The Role of the UK Development Industry in Brownfield Regeneration

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Stage 1 Report

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Executive Summary

Overview
This report presents the initial findings from an ongoing research project underway at the College of Estate Management in Reading. The overall aim of the research is to critically examine the dynamics and role of residential and commercial property developers in relation to the assessment, remediation and reuse of brownfield land in the UK. The first stage of the project included a nationwide survey of developers during 2004.

Why does the research matter?
Government policy currently places a strong emphasis on the reuse of brownfield land as part of its sustainable development agenda. However, as well as the benefits redevelopment can bring to existing communities, there can also be difficulties associated with the reuse of such land, particularly if it is located in an area requiring extensive regeneration or where there are issues concerning contamination. In relation to residential development, the additional complexities which can arise in the development process potentially hinder the government’s aim of speeding up the supply of housing land. It is therefore important to understand how the industry is approaching brownfield development within the existing policy and regulatory framework and the relative significance of constraints within both the industry and the environment in which it operates.

Main findings
- Although commercial developers have a long history of developing on brownfield sites, housebuilding on recycled land is no longer the preserve of specialists but is now widespread throughout the industry.
- Government policy and consequently the availability of suitable land have clearly been the main drivers behind the increase in brownfield development. However, there are also ‘pull factors’ at work with a significant proportion of developers recognising the opportunity for profitable development.
- Attitudes towards developing on contaminated sites appear to have changed as developers have gained more experience of building on brownfield land. The vast majority of developers (94%) were prepared to undertake development on sites requiring remediation and over 70% had actually done so over the past 12 months.
- The redevelopment of contaminated sites for residential use could, however, be threatened by the impact of the EU Landfill Directive. Its implementation was likely to dissuade over two-fifths of housebuilders (particularly the smaller operators) from undertaking development on land requiring remedial treatment.
- Following the Directive, commercial developers were less likely to be dissuaded from developing on contaminated sites. They typically had a greater awareness of in-situ remediation techniques compared to most housebuilders and were more likely to have experimented with them. Not surprisingly, of the housebuilders, those building over 2,000 units a year had the greatest experience of using alternatives to ‘dig and dump’.
- Although smaller housebuilders appear as ready to undertake brownfield development as the volume builders, they are generally more wary of developing on contaminated sites. They are less likely than larger companies to have the specialist knowledge or resources to carry the additional risks.
- Indeed, whilst access to independent sources of information on remediation techniques was generally not considered to be a problem by most developers, this was more of an issue amongst smaller housebuilders. This implies that there could be a greater role for government agencies in disseminating and publicising the information that is available.
- On balance, developers were generally positive about integrating ‘sustainability’ considerations into site masterplanning, but the adoption of specific standards of environmental performance (e.g. BREEAM) was less widespread and more common amongst commercial developers.
- The survey results show that developers are beginning to consider the potential impacts of climate change in relation to property development, although these tend to be given the most weight where there are accompanying regulations.
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Background to the research

The impact of industrial decline and restructuring has resulted in the redundant sites and obsolete buildings commonly referred to as ‘brownfield’ land. Changes in working practices, living standards and locational preferences have also increased the stock of vacant and derelict properties. The problems linked to brownfield sites, such as poor environments, as well as the opportunities they bring for the regeneration of existing urban communities, are being tackled across Europe and North America. The UK government, as part of its sustainable development agenda, currently places a high priority on the reuse of previously developed land, but successful implementation of this policy relies to a large extent on the development industry. This research project is focused on the key issues facing the industry in responding to this policy which are outlined below:

- **The development industry**: The headline figures suggest that the industry as a whole has responded positively to the increased emphasis on brownfield development, with the government’s 60% target for new homes achieved by 2001, seven years ahead of schedule. However, publicly available information on how individual housebuilders are approaching brownfield development is limited. This first phase of the research sought to establish the extent to which housebuilders throughout the industry, as well as commercial developers, are engaging in brownfield development and how approaches, perceptions and knowledge differ. Later phases of the research will explore the extent to which brownfield development is stimulating innovation, changing established practices and attracting new entrants into the industry.

- **Market risk**: In buoyant locations brownfield sites can typically be redeveloped without assistance from the public sector. At the other end of the spectrum, many brownfield sites are located in areas that require extensive regeneration and cannot be developed in isolation. Additional infrastructure, including new or upgraded transport links, may be necessary to unlock an area’s potential. Public sector intervention is often required in these cases to deal with market failure and encourage co-ordinated development activity, but this has to take account of the particular socio-economic conditions of the locality. The second phase of the research will investigate how regeneration is progressing in two areas facing different market conditions (the Thames Gateway and Manchester / Salford) where alternative policy initiatives and ‘delivery structures’ are being implemented.

- **Policy and regulatory framework**: In encouraging the private sector to engage in brownfield development, the government should be seeking to minimise uncertainty wherever possible in the regeneration process. However, changes to the policy and regulatory framework (eg EU Landfill Directive, planning reforms) are likely to have the opposite effect. The effectiveness of policy in achieving brownfield regeneration will be investigated through interviews with key participants in the development process and site-specific studies.

- **Development frictions**: At its simplest, this refers to the barriers to successful brownfield redevelopment. At a macro level this encompasses national policy conflicts and the choices which have to be made concerning: the scale and location of new housing development; the speeding up of new housing supply whilst ensuring housing developments are ‘sustainable’ from the detailed design and site layout through to the construction process and occupation; and the spatial allocation of resources to boost regeneration.

    - The attitude and culture of the development industry could also be included within this category, notably the extent to which growing experience of
brownfield development and the transfer of knowledge and skills throughout the industry are leading to changing perceptions and practices.

- At a site-specific level, potential development frictions range from the detailed regulatory procedures relating to contaminated sites through to how developers engage with other actors in the development process.

*The SUBR:IM research presents an opportunity to draw these strands together in the next phase of the project which involves detailed work at a local level. The research will also build on the existing literature and explore international experience to develop further opportunities for constructing alternative approaches in the UK.*

### Key results from the survey of developers

The survey targeted developers according to whether their principal business was commercial property or housebuilding. There has been recent publicity surrounding prominent commercial developers intending to extend their activities to include residential development and the impact this could have on the housebuilding industry. The survey findings show that there is already considerable crossover between the two sectors, with over half of all commercial property developers in the survey also building housing and vice versa: the signs are that this is likely to increase.

*The development industry’s approach to brownfield development*

The survey confirmed that brownfield development is now widespread throughout the housebuilding industry. It was already apparent that brownfield development was no longer the preserve of specialists and had been adopted by volume housebuilders. Findings from the survey show that smaller and medium-sized operators have also clearly shifted their output towards brownfield. Commercial property developers have a much longer history of developing on previously used land. The commercial developers in our survey built predominantly on brownfield sites. However, where they also undertook housing development this was restricted solely to recycled land.

Given the policy emphasis on brownfield development it is not surprising that housebuilders of all sizes are undertaking schemes on previously developed land, to a greater or lesser degree. Maintaining output on greenfield sites has become increasingly difficult in the recent planning climate. Indeed, ‘the availability of land’ or ‘government policy’ (which underpins the former) were the key reasons given by the majority of developers for increasing their output on brownfield over recent years. However, the move towards brownfield development has not been solely policy-driven; a significant proportion of developers – both commercial and residential – viewed it as an opportunity for profitable development in what has been a relatively buoyant property market.

At present, there appears to be a clear intention amongst developers to continue to increase the amount of brownfield development they are undertaking and for housebuilders this was supported by the composition of their land banks in which brownfield accounted for, on average, 70% of total plots.

*Dealing with contaminated sites*

Developing on sites with contamination is likely to become increasingly important if the brownfield target is to be sustained. The survey findings show that developers in both the commercial and residential sectors are clearly not averse to developing on contaminated sites. Practically all the survey respondents were prepared to undertake development on sites requiring remedial treatment and around three-
quarters had actually developed on contaminated sites over the past year. Smaller developers are less likely to undertake schemes on contaminated sites; this is not unexpected given that they may not have the resources, the specialist knowledge or the financial reserves to carry the additional risks involved.

A majority of housebuilders were prepared to hold contaminated sites in their land banks. Attitudes towards contaminated land clearly appear to have changed as housebuilders have gained more experience of developing on brownfield sites.

The readiness of the development industry to tackle contaminated sites could, however, be threatened by the impact of the EU Landfill Directive\(^1\). Over two-fifths of housebuilders were likely to be discouraged from undertaking development on sites with contamination following the implementation of the Directive. This was particularly true of smaller housebuilders and those without experience of commercial development. Commercial developers were less likely to be dissuaded from building on contaminated sites, but the Directive is clearly causing some uncertainty in the industry.

The Directive is causing concern because 'dig and dump' is still the most frequently used method of dealing with contamination. There is, however, evidence that in-situ treatments are being used, most commonly barrier methods and containment. Commercial developers typically had a greater awareness of alternative remediation techniques than housebuilders and were more likely to have experimented with them, particularly solidification / stabilisation and soil vapour extraction. Other techniques were generally used much less frequently.

The EU Directive does appear to have stimulated some interest in exploring alternatives to landfill; just over half of all developers said they were doing this. Of the remainder, around half stated that they were also likely to continue developing on contaminated land, suggesting that they already have sufficient knowledge of alternatives to landfill.

In terms of access to independent sources of information on remediation treatments, the majority of developers did not consider this to be a problem. Smaller housebuilders were less likely to share this view and this could suggest that there is a greater role for government bodies such as the Environment Agency to publicise and disseminate information more widely.

*Risk and stigma*

The survey findings reveal that the use of Environmental Liability Insurance and newer products which allow bespoke outsourcing of liability is relatively limited as yet. Developers are more likely to rely on contractor warranties and fixed price remediation contracts to help manage risk and control costs. This is an issue which will be investigated in relation to site-specific conditions in the case study research in the next phase of the project.

Post-remediation stigma amongst purchasers, valuers and lenders was considered to be a significant issue by both housebuilders and commercial property developers. The impact this has in relation to the marketing of a scheme and end values will be explored in more depth through the case study work.

\(^1\) From 16th July 2004 the Directive banned the co-disposal of hazardous and non-hazardous waste resulting in a radically reduced number of sites permitted to accept hazardous waste. The aim of the Directive is to encourage waste reduction and wider adoption of more sustainable methods of dealing with contamination.
Integration of sustainability into the development process and opinions on climate change

Around a third of developers stated that they had a formal environmental policy or statement. However, this is not a significant influence on attitudes towards brownfield development. Only a small minority of developers cited a company environmental policy as a motivating factor in undertaking brownfield development and this was alongside other influences such as government policy, availability of land and the opportunity for profitable development.

In terms of site location and masterplanning the majority of developers were positive about the need for close proximity to public transport links, access to local shops and services and the need to minimise impact on site ecology. These are often matters which are addressed via the planning system through site allocations in local plans, policy requirements and S106 agreements.

Views on the importance of early community consultation regarding development schemes, again a requirement of the sustainability agenda, were more mixed depending on past experiences. Given the prevalence of NIMBYism some developers are clearly reluctant to engage with local communities, describing attempts as 'counterproductive'. Others, perhaps recognising the benefits of tackling community concerns early in the planning process, placed greater importance on this, including the largest of the volume housebuilders.

