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drivers at the masterplan scale

Baker, Hannah; Moncaster, Alice; Wilkinson, Sara; Remøy, Hilde

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BUILDINGS & CITIES

Demolition or retention of buildings: drivers at the masterplan scale

SPECIAL COLLECTION: UNDERSTANDING DEMOLITION

RESEARCH

HANNAH BAKER
ALICE MONCASTER
SARA WILKINSON
HILDE REMØY

*Author affiliations can be found in the back matter of this article

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ABSTRACT

Current adaptation theory tends to consider individual buildings or the city level, which cannot address decisions related to masterplan developments on large brownfield sites. This paper investigates the drivers for building demolition or retention and adaptation decisions at the masterplan scale. Expert interviews and three case studies are used to explore how and why decisions to demolish, or to retain and adapt, are made at this scale. The research compared three different geopolitical contexts: Cambridge in the UK; Eindhoven in the Netherlands; and Sydney in Australia. Additional factors and complexities that should be considered at the masterplan scale are identified. The theoretical underpinnings of urban development processes are used to explain these complexities in relation to four existing models and demonstrate that no one model is adequate to describe the interactions. With increasing awareness of climate change impacts, it is critical that demolition decisions on masterplan developments are reviewed in the light of retaining carbon as well as heritage.

PRACTICE RELEVANCE

This research demonstrates the different and specific concerns applying to demolition and retention on masterplan scale sites compared with the individual building scale. Although the evidence shows that decisions are context specific, the criteria as identified and categorised within this research offer a useful tool for stakeholders when establishing their priorities and approaches to decisions to demolish or retain and adapt within a masterplan context. This should help to avoid contested decisions and can help community groups hoping to have an influence over the long-term decisions, as well as developers looking to retain good relationships with the local community. The identified criteria can support planners and local authorities responsible for approving masterplan developments to better understand the factors relevant to each decision, including the importance of retaining flexibility throughout to enable response to changing circumstances.

CORRESPONDING AUTHOR:

Hannah Baker

Department of Engineering, University of Cambridge, Cambridge, UK

heb51@cam.ac.uk

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1. INTRODUCTION

When previously developed urban areas become underused, out of date or obsolete (Hanafi *et al.* 2018) there is a need to decide whether to demolish, or to retain and adapt, existing buildings. During such redevelopment various stakeholders, including owners, developers, designers and planners, become involved in this complex decision-making. This paper explores this decision-making by asking: What are the drivers for building demolition or retention and adaptation decisions at the masterplan scale?

Demolition is the deliberate destruction of a building by human methods/agency (Thomsen & Van der Flier 2011). Douglas (2006: 1) defines building adaptation as:

> any work to a building over and above maintenance to change its capacity, function or performance (i.e. any intervention to adjust, reuse or upgrade a building to suit new conditions or requirements).

Such adaptation can enable the retention of existing buildings. Meanwhile, the Commission for Architecture and the Built Environment (CABE) (2011) states that a spatial masterplan:

> sets out proposals for buildings, spaces, movement strategy and land use in three dimensions and match these proposals to a delivery strategy.

Current adaptation theory focuses on demolition and retention decisions on an individual building level (Sayce *et al.* 2022; Wilkinson & Remøy 2018) or a city level (Deakin *et al.* 2012; Stephan *et al.* 2013), although a small number of reports focus on social housing estates (Crawford *et al.* 2014; London Assembly 2015). Several adaptation toolkits have been developed that show relatively good assessment of individual building decisions (Geraedts & Van der Voordt 2007; Langston & Smith 2012). However, when the toolkits were tested against demolition and retention decisions made on privately led masterplan redevelopments, Baker *et al.* (2017) found a disparity between decisions suggested by the toolkits and the actual decisions made. The authors proposed that other issues arise when working at the masterplan scale, in addition to the considerations of individual buildings—forming the foundation for the doctoral thesis that underlies this study (Baker 2019).

The issue of whether to demolish or to retain is partly governed by external concerns. Heritage conservation is recognised as a benefit of building retention (Baker *et al.* 2021). As climate change impacts become a larger societal concern (IPCC 2022), an additional potential benefit of retaining buildings is the resultant savings in materials and embodied carbon (Clegg 2012). Campaigns including the *Architects' Journal*'s (2023) RetroFirst campaign and Architects Declare's (2023) Climate and Biodiversity Emergency argue for the careful consideration of upgrading buildings rather than demolition.

The paper is structured as follows. An overview of drivers towards demolition and retention and urban development theory provides the theoretical framing. The research methodology follows, outlining the approach taken—including a series of expert interviews, and three case-study investigations of privately led developments in England, the Netherlands and Australia. The results describe the demolition and retention drivers that are identified in practice. The application of composite urban development theory further highlights these complexities and demonstrates their exacerbation by the physical and chronological scale of the masterplan. The paper concludes with recommendations about understanding and revising how decisions are taken at a masterplan level.

