also provides for as-of-right development for residential, business and retail use (BCC 2021, section 6.2.6.4). How these planning mechanisms work in practice forms the basis of our inquiry.

3.2. Study Area Selection

To select study areas, we identified parcels across the Brisbane LGA that experienced a zoning change between 1952 and 2021 and encouraged densification and diversification of land uses. Despite several attempts, Brisbane did not gazette a town plan until 1965. An earlier 1944 scheme (continually amended until 1952) was used to guide local government decisions on land use but had not been forwarded to the State government for approval, so was not legally binding (Cox 1968). As it demonstrates local government intention in the 1950s, this scheme provides a useful base for our study. Using QGIS, the 1952 zoning map was georeferenced and digitised. BCC provides zoning data (2021) in shapefile format. We utilised the Queensland Government digital cadastral database (DCDB), a dataset of polygons for every property parcel in the State of Queensland, as a base to ascribe a historical and contemporary zoning category to every parcel in the Brisbane LGA. The DCDB contains unique identifiers for each individual parcel and attributes of parcel size (in m²), and each land parcel was tagged as either "no change" or "rezone" depending on whether zoning change has occurred to the parcel over the past 70 years (1952–2021). For example, the 1952 "Industry" zone is considered the same zone as "General Industry" in 2021, as industrial activities comply with the requirements of both zones. A parcel with those zones would be classified as having no

zone change. However, a parcel that was zoned “Industry” in 1952 and “Mixed Use” in 2021 would be considered a “rezone”, as the latter allows residential and commercial development.

Study areas were selected by identifying contiguous parcels that experienced zoning change between 1952 and 2021, and currently contain mixed use zoning. As many areas within the city have experienced rezoning over the last 70 years, we selected precincts with parcels zoned for the construction of at least a “medium-rise” apartment or office building (four storeys or more), as per the definitions used by the Australian Bureau of Statistics (ABS 2020). Under BCC’s contemporary planning scheme, medium and high density residential zones, as well as mixed use and centre zones, generally allow a building height of four or more storeys. Both mixed use and centre zoning are considered commercial zoning as they allow as-of-right development of uses such as shops, food and drink outlets, offices, and service industry (BCC 2021, para 6.2.2.1). While some residential zones allow subordinate commercial uses, intended development in the centre and mixed use zones aim for a mix of commercial, residential and, for the latter, low impact industry (BCC 2021). It was anticipated that these areas would experience higher levels of land use change, as these parcels were generally industry or detached houses in the 1950s. The spatial distribution of zoning changes, based on 1951 land use, is outlined in Figure 1. This figure demonstrates that land targeted for increased density includes former industrial land within five kilometres of the city centre, residential or commercial land located near major transport routes (road and rail) and undeveloped land on the urban periphery.

The precincts selected include three inner-ring (approximately 0 to 5 kilometres from the city centre) and three middle-ring study areas (approximately 5 to 10 kilometres from the city centre). The study areas ranged in size from 0.9 km² (Nundah/Toombul) to 3.4 km² (Upper Mount Gravatt). The inner-ring study areas were settled in the late nineteenth century and riverfront areas were developed for industry. West End/South Brisbane and Newstead/Teneriffe experienced

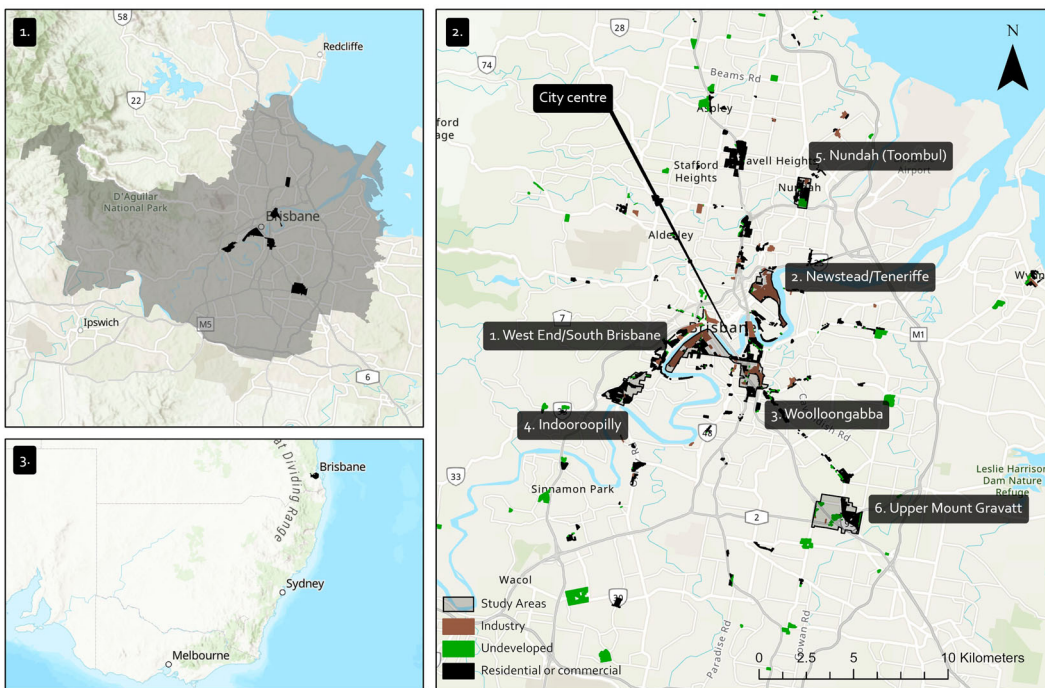


Figure 1. (1) Study areas in the Brisbane LGA. (2) Study areas and land that was rezoned since 1952 for an allowable use in 2021 that includes an apartment of four storeys or more. Classification of industry, undeveloped and residential or commercial is based on land use in 1951. (3) Brisbane LGA and Australia.