The importance of providing affordable housing was also a more contentious issue due to the impact on development economics, with some developers actively avoiding schemes which would require an element of affordable housing.

Consideration of the environmental performance of buildings through the adoption of BREEAM standards was much less widespread in the industry and more commonly taken up by commercial developers.

There are some important issues in relation to this:

- there was a general lack of awareness, if not of BREEAM, then the exact standards required, especially amongst housebuilders;
- some developers claim they design to BREEAM standards but don't apply for accreditation due to cost;
- some housebuilders suggested that the cost of implementing higher environmental standards would not be met by house purchasers who aren't prepared to pay extra for them.

In public-private sector partnerships achieving higher environmental standards in building and site design is often a requirement; English Partnerships, for example, require buildings to achieve a ‘very good’ BREEAM rating. Increasingly these matters will also be subject to regulation; consultation is currently underway for changes to Part L of the Building Regulations to incorporate the requirements of the EU Energy Performance of Buildings Directive. As higher environmental standards become a necessity rather than an option, concerns about increased costs adding to the purchase price of a house will no longer be an issue for individual housebuilders but will apply equally throughout the industry.

There is a growing awareness in the development industry about the potential impacts of climate change. Consideration of possible effects is regarded as particularly important at the building design stage, probably at least partly a result of
continuing changes to the Building Regulations. The impacts of most concern to developers are the possibility of rising insurance costs and increased flood risk.

In conclusion
Government policy has clearly been successful in shifting the pattern of development towards brownfield sites, but conflicting policy aims may start to create difficulties and threaten the continued success of the regeneration agenda. The attempt to reduce the amount of material going to landfill sites may slow down the development of brownfield sites as alternative methods of remediation have to be sourced and implemented and costs of disposal rise. Higher costs for dealing with contamination may threaten the viability of some brownfield redevelopments thus increasing reliance on public sector intervention. There also appears to be a greater need for the public sector to take the lead in disseminating and publicising the information that is available on alternative remediation treatments.

About the research
This report summarises the findings from the first stage of a two-and-a-half year research project on the role of the UK development industry in brownfield regeneration being undertaken at the College of Estate Management, Reading. This project is part of the SUBR:IM² (Sustainable Urban Brownfield Regeneration: Integrated Management) consortium study, funded by EPSRC, which involves 9 institutions working on 12 interlinked projects across science and social science disciplines.

The research completed to date includes a review of the relevant literature and a nationwide survey of developers to gather contextual data on approach and attitudes towards brownfield development. This explored issues such as: how the industry is approaching brownfield development; attitudes towards development on contaminated sites; opinion on current policy and legislation; knowledge and use of different remediation treatments and the integration of sustainability into the development process.

The survey was sent to just under 1,000 commercial and residential developers in June-July 2004. An overall response rate of 16% was achieved and it was possible to compare the sample of housebuilders who responded against the industry structure as a check on the robustness of the findings. In terms of number of respondents, the survey was unable to obtain a representative response from the housebuilding industry’s smallest operators (those building up to 30 units a year), but achieved good penetration amongst medium and larger-sized housebuilders, who account for the vast majority of the industry’s output in volume terms. In total, the output of the survey respondents accounts for some 28% of annual housing completions in the UK; consequently the survey represents a valuable snapshot of the industry, bearing in mind the caveat relating to smaller operators.

Ongoing research
The survey has provided a snapshot of how the development industry is responding to government policy, but continuing research over the next 18 months will allow a more detailed exploration of issues surrounding brownfield development through interviews with developers, planning officers and other key participants in the development process, as well as investigation of specific case studies.

² See www.subrim.org.uk. Funded by the Engineering and Physical Sciences Research Council (Grant No: GR/S148809/01).
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The respondents to our postal survey, who for reasons of confidentiality, must remain anonymous.
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1 Introduction

1.1 Background to the SUBR:IM research programme

The Sustainable Urban Brownfields Regeneration: Integrated Management (SUBR:IM) research consortium brings together a diverse range of projects which seek to increase understanding of brownfield regeneration. There are a total of 12 projects in progress at 9 different institutions encompassing both the science and social science issues surrounding brownfield development (see http://www.subrim.org.uk/ for more details).

The overall aim of work package B is to critically examine the dynamics and role of residential and commercial property development in relation to the assessment, remediation and reuse of brownfield land (which may or may not be 'contaminated') in the UK.

In particular, the proposed research seeks to:

- Scope and systematically review the existing research literature, theoretical frameworks of the development process (set within the sustainable land use agenda), and policy initiatives in order to develop a conceptual framework or model that can be applied to the brownfield development process.

- Explore international experience (particularly in Europe and the USA) of brownfield land development to develop further opportunities for constructing alternative approaches in the UK.

- Examine and assess the relative influence of the main forces that drive and constrain the brownfield development (residential and commercial) process, including the regulatory and policy framework.

- Analyse the role of individual stakeholders (developers/investors, local authorities, scientists, government and other statutory agencies and the general public) in the brownfield development process.

- Examine the processes by which risk is defined, assessed and communicated in the development process and the way in which remediation technology 'diffusion' and 'lock-in' may operate in the development process over time.

- Investigate the existence, and reasons for, any 'dysfunction' and 'dereliction' in local urban property markets (residential and commercial) in the Thames Gateway and Greater Manchester.

- Assess and analyse the relative importance of 'stigma' to different actors in local property markets post clean-up.

- Develop a decision-making tool kit, based on key Quality of Life Indicators (and linking with the SUBR:IM Metrics work package), which can be used by strategic policy-makers and project co-ordinators to guide the process by which development actors are encouraged and persuaded to undertake brownfield development projects.

As well as the literature review, the methods to be used in the project include:

- Analysis of existing data sources relating to brownfield development (eg National Land Use Database, Land Use Change Statistics etc).
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- A nationwide postal survey of developers (housebuilders and commercial developers) to gather data on how the industry is approaching brownfield development; whether the knowledge and skills required to develop brownfield sites are diffusing through the industry; and the integration of ‘sustainability’ into the brownfield development process.
- Follow-up interviews (face to face and telephone) to explore issues raised in the survey in greater depth.
- Detailed case study work on sites in the Thames Gateway and Greater Manchester including interviews with key stakeholders.

This report draws together the findings from the first 12 months of the project and sets out the ongoing research to be undertaken over the next 18 months.

1.2 Definitions

PPG 3 provides a definition of previously developed land as: ‘…that which is or was occupied by a permanent structure (excluding agricultural or forestry buildings), and associated fixed surface infrastructure. The definition covers the curtilage of the development…’ (DETR, 2000a). The definition goes on to state that previously developed land can occur in rural as well as urban locations, but this excludes land within urban areas that has not been previously developed (such as parks and allotments).

One thing missing from this definition is any comment on the current status of the land, whether vacant, derelict, or still in use. Alker et al (2000) proposed a universal definition of brownfield land which clarifies this issue: ‘a brownfield site is any land or premises which has previously been used or developed and is not currently fully in use, although it may be partially occupied or utilized. It may also be vacant, derelict or contaminated. Therefore a brownfield site is not necessarily available for immediate use without intervention.’

The definition of previously used land contained within PPG 3 was adopted by the National Land Use Database in 2000 (NLUD, 2000). However, NLUD does categorise previously developed sites by current use according to whether they are: vacant and ready for development, derelict and require treatment before development, currently in use but subject to a local plan allocation or planning consent and currently in use but with potential for redevelopment. This categorisation of brownfield land is broader than that suggested by Alker et al, as it includes sites currently in use but also where potential for redevelopment has been identified. This approach is certainly encouraged by the government in the preparation of urban capacity studies where local authorities are required to broaden their search for potential housing sites. Vacant and derelict sites should be regarded as ‘one possible source’ of housing land but consideration should also be given to the potential for redeveloping existing buildings whether residential or commercial (DETR, 2000b).

Brownfield land is not necessarily contaminated. A formal definition of contaminated land is given in section 78A(2) of Part IIA of the Environmental Protection Act 1990: ‘any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that –

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or
(b) pollution of controlled waters is being, or is likely to be caused.’
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In this report, as well as sites defined under Part IIA of the Environmental Protection Act 1990, the term ‘contamination’ also refers to land where contamination may become an issue through change of use as in ‘land which has substances in, on or under it which, subject to investigation, might require measures to be undertaken to make the land suitable for a particular use’ (BURA, 2001).

For the purposes of this project, a concise definition of brownfield land derived from POST is used: ‘any land which has been previously developed, including derelict and vacant land, which may or may not be contaminated’ (POST, 1998). Thus, the terms ‘brownfield’ and ‘previously developed land’ (or PDL) are used interchangeably throughout this report.

1.3 Structure of report

Following this introduction:

- Chapter 2 draws together findings from the literature review, setting the context for the ongoing research.
- Chapter 3 details the methodology followed in undertaking the nationwide postal survey of developers.
- Chapter 4 analyses the findings from this survey.
- Finally, Chapter 5 summarises the research findings from the first year of the project and outlines the ongoing research programme.
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2 Context

2.1 Introduction

The impact of industrial decline and restructuring has resulted in the redundant sites and obsolete buildings commonly referred to as ‘brownfield’ land. Changes in working practices, living standards and locational preferences have also increased the stock of vacant and derelict properties. The problems linked to brownfield sites, such as poor environments (including, in some cases, contamination), as well as the opportunities they bring for the regeneration of existing urban communities, are being tackled across Europe and North America. The UK government, as part of its sustainable development agenda, currently places a high priority on the reuse of previously developed land, but successful implementation of this policy relies on the development industry. In buoyant locations brownfield sites can typically be redeveloped without assistance from the public sector. At the other end of the spectrum, many brownfield sites are located in areas that require extensive regeneration and cannot be developed in isolation. Public sector intervention is required in these cases to deal with market failure and encourage development activity, but this has to take account of the particular socio-economic conditions of the locality.

The aim of this chapter is to review previous research and available data to establish the context for the project. It starts by reviewing critically some important ways of conceptualising the development process, and the application of a variety of frameworks to brownfield regeneration. The development process is highly regulated by national, regional and local policies, but there are also clear tensions between the objectives of environmental, economic and regeneration policies, which are briefly outlined. The data used in informing and monitoring policy on brownfield regeneration is also reviewed (for example, NLUD and LUCS) and we examine the available evidence on how the housebuilding industry has responded to the increased emphasis on recycling land. Finally, this chapter concludes by highlighting some outstanding research issues and questions which the nationwide survey of developers aims to address.

2.2 Understanding the brownfield development process

Models of the development process offer a framework for understanding the complexities involved in the creation of new buildings and spaces. Traditional models of the development process from event-sequence, to agency, structure and institutional models all offer different perspectives (see classifications by Guy and Henneberry, 2002; Healey, 1991). The insight that these generic models of the development process bring to brownfield regeneration is discussed below, and contrasted with conceptual models, which focus specifically on brownfield development.

2.2.1 Generic models of the development process

**Event-sequence models** are typically the simplest explanations of the development process which focus on the key stages from initial site identification through to completion and occupation. They can, however, be criticised for concentrating on the

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3 This chapter incorporates extracts from a paper presented at ERES 2004 (Dixon et al., 2004).
practicalities of the process at the expense of exploring the inter-relationships between different actors, but as Healey (1991) notes, ‘they focus attention on potential “blockages” to development activity’ and as such are valuable as a basis for exploring the brownfield development process. One of the most sophisticated is Barrett et al’s (1978) model which, although essentially events-based, does consider the broader picture by identifying external influences on the development process.