2. BACKGROUND

2.1 DRIVERS TOWARDS DEMOLITION AND RETENTION

A range of building characteristics act as drivers towards demolition or retention. The structure, service, condition and layout, and how well these factors support the proposed new function, all influence the feasibility of adapting a building. Previous studies have identified floor spans,

structural grids, construction materials and floor-to-ceiling heights as particularly relevant (Brennan & Tomback 2013; Remøy & van der Voordt 2014; Wilkinson 2011). For example, low floor-to-ceiling heights and poor building condition can be demolition drivers due to updated service requirements and high capital costs to fix issues (Watson 2009). Columnar structures can be a driver towards retention as they enable greater flexibility within a space than load-bearing internal walls (Remøy *et al.* 2011). The adaptability potential of a building can dictate the economic viability of the construction, while the inherent risks of uncovering additional problems not identified in initial inspections, known as latent defects, are a barrier to retention (Bullen & Love 2010). As some consider that 'the language of developers is economics' (Hanafi *et al.* 2018: 266), expenditure, assessment of risk and potential profits are often driving forces behind decisions. There are interdependencies between different factors, and these must be carefully weighed when decision-making (Crawford *et al.* 2014).

Building adaptation potential includes external location factors (Rockow *et al.* 2018). Accessibility to services, facilities, transportation networks, parking and the aesthetics of an area are commonly cited (Heath 2001; Langston 2013; Wilkinson 2011). Locational factors are difficult to change at the building level as they frequently lie outside the owner's or developer's control. When working at the masterplan scale (Thomsen & Van der Flier 2011; Van der Flier & Thomsen 2006), however, factors, such as additional transportation networks, may form part of the development's design (Baker *et al.* 2017).

Planning policy and land-use plans will often dictate the nature of a development; this is applicable to both individual buildings and masterplan sites. For instance, heritage designations or listings are a key driver towards retention (Plimmer *et al.* 2008). Some studies show heritage designations can add a price premium to properties (Ahlfeldt *et al.* 2012; Van Duijn *et al.* 2016), although capital expenditure for retention is often higher.

Reports focusing on social housing estates (Crawford *et al.* 2014; London Assembly 2015) indicate that social factors need to be considered at both the building level and for the wider estate. At the larger scale, broader issues include social cohesion and neighbourhood safety, while both individual buildings and larger sites may hold heritage value for a community even when unlisted (Ashworth 2011). To overcome the negative social impacts of urban regeneration, meaningful public participation in decision-making is essential; collaborative planning, using the exchange of knowledge between different stakeholders, is therefore fundamental to deliberative democracy (Healey 1997; Taylor 1998). This is central to current theory underpinning planning and urban development processes in the case study locations.

2.2 THEORETICAL UNDERPINNINGS OF URBAN DEVELOPMENT PROCESSES

The theoretical underpinnings of urban development processes can be used to frame this research. Compared with the building level, at the masterplan scale there is an additional degree of complexity:

> more than refurbishing or renovating buildings [...] urban regeneration is seen as being part of the broader planning process [... and] masterplans have been the main vehicle used for addressing urban regeneration policies.
>
> (Fonseca & Ramos 2019: 240)

Heritage-led regeneration sits within the context of urban development, with the main focus being the tension between economics and conservation (Pendlebury & Porfyriou 2017).

There are four theoretical models identified as underpinning urban development and planning: equilibrium, structural, event-sequence and agency (Drane 2013; Healey 1991; Squires & Heurkens 2016). Each model focuses on different aspects of urban development and planning.

- *Equilibrium models*

  Equilibrium models centre on market supply and demand. Due to their positivist outlook towards economics, the assumption is that urban development processes are driven by demand for property and the supply is brought forward to meet demand (Squires & Heurkens 2016). Critiques of this single-lens perspective include the exclusion of social and cultural aspects, which can also shape economic activities (Guy & Henneberry 2000).

- *Structural models*

  Structural models depict how institutions, environments, markets and organisations influence development (Squires & Heurkens 2016). For example, a planning authority can either regulate or shape development activities (Adams *et al.* 2012). In the 1940s and 1950s, urban development was a physically deterministic activity where blueprint plans were made by planning institutions (Taylor 1998). In England, the Netherlands and Australia, there was a shift (albeit at different times) to a more collaborative approach (Allmendinger & Haughton 2012). In this transition, Squires & Heurkens (2014: 227) describe how:

  > planning systems seem to transform into instruments that shape and stimulate private investment in times of austerity, combined with regulations that to different degrees enable private interests to materialize through real estate development.

- *Event-sequence models*

  Event-sequence models consider different time stages of development (Squires & Heurkens 2016). Daamen (2010: 6) argues for 'projects as process type thinking'. This is due to the long timespan of urban development projects and the need to think about the process that underpins a development project. There are 'moving parts' that can change over the duration of a project, including the policies and people involved (Pendlebury 2013).

- *Agency models*

  Agency models reflect the diversity of the actors involved with (or impacted by) development processes (Squires & Heurkens 2016). Actors are likely to have various aspirations and require different resources in decision-making (Verhage 2003). Faludi (1987: 117, cited in Verhage 2003) suggests that:

  > physical development involves a stream of decisions taken by private as well as public actors, each pursuing ends of their own.

  Coiacetto (2000) demonstrated that developers have different corporate aspirations and personalities. Hence, Adams *et al.* (2001) emphasise the importance of public planners understanding different developers and their motivations to negotiate with, and incentivise, them.

Interpreting urban development processes through just one of these models has been critiqued as reductionist (Carmona 2014), as none reflects the complexity of real projects. Critics have proposed theoretical models and frameworks that consider one or more of these perspectives, with contemporary academics proposing composite models that include all four. Examples include Squires & Heurkens's (2016) conceptual model for real estate development and Zamanifard *et al.*'s (2018) model for public space governance. The present paper uses all four models to explain the practical realities of demolition and retention decisions on masterplan sites.

