# Rapid evidence review of the economic benefits of brownfield redevelopment for housing

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# Introduction

The review was commissioned by CPRE to better understand the impacts the redevelopment of brownfield sites for housing has on people, the environment and the economy. It also explores the barriers and enablers to returning to a 'brownfield first' approach to development and presents some data on the availability of brownfield land for housing and build out rates. It is a review of published academic evidence and grey literature, which has been screened and reviewed based on its relevance to exploring these topics. This introduction explains the scope of the report, details the approach and sets out review's organisation and content.

## Background and scope of the report

The purpose of the review is to inform CPRE's advocacy in late 2024 and 2025 on pushing the economic case for a 'brownfield first' planning and development policy. The reuse of brownfield land for housing and mixed-use development was a key tenet of the *Urban Renaissance* set out by the Urban Task Force in 1999. Central to this was that the redevelopment of these sites could achieve multiple objectives related to the reversing decline of towns and cities in the aftermath of deindustrialisation. These objectives included the cleaning up and reuse of contaminated, derelict and vacant land and associated structures, increasing density in urban areas to achieve more sustainable, compact development patterns that could accommodate the growing population and respond to climate change, tackling economic and social inequalities that had emerged in the former industrial areas, particularly in the Midlands and North and protecting the outskirts from urban sprawl (Urban Task Force, 1999). As part of this the 'brownfield first' policy was strengthened and the target for the proportion of new homes on brownfields increased from 50% to 60%.

However, the number of new homes being built did not keep up with the formation of new households and in 2010 the Coalition Government stepped back from a 'brownfield first' approach. Although the redevelopment of these sites was still encouraged the proportion of development on greenfield sites increased from 19% in 2008 to 32% in 2011 (CPRE and UWE, 2014). Despite this change the number of new homes still failed to keep up with demand and in 2018 the language in the NPPF was strengthened towards brownfield development.

Prior to 2010 local planning authorities (LPAs) also had to provide data on the extent and type of brownfield land in their areas as well as it's suitability for housing and approximate housing numbers. These data were compiled by the government in the National Land Use Databased for Previously Developed Land (NLUD) and published. However, in 2011 the mandatory requirement for these data were dropped, and in 2017 Brownfield Registers were introduced. These are available online for each LPA but the information in them varies and no central dataset is available. Since 2018, CPRE have collated data from Brownfield Registers (Figure 1), demonstrating that there remains substantial capacity for housing on brownfield sites.

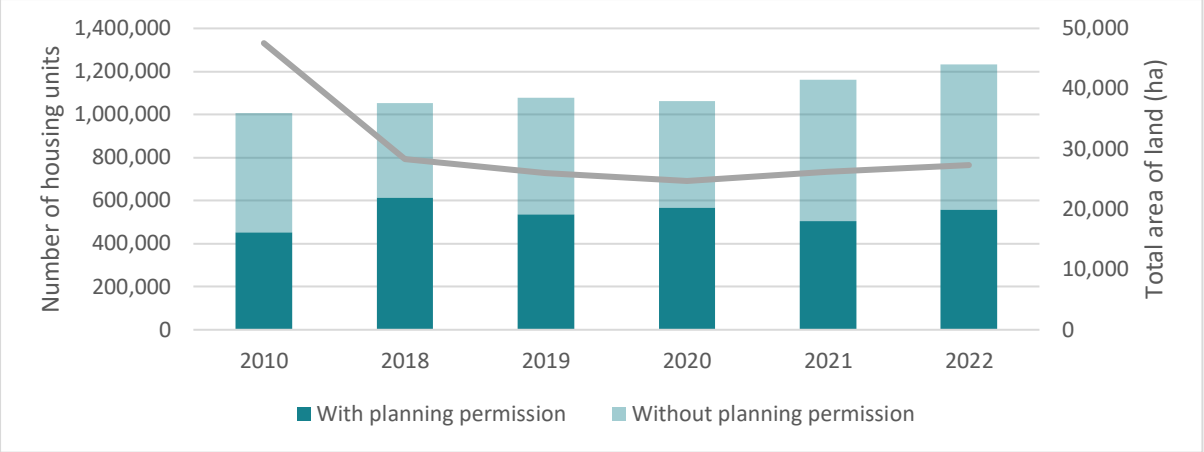


**Figure 1. Availability of brownfield land for housing, from NLUD 2010 (CPRE and UWE, 2014) and Brownfield Registers 2018-2022, and total area of land (ha) (CPRE, 2022).**

Over this period the proportion of new housing on brownfield sites has stayed around the 54-61%, except for 2020/21 (66%; Figure 2).

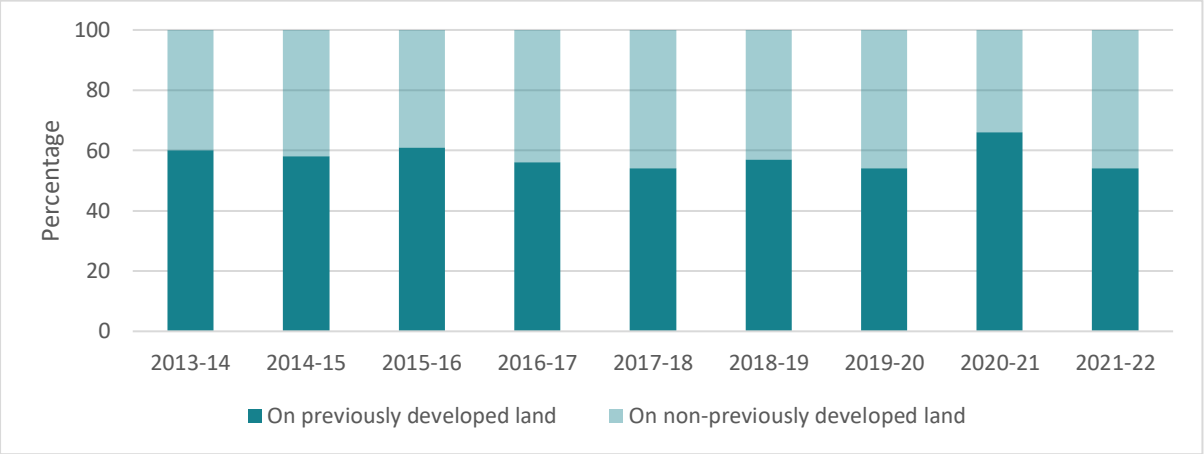


**Figure 2. Proportion of new residential addresses created on PDL and non-PDL, 2013-2022 (MHCLG, 2022).**

The next section sets out the approach, which is then followed by the findings from the literature review before finishing with an outline of the gaps in evidence and conclusions.