Barrett et al (1978) break down the development process into three stages: development pressure and prospects, development feasibility and implementation. The driving forces which initiate the development process are demographic change, economic growth and investment potential. The second stage of the process, development feasibility, is sub-divided into five conditions: ownership, public procedures, project viability, physical conditions and market conditions, and these encapsulate some of the key areas where problems arise in the brownfield development process. The ownership of brownfield sites, for example, is often fragmented and studies have highlighted the time-consuming and problematic nature of assembling brownfield sites (Adams et al., 2001; Syms, 1998; 2001). Consideration of ‘physical conditions’ on previously developed land has to take account of not just the removal of existing buildings or structures but also remediation works if the site is contaminated. However, while these features of the brownfield development process can be accommodated within the model, it does appear to be more suited to describing development undertaken solely by the private sector, (and essentially ignores public sector intervention) which is clearly not always the case in brownfield regeneration. There is a recognition in the model that a development may not proceed if all the conditions for feasibility are not met, but there is no mechanism for facilitating projects in areas of market failure. Project viability is measured in relation to market demand and there is no specific reference to public subsidies or grants. Thus while there may be a policy aspiration for brownfield regeneration on behalf of central or local government, unless the investment prospects are favourable, sites will not proceed through the development process without some form of intervention from the public sector. This is a point recognised by Gore and Nicholson (1985) who applied the model to the development of public sector land. They extended the scope of the model by incorporating the period during which land lies vacant prior to development, and also factored public finance into the consideration of development feasibility.

Event-sequence models, while providing a useful starting point for analysis, cannot capture the complexity of the brownfield development process. For example, a wide range of actors is typically involved, which in regeneration areas may also include additional layers of governance, such as Urban Development Corporations, as well as public sector agencies.

Agency models of the development process therefore seek to provide a greater understanding of the roles and inter-relationships of different actors, but these are of little value in isolation and need to be understood in relation to the economic, political and social frameworks or ‘structure’ within which they operate. Ambrose’s (1986) model, which combines elements of the agency and structure perspectives, steps back from the details of the development process and the actors involved. Instead this model focuses on the relationship between the state, finance and construction industries in a systems-based approach. This model clearly shows the investment flows and control (in the form of policy and regulation) between the three sectors, as well as the influence of the public and other pressure groups on the state. However, there is again no acknowledgement, as in Barrett et al’s model, of the external influences driving the state’s economic and planning policies. Furthermore, the simplification of the state into only central and local government agencies, does not
assist in understanding the brownfield development process as it excludes the wide array of regional and local public sector agencies that can be involved.

The relationship between the actors in the development process and the framework in which they operate is explored further in structure and agency or institutional models. For example, Healey's (1992) institutional model of the development process aims to, ‘…capture the detail of the social relations of a development project, while linking this to broader issues at the level of macro economic and political organization, without overformalizing the highly variable circumstances of specific projects and agencies.’ It is a hierarchical model, building initially on a detailed understanding of the events in the development process and the actors involved, to an exploration of the motivation of these actors, their inter-relationships and how these are influenced by prevailing ‘resources, rules and ideas’. Applying this model to the development of housing on brownfield sites, these might include (adapted from Healey, 1992):

- **resources**: the availability of land and construction workers, finance (from public sector grants and subsidies as well as the private sector); industry knowledge of developing on brownfield sites; scientific knowledge of remediation techniques; sustainable construction methods;
- **rules**: planning policy, building regulations, contaminated land legislation, EU directives, fiscal policy and more informally, established modes of behaviour;
- **ideas**: the 'sustainability' agenda, corporate social responsibility, NIMBYism, consumer preferences, industry preferences.

As Healey (1992) notes, these categories are inter-linked, for example, as planning policy continues to focus on reusing urban land, the knowledge and expertise of building on these sites should develop and disperse throughout the industry, thus feeding back into the resource base. As knowledge spreads, this may also have a wider impact on attitudes and perceptions in the housebuilding industry particularly with the growing adoption of 'corporate social responsibility' policies.

This approach to analysing the development process includes not only an understanding of how actors/organisations are working within the existing socioeconomic structure, but also how they can influence the structure, potentially changing the rules within which the development process operates or conversely the possibility of 'being driven to restructure by external pressures' (Healey and Barrett, 1990). An example of the former might include lobbying by the housebuilding industry to relax restrictions on greenfield development, although there is also evidence presented below to suggest that housebuilders (certainly amongst the larger publicly quoted operators) are adapting, to some degree, to the changed policy environment.

The framework for Healey's model, which rejects a mainstream economics approach as a basis for analysis, has subsequently been criticised for its limited explanation of ‘…how economic processes frame local development practice…’ and its emphasis of the ‘…social over the economic...’ (Guy and Henneberry, 2000). Other criticisms have been made in relation to applying the model to specific developments. Ball (1998) suggests that problems might arise in analysis, due to the possibility of conflicting strategies between agents in the same institution and the difficulties in determining whether outcomes are the result of institutions' strategies or the product of external forces. More significantly, he focuses on the problem of dividing structure and agency and differentiating between the two (Ball, 1998), although Healey acknowledges the close linkages between structure and agency in an earlier paper (Healey and Barrett, 1990).

Ball (1983; 1998) has proposed an alternative approach, Structures of Building Provision (SoP), which was initially developed in relation to work on housing. This is
defined as ‘the contemporary network of relationships associated with the provision of particular types of building at specific points of time’ (Ball, 1998). Unlike the models of the development process discussed above, a SoP does not seek to be a universal means of explanation but rather an in-depth understanding of a particular type of development. This approach treats the agents or organisations and the markets within which they operate as the ‘structure’ due to the close inter-relationship between the two, thus avoiding the difficulties of untangling cause and effect which Ball identified in Healey’s model (Ball, 1998). Such an in-depth study of the supply of a particular building type in a national context, forms a complementary approach to other models of the development process. As Ball (1998) acknowledges, ‘...it does not constitute a complete theory in itself...’ but ‘...is a conceptual device for incorporating institutions into analyses of the development process’.

Models of the development process have evolved from different academic disciplines or specific empirical studies. Approaching analysis from alternative perspectives can be beneficial and bring new understanding. In many cases, models of the development process seek to be universally applicable. In developing her institutional model, for example, Healey’s aim was that, ‘It should be capable of application under different economic and political regimes ...comprehensive in form, relevant to a complex mixed-use project in a city centre as well as a 5-dwelling housing scheme or a barn-conversion project’ (Healey, 1992). Although the models discussed above can all be applied to the brownfield development process, they do lose some explanatory power in seeking to generalise. By narrowing the focus onto a specific form of development and its regulatory framework, therefore, the conceptual models of brownfield regeneration discussed below complement rather than replace generic models.

### 2.2.2 Conceptual models of brownfield regeneration

The conceptual models of brownfield regeneration developed to date have focused on particular aspects of redevelopment rather than seeking to explain the entire process. CABERNET, for example, have developed several models with the aim of understanding the issues from different perspectives and identifying gaps in the current body of knowledge (CABERNET, 2003). Their ‘Bath Model’ (Figure 2.1) views brownfield redevelopment as a series of flows. As brownfield land is reused, the stock is continually being topped up by new supply, while a residue of hardcore sites remains undeveloped. This focuses attention on the reasons behind the creation of new brownfield land (economic drivers at national, regional and local level, changing aspirations), the rate at which brownfield land is reused (market dynamics, policy initiatives) and the residue of hardcore sites (market failure, contamination, regulatory or environmental constraints).

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4 There are perhaps connotations of Actor Network Theory (ANT) in this approach. ANT is an evolving body of theory, but put simply can be seen as a systematic approach to highlighting agency dynamics in the context of scientific and technological developments. ANT analysis attempts to describe the progressive development of networks in which human and non-human actors (or ‘actants’) assume identities according to the strategies of interaction which prevail. See the work of Latour (1993).

5 Alongside the ‘Bath’ and ‘ABC’ models discussed here, CABERNET (see www.cabernet.org.uk) have also proposed a ‘Football’ model which focuses on the drivers and pressures behind the brownfield regeneration process [CABERNET, 2003].
Figure 2.1: CABERNET’s Bath Model

Target 60% of all new housing on brownfields

Brownfield creation

Hardcore of 16,500 ha

Brownfield regeneration

Source: CABERNET 2003 [adapted]

*In the UK, the term ‘brownfield’ is broadly equivalent to ‘previously developed land’

An alternative model proposed by CABERNET (Figure 2.2) focuses on the development economics of a project and consequently whether some form of intervention from the public sector is required to drive the development forward. However, the basis for the model is narrowly defined in terms of the costs of reclaiming the land and the land value after reclamation. This excludes other costs which may be associated with developing on brownfield sites. A broader approach is taken by English Partnerships (2003) in their categorisation of brownfield sites (Figure 2.3). They examine the impact of ‘site abnormalities’ on the viability of the development which, as well as remediation costs (if applicable), may also include additional costs in assembling the site, the impact of planning / conservation constraints on the type of development permitted and infrastructure constraints (English Partnerships, 2003). In addition to highlighting the level of involvement required by the public sector in bringing previously developed land back into use, this model also brings attention to the appropriate end use of a site. For some heavily contaminated sites, remediation to a standard suitable for residential use may either be prohibitively expensive or technically so difficult that a ‘soft’ end use may be more appropriate.
The role of the UK development industry in brownfield regeneration

An earlier model of brownfield regeneration developed by POST (1998) is essentially a structure model which identifies the drivers, barriers and risks involved in the policy/regulatory framework surrounding brownfield development. This model is described as a 'three way dynamic' highlighting the tensions between the 'policy push' of regeneration and sustainability aims, the 'development frictions' in the obstacles and uncertainties faced by developers and the 'opportunity pull' of sustainable communities and investment returns (POST, 1998). Development frictions (the obstacles and uncertainties) are presented in the model from the developer's viewpoint, although the accompanying commentary acknowledges that negative perceptions of brownfield in the development industry can also be regarded as an obstacle (POST, 1998). The extension of the model below (Figure 2.4) attempts to make the link between the attitudes and perceptions of the stakeholders involved in the process, the drivers and barriers of policy, regulation and institutional 'rules' and the eventual outcome. Not all brownfield sites are problematic and in some cases the development frictions will be minimal allowing development to proceed. Sites where the development frictions are not overcome are likely to become or remain derelict until perceptions or market conditions change and / or public sector intervention succeeds in stimulating development.