gradual economic decline in the late twentieth century following the relocation of port activities (Minnery 2004). State and local governments targeted these locations for redevelopment in the late 1980s and early 1990s, with South Brisbane hosting the World Expo 1988, leading to the conversion of industry and wharves into a mixed use, commercial and residential precinct, and BCC, with federal funding for upgraded sewerage infrastructure, introducing a development plan for Newstead/Teneriffe which facilitated private sector redevelopment into “mixed residential and commercial development ... [with] high residential amenity ...” (BCC 1987, p. 27). Woolloongabba once contained Brisbane’s main locomotive depot, now a shopping centre following the removal of trams (1969). The suburb was also divided into east and west by an above-ground motorway (1973) but has recently experienced high levels of new high density residential development, with a new underground railway station under construction. Two middle-ring study areas were settled in the nineteenth century (Indooroopilly and Nundah (Toombul)) around railway stations, but experienced high levels of residential growth, and the construction of large shopping centres, in the post-war period. Upper Mount Gravatt was developed from rural use into a peripheral, low density suburb from the 1960s, including a shopping centre (1971), 6-lane motorway (1980), and rapid busway station (2001).

3.3. Data Collection and Analysis

Our analysis utilised an inductive research methodology by incorporating land use change analysis at parcel-scale. The zoning dataset created using the DCDB, containing parcel attributes of area and 1952 and 2021 zoning, was used as a base. We also required parcel-specific data of historic land use, transitional zoning, contemporary land use, and contemporary zoning. To obtain transitional zoning data, we selected the 1987 Brisbane Town Plan, as it was introduced approximately 30 years between both 1952 and 2021 and contained aspects of urban consolidation instigating the redevelopment of some inner-city areas for mixed use development. Hardcopy maps of the 1987 planning scheme were scanned, georeferenced and manually digitised. As a result, in addition to the 1952 and 2021 zoning, the 1987 zone classifications were also ascribed to each parcel within the study areas.

Historic land use data was sourced from a 1951 survey undertaken by BCC, manually digitised in QGIS, and spatially joined to the 2021 property parcels, ascribing contemporary parcels with a historical land use. A dataset of contemporary land use for each parcel was created through a combination of the Queensland Government’s land use data (Queensland Land Use Mapping Program (QLUMP) dated 2019), address point data (2020) and manual review through site visits and Google Streetview. [Figure 2](#) provides some examples of the source maps we use in this study.

The QLUMP categorises land uses, with “urban residential” defined as urban land with houses, flats, hotels, and similar structures. As we required specific information on the type of dwelling (not just whether the parcel was a residential use), the Queensland Government address point data, a dataset of every address in the state specifying if some dwellings contain multiple dwelling units, was spatially joined to the cadastral and land use data. Parcels ascribed with an “urban residential”, lacked a unit type from the address point data and were zoned for a higher residential density or other land uses, were manually reviewed on Google Streetview. Through this process, 2887 data records across the six study areas required manual review. We identified seven types of land uses according to the definitions used by BCC and the Queensland Government (Department of Environment and Science 2019, BCC 2021). This includes residential use divided into house (single, free-standing dwelling) and multiple dwelling (multiple dwellings contained in the same building or complex, such as townhouses, rowhouses or apartments). Commercial use was defined as places of employment where services are provided (including shopping centres, offices buildings and fast-food outlets), whereas industrial use were parcels where goods are produced (including ceramic makers, vehicle mechanics and manufacturing plants). Other uses included public services (for example, schools and hospitals), transport and communication infrastructure (for example,



Figure 2. Examples of original source data. (1) Zoning map dated 1952. (2) Zoning map sourced from Brisbane Town Plan 1987, (3) Zoning data sourced from Brisbane City Council City Plan, dated 2021, (4) Land use survey map dated 1951 and (5) Land use data dated 2019.

electricity substations and busway stations) and recreation and culture (for example, parkland and museums).

The analysis of the data was conducted using a GIS-based site-specific change analysis between 1951 and 2021 land use maps, and between 1952, 1987 and 2021 zoning maps. This identified the locations and number of land parcels that were rezoned from 1952 to 1987, and from 1987 to 2021, as well as those that experienced a land use change between 1951 and 2021, and the area (m^2) these changes impacted. Additional attribute data were added to each parcel to indicate if there was a zoning and/or land use change, and how such change had occurred (for example, residential to commercial). Parcels were measured based on the polygon area in the 2021 (in m^2). A total of 10,519 land parcel data records (2029 in West End/South Brisbane, 1574 in Woolloongabba, 2105 in Indooroopilly, 867 in Nundah (Toombul), 1433 in Newstead/Teneriffe and 2510 in Upper Mount Gravatt) were generated, accounting for a combined area of 11.7 km^2 .

4. Results

There was a loss of industrial land in the inner-ring and adjacent middle-ring study areas, attributable to both the changing needs of industry (for example, larger building footprint requirements or access to high volume distribution network capability) and to zoning. Large-format industry, including manufacturing, processing, and to a lesser extent warehousing, experienced largescale transformation, most often single-use residential development and commercial services. The data indicate that a substantial number of properties were rezoned from industry to “mixed use”, firstly in inner-ring study areas, followed by middle-ring study areas. The results show land use

homogenisation, particularly properties used for employment activity. While the initial focus of land use conversion was large, easily converted industrial parcels in inner-ring study areas, into residential and commercial use, this type of land use conversion was facilitated across both inner and middle-ring study areas by 2021.