# Approach

This is a rapid evidence review, which aims to provide a quick, concise summary of the current evidence for the following:

The social, environmental and economic impacts of housing development on brownfield land

- The barriers to delivering a brownfield first approach to housing development
- The enablers to delivering a brownfield first approach to housing development.
- Broadly, the review consists of two stages.

**Stage 1** focused on conducting a search of literature published between 2011 to 2024 using Google Scholar. Search terms included 'brownfield redevelopment', 'contaminated land redevelopment', alongside terms such as 'benefit', 'cost benefit' and 'return on investment'. Here we take an inclusive definition of brownfield that include contaminated sites and previously developed land. In the US brownfield is synonymous with contaminated land and we have made clear where the literature is referring to contaminated sites in this context.

From resulting searches, titles and abstracts were screened for relevance to the above topics.

**Stage 2** comprised the full literature review, where each piece of literature was read, and information related to the above topics added to a spreadsheet. Some publications were provided by CPRE and snowballing of cited articles was used to supplement the evidence; these were also reviewed. Finally, the evidence was summarised to draw out the key findings from the review.

# Findings

In total, 42 pieces of literature are considering including academic papers, conferences presentations and grey literature. The findings are summarised, first setting out the social, environmental and economic impacts of brownfield development for housing, before presenting the barriers and corresponding enablers to a brownfield first approach.

## Impacts of brownfield redevelopment

### Social impacts

One the key arguments for redevelopment of contaminated sites is that it protects the health of existing or future inhabitants or users of the site (Bambra et al., 2014; Kotval-K, 2016; Ameller et al., 2020). In their systematic review of the health impacts of brownfield land, Wang et al. (2023) drew on four studies from the United States to report that **those living in neighbourhoods with contaminated sites were more likely to have greater rates of all-cause mortality, lung cancer mortality, respiratory mortality, lung cancer, chronic obstructive pulmonary disease (COPD)**, accelerated aging and blood lead levels. In addition, neighbourhoods with contaminated sites within 2km experienced greater rates of some birth defects (Wang et al., 2023).

The redevelopment of these sites can therefore provide a direct benefit to public health and corresponding economic benefits. For example, in their systematic review of sixteen papers exploring the health impacts of remediation Sinnett et al. (2022) found that the clean-up of sites contaminated with lead, chromium and other heavy metals reduced concentrations of the toxic elements in the blood or urine of people living near contaminated sites. There is also an indirect health benefit to redeveloping brownfield sites, irrespective of whether they are contaminated. This rests on the impact vacant and derelict land can have on residents' stigmatization from being associated with a place that has a 'spoiled' identity, which can

result in feelings of shame, psychosocial stress and poor general health (Bambra et al., 2014; Kotval-K, 2016; Ameller et al., 2020; De Sousa et al., 2023). In their analysis of 2009 NLUD data with 2001 Census data Bambra et al. (2014) found that **electoral wards in England with relatively high levels of brownfield land have worse general health and levels of limiting long-term illness (LLTI) than those with relatively low levels of brownfields**. Controlling for socioeconomic and environmental deprivation, and sociodemographic characteristics suggested that the average rate of being in 'not good health' was 15.4 units greater than expected for those living in wards with relatively high levels of brownfield land and the rate of LLTI was 14.3 units greater than expected (Bambra et al., 2014). There was also a significant difference between local authorities suggesting that local-level policy and decision-making may also have an effect (Bambra et al., 2014).

Other indirect benefits stem from the avoidance of building on greenfields. Developments on greenfields tend to be lower density, have fewer amenities and less access to public transport making them more car dependent, whereas the greater densities typical of brownfields support the viability of public transport, businesses and amenities (Urban Task Force, 1999; De Sousa et al., 2023). Such development patterns are associated with worse health and wellbeing outcomes (RTPI, 2024). However, this picture is complex as more affluent people chose greenfield development for the greater access to private gardens and better air quality that it provides (Tang and Nathanail, 2012).

Brownfield sites are more concentrated in deprived neighbourhoods (Tang and Nathanail, 2012), which makes it challenging to disaggregate the impact of living with these sites from other factors that cause ill-health in deprived areas. But the deprivation also impacts the likelihood of redevelopment. For example, in their study of brownfield redevelopment in England, Schulze Bäing and Wong (2012) found that between 2001 and 2004 around 17% of the land redeveloped for housing was in neighbourhoods in the lowest quintile of deprivation, but between 2005 and 2008 this had increased to around 24%, suggesting that **developers prioritised sites in places with the greatest gentrification potential**. They also found that the density of housing was greater on brownfield redevelopment, particularly in the more deprived neighbourhoods (Schulze Bäing and Wong, 2012). There are health and wellbeing benefits of higher density development to creating more sustainable and walkable places (Sinnett and Williams, 2020). The concentration of brownfield redevelopment in areas of deprivation resulted in new residents moving into these neighbourhoods and corresponding reduction in economic deprivation (Schulze Bäing and Wong, 2012). Similarly in their study of 2004 NLUD data and the 2010 Index of Multiple Deprivation (IMD), Tang and Nathanail (2012) found that areas with greatest levels of deprivation were more likely to have land vacant for less than one year, but land derelict for more than one year. They also found that the majority of redevelopment was on sites characterised as 'underused' in NLUD as opposed to those characterised as 'vacant' or 'derelict'. The higher concentration of brownfields in LAs with greater levels of deprivation meant that these locations were more likely to achieve the target of 60% of housing on brownfield sites between 1995 and 2010 (Tang and Nathanail, 2012). The redevelopment of sites in deprived neighbourhoods can also risk gentrification (Tang and Nathanail, 2012), which given the lack of affordable housing in many towns and cities in England, may be a negative social impact of brownfield

redevelopment useless mitigated with requirements for affordable housing in planning policy (see enablers). Although focussed on the US, studies have reported gentrification, increased spatial injustice (De Sousa et al., 2023) and sociodemographic changes, including increased white populations and median income, alongside redevelopment of contaminated brownfield sites (Becerra, 2024).