The POST model does not attempt to define the inter-relationships between different actors in the development process or to identify resources flows between sectors but rather to provide a structure within which brownfield regeneration can be analysed either in a generic sense or in relation to a specific locality. It could be regarded as an alternative illustration of Healey’s 'rules, resources and ideas', particularly in terms of how conflicting policies can cause development friction and how uncertainty caused by insufficient data and knowledge can hinder the progress of policy aspirations. The policy framework must seek to minimise development frictions if the aims of urban regeneration are to be met.
The role of the UK development industry in brownfield regeneration

Figure 2.4: Conceptual model of brownfield development (adapted and extended from POST 1998)

Source: derived from POST 1998
2.3 Implementing brownfield regeneration: tensions in the policy framework

On their election in 1997, the New Labour government inherited policies from the previous Conservative administration which recognised the importance of reusing brownfield land both to improve urban environments and to relieve pressure for development in the countryside. The new government took on board these policies, placing urban regeneration high on their agenda. The emphasis on recycling urban land was strengthened with the introduction in 1998 of the target aiming for 60% of all new homes to be developed on brownfield land (DETR, 1998a). This forms part of the government’s sustainability agenda which embraces the promotion of social progress, protection of the environment and natural resources and a commitment to maintaining a high level of economic growth (DETR, 1999). These objectives informed the Sustainable Communities Plan (ODPM, 2003g) which is the government’s strategy for tackling both areas of strong housing demand in the South East and areas of decline in the North and Midlands. However, the three underlying objectives (or ‘pillars’) of sustainable communities – environmental, social and economic – are not easily balanced and opinions differ on how much emphasis should be placed on each (Figure 2.5). The increasing pressure to release more land for housing (Barker, 2004) will heighten the tensions that exist within the sustainability agenda.

Figure 2.5: Tensions in the policy framework (three 'pillars' of sustainability)
2.3.1 Environmental tensions: The Sustainable Communities Plan

Criticisms of the Sustainable Communities Plan can be found under each of the three objectives. Starting with 'environmental', of the four growth areas identified in the plan, only the Thames Gateway will offer significant opportunities for brownfield development. In the remaining areas, while there will be some scope for reusing land in existing communities, growth is likely to be met largely through urban extensions and new settlements.

Similarly, the government's rationale for reusing previously developed land is both the promotion of urban regeneration and protection of the countryside (DETR, 1999). Developing on brownfield sites is generally considered to cause less damage to the environment than building on greenfields, although this is not always the case; undisturbed brownfields, for example, may have a higher ecological value than poor quality greenfields at the urban fringe or farmland (Levett-Therivel, 2004). The environmental debate, however, is wider than just site ecology and embraces the reduction of urban sprawl and the encouragement of sustainable travel patterns. Even here there is an acknowledgement that in some instances urban extensions can be a sustainable form of development (Breheny et al, 1993 quoted in Adams and Watkins, 2002; DETR, 1998a).

In a recent review of government performance on sustainability, the Sustainable Development Commission acknowledged that the national target for brownfield development had been met, albeit with wide regional variations, but this meant that large amounts of greenfield land were still being developed (Sustainable Development Commission, 2004). As well as seeking to protect the countryside, the second objective of reusing brownfield land is to regenerate urban areas. There is a danger that a policy framework which supports large-scale greenfield development could direct resources away from towns and cities, thus undermining the aims of urban regeneration. Power (2004) in her review of the Sustainable Communities Plan suggests that the proposed growth areas in the South East could increase the social and ethnic polarisation of urban communities, by allowing the better off to move out and failing to address the problems of the vulnerable communities left behind.

Although to some extent oversimplified, (see Adams and Watkins, 2002) the debate on greenfield versus brownfield development is likely to continue following the outcome of the Barker Review (Barker, 2003; 2004). The review was commissioned by HM UK Treasury to investigate the lack of responsiveness of housing supply to increasing demand amid concerns over the consequences of rising house prices for the national economy. The conclusions from the review support the need to release more land for housing if the aims of lowering house price inflation and increasing the amount of affordable accommodation are to be realised. Although there is no suggestion in the report that the 60% target for brownfield reuse should be discarded, the difficulties inherent in brownfield development raises the possibility of a potential conflict between the pressing need to increase the supply of housing land and the government's emphasis on reusing land. Therefore there are tensions here between the requirements for national economic growth, including improving accessibility to affordable housing, and the restrictions on greenfield development to limit environmental damage and direct resources towards revitalising urban communities.

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7 The huge investments needed in infrastructure provision for communities which are sustainable in terms of transport, health, education and other services have led many to criticise the lack of controlled implementation by government (see, for example: (House of Commons, 2003a)
2.3.2 Social tensions: effective engagement with communities

One of the requirements of a sustainable community set out in the Sustainable Communities Plan as part of the ‘social’ agenda is ‘effective engagement and participation by local people, groups and businesses…’ (ODPM, 2003g). But the ‘top down’ approach of the plan is the second main criticism of Power’s (2004) review, which, she argues, excludes any mechanisms for ‘community level engagement’. This ignores the opportunities which already exist in the planning process for community consultation. The government also appear to have taken on board criticisms of previous Urban Development Corporations (UDCs) which centred on the lack of interaction with local communities with the result that the social needs of local people were often overlooked (DETR, 1998b). The plan stresses that the organisations implementing regeneration policies will be ‘new style’, using the powers of UDCs but ‘will operate with the full involvement of local partners’ (ODPM, 2003g). Details of how this will be done are touched upon in the regulatory impact assessment for the setting up of a new UDC in Thurrock. After acknowledging that formerly UDCs did not give a high enough priority to the needs of local communities, a solution is put forward to ensure that this won’t happen again: ‘The proposed strong representation of the local authority on the UDC Board will mitigate this risk, as will the setting of social and community outcome and output targets by Government’ (ODPM, 2003a).

The government has also expressed a desire to put ‘community involvement at the heart of planning’ in their current planning reforms (ODPM, 2003f). But the aim of these reforms in ‘creating a fairer and faster planning system with greater community participation’ is contradictory (ODPM, 2003e). Given the prevalence of NIMBYism in relation to housing development, greater community participation is unlikely to speed up the planning system, nor is it likely to create a fairer system as people without access to adequate housing do not have any effective representation at a local level. These points are recognised in the Barker Review (2003; 2004) which stresses the importance of early community consultation: ‘Consultation cannot go on indefinitely and once widespread consultation has informed the Local Development Framework, development should be encouraged to proceed without undue further intervention.’ (Barker, 2004). Moreover, the Review suggests the introduction of two new routes for obtaining planning consent which would involve the delegation of detailed decisions to planning officers after the scheme had gained approval in principle from local councillors (Barker, 2004). Any limitations on community involvement and representation in planning decisions are controversial, but providing the preparation of the local plan has involved extensive consultation, could contribute to the aim of creating a more efficient planning process. However, this would also require increased effort on the part of developers in acknowledging and accommodating community concerns at an early stage and raising design standards.
2.3.3 Regional tensions: growth and dispersion

In its decision to concentrate growth areas in the South, the government has effectively placed a higher priority on promoting the continued economic success of London and the wider South East region than tackling the economic decline of parts of the North and the Midlands. The government’s strategy for the North (ODPM, 2004b), published after the Sustainable Communities Plan, contained little that was new. It is hard to see how renewing the housing stock in the nine Pathfinder areas will succeed in transforming these areas in the longer term unless measures are also taken to strengthen local economies. A radical rethink of regional policy could help to boost demand in some locations, addressing the mismatch between development pressures and the availability of brownfield land. A House of Commons report into the government’s regional policy was critical of the refusal to constrain growth in the South East and recommended that a priority must be to ensure, ‘...that the fundamentals for growth – transport, research and development investment and universities – are put in place now in the less prosperous regions’ (House of Commons, 2003b). Whilst some additional development in the South East is a necessity if London is to remain competitive internationally as a business location, targeted efforts to stimulate employment growth in less prosperous regions could help to unlock demand for brownfield sites. The implementation of the recommendations from the Lyons Review (2004) to relocate 20,000 public sector jobs away from London and the South East could be a small step in this direction.

Policies concerning housing supply, the environment and urban regeneration will have to be finely balanced. Although there will undoubtedly have to be additional housing development on greenfield land to accommodate housing need, where this occurs it must be well planned, incorporating higher standards of design than previously and built at higher densities. At the same time the focus on brownfield regeneration must not be diminished as this would result in a lost opportunity to help revitalise existing urban communities by integrating new development and bringing improvements to local services and infrastructure. English Partnerships’ review of issues surrounding the development of brownfield land, based on a detailed analysis of the available data, is the first step towards a co-ordinated national strategy (English Partnerships, 2003). The next section explains more about the data which informed this review.

8 A House of Commons Select Committee was critical of the disparities between regions, suggesting that, ‘much Government policy is, inadvertently, acting against the interests of the less prosperous regions’ (House of Commons, 2003b).

9 For a fuller critique of the Sustainable Communities Plan see Raco (forthcoming 2004).

10 Housing Market Renewal Pathfinders constitute a major new initiative by ODPM designed to address the problems of areas where the housing market is failing.

11 Amin et al (2003) for example suggest that regional inequality cannot be addressed without the decentralisation of political power and decision-making, that goes further than the current proposals for devolution, together with a new understanding of how regions are conceptualised (Catalyst).
2.4 Implementing brownfield regeneration: data issues and strategy

There is now a growing body of quantitative data that can be used to monitor and model the brownfield redevelopment targets set by government. Two national datasets in particular enable the tracking of past changes in land use and the amount of available brownfield land that is suitable for redevelopment. These are the Land Use Change Statistics (LUCS) and the National Land Use Database (NLUD). LUCS records data retrospectively and details actual land use changes, whilst NLUD records the potential for future land use changes by detailing sites suitable for redevelopment (Table 2.1).

<table>
<thead>
<tr>
<th>Data</th>
<th>National Coverage</th>
<th>Time series</th>
<th>Comments</th>
</tr>
</thead>
</table>

2.4.1 Land Use Change Statistics\(^2\)

Data on land use changes is based on map revisions undertaken by Ordnance Survey (OS) and has been collated since 1985. The Land Use Change Statistics (LUCS) are principally used by the government to formulate and monitor its national 60% target for the percentage of new homes that should be built on brownfield sites which is one of the headline indicators (H14) of sustainability (DETR, 1999; ODPM, 2003d)\(^3\).

The nature of the data collection process has led to certain characteristics in the data set. Notably, urban land use changes tend to be recorded before rural land use changes and there is often a lag between the change occurring and the recording of that change. Where the date of change is uncertain, the convention was to round to the nearest 5 years. In the early years of data collection, however, attempts are now made to record changes to the nearest year and this is made easier by more frequent OS surveys (ODPM, 2003d).

Given these characteristics, there are problems in attempting longitudinal comparisons of the proportion of new homes built on brownfield land over the longer term. The focus on a percentage indicator also masks trends in the absolute numbers; the 60% target has been achieved as housing completions have fallen to their lowest level since 1947\(^4\). There are also wide regional variations, with the proportion of new homes built on brownfield land, ranging from only 46% in the North East and West Midlands to over 90% in London (ODPM, 2003c).

The proportion of previously used land being recycled for residential use is somewhat lower than the proportion of dwellings built on recycled land, but has also risen to

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\(^2\) For more detail on LUCS and NLUD, see ERES 2004 paper Appendix 1 (Dixon et al., 2004).

\(^3\) This target has faced much criticism because it is entirely possible for new housing rates to fall but the brownfield target still to be met (see Adams and Watkins, 2002).

\(^4\) Source: ODPM Housing Statistics.
reach a provisional figure of 56% in 2002 (ODPM, 2003c). The higher densities that are typically achieved on brownfield sites compared with greenfield are clearly making an important contribution to meeting the 60% target.