4.1. Zoning Changes

The changes to land use zoning over the study period reflect changes to planning policy over time, particularly the introduction of high density residential and mixed use zones from the late 1980s. In 1952, industrial zoning dominated riverfront locations across inner study areas and accounted for 31.6% of the combined land mass of all study areas, with 39.1% dedicated to residential use. Industrial zoned land decreased to 0.7% of land across all study areas by 2021, whereas zoning that allowed for commercial development increased from 0.8% of total land in 1952 to 34.0% in 2021 (Figure 3). Figure 4 shows that all study areas except Indooroopilly experienced a decrease in land zoned for industrial uses, but this was most pronounced in the three inner-ring study areas (West End/South Brisbane, Newstead/Teneriffe, and Woolloongabba).

All study areas experienced an increase in commercially zoned land, ranging from an increase of 23.1% in Upper Mount Gravatt to 49.9% in Newstead/Teneriffe. Residential zoned land decreased across the study areas, except in Newstead/Teneriffe and Nundah (Toombul). The increase in commercial zoning was largely facilitated by rezoning former industrial precincts. For example, by 2021, almost all former industrial zones in Newstead/Teneriffe were replaced with mixed use and residential zoning (Figure 5). Between 1987 and 2021 industrial zones in that study area decreased from 45.3% of land mass to 5.9% in 2021. Similarly, in 1952 Woolloongabba's zoning was predominately residential (50.3%), followed by industrial zoning (36.7%). The expansion of residential and commercial zoning began in 1987 and continued to 2021, where land zoned for residential (39.4%) and commercial (33.8%) development account for a similar land mass. In Upper Mount Gravatt, the small amount of land reserved for industrial uses in 1987 was zoned for large format retail in

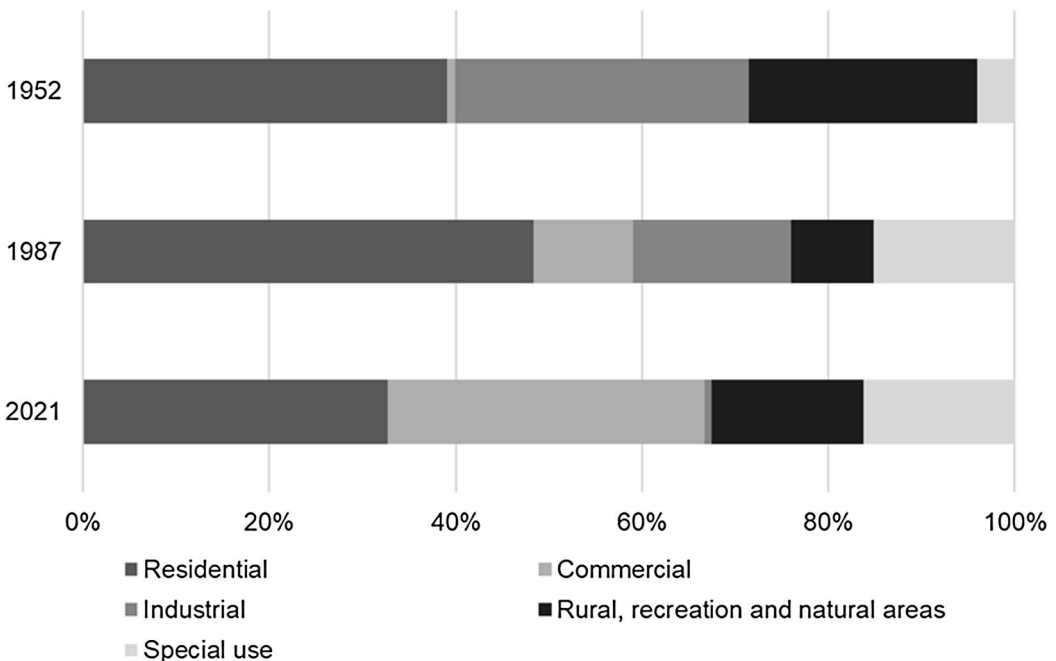


Figure 3. Proportion of land zoned for each purpose in 1952, 1987 and 2021, with a total combined area of 11.7 km².