The **redevelopment of sites has other social benefits including reduced crime risk, and increased attractiveness, quality of life, employment, amenities and business opportunities** (Ameller et al., 2020). In their questionnaire and interviews with experts involved with the redevelopment of 25 brownfield sites internationally, Loures and Vaz (2018) found that benefits differed between different types of brownfield (vacant, derelict, contaminated, underutilised, abandoned). Classifying the social benefits as communitarian, recreational, health or cultural they found that health benefits included improved public health and neighbourhood satisfaction, reduced stress and more opportunities for physical activity. Related to these, communitarian benefits include an increased sense of belonging and liveability of city centres, reduction in neighbourhood stigma and greater opportunities for marginalised groups, and that redevelopment enabled the reuse of redundant structures and protection of historic buildings. Recreational benefits included the creation of green spaces and improved visual amenities and opportunities for leisure and educational activities, whilst cultural benefits included greater cultural diversity, protection of heritage and liveability of heritage areas, as well as a better relationship between culture and environment (Loures and Vaz, 2018). Similarly, a study of three case studies of brownfield redevelopment in Romania, Greece and Latvia found that benefits included the creation of areas for recreation, improved greenspaces, reduced land degradation and increased quality of life (Morar et al., 2021). Crucially the avoidance of urban sprawl was cited as a key benefit from the redevelopment of a former military site in Oradea, Romania (Morar et al., 2021). The redevelopment of the Kings Dock, Liverpool resulted in new open space and relatively high levels (40%) of affordable housing, although local stakeholders were critical of the lack of residential and leisure uses adjacent to the quays, where hotels and conference facilities were located (Maliene et al., 2012), presumably due to their greater economic returns. Redevelopment of former docklands in Cologne consisted of a mix of uses including high levels of new homes, resulting in their area becoming a desirable neighbourhood (Maliene et al., 2012).

Although the potential of new amenities for existing and new residents is often cited as a key benefit for brownfield redevelopment economic conditions can result in a scaling back of the initial plans. Although initially design-led the development of the Olympic Park, London has been criticised for the lack of meaningful consideration of existing residents' experiences of the area (Oudes and Stremke, 2020). Over time the political and economic conditions came to dominant at the expense of planned social housing, energy projects and community centres and this coupled with a narrative focused on the deprivation of the area resulted in a lack of access to amenities and loss of local identity (Oudes and Stremke, 2020). Similarly, a changing in economic conditions following the 2007-2008 crash meant that many brownfield sites purchased for housing were left vacant (CPRE and UWE, 2014;

Burke et al., 2015) thereby **delaying the anticipated social benefits at the expense of local communities**.

The deindustrialisation of our towns and cities has seen large areas land left vacant or derelict where industrial and manufacturing uses are no longer required or appropriate. In these places residents may prefer new housing on these sites (Kotval-K, 2016), especially given the need for new housing in many areas of England.

Although the studies outlined above point to numerous health and social benefits from the redevelopment of brownfield sites, **there are a lack of studies that present these benefits in economic terms** (Ameller et al., 2020). However, Eftec and SQW (2023) have used a stated preference approach to examine the preference the public have for brownfield development and estimate the associated willingness to pay for these options. Assessment of impacts from brownfield redevelopment - loss of disamenity these sites cause existing neighbourhoods. The choices presented to participants were based on: 1. Brownfield redevelopment scenarios: previous use, distance from home, size of site, reuse/removal of buildings, cost in increased council tax; controlled by different post-development outcomes based on density of homes, types of homes and proportion of open space; and 2. Added development features: cycle path, walking path, sports pitch, children's play area, nature and wildlife space, green space, hardscaped space, multi-use games area, outdoor gym, increased council tax. First, they found relatively high levels of disamenity from the presence of brownfields, including:

- 44% of participants concerned with the visual impact of vacant/derelict sites;
- 39% concerned that the sites attract crime or anti-social behaviour;
- 34% concerned that the sites contribute to deprivation due to their negative impact on property prices and businesses;
- 32% concerned about the risk to public safety; and
- 24% concerned about potential contamination (Eftec and SQW, 2023).

Second, they found that people's experience of brownfield redevelopment was that this was mainly mixed or commercial uses and that participants exhibited strong preference for the redevelopment of brownfield sites. However, they had a greater preference for the future uses to be commercial, followed by industrial with residential uses being the least preferred option. Here, 42% of participants agreed that they wanted brownfields to be 'redeveloped for something other than housing' (22% disagree), which was perhaps related to the findings that 36% of participants disagreed that local 'infrastructure can easily support more people' (38% agreed). In terms of their priorities for any redevelopment 76% agreed that redevelopment should include affordable housing and participants expressed a preference for reusing structures where possible, redeveloping sites closer to their home, options associated with smaller increases in council tax, and, to a lesser extent the redevelopment of large sites (Eftec and SQW, 2023). Although positive about any redevelopment, they did express concerns about short-term disruption and the potential for redevelopment to have

a negative impact on the character of the area (Eftec and SQW, 2023). Participants were willing to pay more council tax for local amenity improvement, although this was irrespective of brownfield redevelopment. The amount they were **willing to pay was greater for the redevelopment of industrial and commercial land, where the structures were already demolished or could be reused** and as the size of the site increases, but less as the distance from their home increases. They were also willing to pay more if specific features were included in the redevelopment, including relatively high amounts for greenspace (£97), wildlife space (£94), walking paths (£68) and children's play area (£64), whereas hardscaped areas, MUGA, sports pitches and cycle paths attracted smaller increases (£27 to £52) and outdoor gyms resulted in a decrease (-£1) (Eftec and SQW, 2023).