2.4.2 The National Land Use Database and brownfield strategy

The National Land Use Database is a collection of local authority information on brownfield sites across England. The wider aim of NLUD is to develop a national database of all land parcels, but the first phase (NLUD-PDL) has been to identify vacant previously developed land and vacant buildings that would be suitable for reuse and / or redevelopment (Myers and Wyatt, 2003).

The first data output for NLUD was in 1998 and the exercise was repeated in 2001 and 2002, thus as a dataset it is still in the early stages of development. NLUD is an ambitious exercise and given the scale of the task it is not surprising that problems have been identified in the data collection strategy and in the data itself (Dühr et al., 2002; Myers and Wyatt, 2003). Most importantly, NLUD should not be regarded as a comprehensive list of all brownfield land that is available for development. Not all local authorities submit data to NLUD, and although the final results are statistically ‘grossed up’ to account for this, this does limit the potential for detailed analysis of the data at a local level. Even where local authorities do provide data, the sources they rely on will vary, and consequently the depth and range of coverage will fluctuate between authorities.

English Partnerships undertook extensive analysis of NLUD-PDL in preparing the first stage of their brownfield strategy. This identified that 69% of the 65,500 ha total stock of previously developed land (PDL)\(^1\) is subject to either regulatory and / or market constraints, including some 16,500 ha of ‘hardcore’ sites (English Partnerships, 2003). Of the sites free from constraints, the majority are still in use, leaving just 11% of total stock ‘effectively available’ for development. Taking into account these constraints reduces an 8-year supply to a supply only sufficient for 2 - 3 years, balancing supply against expected demand derived from the government targets for previously developed land (English Partnerships, 2003). This analysis fuelled press comment concerning fears that supply ‘may run out’, with demand from the industry for ‘urgent action over the shortage of brownfield land’ (Aldrick, 2003b; Aldrick, 2003a; Willis, 2003b; Willis, 2003a).

The interpretation of this analysis as signalling an impending shortage is somewhat misleading, however, because it ignores the veracity of the ‘stock and flow’ model of brownfield regeneration, highlighted by CABERNET’s ‘Bath Model’ (2003). As NLUD is not a comprehensive list of all brownfield land that is available, sites currently unrecorded are likely to come forward for development. These sites are described by English Partnerships as ‘latent PDL’. This raises additional problems in that this source of supply is uncertain and therefore impossible to quantify.

In conclusion, NLUD is not an effective tool for estimating the potential housing capacity of brownfield land, given that the dataset is incomplete. The data provided to NLUD on site-specific housing capacities may also be under-estimates, if based on local plan allocations which will not necessarily reflect current policy on housing densities. Nonetheless, in the absence of alternative datasets, both NLUD and LUCS offer us the only viable national data. This and the marked lack of available data on

\(^1\) 2001 data. Of this total stock, 43% was thought to be suitable for housing. Previously developed land is defined in PPG 3 (DETR, 2000a) but is generally taken to equate to the term ‘brownfield’.

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contaminated sites (other than the Environment Agency’s ‘Special Sites’ register) highlight the continued paucity of really robust and accurate data in the UK.

2.4.3 Implementing brownfield regeneration: the housebuilding industry’s approach

The shift in policy towards reusing urban land has changed the framework within which the housebuilding industry operates. Housebuilders have been required to reduce their dependency on greenfield and develop in a very different context. So to what extent has the industry, which has been notoriously slow to innovate (Ball, 1999), adapted to these changes? This section draws together previous work and the limited evidence in the public domain to explore the questions:

- To what extent are housebuilders engaging in brownfield development?;
- How do the strategies of individual housebuilding firms differ?; and,
- What factors will influence involvement in brownfield development in future?

One of the aims of the SUBR:IM research into the role of the development industry in brownfield regeneration is to build up a more detailed, industry-wide picture. However, publicly available information on how housebuilders are approaching brownfield development is largely restricted to the company literature of publicly quoted firms and public statements such as submissions to the Barker Review. Nonetheless this data reveals some interesting findings. Not surprisingly perhaps, the headline figures suggest that the industry as a whole has responded positively to the increased emphasis on brownfield development, with the national 60% target having been reached by 2001, seven years ahead of schedule.\(^{16}\) The industry body, the House Builders Federation (HBF), has been broadly supportive of the idea of building homes on brownfield sites, but as a supplement to and not a replacement for greenfield development, and has continually pointed to flaws in the procedural and policy framework which make such development more difficult (The House Builders Federation, 1998; 2003).

There is a wide variation in individual housebuilders’ strategies towards brownfield development. As a starting point, a simple review of the company literature of the 12 largest publicly quoted housebuilders (which include the top 10 housebuilders overall measured on completions) highlights a range of responses (Table 2.2)\(^{17}\). For some housebuilders, notably Berkeley Homes, Countryside Properties, Barratt and Bellway, brownfield sites now account for the majority of their output. George Wimpey saw a large rise in completions on brownfield land from 54% in 2002 to 67% in 2003 which is likely to be due in part to their acquisition of Laing Homes towards the end of 2002. At the other end of the scale, housebuilders such as Redrow, Bovis Homes, Wilson Bowden and Persimmon have yet to reach the government’s target. Most of this group state that they support the government’s aim to build 60% of homes on brownfield sites and are working towards achieving this target. Wilson Bowden, for example, report that ‘the Group has shifted its extensive land bank acquisition towards brownfield sites’ and that brownfield comprised 67% of all land (gross acreage) purchased in 2002 (Wilson Bowden, 2003a; 2003b). Similarly, Redrow, although only completing half of their new homes on previously developed land, report that brownfield sites now account for over 70% of their land bank (Redrow, 2003).

\(^{16}\) LUCS data excluding conversions [ODPM website]. See also footnote 11 in this report.

\(^{17}\) Based on data available as at April 2004.
# The role of the UK development industry in brownfield regeneration

Table 2.2: The Top Publicly Quoted Housebuilders

<table>
<thead>
<tr>
<th>Parent Company</th>
<th>Index</th>
<th>Comps (2002)*</th>
<th>Rank (comps)*</th>
<th>Average selling price (2002)*</th>
<th>% homes built on brownfield land</th>
<th>% brownfield in landbank</th>
<th>Approach to brownfield</th>
</tr>
</thead>
<tbody>
<tr>
<td>George Wimpey</td>
<td>FTSE 250</td>
<td>13480</td>
<td>1</td>
<td>£147,000</td>
<td>67%</td>
<td>-</td>
<td>The proportion of homes built on brownfield has risen from 45% in 2000. There was a big increase between 2002 and 2003 in the proportion of completions on brownfield (from 54% to 67%) which may partly reflect the purchase of Laing Homes in late 2002. 48% of developments on formerly contaminated land. They focus on prime sites in major British cities - high quality / low risk</td>
</tr>
<tr>
<td>Persimmon</td>
<td>FTSE 250</td>
<td>12352</td>
<td>2</td>
<td>£138,000</td>
<td>50%</td>
<td>-</td>
<td>They support the government's 60% target and look for new opportunities for the restoration and development of PDL.</td>
</tr>
<tr>
<td>Barratt</td>
<td>FTSE 250</td>
<td>12250</td>
<td>3</td>
<td>£135,000</td>
<td>&gt;75%</td>
<td>-</td>
<td>Over 75% Barratt homes built on brownfield sites. 'reclaim' over 800 acres of brown land nationally each year</td>
</tr>
<tr>
<td>Taylor Woodrow**</td>
<td>FTSE 250</td>
<td>6238</td>
<td>4</td>
<td>£182,000</td>
<td>63%</td>
<td>-</td>
<td>'Contributing to urban regeneration is a significant part of Taylor Woodrow’s business' (CSR Report 2003)</td>
</tr>
<tr>
<td>Bellway</td>
<td>FTSE 250</td>
<td>6044</td>
<td>5</td>
<td>£121,000</td>
<td>&gt;75%</td>
<td>-</td>
<td>They aim to meet and where possible exceed government targets for developing on brownfield land (environmental policy statement in 2003 report)</td>
</tr>
<tr>
<td>Wilson Bowden</td>
<td>FTSE 250</td>
<td>4164</td>
<td>6</td>
<td>£200,000 (David Wilson)</td>
<td>45% (2002) 67% (2002 acquisitions)</td>
<td>-</td>
<td>To accommodate the trend for city living 'the Group has shifted its extensive landbank acquisition towards brownfield sites.' Produces a separate environmental report which states that during 2002, 67% of the gross acreage of land purchased was brownfield and 45% of housing completions (units) was on PDL (41% by turnover). Stated aim is to increase these figures.</td>
</tr>
<tr>
<td>Berkeley Group</td>
<td>FTSE 250</td>
<td>3955</td>
<td>8</td>
<td>£315,000</td>
<td>&gt;95% (website)</td>
<td>-</td>
<td>Produce a Sustainability Report: in the financial year 2002/3 over 90% of Berkeley’s dwellings were built on brownfield.</td>
</tr>
<tr>
<td>Redrow</td>
<td>FTSE 250</td>
<td>3908</td>
<td>9</td>
<td>£139,000</td>
<td>approx 50%</td>
<td>&gt;70%</td>
<td>Brownfield represents over 70% of landbank. Claim 'were significant brownfield developers long before such approaches became fashionable'. 'In the City' brand (eg Whitworthwest, Manchester). But company have also launched Redrow Homes (South Midlands) to take advantage of strategic growth area</td>
</tr>
<tr>
<td>Westbury</td>
<td>FTSE 250</td>
<td>3812</td>
<td>10</td>
<td>£171,000</td>
<td>-</td>
<td>&gt;60%</td>
<td>Environmental policy states that Westbury aim to: 'remain at the forefront of expertise in the recycling of brownfield land to create safe and attractive living environments'</td>
</tr>
<tr>
<td>Bovis Homes</td>
<td>FTSE 250</td>
<td>2691</td>
<td>11</td>
<td>£168,500</td>
<td>-</td>
<td>-</td>
<td>Produce a separate Corporate Social Responsibility Report - states that it 'supports the government's policy of optimising the use of brownfield land' and is keen to work with the government to try and achieve the 60% target.</td>
</tr>
<tr>
<td>Crest Nicholson</td>
<td>FTSE 250</td>
<td>1899</td>
<td>15</td>
<td>£225,000</td>
<td>71%</td>
<td>-</td>
<td>Produce a Social and Environmental Report which aims to prioritise the acquisition of urban brownfields and exceed the government's 60% target. Their completions on brownfield have increased from 60% in 2000 to 70% in 2002, with a target of 75% in 2003.</td>
</tr>
<tr>
<td>Countryside Properties</td>
<td>FTSE SmallCap</td>
<td>1854</td>
<td>17</td>
<td>£279,000</td>
<td>84%</td>
<td>-</td>
<td>Completions on brownfield sites have increased from 68% in 2001.</td>
</tr>
<tr>
<td>McCarthy &amp; Stone</td>
<td>FTSE 250</td>
<td>1671</td>
<td>18</td>
<td>£112,000</td>
<td>100%</td>
<td>Consistently achieve a 100% brownfield ratio</td>
<td>Consistently achieve a 100% brownfield ratio</td>
</tr>
</tbody>
</table>

Information up to date as at April 2004 / **acquired Wilson Connolly (ranked 7th on completions) in Oct 2003
Sources: *Private Housebuilding Annual 2003 / Company Annual Reports and Corporate Social Responsibility Statements

These publicly quoted companies make up around 50% of the market; there is little information in the public domain on the strategies and approach to brownfield development of smaller and privately owned housebuilders who constitute the remainder of the industry. Exceptions include high-profile innovators such as Urban
Splash\textsuperscript{18}, who although producing less than 200 units a year, have arguably had a much greater impact on the attitudes of the industry towards the potential of urban development.