3. METHODS

The research design followed three phases: a literature review, interviews with built environment professionals and case studies of three masterplan projects.

The literature review of building adaptation and demolition identified a list of decision-making criteria. These criteria applied principally to decision-making at the building level (Baker *et al.* 2017) and were used to develop the interview questions for the following phase.

The interviews with built environment professionals in the UK (conducted in 2016–17) focused on how and why demolition and retention decisions were made. Categories of professionals to interview were identified from Bullen & Love (2010) and Wilkinson (2011). These included: heritage societies ($n = 6$); consultants including engineering, environmental and planning ($n = 11$); designers ($n = 4$); developers ($n = 4$); policymakers ($n = 2$); and regulators ($n = 3$). No interviews were possible with community members, construction companies, service providers or investors due to lack of responses, limited involvement in the decision-making process or need for more contextualisation via the case study investigations. Two additional interviews were conducted with academics based in the Netherlands and Australia researching embodied carbon. The average interview lasted for 49 minutes; 33 interviews (34 interviewees) were conducted.

The semi-structured interviews enabled flexibility in the order of questions posed and for follow-up questions. Topics included: the interviewees' professional role in demolition and retention decisions; the benefits and drawbacks of retaining buildings; and the problems and suggested improvements with the decision-making process.

The three case studies followed the professional interviews. These were large urban sites previously used for industrial purposes which were being regenerated via implementation of a masterplan by private developers. The sites were located in England, the Netherlands and Australia. Site visits were conducted and documents gathered from publicly available sites, including planning applications and newspaper articles. The primary data collection method was semi-structured interviews, which enabled the investigation of decision-making processes to be contextualised within each case study (Proverbs & Gameson 2009). A total of 38 case study interviews were conducted (in 2017–18) with 42 interviewees (CB1: 13 interviews, Strijp-R: 10 interviews, Central Park: 15 interviews). The target stakeholder groups were the same as those for the professional interviews and included consultants, developers, designers, planners and policymakers. On two sites (CB1 and Central Park) community members were interviewed, and on Strijp-R a contractor for some of the existing buildings. The interviews focused on adaptation and demolition decisions specific to the case study site. Broader questions about the masterplan development were included to obtain a better understanding of the context, including participant's thoughts on the most successful part of the scheme and problems faced.

For all interviews, permission was sought to record, and where granted (most cases), interviews were recorded and transcribed. Where not granted, detailed notes were taken. The transcripts and notes were analysed to develop thematic ideas via coding (Creswell & Creswell 2018). The codes developed were decision-making criteria and influencing factors for the decision to demolish or retain and adapt buildings. For example, if an interviewee discussed how building condition was a driver towards demolition, the passage of text was tagged 'building condition'. These codes were collated into a smaller number of themes, *e.g.* 'building condition' was part of 'building's physical attributes'.

A combination of predetermined codes and developing codes was used (Creswell & Creswell 2018). An initial list of codes was established from the literature review, which was built upon with the professional, and then using the case study interviews. The final code book and a criterions source are provided in item 1 in the supplemental data online. Computer Assisted Qualitative Data Analysis Software (CAQDAS), in this case *HyperResearch*, was used for the coding analysis.

4. CASE STUDIES

Case study selection was based on several parameters. For a full list and justifications see item 2 in the supplemental data online. These parameters included: former and proposed function; area/density; developer type; and status of planning permission. All cases were previously industrial sites being regenerated as mixed-use sites by private developers. Former industrial sites are often located in 'prime locations' which are desirable for redevelopment (Belláková 2016). As previous reports at the masterplan scale focused on social housing (Crawford *et al.* 2014; London Assembly 2015), the authors felt a focus on industrial areas could generate additional insights into the research topic.

Planning permission for the outline masterplan had been approved at the time of the interviews in 2017–18. Therefore, there were already publicly available documents outlining the planning process. In England and the Netherlands, both unitary states, planning policy is designed to be implemented by local government and communities, in adherence to national planning policy. In Australia, the federal system means that individual states hold constitutional authority (Ruming & Gurran 2014), so the planning system is not coordinated by the national government.

Case study investigations were undertaken in different locations to enable the decision of demolition and retention on masterplan sites to be reviewed in different contexts. During the doctoral thesis, the opportunity arose for the lead author to undertake academic secondments in the Netherlands and Australia, hence the case study investigations were undertaken in these countries. Potential sites fitting the set parameters were suggested by local experts and secondment hosts.

Table 1 and Figure 1 show some key contextual characteristics about the case study sites.

Table 1: Contextual characteristics of the three case study sites

Source: Adapted from Baker (2019). Original information sources include: Ashwell CB1 Ltd (2008), Gemeente Eindhoven (2010) and NSW Department of Planning (2007).