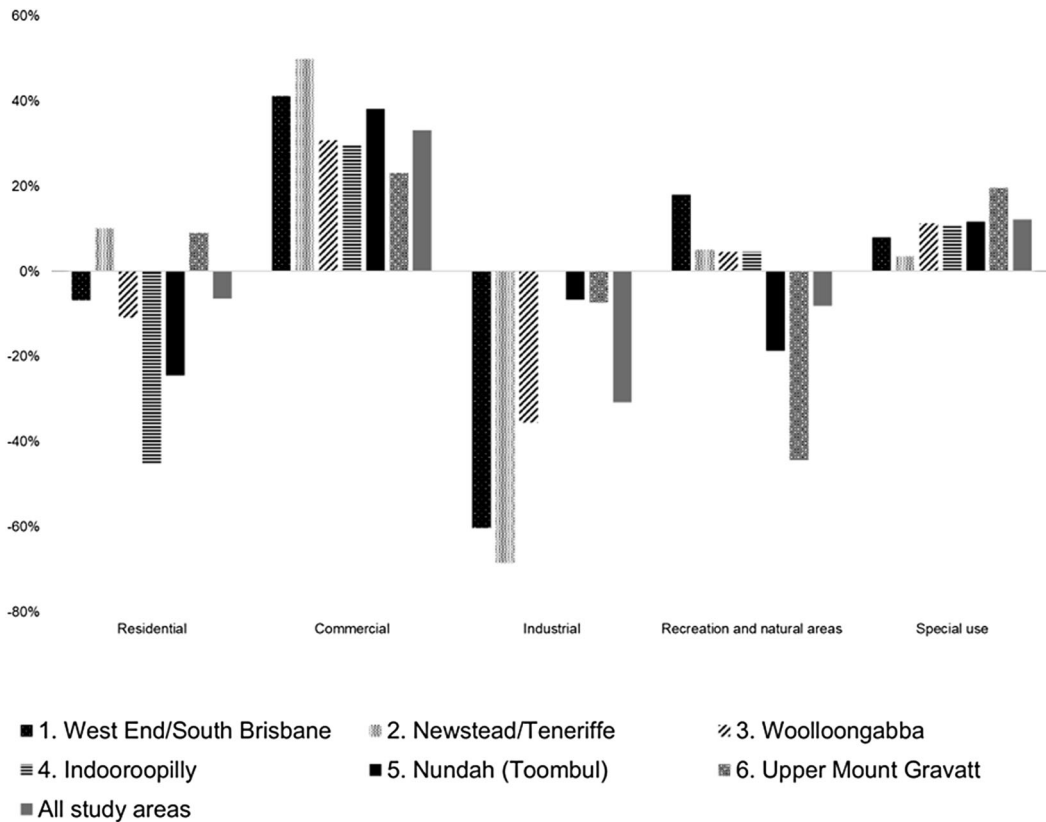


Figure 4. Change of land use zoning between 1952 and 2021 by study area.

2021. Like Newstead/Teneriffe, land that was zoned for industrial uses in 1987 in Nundah (Toombul) and Indooroopilly was rezoned as “mixed use”.

4.2. Land Use Conversions

The expansion of commercial use at the expense of industry and manufacturing occurred across all study areas. While residential use was the most dominant land use across all study areas (36.0% of combined land area in 2021), commercial use grew from 2.3% of combined land area in 1951 to 28.9% in 2021. The three inner-ring study areas experienced the most significant growth in commercial land (Figure 6).

In 1951, 92.2% of combined industrial land (by area) was in the inner-ring study areas of South Brisbane (20.3%), Newstead (59.9%) and Woolloongabba (12.0%). In Woolloongabba, parcels containing houses occupied 62.1% of the land mass in 1951, followed by railways (10.9%), industry (8.4%) and business (5.0%) uses. By 2021 industrial use in Woolloongabba largely disappeared, parcels with residential uses (both houses and multiple dwellings) accounted for 37.4% of the land mass, and commercial services occupied 30.6%. In Teneriffe/Newstead, industry (46.8% of land area in 1951 and 1.2% in 2021) was largely replaced with commercial services (3.4% of land area in 1951 and 46.2% in 2021), and houses were replaced with multiple dwellings. The limited number of properties zoned for “low impact industry”, which aims to “support industry activities and ... not compromise the future use of premises for industry activities” (BCC 2021, para 6.2.5), contained some industry (ceramic workshops, fabric printer and car repair stores), but also many car dealerships and gyms. In West End/South Brisbane, commercial services occupied 38.8% of land area in

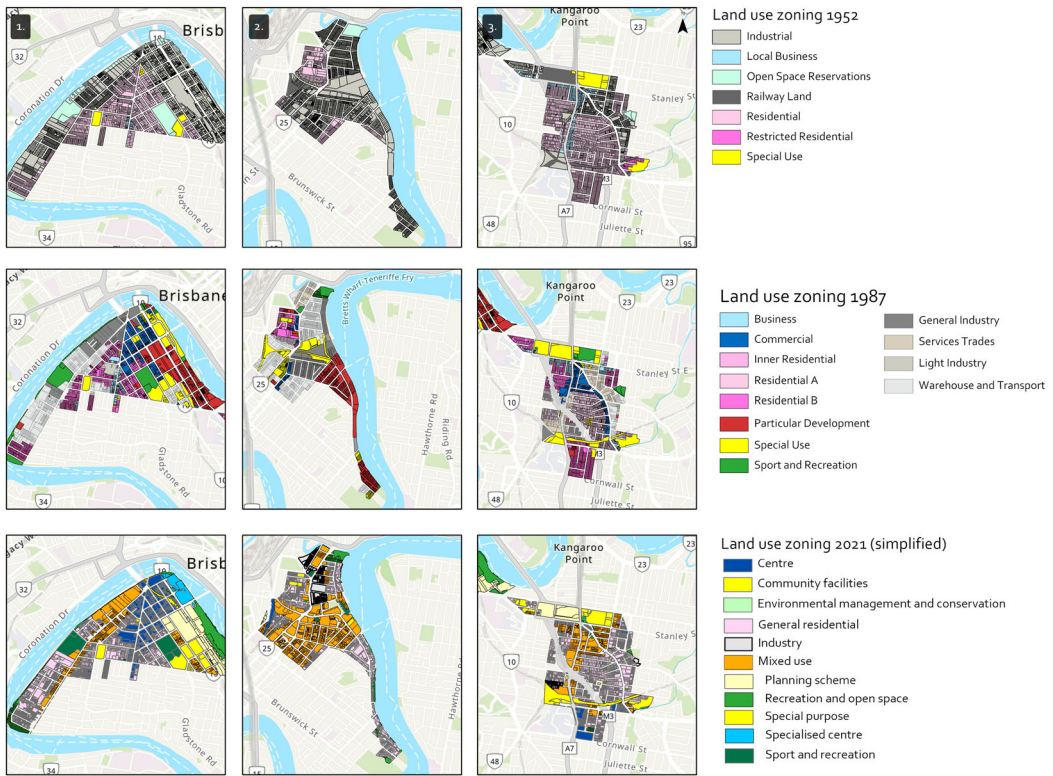


Figure 5. Zoning in 1952, 1987 and 2021 in (1) West End/South Brisbane, (2) Newstead/Teneriffe and (3) Woolloongabba.