In terms of categorising the strategies of housebuilders, London Residential Research (quoted in GLA, 2002) devised a useful typology of residential developers in London in relation to the principles enshrined in the Urban Task Force report (Table 2.3). Developers such as The Berkeley Group and Laing Homes undertaking large-scale mixed-use schemes were categorised as ‘Urban Task Force Leaders’, whilst volume housebuilders just beginning to engage in urban development were classified as ‘Urban Task Force Followers’. The report acknowledged that continued merger and acquisition activity, whether to gain market share or acquire new skills, was changing the structure of the industry. For example, George Wimpey, a ‘UTF Follower’, has since acquired ‘UTF Leader’ Laing Homes. However, Wellings (2003) suggests the main reasons for mergers and acquisitions have always been the financial rewards this brings to the stronger company, the acquisition of land or the extension of geographic coverage. The rationale for George Wimpey’s acquisition of Laing Homes was not linked to the company’s experience of building on brownfield sites but rather its focus on the higher margin premium sector, allowing George Wimpey to fulfil its strategy of expanding into this sector of the market (George Wimpey, 2002a). Another recent acquisition, Taylor Woodrow’s purchase of Wilson Connolly, was attributed to the ‘complementary land banks and synergies’ between the two companies, which had essentially different areas of operation (Taylor Woodrow, 2003).

<table>
<thead>
<tr>
<th>Typology</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Task Force Leaders</td>
<td>Very large scale developers. A small group capable of delivering very large scale schemes of over 200 units, with at least 25% affordable units, mixed use on brownfield sites</td>
<td>Berkeley Group (incl. St George), Laing</td>
</tr>
<tr>
<td>Urban Task Force Followers</td>
<td>Traditional volume housebuilders rather than regeneration specialists, but some of whom are cultivating their activities to more urban lifestyles</td>
<td>Bellway, Barratt, Fairview, Wimpey</td>
</tr>
<tr>
<td>Suburban Housebuilders</td>
<td>Volume housebuilders who cater to low to mid value suburban developments. Some presence in Outer London but primarily in the provinces</td>
<td></td>
</tr>
<tr>
<td>High Value Central London Specialists</td>
<td>Old Estates and high profile niche developers who concentrate on the prime market, albeit on occasions on a large scale</td>
<td>Grosvenor Estates</td>
</tr>
<tr>
<td>Local Specialists</td>
<td>A large number of small companies who complete less than 100 units per annum and often concentrate in particular areas known to them. While unimportant individually, cumulatively, this group are important</td>
<td></td>
</tr>
<tr>
<td>Housing Associations</td>
<td>Registered Social Landlords (RSLs) are an increasingly innovative force in their own right</td>
<td></td>
</tr>
</tbody>
</table>

\textit{Source: London Residential Research quoted in GLA (2002)}

\textsuperscript{18} Urban Splash have won numerous awards for their inner city regeneration projects. The founder, Tom Bloxham, has been credited with an innovative, pioneering approach to regeneration (see Brown, 2003; Gardiner, 2004) and acts as an advisor to the ODPM on urban policy.
Behind the headline figures there are clearly differing levels of commitment and motivation towards brownfield development with some housebuilders viewing it as a new opportunity but others appearing to be responding more reluctantly to the changed policy framework and targeting sites very selectively. George Wimpey, for example, state that they are ‘developing a high quality, low risk business able to exploit the growing market for inner city living’ targeting prime sites in London and other major cities (George Wimpey, 2002b). Many housebuilders clearly see a market for urban living amongst certain sectors of the population, such as affluent young professionals, which they are prepared to cater for, but are more sceptical about wider demand. To date, the Berkeley Group’s main activities have largely focused on the premium market achieving an average selling price which far exceeds other leading housebuilders (Table 2.2), although this is also a reflection of their main area of operation in London and the South East.

Building on this preliminary analysis, the SUBR:IM research will seek to extend and develop LRR’s typology of developers to consider how companies are organised and how expertise and skills are acquired and transferred within companies. Some housebuilders, for example, have become brownfield specialists in their entirety (eg Fairview and Linden Homes) whilst others have set up subsidiaries to focus on urban developments. Berkeley Homes, although a brownfield specialist, has separate divisions with different specialities, for example: St George (mixed-use developments), Crosby Homes (which unlike the rest of the company operate outside London and the South East) and Berkeley First (student and key worker housing). In undertaking residential development in urban areas, groups such as Countryside Properties, Crest Nicholson and Wilson Bowden have the benefit of applying experience gained by their commercial subsidiaries.

The dominance of the largest high-volume housebuilders also has implications for the influence these actors have in housing production. For example, Barlow (1999) identified the lack of competition ‘from alternative sources of supply’ in the housebuilding industry as an important barrier to innovation. However, there has been recent speculation about the possible entry of commercial developers into the housebuilding market and the impact this would have on the industry (Donnell, 2003; Smit, 2004). As Barker (2003) commented, the skills required for brownfield development are more characteristic of commercial property developers. Chelsfield, primarily a commercial developer, are already active in residential development in London, whilst Stanhope (in much the same category) have set up a subsidiary First Base which will focus on providing low-cost homes. Stanhope believe that their alternative approach, drawing from experience in the commercial sector, will enable their to reduce construction costs by 20% through changes to the procurement process and the use of off-site manufacturing technology (Smit, 2004). This is an example of the kind of changes in both ‘process and product’ housebuilders need to implement to develop successfully on brownfield sites (Adams, 2002).

In summary, the available evidence shows that housebuilders have responded by varying degrees to the changes in the regulatory structure within which their industry operates. But the extent of the response from the industry should not be overplayed. For example, in the early 1990s, housebuilders were already engaging in brownfield development; in 1993 56% of dwellings in England were built on brownfield sites and this had risen to 64% by 2002\(^{19}\). To put this into context, applying these figures to the

\(^{19}\) LUCS data including conversions [source: ODPM]
annual private sector completions data\textsuperscript{20} gives a total increase over this 9-year period of just over 13,500 dwellings – equivalent to the annual completion rate of George Wimpey.

2.4.4 What will influence future strategies towards brownfield development?
The national target for building homes on brownfield land has been met, but there is uncertainty surrounding this target, not least over how sustainable it is as the 'best' sites (in terms of location and site conditions) are taken up by developers. Data is also patchy and not without problems over veracity.

If the number of new homes on brownfield sites is to be increased, contaminated sites will inevitably also have to be tackled. But there is no official data source on the type of brownfield sites being developed for housing nationwide, and of the 60%+ houses built on previously developed land, the proportion developed on remediated sites is unknown.

In a survey undertaken in 1998, over three-quarters of house builders stated that they were not prepared to hold contaminated land in their land banks and over 70% would not purchase heavily contaminated sites (Fulford, 1998). The same survey showed that at the time only 40% of units completed by the respondents were built on brownfield sites, which may reflect some bias in the sample but is also an indication of the extent to which the industry has responded to the policy framework over the intervening period. Since then, the sustained policy emphasis on brownfield development, the introduction of the tax credit on cleaning up contaminated land, and advances in remediation techniques are likely to have changed attitudes towards developing on contaminated land but new research is needed to focus on how the industry is now dealing with such issues. Indeed, a review of recent company literature suggests Barratt, Bellway, George Wimpey and Crest Nicholson, amongst others, are all developing on contaminated sites. To what extent this applies throughout the industry and how the relevant skills and knowledge are being acquired will also be investigated in the SUBR:IM research.

The location of brownfield sites relative to housing demand is also an important issue. Speculative housebuilders need to work in areas where there is a housing market. On the other hand, a different approach is required in areas of low demand where a market needs to be created. In these areas, public sector intervention is required in some form or another, whether through large-scale regeneration programmes, or the provision of funding. The success of these initiatives will determine to what extent brownfield development is a realistic option in these circumstances.

The government’s push towards brownfield development has corresponded with a buoyant period in the housing market. The quoted housebuilders have seen strong profits growth, with margins up from 13% in 1998 to an estimated 17.3% in 2003 (Wellings, 2003). Some commentators have suggested this strong financial performance explains why housebuilders have been prepared to engage in brownfield development (Smy, 2004). If market conditions change, housebuilders will have to work harder to make profits from brownfield development, which may stimulate innovation in the development process.

\textsuperscript{20} Private sector completions for England [source: ODPM]. This comparison uses data from two different sources and the LUCS data may be subject to a time lag. However, this illustration does give some indication of the likely scale of the increase.
This presupposes that the policy framework within which the industry operates retains its emphasis on brownfield regeneration. However, most of the leading housebuilders are still engaged in 'greenfield' development to a greater or lesser degree. For housebuilders such as Persimmon, Wilson Bowden and Redrow, building on greenfield sites constitutes an important element of their output. The government’s strategic growth areas outside London, outlined in the *Sustainable Communities Plan* (ODPM, 2003g) also represent an opportunity for housebuilders to continue to engage in greenfield development, and it may well be that relative ‘shortages’ of brownfield land in some regions may lead to further tensions over greenfield sites.

Redrow, for example, are gearing up to take advantage of this policy drive by opening a new branch in the South Midlands (Redrow, 2003). Similarly, the findings of the Barker Review (2004), which stress the need to substantially increase levels of housebuilding and to allocate more land for housing, could also strengthen the case for releasing more greenfield sites. The government acknowledged the difficulties involved in the release of the Barker Review stating that it: ‘needs to balance the economic and social case for development against its environmental and wider implications, and ensure that development is sustainable and protects valuable countryside’ (HM Treasury, 2004). The additional public sector funding and inherent fiscal cost needed to bring some brownfield sites forward for development (such as Barker’s proposed Community Infrastructure Fund) is also likely to be a factor taken into consideration in the future direction of policy. Implementation of Barker’s recommendations will be delayed whilst further consultation is carried out, but if adopted, they could ultimately lead to a shift in the focus of government policy away from meeting the objectives of urban regeneration and towards increasing housing supply. This, in turn, could undermine attempts to encourage brownfield redevelopment and bring the brownfield versus greenfield debate sharply into focus.

### 2.5 Social vs technical interface

In undertaking brownfield development, developers are having to adapt to a new regime, especially in relation to contaminated sites; tackling complex issues and dealing with new regulatory frameworks. Government bodies have an important role to play in disseminating information on dealing with contaminated sites and encouraging use of new remediation technologies to reduce reliance on disposal through landfill. The Environment Agency, for example, is producing a series of datasheets on remedial treatments\(^{21}\) and the public-private partnership CL:AIRE\(^{22}\) undertakes demonstration projects and publishes its findings. Professional organisations also produce guidance for their members, particularly in relation to dealing with the legislative and procedural framework surrounding contaminated sites (see for example BURA, 2001; RICS, 2003).