	CB1 CAMBRIDGE, UK	**STRIJP-R EINDHOVEN, NL**	**CENTRAL PARK SYDNEY, NSW, AU**
Former function	Railway station, and Rank Hovis industrial area containing a flour mill, grain silo and goods yard	Occupied by Philips to manufacture television tubes	Used as a brewery. Last owners were Carton and United Breweries (CUB)
Planning permission	Site purchased: 2004 Planning approved: 2008	Site purchased: 2005 Planning approved: 2010	Site purchased: Frasers, 2007 Planning approved: 2007 Frasers Centrepoint Ltd purchased the site and submitted a modified masterplan application: 2009
Area (ha)	10.2	20	5.8
Final use	High density due to its location next to a key transport gateway Approximately 300 residential dwellings and 1,250 student bed spaces and over 53,000 m^2 of offices	Family housing, less dense in comparison with other case studies as located on the outskirts of the city Approximately 600 residential dwellings as well as a factory, restaurant and shops	High density due to its location in the centre of a city and next to a key transport interchange Approximately 1,800 residential apartments, 97,000 m^2 of offices and 12,000 m^2 of retail
Planning context	*Consent authority:* Local authority (Cambridge City Council) Planning inspectorate, a national body, overturned the decision of the city for a subsequent application (Wilton Terrace) *Local authority development plans:* Station Area Development Framework 2004 and Cambridge Local Plan 2006 *Heritage designations:* Contained nationally and locally listed buildings as well as a conservation area	*Consent authority:* Local authority (Eindhoven municipality) *Local authority development plans:* No local plan in place when developers purchased the site *Heritage designations:* Contained no designated buildings	*Consent authority:* State of New South Wales (NSW) planning minister. Due to the site being declared State Significant, the City of Sydney was a consultee *Local authority development plans:* Sydney Local Environment Plan 2005. The competition brief set out the initial parameters. The Conservation Area Management Plan was then developed by the City of Sydney alongside the developers *Heritage designations:* Contained locally listed buildings

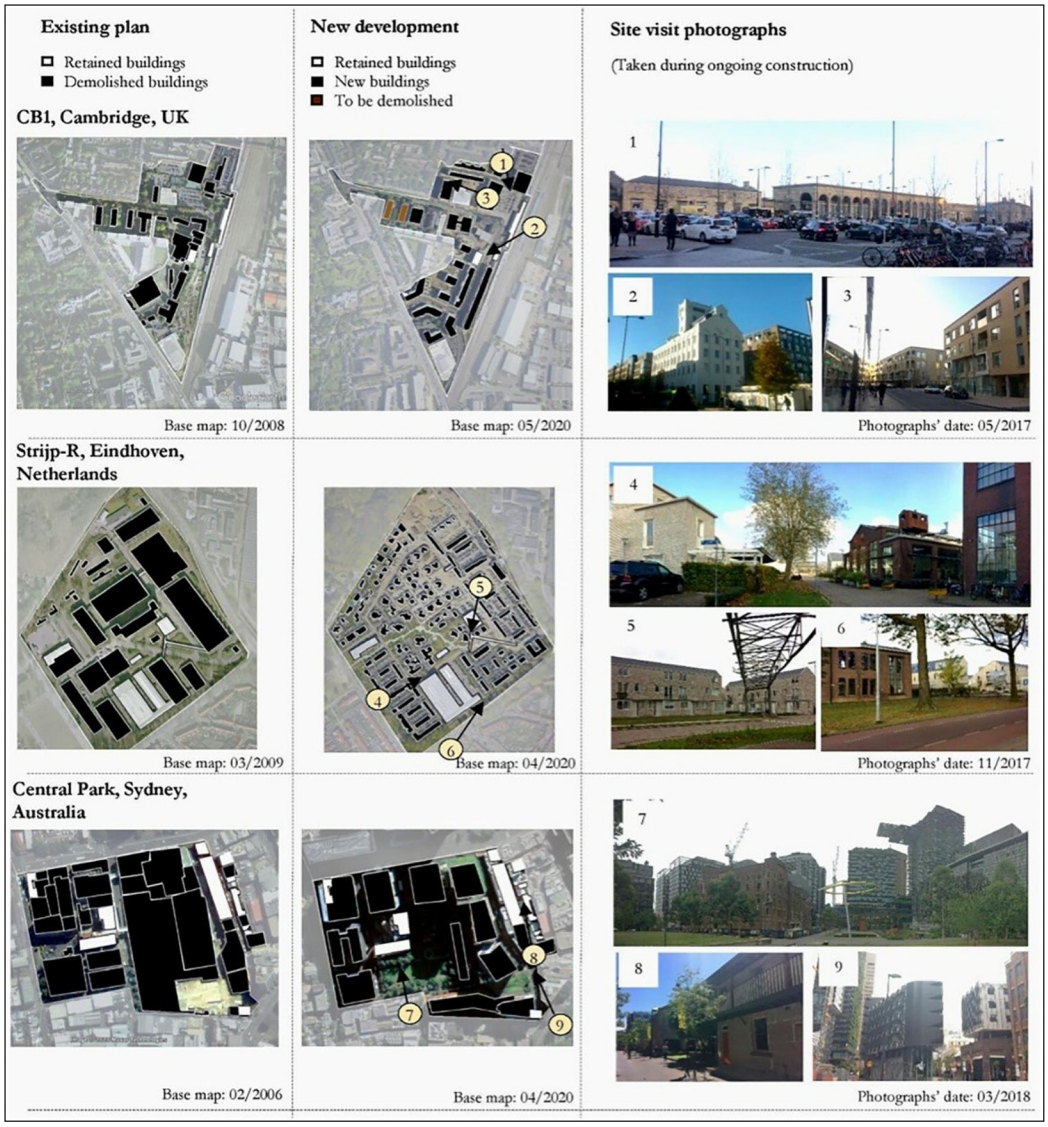

Figure 1: Figure ground plans and photographs of case study sites.

Source: Reproduced from Baker *et al.* (2021). *Original sources:* Map data: Google 2021/Infoterra Ltd; Bluesky; Aerodata International Surveys; and Mazar Technologies. The shapes of buildings were added by the author using information from: Ashwell CB1 Ltd (2008), Gemeente Eindhoven (2010) and NSW Department of Planning (2007). Photos: Hannah Baker.