## Environmental impacts

There are also direct and indirect environmental benefits from the development of brownfield sites. In their review of the contribution of economic science to the understanding of brownfield redevelopment, Ameller et al. (2020), identified environmental benefits from **reduced pollution and corresponding benefits to biodiversity and the delivery of ecosystem services, and the reuse of construction materials**. The reuse of existing infrastructure (e.g. road, sewage, energy) due to the more urban location of many brownfields is also often argued to provide environmental benefits compared with greenfield development which usually requires additional infrastructure (Kotval-K, 2016). Related to this brownfield redevelopment is reported to avoid urban sprawl and the associated greater levels of energy consumption, pollution and habitat loss due to the lower densities and car dependency typical of this type of development (Kotval-K, 2016; Ameller et al., 2020; De Sousa et al., 2023). The greater density of housing on brownfield land also means that the land used for housing is less than greenfield development; De Sousa et al. (2023) reported that a study in the US found that 1 acre of brownfield development corresponded to a reduced of 4.5 acres of greenfield development. This is likely to be the case in the UK, as recent data suggests that housing on brownfield land is still built to a lower density that that on greenfield sites, with the gap widening since 2013 (Figure 3).

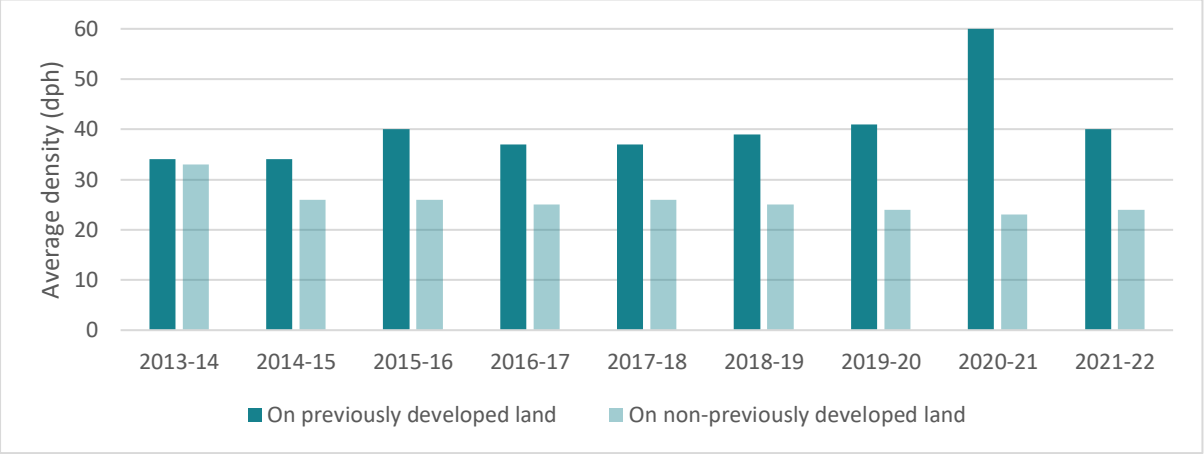


**Figure 3. Average density of new residential addresses created on PDL and non-PDL, 2013-2022 (MHCLG, 2022).**

In addition to the social benefits described above, the survey and interviews conducted with experts involved in the redevelopment for 25 brownfield sites reported similar environmental or 'ecologic' benefits. These included a reduction in greenfield consumption and contaminant pathways, increased human-environment connection, the reuse of buildings and therefore resources and protection of wildlife and habitats (Loures and Vaz, 2018). A key feature of brownfield redevelopment set out by the Urban Task Force (1999) was that it should contribute to more sustainable development in general. The redevelopment at Kings Dock, Liverpool and the former dockland area in Cologne, have been constructed to higher environmental standards, in terms of energy generation and consumption and the use of some materials, than might have otherwise been the norm. However, the use of imported granite in Liverpool and the poor transport accessibility in both has attracted criticism (Maliene et al., 2012).

There is also **lack of studies that present these environmental benefits in economic terms** (Ameller et al., 2020). The study by Eftec and SQW (2023) outlined above does suggest that people are willing to pay more for some environmental features of brownfield redevelopment, including where an area for wildlife is provided or existing structures are reused.

## Economic impacts

There is limited published evidence related to the economic impacts of brownfield regeneration in terms of cost benefit or return on investment analyses. Most of the evidence available points to the economic disbenefits of leaving brownfields undeveloped, citing, for example, their role in continuing neighbourhood deprivation and suppressing property prices, business performance (Green, 2018; Eftec and SQW, 2023; De Sousa et al., 2023) and investment in the area (Hutchison and Disberry, 2015; Green, 2018), and the corresponding benefits of redevelopment through increased land values, property prices, tax revenue and investment (Tang and Nathanail, 2012; Kotval-K, 2016; Loures and Vaz, 2018; Ameller et al., 2020).

There is also empirical evidence, mainly from the US, that redevelopment can increase property prices and, as a result, tax revenue (De Sousa et al., 2023). For example, a quasi-experimental study of the economic impact of the cleanup of contaminated sites under the US Brownfields Programme compared property transaction data in neighbourhoods with sites that received cleanup grants with those that applied but were not successful in securing funding (Haninger et al., 2017). They found that the **value of property post-cleanup increased by 5% to 11.5%** with a maximum of 15.2%, but that these effects were highly localised (Haninger et al., 2017). Applying a buffer around the sites and estimating the uplift in property prices in the buffer enabled them to estimate that the **average benefit per site was around $4m whereas the average cleanup costs were £600k** (Haninger et al., 2017), a cost:benefit ratio of 6.7. However, as discussed earlier, developers appear to prioritise redevelopment in areas with the greatest potential for gentrification. Another study in the US examining the redevelopment of contaminated sites reported that the value of redevelopment was greater in those neighbourhoods with middle and upper incomes

(Green, 2018). Similarly, an analysis of NLUD data, population density and IMD found that **development in England is concentrated on 'easy' brownfields and that more needed to be done to enable redevelopment of 'difficult' sites** including large former industrial and commercial sites that are located in more deprived, disconnected places (Longo and Campbell, 2017).