2021, and residential uses occupied 24.5% (11.1% multiple dwellings and 13.4% houses). Industry occupied 5.6% of land area, including a milk processing facility, concrete batching plant, and glass manufacturer – the latter 57,000 m² site to be purchased by government for redevelopment (Stone *et al.* 2021). In contrast, in 1951 commercial services only occupied 4.1% of land area, with 24.9% occupied by industry and wharves, and 54.3% by residential uses. See Figure 7.

4.3. Impact of Zoning on Land Use Conversion

Across all study areas, the majority (54.2%) of land zoned for commercial use in 1987 had converted to a commercial use in 2021. All industrial parcels (1951) rezoned for a commercial use in 1987



Figure 6. Land use in 1951 and 2021 in (1) West End/South Brisbane, (2) Newstead/Teneriffe, (3) Woolloongabba, (4) Indooroopilly, (5) Nundah (Toombul), and (6) Upper Mount Gravatt.

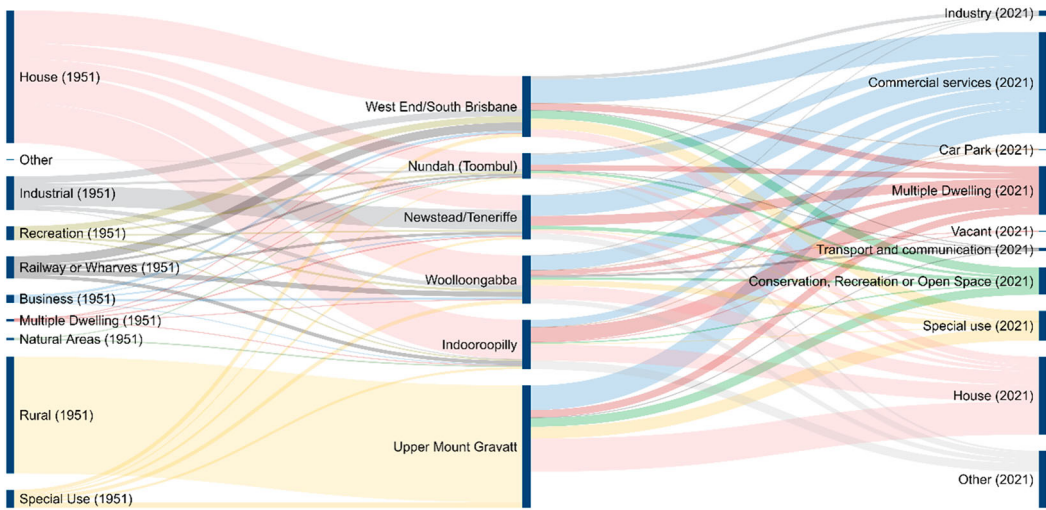


Figure 7. Land use change (1951 to 2021) by area (m²).

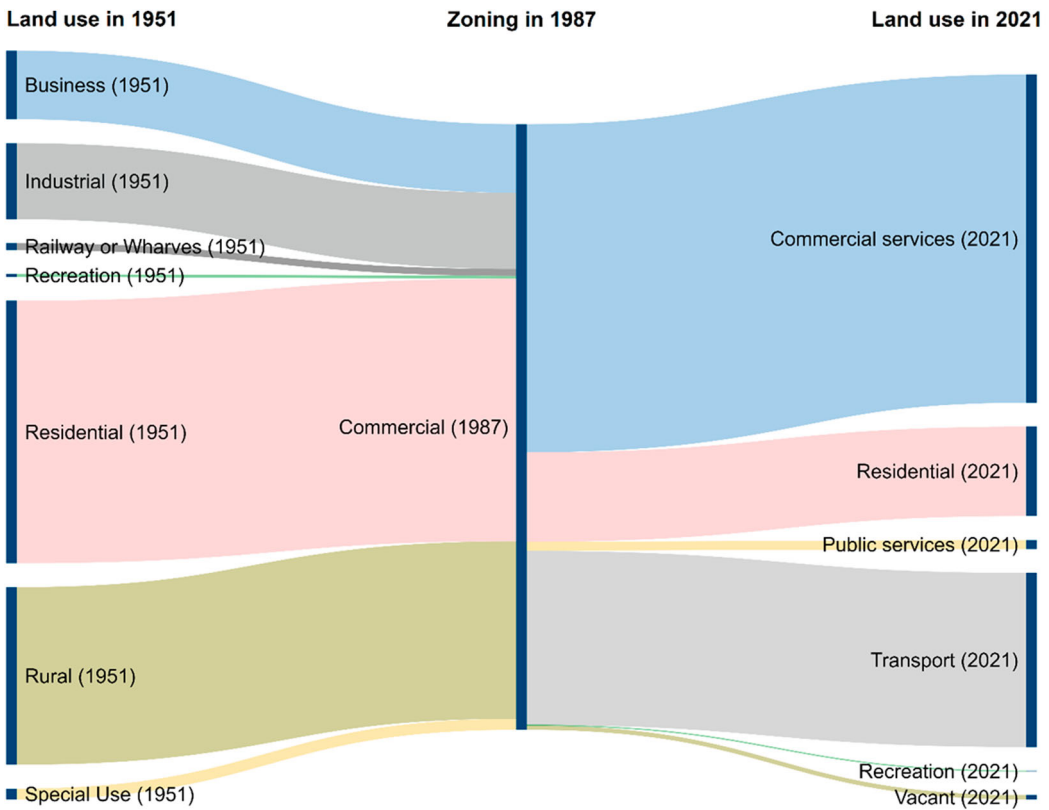


Figure 8. Historical and contemporary land use of parcels zoned for commercial use in 1987, noting that the large proportion of land used for transport in 2021 represents road networks constructed post 1951.