5. DEMOLITION AND RETENTION DRIVERS IN PRACTICE

The results of the professional interviews and case studies revealed a wide variety of factors considered by developers and design teams when deciding whether to demolish or to retain and adapt buildings. These factors were analysed under the themes: a building's physical attributes; masterplan design principles; economic viability; heritage; and environmental considerations, including operational and embodied energy. There were also more complex and case study-specific reasons for decisions, which determined the extent of influence of the simpler drivers for demolition or retention. Examples include local authority aspirations, the importance of long-term flexibility, public opposition, and the role of individuals involved in decisions. These fit within the themes planning structure and requirements, processes, and people. The frequency distributions for the number of times a criterion was mentioned is included in item 3 in the supplemental data online.

As identified in the literature review, professional interviewees explained that buildings are often demolished if the future function cannot be accommodated by the existing structure and layout. Aspects related to this include floor-to-ceiling heights, load-bearing capacity, stability, floor area and flexibility. Poor condition was identified as a key driver towards demolition, particularly if buildings had no heritage value. One interviewee stated:

> if you've got a building in very poor condition, it's going to cost a lot to bring it back into use to make it usable.

On the case study sites, the buildings' physical attributes were relevant. A member of the design team on Strijp-R stated:

> if the building is in poor condition or too contaminated it should be demolished, but if it is still in good condition then why break it down? The costs, the efforts and the result should be weighed up.

However, there were examples of buildings being retained despite being in poor condition. This was often due to assessed heritage value which contributed to place-making (*i.e.* the creation of space goes beyond the material dimension and can include societal aspects; *Archdaily* 2021). In the Central Park development, a row of worker cottages on Kensington Street (Figure 2) was retained and adapted for use as cafés, restaurants and retail units. An architect described these as being in 'totally terrible condition', but went on to say that:

> if you take the blunt view on the return per square metre, it probably doesn't stack up [... but] it was a huge selling tool for the apartments.

Figure 2: Kensington Street Cottages in Central Park, Sydney, AU, March 2018.

Source: Hannah Baker.

The retention of these buildings was subsequently described by several interviewees as a successful part of the development, giving the area its own character. In cases such as this, which are influenced by the scale of the masterplan development, buildings that would have been too expensive to retain at an individual level may be retained as they have a wider purpose, and the cost can be offset or recovered elsewhere. One property consultant described this as:

> When you look at the benefit of knocking that building down and replacing it in the scheme of the masterplan, it's miniscule [...] any space that we could have grabbed by knocking it down, we could catch up with elsewhere.

At both building and masterplan scales, the scale of buildings relative to one another and the general density of buildings within the site were key drivers towards demolition and retention options. On the case study sites, this depended on the site's context and economic conditions. Increasing density was a key driver towards demolition of smaller scale buildings on the CB1 and Central Park developments. On the CB1 site, a three-storey Victorian terrace (Wilton Terrace) was demolished and replaced with a larger scale office building (Figure 3). A key justification was the need to increase density. A similar example was identified in Central Park. One interviewee stated: 'clearly you couldn't get the density of the site if you retained absolutely everything', and another stated:

> [the reason] to replace any of the heritage buildings really would have been increased floor area. I mean that is fundamentally it.

However, the desired density is contingent on the location of the urban development. On both sites, increasing density was justified on the grounds that the sites were located by key transport hubs for their respective cities. In contrast, Strijp-R is located on the outskirts of Eindhoven. The design team wanted smaller scale new buildings relative to the existing buildings to provide

family housing rather than larger new builds with apartments and/or studios (Gemeente Eindhoven 2010). For this reason, a seven-storey former office block described as the Strijp-R's 'most striking building' (van der Hoeve 2006: 169) was considered out of character with the proposed development as it was too tall, and was demolished. Therefore, on each case study site the retention versus demolition decisions related to their massing and scale in the context of the target market, which in turn was affected by the economic conditions of the area.

Figure 3: CB1 Development, Cambridge, UK: (left) Wilton Terrace before demolition, November 2016; and (right) Wilton Terrace's replacement new office building, March 2019.
Source: Hannah Baker.

Both the professional and case study interviewees indicated that improving pedestrian and vehicle flow through the implementation of a masterplan might require the demolition of buildings. On the CB1 site, for example, the construction of a new taxi rank/drop-off point and new junction for buses required the demolition of locally listed buildings. The conservation officer for the local council accepted these were 'essential for the transport interchange' (Dyer 2008: 25). Similarly, on Central Park, some buildings on Kensington Street were demolished. The justification for demolition was to create entry points to 'Spice Alley', a small intimate area behind Kensington Street with food stalls which formed part of the development. A member of the design team stated: 'the vibrancy of the space [...] justifies what we have done'. These examples of infrastructure provisions are required as part of the masterplan; they are therefore often in the control of the developers and are key considerations for demolition or retention decisions at the masterplan scale.

The interviews suggested that heritage was a key driver towards retention due to planning requirements and/or the contribution of the existing buildings to place-making. In one of the professional interviews, the idea of demolishing all buildings on a masterplan site and building new was described as 'old-fashioned', with the interviewee arguing that developers should:

> take heritage in the broader sense—anything that exists and may add value moving forward.