Based on the previous uses of brownfield land on which new residential addresses were created since then (Figure 4), this pattern appears to have continued, with around 19% of new housing on residential and community services sites, that would likely to be 'easier' to develop, and around 12.5% on land previously used for industry, commerce, transport and utilities, likely to be more 'difficult'. The remaining 34.5% of new homes were on vacant previously developed sites or those where the developed use was unknown.

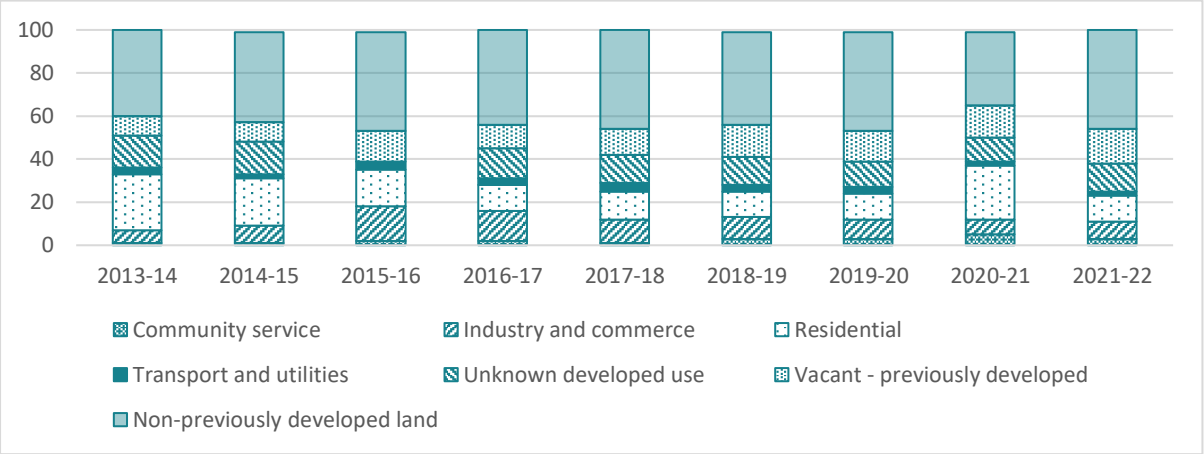


**Figure 4. Proportion of new residential addresses created on different previous uses of PDL and non-PDL, 2013-2022 (MHCLG, 2022).**

In the study of English brownfield development between 2001 and 2008 trends in house prices and economic deprivation over this period were also examined (Schulze Bäing and Wong, 2012). They found house price increases between 2001 and 2005 were greater in those neighbourhoods with brownfield reuse than those without (61.0% compared with 57.6%), but smaller between 2005 and 2008 (13.7% compared with 16.6%). As already mentioned, this study found that redevelopment was greater in the most deprived neighbourhoods and the analysis of house price data found that between 2001 and 2008 the increase in house prices were greater in deprived areas with brownfield redevelopment compared with those without; 113.5% in the bottom quintile of deprivation and 105.7% in the bottom decile. They also reported mixed impacts on the economic conditions of neighbourhoods over this period, with the **greatest improvements in those neighbourhoods categorised by gentrification driven by a change in the sociodemographic profile of the residents** (Schulze Bäing and Wong, 2012). Indeed, given the lack of affordability of many towns and cities in England an increase in land values in deprived neighbourhoods may not been a benefit to the local economy or affordability of housing for the existing communities (Tang and Nathanail, 2012).

There are other direct economic benefits of brownfield redevelopment cited in the literature, but these are not empirical studies. Other than those examining the impact on property prices most economic studies focus on the engineering costs of remediation of contaminated sites and do not examine the economic impacts from the social or environmental impacts of brownfield redevelopment (Ameller et al., 2020). However, these cited benefits include benefits to health and wellbeing from reduced stigma, blight and the risk from contamination and derelict structures which have substantial benefits to the state. Additional economic benefits from case studies of brownfield redevelopment include increased business startups (Morar et al., 2021), inward investment, tax revenue, commercial value, spending and job creation (Loures and Vaz, 2018). A study modelling the external economic benefits from the redevelopment of brownfield land found that the **'removal of a nuisance' and positive impact from agglomeration economies appeared to have the greatest economic impact** suggesting that landowners would underinvest in redevelopment and **state intervention is justified** (Vermeer and Vermeulen, 2012). However, they found that is a risk that agglomeration in the inner urban areas might increase demand for new development at the urban fringe due to inflows of new residents (Vermeer and Vermeulen, 2012).

Several studies also report on the economic benefits of brownfield redevelopment in terms of costs avoided from the development of greenfield land. These include reduce costs for the developer in terms of infrastructure, utilities, development (Loures and Vaz, 2018; Ameller et al., 2020; Kotval-K, 2016) and for the residents in energy, water and transport (Ameller et al., 2020; De Sousa et al., 2023) and increased viability of public services in the urban areas (Loures and Vaz, 2018). For example, De Sousa et al., 2023 reported that living in urban brownfield developments accrued savings of $150 per year in lifestyle costs (e.g. transport) compared with greenfield developments.

The Urban Task Force (1999) argued that brownfield redevelopment should be combined with sustainable development and wealth creation to provide compact, mixed-use neighbourhoods that enable walking, cycling and public transport use. However, the *Urban Renaissance* that this championed has been criticised for failing to deliver the mix of uses, public transport and active travel infrastructure critical to its success (Williams, 2014). The RTPI (2024) highlight the value of good urban design that provides the types of liveable neighbourhoods heralded by the Urban Renaissance finding that if the target of 300,000 new homes per year was met the economic value over next 10 years would be more than £50.4bn (£63.8bn if £380,000 homes were delivered). If these homes increased the density of cities, which would likely be predominantly brownfield redevelopment, this could add a further £23bn (£29.5bn if 380,000 homes were delivered) in economic benefits via agglomeration effects (RTPI, 2024). A few studies have highlighted the benefits from brownfield land redevelopment along the principles set out by The Urban Task Force (1999), including in creating affordable housing (Loures and Vaz, 2018), increased development value when combined with sustainable construction (Green, 2018) and the greater demand for sustainable housing (Adams et al., 2010).