On a practical level it will take time for the knowledge and skills necessary for dealing with contamination to diffuse through the industry, and knowledge will have to be continually updated as new remediation techniques come forward. The building of relationships between developers and remediation specialists will play an important part in this.

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\(^{22}\) [http://www.claire.co.uk/](http://www.claire.co.uk/) (Contaminated Land: Applications in Real Environments)
Developers with longer experience of brownfield development may be sticking with familiar clean-up techniques for contaminated sites regardless of other, perhaps superior, options becoming available. This could be described as a form of ‘lock-in’, by which shared familiarity and experience of a particular technique prevents new solutions and possibilities from being explored (Perkins, 2003). The implementation of the EU Landfill Directive, however, which effectively cuts off the most established method of dealing with contaminated soil by reducing landfill capacity and increasing costs, is likely to provide a strong stimulus for change, effecting a transition from an old regime to the new (see Berkhout et al., 2003). There are questions over whether there is the capacity in the remediation industry to cope with the increase in demand for in-situ treatments which may delay transition to the new regime (see O’Keeffe, 2004; Pearson, 2004). The changes could also deter some developers from continuing to develop on contaminated sites which would be contrary to the aims of government policy.

These themes of knowledge acquisition, use of new technologies, as well as the drivers and barriers to change, will be explored in the ongoing research.

2.6 Research questions

From our review of the existing literature and data sources, some of the outstanding questions and issues our nationwide survey of developers seeks to address are:

- An essential starting point is to explore the extent to which developers are engaging in brownfield development and how this varies by company type and size.
- Further investigation of the driving forces behind brownfield development; is it primarily the push factor of government policy or are there pull factors as well?
- If the government’s target for brownfield development is going to be sustained, increasingly contaminated sites will have to be tackled, but what are attitudes towards developing on contaminated land in the industry? Is post-remediation stigma considered to be a significant issue?
- To what extent is awareness and use of remediation technology moving beyond the usual ‘dig and dump’? Do developers consider that they have adequate access to independent sources of information on remediation technology?
- Is ‘sustainability’ permeating the development process – from detailed building design to site masterplanning and community consultation?

The survey also presents the opportunity of gathering opinion on recent policy reviews and legislation such as:

- How will the EU Directive banning the co-disposal of hazardous and non-hazardous waste impact on developers’ behaviour?
- What are housebuilders’ opinions on the likely effectiveness of the Barker Review recommendations on increasing housing supply?

The follow-up interviews with housebuilders and commercial developers will provide an opportunity to investigate other policy-related questions in more depth: these are outlined in Chapter 5 together with the remainder of the research programme.
3 Methodology

3.1 Introduction
A nationwide survey of developers was undertaken to gather contextual data on approach and attitudes towards brownfield development. The issues raised in the questionnaire will subsequently be pursued in more detail in case study work.

A postal survey was sent to just under 1,000 developers. The sample was split in a ratio of approximately 30:70 between commercial developers and housebuilders, reflecting the focus of the project. The sample of housebuilders included the top 100, based on unit output, sourced from the Private Housebuilding Annual (Wellings, 2003). The remainder were selected randomly from various sources and directories including: NHBC, Freemans, Estates Gazette Interactive and Glennigan. The sample of commercial developers included the most prominent in the industry, with the remainder selected randomly from directories. The survey required a response from someone with an overview of company strategy, and so it was targeted at named managing directors or other members of senior management.

The remainder of this chapter covers methodological issues relating to research design and response.

3.2 Research design
The survey questions were pre-tested with industry experts and academics before the questionnaire was finalised. The survey was split into two phases; the first survey contained questions about the company (for use in classification of the results) and also explored the company’s general approach towards brownfield development. At the end of the survey, an appropriate contact was requested for the second phase of the survey which contained detailed questions relating to contaminated land and sustainability. It was recognised that these may require input from a different person within the organisation. Copies of the questionnaires are contained in Appendix 1.

The subject areas in each questionnaire are summarised below:

- Part 1: contained questions on company type, geographic spread, type of development undertaken, extent and composition of land bank (housebuilders only), amount of brownfield development undertaken, how and why this had changed / is likely to change in future, attitudes towards developing on contaminated sites and opinions on the impact of the EU Landfill Directive and the Barker Review.
- Part 2: explored knowledge and use of different remediation technologies, access to information, experience of post remediation stigma amongst different groups, insurance against risk, the existence of a company environmental policy, attitudes towards sustainability and opinions on the potential impacts of climate change.

A small pilot survey (sample size: 25) was distributed in early June 2004 and following a favourable response, the full survey (part 1) was sent out in mid-June 2004. The second part of the survey was sent out in early July 2004. Reminder letters were sent out after a reasonable length of time in an attempt to increase the response rate.
The role of the UK development industry in brownfield regeneration

### 3.3 Response and non-response

The response rate for the first phase of the questionnaire was 16% (158 useable responses; sample size: 987). The second phase of the questionnaire was sent out to all those who responded to the first survey and supplied an appropriate contact; 65% of these were returned (94 useable responses representing 10% of the original sample).

A comparison of the survey respondents by number and size of output against NHBC data gives an indication of how representative the sample is against the industry as a whole. Table 3.1 shows that the sample is much more representative of medium to large sized housebuilders (31+ units pa) than smaller operators (<31 units pa). However, whilst housebuilders producing less than 11 units per annum account for 80% of registered and active housebuilders, NHBC data (2003) shows that their contribution to the industry’s total output is small (Table 3.2).

#### Table 3.1: Sample compared to industry structure: number of developers undertaking residential development

<table>
<thead>
<tr>
<th>NHBC data</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size band</td>
<td>Number registered (2003)</td>
</tr>
<tr>
<td>0 units</td>
<td>10,188</td>
</tr>
<tr>
<td>1-10 units</td>
<td>4,421</td>
</tr>
<tr>
<td>11-30 units</td>
<td>712</td>
</tr>
<tr>
<td>31-100 units</td>
<td>264</td>
</tr>
<tr>
<td>101-500 units</td>
<td>112</td>
</tr>
<tr>
<td>501-2000 units</td>
<td>20</td>
</tr>
<tr>
<td>2000+ units</td>
<td>14</td>
</tr>
<tr>
<td>Total active</td>
<td>5,543</td>
</tr>
<tr>
<td>Total registered</td>
<td>15,731</td>
</tr>
</tbody>
</table>

*Housebuilders and commercial developers undertaking residential development

**Source:** NHBC New House-Building Statistics (2003 Q4) / CEM Survey

#### Table 3.2: Sample compared to industry structure: by size of output

<table>
<thead>
<tr>
<th>NHBC data</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size band</td>
<td>starts by size band</td>
</tr>
<tr>
<td>1-10 units</td>
<td>13,488</td>
</tr>
<tr>
<td>11-30 units</td>
<td>11,802</td>
</tr>
<tr>
<td>31-100 units</td>
<td>13,488</td>
</tr>
<tr>
<td>101-500 units</td>
<td>23,604</td>
</tr>
<tr>
<td>501-2000 units</td>
<td>23,604</td>
</tr>
<tr>
<td>2000+ units</td>
<td>80,928</td>
</tr>
<tr>
<td>Total UK completions</td>
<td>168,600</td>
</tr>
</tbody>
</table>

**Source:** NHBC New House-Building Statistics (2003 Q4) / CEM Survey

35
Table 3.2 compares the sample in terms of the number of units produced annually by respondents against the industry structure. Again, the sample is clearly much more representative of medium to large-sized housebuilders.

Therefore, in interpreting the results, it should be borne in mind that the survey captured only a small proportion of developers building up to 30 housing units per annum, although this group accounts for only 15% of the industry’s annual output.\textsuperscript{23} The survey captured over a fifth of housebuilders producing 31-100 units per annum rising to over two-fifths of volume housebuilders completing over 2,000 units every year.

A further concern relating to non-response bias is that developers undertaking mainly greenfield development may not have felt the survey was relevant to them and failed to return it. To investigate this issue a small-scale telephone survey was undertaken to gather information on non-response. An attempt was made to contact the original recipient of the survey and answers to the following questions were sought:

- Why were you unable to return the survey? (e.g. too busy, not relevant etc)
- Do you undertake brownfield development?
- How many units do you complete per annum?
- What proportion of these was on brownfield sites?

This information proved very difficult to gather with a hit rate of less than 1 in 10 calls. In cases where contact was made, the respondents had been too busy to return the survey or were in the process of winding down their companies due to retirement, but all undertook brownfield development. However, the sample was not large enough to draw any robust conclusions.

Further investigation of the questionnaires returned by type of developer shows that 16% of the sample derives at least 50% of their output from greenfield development which does lessen concern about sample bias to some extent\textsuperscript{24}. A review of the websites of non-respondents also indicates that many are clearly engaged in brownfield development\textsuperscript{25}.

The proportionately lower response from smaller housebuilders discussed above is unsurprising given that smaller companies are perhaps less likely per se to respond to surveys due to limited resources and no perceived benefits from participating (larger companies are more likely to be concerned about their public image, for example). Data constraints and a lack of information regarding the underlying population also made it difficult to boost response amongst smaller housebuilders.

\textsuperscript{23} The results of the survey presented in Chapter 4 have therefore not been weighted to give more emphasis to smaller housebuilders, because of the importance of larger companies in volume terms.

\textsuperscript{24} The size structure of this sub-group was similar to the total sample.

\textsuperscript{25} A review of 80 websites selected randomly from non-respondents, revealed that at least 90% of these housebuilders undertook brownfield development to a greater or lesser degree. Where this was not stated explicitly it was judged on location of developments, land requirements etc. In comparison, the proportion of survey respondents undertaking any brownfield development was 96%.
3.4 Conclusions

Although the survey did not manage to obtain a particularly high response rate from the housebuilding industry’s smallest operators (those building up to 30 units per annum), it did achieve good penetration amongst medium and larger-sized housebuilders who account for the vast majority of the industry’s output. Therefore our sample does contain fewer small housebuilders in percentage terms than the national proportion. However, our analysis also showed that non-response bias due to possible focus on greenfield sites was not an issue.

With these caveats in mind, it should also be stressed that additional insight into how smaller housebuilders are approaching brownfield development will also be possible through the local-level interviews and case study work in the next phase of the study.

In total, the annual output of the survey respondents accounts for some 28% of annual housing completions in the UK; consequently the survey can be said to represent a valuable snapshot of the industry, bearing in mind the caveat relating to smaller operators.
4 Results and analysis

4.1 Introduction

This chapter discusses the results of the postal surveys covering:

Questionnaire 1
- The sample: company type and size.
- The extent of brownfield development.
- Changing attitudes towards developing on brownfield sites.
- Potential impact of the Barker Review.
- Willingness to develop on contaminated sites.

Questionnaire 2
- Knowledge and use of remediation technologies.
- Integration of sustainability into the development process.
- Opinions on the importance of potential climate change impacts.

4.2 The sample: company type and size

This section describes the type of companies in the survey sample in order to set the context for the subsequent analysis.