All the buildings retained on the CB1 and Central Park sites were protected by planning policy (either local or national listings). Although some listed buildings were demolished, the developers and design teams for both sites commented that existing buildings can add character and diversity to an area. One Central Park interviewee stated, 'the site would not be anywhere near as great a site' without the retention of the buildings. On Strijp-R, none of the buildings were protected by planning policy, yet four were still retained. The demolition of all buildings on site was also described as 'old-fashioned' by one Strijp-R interviewee, with another stating that 'the history of the place proved so rich that Amvest wanted to derive Strijp-R's new identity from it'. In this case, heritage value and a sense of identity derived from the economic importance of the Philips' factories for Eindhoven were key drivers towards retention, even without the support of heritage policy.

Embodied carbon was identified in the literature as a key reason for retaining buildings. However, in contrast to the heritage factors, no buildings were retained on any of the case study sites solely for the environmental benefits of saving materials. Embodied impacts were mentioned during some interviews and recognised as a benefit of retention, while there were references to material savings in particular for the end-of-life stage when a building was demolished.

For example, during the Strijp-R interviews, members of the design team discussed the reuse of bricks from the demolished buildings for the construction of the road network and said this led to lower environmental impacts. However, for demolition or retention decisions, the focus of environmental considerations on the case study sites, tended to be on the lower operational impacts expected to be achieved by replacing existing buildings.

The apparent prioritising of heritage and operational impacts over embodied carbon may be due to the greater historic focus of regulation on these issues (Baker *et al.* 2021). Some interviewees called for more policy addressing embodied carbon considerations. One conservation officer from the professional interviews felt that for life cycle assessment and the inclusion of embodied carbon to:

> be a valid argument [...] in terms of seeking retention [...] it would depend on a firm policy being developed that had a clear reference to how the embodied energy could be offset.

While certain criteria can suggest that demolition or retention is more or less likely, other factors affecting outcomes are more complex and context dependent—particularly at the masterplan scale. Local authorities' involvement with, and aspirations for, urban development sites can impact demolition and retention decisions during the preparation of a masterplan and subsequent planning applications. The case studies showed that parameters in local plans can be subject to compromise, including the demolition of locally listed buildings originally identified for retention. Due to the geographical scale of masterplan sites, one public planner stated:

> it wouldn't be unexpected for a developer to bring something forward slightly different, as long as they can justify that that would be appropriate.

This compromise works both ways. On the CB1 site, one building identified by developers for demolition was retained after intervention by the local authority, after advice from a design and conservation panel, which stated:

> we would like to see an option prepared which shows the retention of 125 Hills Road before we are convinced that the masterplan requires the demolition of this [building of local interest].
>
> (Dyer 2008: 23)

The developers amended the plans to incorporate the building.

Hierarchy and decision-making power within the planning system can go beyond local authorities. This was clear for a CB1 site building which was demolished despite objections from the city councillors who reviewed the planning application. In the initial application for the masterplan development, the demolition of Wilton Terrace was granted, subject to Conservation Area Consent (CAC), which was subsequently sought. Full planning permission for the replacement building was required as an increase in proposed height took it out of accordance with the approved masterplan. At the time the developers submitted the CAC, a group of local residents set up the 'Friends of Wilton Terrace' to fight the demolition. This group created a petition which received 1347 signatures and the demolition was condemned by organisations including the national campaign group SAVE Britain's Heritage (SAVE 2017; Save Wilton Terrace 2015). Cambridge City's planning officer recommended that the proposed scheme was approved as 'the Masterplan anticipated the demolition of 32–38 Station Road [Wilton Terrace]' (Dyer 2012: 17). Despite this recommendation, in July 2012, the planning committee refused the CAC and the planning application for a replacement building. Subsequent applications in December 2012 and July 2013 were rejected by councillors, one reason being the failure:

> to provide sufficient justification for the demolition of Buildings of Local Interest which are recognised as heritage assets.
>
> (Edwards 2013: 1–2)

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The developers took the decision to appeal at the national planning inspectorate, which ruled that:

> since the outline permission clearly anticipates the demolition, on the basis of the public benefit arising from the CB1 development as a whole, conservation area consent could only reasonably be refused if the reserved matters proposal was thought to be of inadequate design quality.
>
> (Gray 2013: 5)

This demonstrates the complexities associated with various hierarchies in the planning system.

These hierarchies were evident in the Central Park development in Sydney. The city planning authority was originally the consent authority. However, the site was declared of State Significance under Part 3A of the Environmental Planning and Assessment Act 1979:

> developments that, in the opinion of the Planning Minister, are of State or regional environmental planning significance.
>
> (EDO 2013)

Planning permission was therefore obtained in 2007 from the State of New South Wales (NSW), with the City of Sydney a consultee. The state minister was quoted saying that:

> the project had become tangled in red tape for three years…this will streamline planning, provide ample opportunity for public consultation, and deliver more certainty for local residents and investors.
>
> (Australian Associated Press 2006)

The City of Sydney put forward objections to the concept plan in 2006, stating that it found it:

> remarkable that the concept plan does not evaluate, or even discuss the work that was undertaken by the Council, the [Central Sydney Planning Committee] and the site's owner over the past two to three years.
>
> (City of Sydney 2006: 6)

One issue it had was the demolition of heritage assets previously identified in their earlier conservation management plan (CMP). It is important to emphasise the disagreements were not only about existing buildings. On both CB1 and Central Park, contentious issues included the proposed density of buildings and potential increases in traffic. Demolition and retention decisions only form part of the complex negotiations between private developers and public authorities, and different levels of public authorities can also disagree with each other.