were converted by 2021 (Figure 8). For land zoned as mixed use in 2021, despite allowing low impact industrial uses, the majority were used for housing or commercial services (see Figure 9). Manufacturing and industry use accounted for 3.3% of total mixed use zoned land. Only 4.9% of

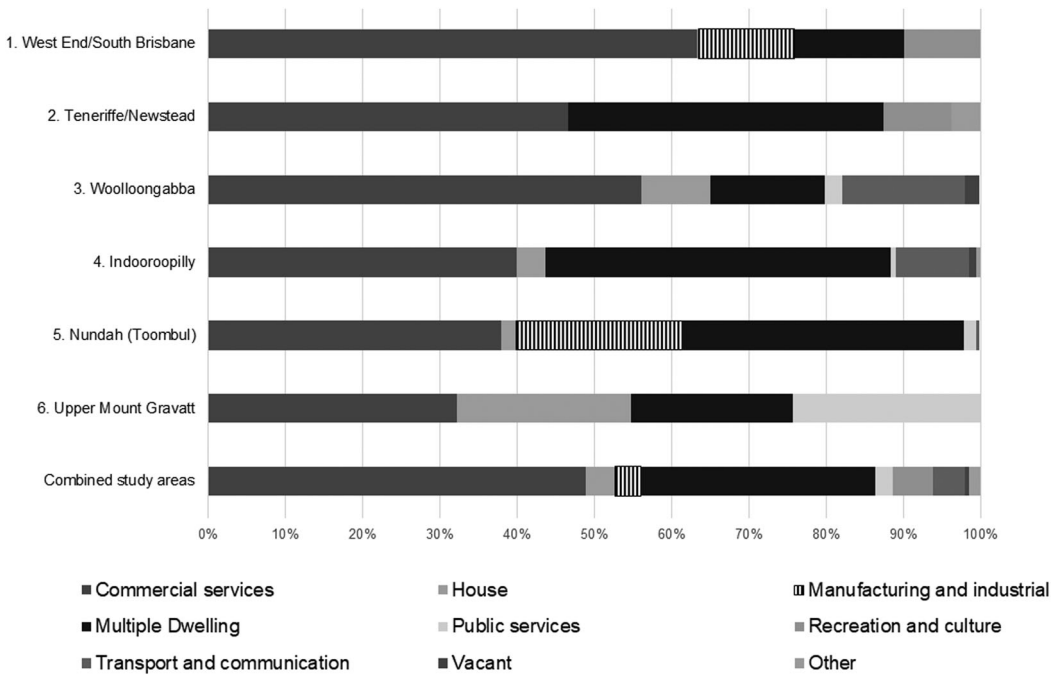


Figure 9. Actual land use (2021) of parcels zoned as mixed use in 2021, by area (m²).

land used for industry in 1951 contained industry or manufacturing in 2021 (Figure 10), with industrial land in 1951 generally converted to multiple dwellings (33.4%), followed by commercial services (31.0%) and recreation and culture (10.5%), the latter largely due to the conversion of the South Brisbane waterfront into art galleries, museums, and parkland. For land that had a manufacturing or industrial use in 2021, 84.2% was zoned as General Industry in 1987.

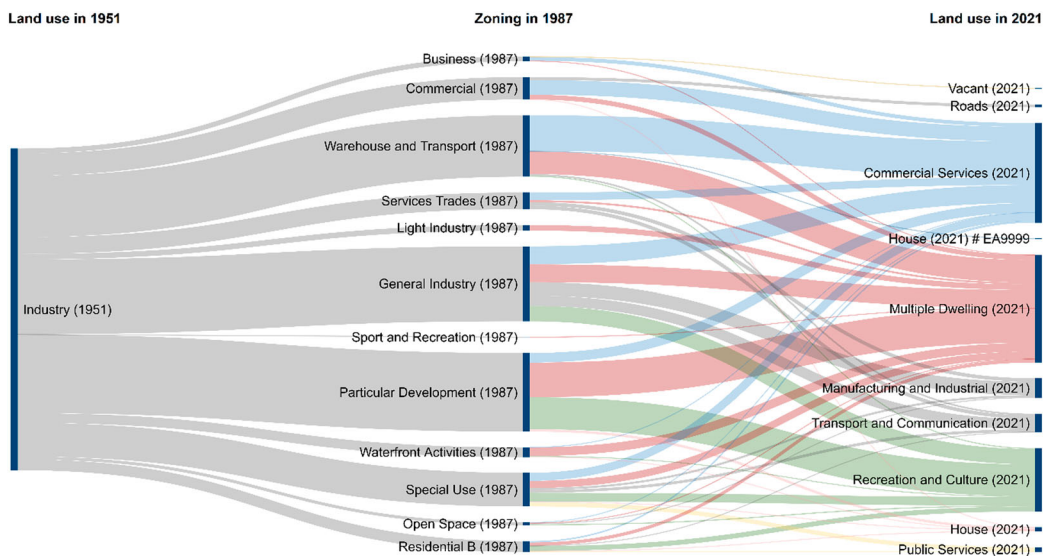


Figure 10. Zoning (1987) and land use (2021) of industry land (1951), by area (m²).