In addition to reduced costs of development, some studies also suggest there were **economic benefits to developers who established themselves as market leaders** in brownfield redevelopment enabling them to generate large returns on investment (Adams et al., 2010; De Sousa et al., 2023). Indeed, recent advocacy from the sector suggests a willingness to invest in high-quality mixed use development brownfield redevelopment (Landsec and British Land, 2023) and the benefits to tackling regional disparities in economic performance (Landsec and British Land, 2023; EIC, 2024).

As highlighted above there are empirical studies that examine the economic performance of brownfield redevelopment. However, pre-development estimates of the value suggest that expectations from such development is high (see Table 1). For example, Landsec and British Land (2023) cite data from 2019 that suggests that the redevelopment of brownfields in Greater London, Greater Manchester, West Midlands CA and Cambridge has the potential to deliver more than 300,000 new homes by 2030, create 30,000 jobs per year and £60m of Gross Value Added (GVA) annually.

## Table 1. Some examples of economic benefits expected from brownfield redevelopment

| Case study | Key facts | Economic benefits | Source |
|---|---|---|---|
| Masterplan, Camden | 1,800 energy-efficient homes, 180,000 sq ft retail, leisure and community space. | £1bn investment in area<br>1000 new jobs<br>£34.5m in additional spending in local economy | Landsec and British Land, 2023 |
| Mayfield, Manchester | 1,500 new homes, 1.9m sq ft of commercial, retail and leisure space, new city park, 90% BNG. | £1.5bn investment<br>13,000 new jobs<br>£1.4bn GVA<br>Potential 25-125% uplifts in commercial rents over ten years<br>£200-300m in value creation over 30 years | Landsec and British Land, 2023<br>Byrne, 2023 |
| Canada Water Masterplan | Up to 3,000 net-zero homes (35% affordable), 2m sq ft workspace, 1m sq ft of retail, leisure, entertainment and community space, new park. | 1,000 new construction jobs<br>Workspace for 20,000 workers<br>£2bn GVA | Landsec and British Land, 2023 |
| Whitechapel Development Programme | 900,000 sq ft healthcare and research facilities, industrial and community space<br>£150K investment from One Public Estate | Construction phase: 2,505-2,670 job years created and £4.4-4.7m construction work expenditure<br>Operational phase: 13,500-14,600 new jobs, £21-23m worker expenditure, £1.2-1.3bn GVA per year, 55-126% uplift in tax revenues, 79-92% uplift in business rates. | LGA, 2024 |
| Albion Waterside, Gravesham | 1,500 new homes, 48,438 sq ft of commercial space, new open space, 271% BNG | 172 new jobs<br>385 construction jobs<br>£6.5m GVA per annum | Reynolds, 2023 |
| Northfleet Harbourside | 3,500 new homes, new stadium, 344,445 sq ft retail, food and beverage, and 193,750 sq ft commercial space | 3,000 new jobs<br>Incubator spaces for start ups. | Reynolds, 2023 |
| Perry Barr | 28ha brownfield, 1,914 new homes, mixed use town centre, public transport infrastructure, active travel routes, stadium redevelopment | 645 new jobs (68% hired locally)<br>1,354 people upskilled, 97 apprentices<br>£267m social value | MacLoed, 2023 |
| Leeds | 13 sites, 30ha, 3 neighbourhoods, 971 new homes (25% affordable), new road link and bus route, meadow natural flood management | 175 new jobs<br>Skills hub and 76 apprenticeships<br>700 weeks work experience<br>£1m greenspace contribution | Jolley, 2023 |

## Barriers to brownfield first

There are many barriers to delivering a brownfield first approach to housing (see Table 2), related to site conditions, planning and regulatory condition, and market conditions (CPRE and UWE, 2014). However, several of these are in essence related to the uncertainty of delivering development on brownfields, for example, due to presence of contamination, ground conditions, ownership issues, delays in planning and planning risk. These come together to increase the risk or perception of risk, which then has knock on consequences in terms of securing financing and having confidence that the development will remain viable over the medium-term viability (Figure 1).