In contrast to the CB1 and Central Park developments, according to interviewees, the Strijp-R masterplan development had little municipal or institutional involvement. The site was located on the outskirts of the city and did not have a local plan at the time of purchase. A member of the design team felt the developers had more influence on the final masterplan design due to this detachment of the municipality:

> we were very happy that the municipality was not involved that much—we were at the steering wheel.

The timespan of masterplan developments was a further factor. Although decisions to demolish or retain existing buildings were initially made at the planning application stage, changing circumstances throughout the development process led to changes in this decision-making. On CB1 a fire in a building to be retained resulted in its demolition (Beacon Planning Ltd 2015). On Central Park and Strijp-R, additional buildings were retained later in the development process. For Strijp-R, the purchase of some buildings from the masterplan developers by Dutch furniture designer Piet Hein Eek's led to changes in the masterplan and the retention of those buildings. As the former use of the site had been industrial, the planning restrictions allowed for some industrial processes to still be on site (Gemeente Eindhoven 2010), which included Eek's furniture factory.

Eek's presence on site was considered to be attractive to future occupants as it created 'life' early on within the development and his involvement was considered as a success by several of the interviewees.

The point at which a building was adapted to a new use was also important. When the Central site was purchased by Frasers in partnership with Sekisui House (which submitted the modified masterplan), they:

> embarked on a mission to regain the confidence of the local community and the City of Sydney through commitments to design excellence and more environmentally sustainable urban development.
>
> (Tzannes 2016: 20)

This included the early refurbishment and temporary use of the buildings on Kensington Street as art studios. This was seen as positive my most interviewees, with one describing it as:

> very successful as a community, cultural exercise, and I think that generosity of spirit helped with the council.

Another, who had initially opposed the development, acknowledged that this:

> sort of immediately started to repair the relationship with the community around them and also gave the site a sort of vibe of its own.

Lastly, there was considerable evidence of the influence of individual people in the decision-making process. During the professional interviews, it was acknowledged that some people are more willing to take the risk associated with building retention than others:

> One person's liability is another person's opportunity. So, you know they might see something that is run down as hopeless, someone else might say, well I can get that cheap and I can afford to throw some money at it.

In the Strijp-R and Central Park case studies, an individual was identified as being highly influential in the masterplan design process. Ultimately it was felt that these individuals had a direct impact on decisions to retain buildings in both developments. On Strijp-R, an interviewee stated that Piet Hein Eek had the 'X-factor' and another felt he was 'the main guy who brought in this identity'. For Central Park, Dr Stanley Quek was the chief executive officer (CEO) of Frasers and responsible for the modified masterplan. One interviewee felt Quek played a key role easing the pre-existing tensions with the City of Sydney as:

> he built up that relationship [with the city mayor] and part of that is because of his good track record.

Although Quek left Frasers during the implementation of the masterplan, interviewees stated he continued to be involved in the development of Kensington Street. One felt this was because:

> he wanted to deliver his dream [...] and the original concept he put forward to council and the authorities.

Without Quek's input (also see Van 2016), as with Eek's role on Strijp-R, the final developments could have had very different outcomes. Both these influential people got involved in the development after the original masterplan had been approved, emphasising how open to change the development process can be.

In sum, heritage was the primary driver for retention across the case study sites. Meanwhile, the drivers for demolition were economic viability and masterplan design principles, such as increasing densities and providing transportation networks. While certain criteria can suggest that demolition or retention is more or less likely, other factors affecting outcomes are context dependent. These included the planning structure, economic conditions, changing circumstances and people involved.

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6. DISCUSSION AND THEORETICAL FRAMING

The theoretical underpinnings of urban development processes, and the four models explored in the literature, offer a potential framing for better understanding of decisions at the masterplan scale.

The equilibrium model suggests that the urban development process is driven by the demand for property and that supply is brought forward to meet that demand (Squires & Heurkens 2016). The case studies have shown that economic conditions and the site's significance to a city's development vary, depending on its location within a city and distance to transport links, as well as the city's population. This, in turn, can impact the desired scale and density for development and consequently the demolition or retention of buildings. The equilibrium model excludes any social and cultural aspects of development. This is clearly a limitation, as heritage was seen to add economic value via character and place-making, and was found to be a key driver towards retention on all the case study sites.

In all the case studies, institutions, environments, markets and organisations influenced development (Squires & Heurkens 2016). Local authorities influenced developer behaviour in different ways throughout (Adams *et al.* 2012). Viewing the role of local authorities as shaping rather than solely regulating (Squires & Heurkens 2014) helps to explain parameters set out by the planning authorities on CB1 and Central Park, and how decisions were made. In these cases, the authorities acted more as facilitators than regulators; both the planners and developers expected this level of involvement and negotiation. In these examples, the hierarchy of the planning structure had a key influence on demolition and retention decisions when agreements could not be reached. These hierarchical relationships and the ability of the developers to persuade the planners and vice versa sits at the heart of the urban development process (Carmona 2014).

Given that all the buildings retained on the CB1 and Central Park sites were protected by planning policy due to their heritage status, this was clearly a key driver towards retention. However, some protected buildings were demolished. In addition, the Strijp-R case study showed these regulating instruments are not always required. The description of demolishing all existing buildings as 'old-fashioned' in interviews suggests that the consideration of heritage and place-making without the push from policy is starting to become the norm. Daamen (2010: 24) describes how going against social norms can lead to a loss of reputation and social disapproval. As more developments retain buildings to distinguish themselves, the 'old-fashioned' idea of starting from a blank canvas is likely to garner increasing disapproval.