5. Discussion

The findings of this study highlight the ability of zoning to both facilitate, and prevent, land use conversion. By allowing open competition between commercial, residential, and industrial uses, land use policy aiming to diversify land uses has the opposite effect. Employment uses are largely confined to commercial services, encouraging the creation of urban “blandscapes”. However, our results also demonstrate the ability of zoning to protect certain land uses from redevelopment, and we highlight that this can potentially be used to protect and enhance land use diversity.

5.1. Planning Policy Encourages “Blandscapes”

The way that policymakers conceptualise commercial services, industry and manufacturing has direct implications for how these land uses are envisioned in urban policy (Grodach and Gibson 2019). Contemporary planning policy is shaped around the notion that industry and manufacturing are inevitably declining (Stanford 2016) and that remaining firms require largescale, outer urban sites adjacent to transport infrastructure such as motorways and railways (BCC 2019, Grodach and Gibson 2019). In Brisbane, the movement of industrial zones began with rezoning inner suburbs from the late 1980s. By 2000, BCC’s planning scheme identified some 3400 hectares of “vacant” industrial land (then undeveloped sites containing uncleared vegetation), on the periphery of the city, targeted for industrial development due to their proximity to the interstate railway and motorway infrastructure (BCC 2000). By 2021, many of the study areas had dedicated large swathes of land to residential and commercial services, confining employment activity to commercial services, and the 1952 industrial zoning of centrally located properties was largely replaced with high density residential and mixed use zoning (see Figure 11).

Rezoning centrally located industrial sites for infill projects or “urban renewal” facilitates the conversion of traditional mixed use neighbourhoods into homogenous residential or commercial urban environments (von Hoffman 2008). A public-private partnership is created where local governments create beneficial conditions for developers, as making large industrial sites available for redevelopment facilitates value gain and reduced redevelopment costs (Wolf-Powers 2005). The neoliberal approach that land should be put to its “highest and best use”, in an economy that values residential and commercial development above all else, creates diseconomies for the city in the long term (Wolf-Powers 2005, p. 381). An urban landscape created by dedicating large areas to offices, retail and other commercial uses is vulnerable to shocks, and the COVID-19 pandemic exposed the tenuous situation this created for local economies. Employees working from home resulted in low levels of foot traffic, with impacts for businesses relying on commuting workers. In comparison, manufacturing workers largely continued to attend a workplace. In fact, the most resilient places during COVID-19 lockdowns were those that contained a diversified industrial employment mix and did not rely on a single sector for employment (Grodach and Martin 2020). Melbourne’s last remaining inner-city industrial zone, Port Melbourne, an area that provides a diverse mix of production as well as commercial services, was among the most resilient places of employment in Australia (Grodach and Martin 2020). It offers valuable insight into what a truly “mixed use” precinct encompasses.

5.2. Industrial Zoning Protects Industrial Uses, While Mixed Use Zoning Facilitates Land Use Conversions

Despite mixed use zones allowing for “low impact” industry and manufacturing land uses, our findings demonstrate that most land (by area) zoned for mixed uses is used for commercial services, followed by high density residential uses. Rezoning or approving the development of non-industrial uses in industrial zones is crucial to the implementation of land use conversions aimed at replacing industry or warehouses with commercial services and residences (Burchell *et al.* 2000). Unlike