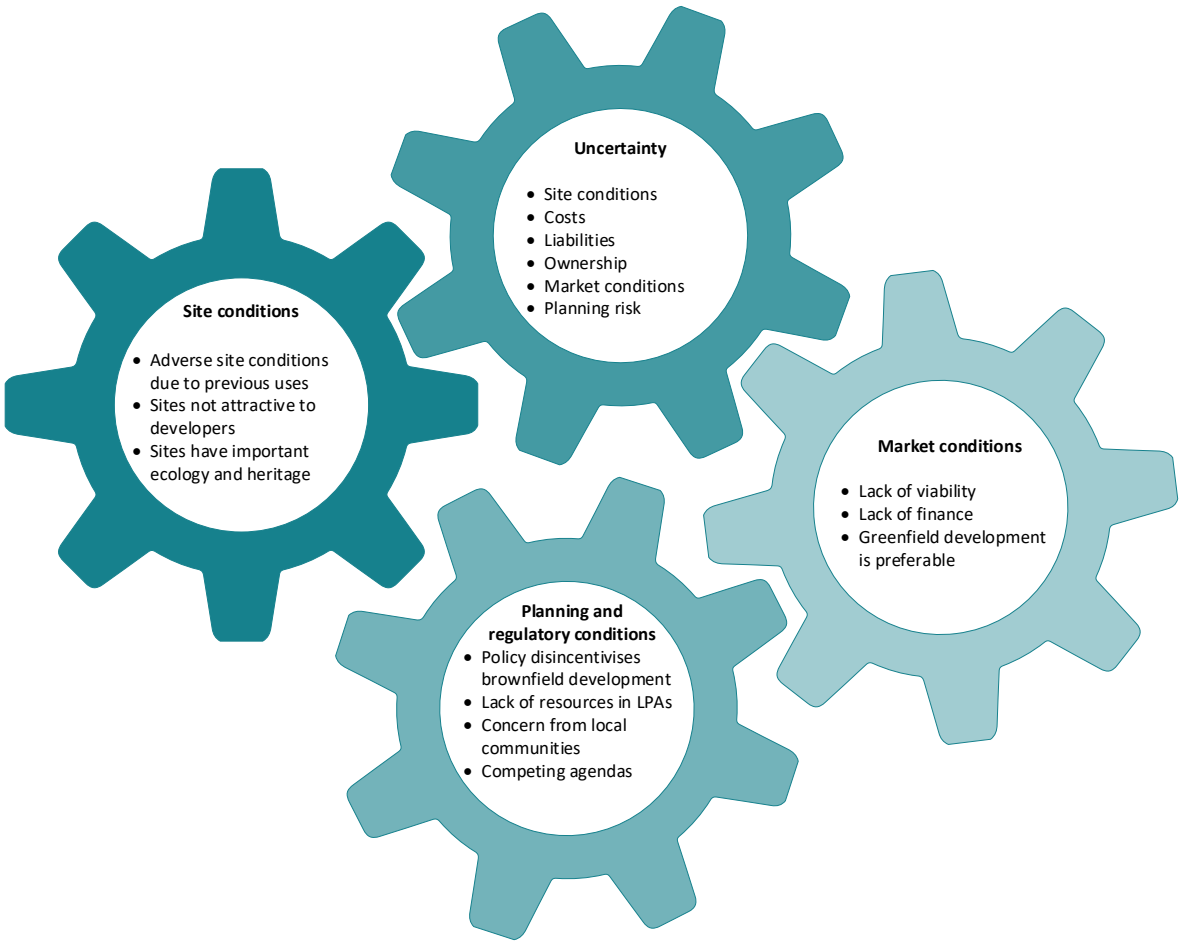


**Figure 1. Interrelated barriers to a brownfield first approach**

## Table 2. Main barriers related to a brownfield first approach

| Barriers[1] | Example impact |
|---|---|
| *Site conditions* | |
| Poor site conditions (e.g. ground works, drainage, topography) | Study of 5,000 projects found that all those on brownfield land had unforeseen problems with ground conditions (Burke et al., 2015). |
| Risk of contamination | Typical costs for remediation: £200,000-£790,000 per ha (EIC, 2024). |
| Size of site | Small sites less viable (Hutchison and Disberry, 2015), large industrial sites more likely to be hard to develop (Longo and Campbell, 2017). |
| Poor (undesirable) location | Low demand for new housing, lack of infrastructure. |
| Lack of site information | Lack of accurate information increases uncertainty and risks, which affects viability of development. |
| Ecology | High biodiversity sites may be challenging to deliver BNG, or site may be better as BNG offsetting. |
| Existing structures and heritage | Vacant buildings may require demolition, listed buildings may require renovation. |
| Complex ownership | Current owner/s not seeking to develop for housing, or unclear/multiple ownership with different expectations for the site. |
| Ongoing liabilities from previous land use | Developer may not want to take on the ongoing liability, may make financing challenging. |
| *Planning and regulatory conditions* | |
| Lack of data on available sites | Brownfield Registers contain duplication and accuracy is uncertain (Lichfields, 2022). |
| Available alternative greenfield sites allocated for housing | Developers prioritise greenfield development as it is less risky. |
| Not enough brownfield land identified/allocated | Development has focussed on 'easy' sites and 'difficult' sites concentrated in less desirable locations (Longo and Campbell, 2017). |
| Potential brownfield sites allocated for other uses (e.g. employment) | Lack of demand for these uses means that sites remain undeveloped. |
| Building housing on brownfield pushes other uses to urban fringe | Greenfield development continues, potentially increasing private car usage. |
| Limited incentives and resources for LPAs to be proactive | 39% of LAs do not have resource for a contaminated land officer (EIC, 2024). Small sites require land assembly (Leger et al., 2016). |
| Does not increase delivery of new homes | Planning applications greenfield developed are refused in order to meet policy requirements (Adams et al., 2010) |
| Uncertain national and local government policy or practice | Regulators have become more restrictive on reuse of waste soils in development (e.g. for landscaping) adding to costs (EIC, 2024). |
| Concerns from local community about redevelopment | Development does not secure support of local community, which increases planning risk. |
| *Market conditions* | |
| Site not viable: low value/high costs = unacceptable profit | Analysis of ratio of costs to house prices found that greatest risks of viability issues are in North and Midlands (Lichfields, 2022). |
| Expected higher profit for site in the future | Value of sites purchased in Leeds in early 2000s has decreased so these sites will not deliver expected returns (Burke et al., 2015). |
| Unavailability and/or high cost of finance | PPPs can be based on optimistic economic forecasts, and delays increase the risk (van den Hurk et al., 2022) |
| SME developers priced out of land market, or unable to gain finance | Tax relief on remediation is often not claimed by SME developers, risks are increasingly pushed down the supply chain (EIC, 2024). |
| Available cheaper/alternative greenfield sites (in some places) | Developers prioritise greenfield development. |
| Lack of demand for high-density homes delivered on bronwfields | 48% of homes on brownfield register are likely to be flats (>100dph), but 17% of households are likely to live in flats (Lichfields, 2022). |

[1] Urban Task Force, 1999; Adams et al., 2010; CPRE and Green Balance, 2011; Tang and Nathanail, 2012; CPRE and UWE, 2014; Burke et al., 2015; Hutchison and Disberry, 2015; Leger et al., 2016; Longo and Campbell, 2017; Ameller et al., 2020; Charlson, 2020; Lichfields, 2022; De Sousa et al., 2023; Landsec and British Land, 2023; Okeyinka et al., 2023; Becerra, 2024; EIC, 2024; RTPI, 2024.

# Enablers of a brownfield first approach

Enablers tend to focus on addressing market failure and derisking development (Table 3).