Meanwhile, environmental standards are a long-standing consideration in building design. Professional and case study interviewees discussed sustainability assessments such as the Building Research Establishment Environmental Assessment Method (BREEAM) and GreenStar, and felt that these had a discernible impact on marketing and branding. Interviewees felt that as more developments obtained green credentials, other developers would be likely to use this as a reference point for standards. Although the consideration of whole life energy and carbon (embodied impacts as well as operational) is currently limited in these assessments, the consideration has been gaining traction (LETI 2020; Skillington *et al.* 2022).

When considering a development process, models should include when the decision is made and whether this is likely to change, as well as the different points at which buildings are retained or adapted during a masterplan's implementation (applicable to event-sequencing models). Changes in circumstance on the case study developments led to changes in demolition and retention decisions, with the long timescales of masterplans making their economic viability more vulnerable to changing market conditions. Developments at the building level, with shorter timescales, face comparatively less risk from changing external circumstances during the process than masterplan developments.

Agency theory suggests that stakeholders have different aspirations from one another (Verhage 2003). This was apparent in the cases studied, with evidence of disagreements among the site stakeholders, including community opposition to the demolition of buildings. Differences in

aspirations appear between stakeholders, and within stakeholder categories. Although all three developments were privately led there was a difference in corporate agendas. The literature defines 'pioneers' as those developing alternative and innovative design solutions (Payne 2009). At Strijp-R and Central Park, Piet Hein Eek and Dr Stanley Quek were identifiable as such 'pioneers', demonstrating the influence one person can exert.

The analysis suggests all four theoretical underpinnings of urban development processes are applicable to demolition and retention decisions on masterplan sites, and that these decisions cannot be fully understood through one theoretical lens in isolation. While the four models help to map the governing forces underlying decisions, how decisions are taken in practice remains highly context-specific.

7. CONCLUSIONS

This research offers three contributions to knowledge. First, current adaptation theories suggest a wide range of criteria that influence the decisions to demolish or retain and adapt buildings, and a considerable literature has developed a detailed analysis of these for individual buildings. However, this research has demonstrated that these are inadequate at the masterplan scale, and has identified additional factors and complexities that should be taken into account. These include (but are not limited to) the ability of developers to offset the cost of retention within the context of larger developments; the influence of economic conditions and therefore desired building density on demolition and retention decisions; and infrastructure provisions leading to the demolition of assets at the masterplan scale. The research has demonstrated the importance of other context-specific factors such as the influence of planning structure, processes and people within the decision-making process. These complexities are exacerbated by the chronological and physical scale of masterplans in comparison with individual buildings. This research has also applied and further developed urban development theory, analysing the findings in relation to four existing models and demonstrating that no one model is adequate to describe this complexity of interactions.

Second, the two main drivers for retaining buildings in the literature were the retention of heritage and the reduced embodied carbon of retention compared with demolition and rebuild. The importance of inclusion in policy was evident in the consideration of heritage, and heritage is now a driver for retention on some masterplan sites even without this regulation (Baker *et al.* 2021). Decisions on the case study sites were made over a decade ago, and subsequent developments in understanding mean that there is now a growing recognition of the importance and extent of embodied carbon (Anderson & Moncaster 2022). If the inclusion of embodied as well as operational environmental impacts gains more weight within policy, particularly at the national level, it would seem highly likely to become a key driver towards the retention of buildings. Therefore, this research provides evidence towards the introduction and standardisation of embodied carbon measurement within national regulation, for decisions about demolition of buildings as well as the design of new.

Finally, although the evidence showed that decisions were context specific, the criteria as identified and categorised within this research offer a useful tool for stakeholders when establishing their priorities and approaches to decisions to demolish or retain and adapt within a masterplan context. Hierarchies are clearly present in the planning system; this research demonstrates the importance of developing a shared understanding between stakeholders in order to address these issues effectively. This understanding could serve as a starting point in developing a coherent approach to various considerations, including embodied carbon and heritage. The identified criteria could help community groups to frame their arguments and their influence over the long-term decisions as well as developers looking to retain good relationships with the local community. The criteria can also support planners and local authorities responsible for approving masterplan developments to better understand the factors relevant to each decision, and the importance of retaining flexibility throughout to enable response to changing circumstances.

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AUTHOR AFFILIATIONS

Hannah Baker orcid.org/0000-0002-8103-5656
Department of Engineering, University of Cambridge, Cambridge, UK

Alice Moncaster orcid.org/0000-0002-6092-2686
School of Engineering and Innovation, Open University, Milton Keynes, UK

Sara J. Wilkinson orcid.org/0000-0001-9266-1858
Faculty of Design Architecture & Building, School of Built Environment, University of Technology Sydney, Sydney NSW, AU

Hilde Remøy orcid.org/0000-0001-6911-0310
Real Estate Management, TU Delft, Delft, NL

COMPETING INTERESTS

The authors have no competing interests to declare.

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SUPPLEMENTAL DATA

The following supplemental data can be accessed at: https://doi.org/10.5334/bc.308.s1

- Final list of codes/decision-making criteria used for analysing interviews and sources
- Case study parameters
- Frequency distributions for codes/decision-making criteria during interviews

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