Inner city industrial land

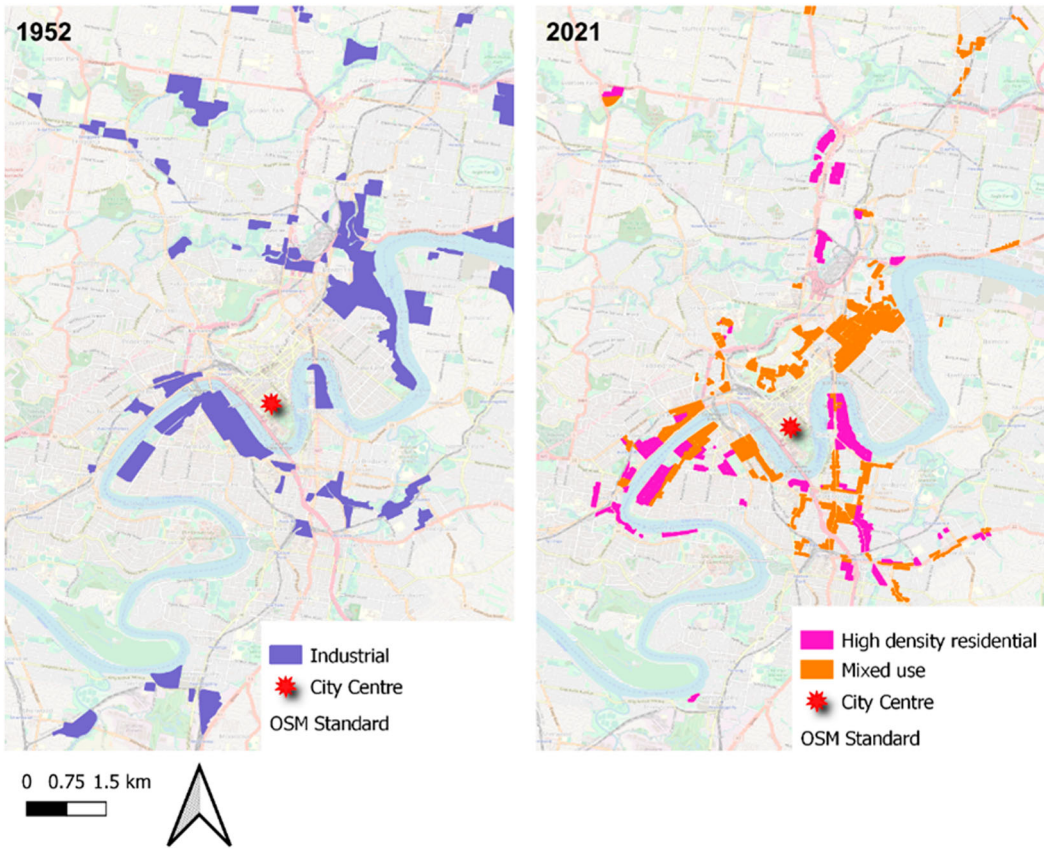


Figure 11. Geographic distribution of industrial land use zoning (1952) and high density residential and mixed use zoning (2021).

industrial zones, mixed use zones allow for as-of-right residential or commercial conversions. These zoning changes create open and unrestricted competition between commercial or residential uses, and industrial uses (Wolf-Powers 2005, Grodach and Martin 2021). Industrial land is worth less, so this inevitably leads to the displacement of manufacturers (Wolf-Powers 2005).

The results also demonstrate that parcels zoned for heavier industrial uses, being the General Industry zone in 1987, retained their industrial use by 2021. This is supported by other research, with Lester *et al.* (2013) finding that industrial zone designations reduce the probability of conversion. Policymakers minimise the connection between an economic growth model centred on property development and industrial decline, citing globalisation and the changing post-war economy. However, our research contributes to the growing body of evidence that rezoning that allows for conversions of industrial land contributes to the decline of industrial uses (Wolf-Powers 2005, Grodach and Martin 2021). Inner cities remain competitive locations for small and medium sized manufacturing enterprises (Lester *et al.* 2013) and other jurisdictions recognise this by introducing industrial protection zones (Grodach and Gibson 2019). Industrial preservation policies work, with evidence from Chicago showing a significant relationship between the retention of industrial land use for parcels within industrial protection zones (Lester *et al.* 2013). Land use regulation in Germany has long mixed low impact industry with other uses (Hirt 2007). In fact, many contemporary industrial enterprises, commercial services, and residential uses can co-exist, often in the same buildings.

There is growing evidence to suggest that policies that view “low tech” and “high touch” manufacturing, such as food and beverage or textile production, as obsolete in inner-city locations are based on flawed assumptions (Grodach and Gibson 2019). Contemporary manufacturing is no longer characterised by largescale industrial production with heavy machinery and immense infrastructure, and smaller firms make up most manufacturing enterprises in Australia (Gibson *et al.* 2012, Grodach *et al.* 2017) and in the United States (United States Census Bureau 2017). In fact, manufacturers are attracted to inner-city locations for the same reasons that service sector enterprises are, including access to large markets, skilled labour, and specialised suppliers (Curran 2010, Lester *et al.* 2013). Cluster dynamics, where customers, suppliers, retailers and manufacturers are co-located, make inner-city precincts desirable for small urban manufacturers (Fox Miller 2017, Hatuka *et al.* 2017). Even gentrification can assist local manufacturers, as it requires both short-term, labour intensive renovation and other customised goods and services (Curran 2010, Grodach and Gibson 2019), as well as long-term culturally specific and local production, such as microbreweries, textiles for clothing and furniture design, metal workers and foundries for specialised building requirements, or carpentry and set design for film and theatre productions (Grodach *et al.* 2017). Despite policy documents highlighting “a resurgence of ‘creative, maker and sharing’ culture”, land use planning continues to assume that peripheral sites are most desirable for industrial users (BCC 2019, p. 9). The spatial requirements of manufacturing businesses vary, and enterprises in Australia, North America and the United Kingdom have highlighted a lack of affordable space as one of the largest business constraints (Grodach and Martin 2020). Yet, the remaining centrally located, industrially zoned sites, suitable for industrial equipment and containing loading docks and other supporting infrastructure, remain vulnerable to displacement (Gibson *et al.* 2017). Policymakers should reconsider land use planning that creates open competition between industrial, and residential or commercial uses, and how various land uses interact at a human scale. More active planning, potentially at a parcel scale, may be required to deliver the goals of a truly mixed use urban landscape.

6. Conclusions

Our findings demonstrate how the implementation of planning policy continues to create homogenous urban landscapes. This exposes a disjoint between policy aimed at diversification, and practical implementation demonstrated through land use conversions. The lack of land use diversity can create weaknesses in the physical structure of cities, and policymakers have, arguably, (and inadvertently) encouraged the abandonment of urban centres by favouring commercial services over other uses, as the former are most amenable to home-based work. Existing planning practices that allow open competition between industry and other uses across high value real estate only consider the beneficial impact for individual landholders (and the economic gain from rezoning), rather than the long-term impact on the urban economy. If the role of planning authorities is to regulate land use in the interest of the community, with a comprehensive and future-focused view, it is questionable whether facilitating the most lucrative use of a particular parcel is in the best interest of the city. Our research contributes to the growing evidence that zoning can be used to protect land use diversity, rather than simply facilitate land use conversions. Further research is required to understand how planning can best respond to the rise of remote working and its impact on existing commercial land, to understand the impact of real estate dynamics on relocation of inner-city industrial firms, as well as the interface between transport and cluster dynamics and how contemporary industry can be best accommodated through the land use planning system.

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