**Table 3. Enablers of a brownfield first approach**

| Barriers[1] | Example enabler |
|---|---|
| *Site conditions* | |
| Poor site conditions (e.g. ground works, drainage, topography) | Direct funding for remediation or greater tax relief or other incentives (Adams et al., 2010; Maliene et al., 2012; Hutchison and Disberry, 2015; De Sousa et al., 2023; EIC, 2024).<br>Provide support and incentives for SME housebuilders to deliver small sites (Urban Task Force, 1999; EIC, 2024) |
| Risk of contamination | |
| Size of site | |
| Poor (undesirable) location | Public sector investment in infrastructure (Hutchison and Disberry, 2015; Ameller et al., 2020; van den Hurk et al., 2022). |
| Complex ownership | Proactive planning to carry out land assembly or purchasing (Leger et al., 2016; Hickman et al., 2023; RTPI, 2024). |
| Lack of site information | Subsidies or tax incentives for site investigation (Ameller et al., 2020); more robust Brownfield Registers (Lichfields, 2022). |
| Ecology | Partnership working around a shared vision (Hickman et al., 2023). |
| Existing structures and heritage | |
| Ongoing liabilities from previous land use | Land Trust model to take on long-term liabilities, maintenance and derisk development (Gilbert and Hall, 2014) |
| *Planning and regulatory conditions* | |
| Lack of data on available sites | Land capacity assessments, more detailed, consistent and robust Brownfield Registers (Lichfields, 2022) |
| Available alternative greenfield sites allocated for housing | Proactive planning to carry out land assembly, land purchasing, led PPPs, coordinate partnerships (Leger et al., 2016; Hickman et al., 2023; RTPI, 2024). Streamline planning decisions (Landsec and British Land, 2023). Establish Development Corporations; estimated a £3.24 benefit from investing in town planners for every £1 spent and delivered 150% more housing (RTPI, 2024).<br>Proactive 'market stimulant' role needs resourcing and capacity building in LPAs (EIC, 2024; Landsec and British Land, 2023; RTPI, 2024). Training for planning committee members and independent experts on committees (Landsec and British Land, 2023).<br>Permitted development or granting planning permission in principle reduces risk (Hutchison and Disberry, 2015; Charlson, 2020).<br>Partnership working around a shared vision (Hickman et al., 2023). |
| Not enough brownfield land identified/allocated | |
| Potential brownfield sites allocated for other uses (e.g. employment) | |
| Building housing on brownfield pushes other uses to urban fringe | |
| Limited incentives and resources for LPAs to be proactive | |
| Does not increase delivery of new homes | |
| Uncertain national and local government policy or practice | |
| Concerns from local community about development | Community engagement in densification and directly benefit from S106 contributions (Landsec and British Land, 2023). |
| *Market conditions* | |
| Site not viable: low value/high costs = unacceptable profit | State support to reduce abnormal costs (Lichfields, 2022), via PPPs (van den Hurk et al., 2022) or Development Corporations (RTPI, 2024).<br>Tax incentives or reduced fees for brownfield development (Hutchison and Disberry, 2015). Vacant land tax to incentivise timely development (Urban Task Force, 1999).<br>Provide support and incentives for SME housebuilders (Urban Task Force, 1999; EIC, 2024). |
| Expected higher profit for site in the future | |
| Unavailability and/or high cost of finance | |
| SME developers priced out of land market, or unable to gain finance | |
| Available cheaper/alternative greenfield sites (in some places) | Environmental surcharge (Urban Task Force, 1999) or greenfield surcharge (Ameller et al., 2020; EIC, 2024). |
| Lack of demand for high-density homes delivered on brownfields | High quality design the norm in brownfield redevelopment (Urban Taks Force, 1999; Landsec and British Land, 2023; RTPI, 2024). |

## Evidence gaps

There are four main evidence gaps related to the impacts of brownfield development. First, is the limited amount of economic evidence available, particularly related to the externalities provided by developing brownfield land for housing. Much of the case for this form of development is focused on removal of a nuisance in the form of contaminated, derelict or vacant buildings, and the barriers are equally focussed on the additional constraints this removal places on the cost or risks to development and the impact these have on viability. It is apparent in much of literature that the public sector will be required to derisk development in some way (e.g. providing infrastructure, direct funding, subsidies) to enable development to take place, but there are very few studies that seek to quantify how much the removal of a nuisance is worth in monetary terms and what the return on investment might be to the developer or the state (e.g. through sale/rental prices of the new homes, reduction in ill-health, increased business rates). This makes it much more challenging to argue that the removal of the nuisance is an effective use of public funding.

Second, and related to this, there are very few studies that look across the development process from pre-development to post-completion. Most involve looking back at the pre-development state and rely on secondary data (e.g. house prices, deprivation), whereas a longitudinal study design would allow pre-development data (e.g. health, neighbourhood satisfaction, income) to be compared with post-development data, preferably several years after completion and compared with areas that do not experience redevelopment.

Third, other arguments for brownfield redevelopment are that it enables more sustainable development. However, anecdotal evidence suggests that often promised improvements to amenities and public transport were not delivered. So, there is a lack of evidence about whether brownfield developments are more sustainable than greenfield development, beyond the higher densities, and whether people behave more sustainability. This could also include economic benefits of more sustainable features and any related behaviours (e.g. expenditure on fuel, local shopping, health impacts from greater walking).

Finally, the enablers are a mix of those tried in specific location and those proposed in the literature. There is a need to test whether these are effective in pilot areas and whether this efficacy is related to any specific dependencies or whether there are additive benefits in combining enablers (e.g. support for SME housebuilders alongside more proactive planning).

# Conclusions

This review explored the social, environmental and economic impacts of brownfield development. There is a raft of benefits, partly from removal of a nuisance, and partly from positive impact of more sustainable forms of development and impacts of regeneration. However, there are few robust empirical studies, most rely on a limited suite of measures (e.g. house prices, deprivation), over relatively short time periods or are based on assumptions of the benefits. Despite this, taken together there does appear to be evidence

that brownfield redevelopment provides benefits from reusing sites and supporting the regeneration of neighbourhoods. There is some evidence that this has economic benefits in terms of increased house prices and externalities through removal the nuisance of a brownfield and potential agglomeration effects of increased population and economic activities. There is also some indication that because brownfield redevelopment is more sustainable (i.e. high density, mixed use) that it avoids the disbenefits from greenfield development, although this evidence base is far more limited. Crucially, from a public policy perspective there is evidence that brownfield development receives greater public support, although this is linked to the quality of the development and the benefits it provides to the existing community beyond simply reusing the land, for example, by provided amenities, greenspaces and opportunities for active travel.

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