The sample comprises both commercial developers and housebuilders (Table 4.1). There has been some recent press speculation about high-profile commercial developers moving into residential development (see, for example, Smit, 2004). However, there is already considerable crossover between these two categories; 57% of commercial developers in the sample also undertake residential development and 51% of housebuilders develop commercial properties (Figure 4.1). Of the remaining commercial developers, over one-quarter were planning to move into housebuilding within the next 5 years, either through direct company involvement or through joint ventures with housebuilders.

<table>
<thead>
<tr>
<th>Developer type</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial developer</td>
<td>46</td>
<td>29</td>
</tr>
<tr>
<td>Housebuilder</td>
<td>112</td>
<td>71</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100</td>
</tr>
</tbody>
</table>

26 Unless labelled otherwise, the basis for charts in this section is 'all respondents / developers' (ie both housebuilders and commercial developers).

27 The results of the survey have been examined by company type, size and where relevant, regional focus. Additional tables are presented in Appendix 2 (Table number has ‘A’ prefix).
Output is one of the best indicators of company size in the development industry. The questionnaire sought details of completions in 2003 or the company’s latest financial year. The sample contains a broad range of developers, with the scale of development programme ranging from 0 - 1.4mn sq ft for commercial developers and from 2 to just under 12,000 units for housebuilders (Table 4.2). A more detailed breakdown of company size by output is given in Figures 4.2 and 4.3 and the sample of residential developers relative to the industry structure is discussed in section 3.3.

### Table 4.2: Company size by output (sample average & range)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial (total sq ft)</td>
<td>229,000</td>
<td>150,000</td>
<td>0</td>
<td>1,400,000</td>
</tr>
<tr>
<td>Residential (no. of units)</td>
<td>446</td>
<td>60</td>
<td>2</td>
<td>11,810</td>
</tr>
</tbody>
</table>
The role of the UK development industry in brownfield regeneration

The size of the company was also examined in terms of its area of operation (Table 4.3). Two-thirds of housebuilders restrict their activities to a single region; a reflection of the industry structure. A higher proportion of commercial developers in the sample operate nationwide or in more than one region. This is a useful indicator of size as the amount of development undertaken by commercial developers annually is likely to be much more variable than for housebuilders.

Table 4.3: Company type by extent of operation

<table>
<thead>
<tr>
<th></th>
<th>Housebuilders</th>
<th>Commercial developers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>%</td>
</tr>
<tr>
<td>Single region</td>
<td>73</td>
<td>66%</td>
</tr>
<tr>
<td>Small multi-regional (2-4 regions)</td>
<td>25</td>
<td>23%</td>
</tr>
<tr>
<td>Large multi-regional (&gt;5 regions) or nationwide</td>
<td>13</td>
<td>12%</td>
</tr>
<tr>
<td>All respondents</td>
<td>111</td>
<td>100%</td>
</tr>
</tbody>
</table>

4.2.1 Housebuilders by type of development undertaken

More detail was requested from housebuilders about the type and value of properties developed to assist in classification. The majority of respondents were engaged primarily in new-build development; although 35% of housebuilders undertook conversions, these accounted on average for only 10% of completions.

When asked about the type of property they had developed over the past year, most housebuilders had built detached homes (77%), closely followed by flats (69%) and terraces (65%). Semi-detached homes had been built by just over half of all developers and very few had built ‘other’ types of property (eg bungalows). However, with regard to the number of completions by type, detached homes and flats are the most commonly built, with each accounting for just over one-third of total completions.
by housebuilders in the sample (Figure 4.4). The survey data on completions has been plotted against the NHBC data (2003) on annual starts for comparison and appears to be broadly in line with the national picture. Two volume housebuilders in the survey sample did not provide a breakdown of completions by property type; this omission may have effectively reduced the proportion of flats and terraces.

The majority of housebuilders in the sample are mid-market operators, with the most common selling price of completions over the past year falling within the ranges £150,001 - £200,000 (31%) and £100,000 - £150,000 (26%). The survey also captured a number of upmarket developers with 8% of the sample building homes with an average value of over £400,000.
Around 35% of housebuilders built social housing as well as private units and these comprised, on average, 10% of completions. The likelihood of housebuilders developing social housing increases with size (Table 4.4). This is not unexpected as planning guidance (ODPM, 2003b) suggests that affordable housing should not be sought on developments of less than 15 dwellings (or sites of less than 0.5 ha), although local exceptions can be made.

### Table 4.4: Housebuilders developing social housing

<table>
<thead>
<tr>
<th>No. of housebuilders</th>
<th>Undertake social housing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
</tr>
<tr>
<td>1-10 units</td>
<td>9</td>
</tr>
<tr>
<td>11-30 units</td>
<td>23</td>
</tr>
<tr>
<td>31-100 units</td>
<td>41</td>
</tr>
<tr>
<td>101-500 units</td>
<td>26</td>
</tr>
<tr>
<td>501-2000 units</td>
<td>6</td>
</tr>
<tr>
<td>2000+ units</td>
<td>6</td>
</tr>
<tr>
<td>Missing data</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>112</td>
</tr>
</tbody>
</table>

#### 4.2.2 Size of land bank

Housebuilders have been criticised for stockpiling sites in land banks, thus reducing competitive pressures in the industry by erecting barriers to market entry. Barker (2003), in her review of housing supply, however, concluded that given the length of the planning process, that this was not unreasonable behaviour for a business seeking to secure future production. At this stage in the research we were interested in obtaining information on the amount and type of land held in housebuilders’ land banks. An area of concern Barker (2003) identified in relation to housing supply is the extent to which housebuilders control supply locally on large sites by ‘trickling out’ production at a certain rate once development is underway. This is an issue more suited to investigation through interview or case study based work.

In the postal survey housebuilders were asked to indicate the size of their land bank measured in terms of the number of plots with planning consent (Figure 4.6). Some reticence in answering this question was anticipated. However, perhaps surprisingly, only 2% of the sample declined to provide this information. The majority of housebuilders (70%) had less than 500 plots with planning consent in their land bank, 11% had between 500 and 1,000 plots and only 15% had more than this. This question was carefully phrased using a very specific definition of a land bank to ensure that we would be able to compare the responses like for like. Thus, our land bank definition excludes any strategic land housebuilders may be holding in the hope of getting planning consent.
The role of the UK development industry in brownfield regeneration

Figure 4.6: Size of land bank*

The type of sites held in the land bank and attitudes towards contaminated land are discussed in sections 4.2 and 4.3 below.

4.3 The extent of brownfield development

Brownfield development has become a mainstream activity, that is no longer undertaken only by niche developers. Across the sample as a whole, some 80% of homes and 84% of commercial developments completed in the past year were on brownfield sites (Table 4.5). Where commercial developers were building residential units these were exclusively on brownfield sites. In contrast, a minority (4%) of housebuilders were still building their entire output on greenfield sites. This was also true of a small number of commercial developers who were building a high proportion of their non-residential output on greenfield sites (4% had completed over 80% of their developments on greenfield over the past year).

Table 4.5: Amount of brownfield development

<table>
<thead>
<tr>
<th>Residential development on brownfield land (% completions)</th>
<th>Mean</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housebuilder</td>
<td>77%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Commercial developers</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>80%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Commercial development on brownfield land (% completions)</th>
<th>Mean</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial developers</td>
<td>84%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The transition to brownfield development by housebuilders is underlined by comparison with an earlier survey in which greenfield sites still accounted for 60% of completions (Fulford, 1998).
The role of the UK development industry in brownfield regeneration

The extent of brownfield development now undertaken by housebuilders is detailed further in Table 4.6. This shows two-fifths of housebuilders in the sample developing housing entirely on brownfield sites. In comparison, just 4% of housebuilders developed solely on greenfield land and this group had the smallest output in terms of average completions. Housebuilders with the highest average completions were building between 50% - 74% of their units on brownfield sites. This ties in with data on volume housebuilders which suggests that completions on brownfield sites account for an average 68% of total output.28

<table>
<thead>
<tr>
<th>% brownfield completions</th>
<th>Housebuilders</th>
<th>Completions (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>%</td>
</tr>
<tr>
<td>None</td>
<td>4</td>
<td>4%</td>
</tr>
<tr>
<td>1%-24%</td>
<td>6</td>
<td>5%</td>
</tr>
<tr>
<td>25%-49%</td>
<td>9</td>
<td>8%</td>
</tr>
<tr>
<td>50%-74%</td>
<td>20</td>
<td>18%</td>
</tr>
<tr>
<td>75%-99%</td>
<td>27</td>
<td>24%</td>
</tr>
<tr>
<td>100%</td>
<td>45</td>
<td>40%</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>112</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 4.6: Residential completions on brownfield sites by number & size of housebuilders

Based on completions in the past year

A more detailed breakdown of housebuilder size against average brownfield completions (Figure 4.7) shows that the very smallest housebuilders (those producing up to 10 units per year) develop the highest proportion of units on brownfield sites. However, as discussed in section 3.3 above, the sample size of this group is too small to be regarded as being representative of the industry. In all size bands, there were housebuilders building solely on brownfield sites.

The lowest average completions on brownfield sites were amongst the largest housebuilders, those developing over 2,000 units per annum (71%), and at the opposite end of the scale, amongst housebuilders producing 11 - 30 units every year (72%). These averages still comfortably exceed the government’s target for the development of new homes on previously developed land (60%) set in 1998.

28 Average of top publicly quoted housebuilders sourced from annual reports and websites.
There was very little difference in the proportion of completions on brownfield land amongst housebuilders whose activities were restricted to residential development (75%) and those who also undertook commercial development (79%), again indicative of how widespread brownfield development has become in the housebuilding industry.

Figure 4.8 (which illustrates the average level of brownfield completions against sale price) indicates that expensive properties are just as likely to be developed on brownfield as cheaper properties. This is a reflection of the broad range of brownfield sites being developed for residential, from prime city centre riverside sites which command a premium, to sites in suburban locations.
4.3.1 Housebuilders’ land banks

That the switch to brownfield development required by government policy has been taken seriously by the housebuilding industry is clearly evident in the type of sites held in land banks. Across our sample, 70% of plots with planning consent in land banks were brownfield sites. The very smallest housebuilders (building up to 10 units per annum) had the highest proportion of brownfield plots in their land banks: however, given the sample size it cannot be assumed that this is generally the case amongst this group. Larger housebuilders (particularly those building between 500 and 2,000 units per annum) certainly appear to have made the switch to brownfield sites in their land holdings (Figure 4.9).

![Figure 4.9: Composition of land bank (% brownfield plots) by housebuilder size](image)

Not surprisingly, there is clearly some correlation between the amount of brownfield development undertaken and the extent of brownfield sites held in the land bank (Table 4.7).

<table>
<thead>
<tr>
<th>% residential completions on brownfield</th>
<th>% brownfield plots in land bank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>0%</td>
<td>43</td>
</tr>
<tr>
<td>1%-24%</td>
<td>37</td>
</tr>
<tr>
<td>25%-49%</td>
<td>45</td>
</tr>
<tr>
<td>50%-74%</td>
<td>56</td>
</tr>
<tr>
<td>75%-99%</td>
<td>71</td>
</tr>
<tr>
<td>100%</td>
<td>90</td>
</tr>
<tr>
<td>Average</td>
<td>70</td>
</tr>
</tbody>
</table>

Table 4.7: Land bank composition by amount of development on brownfield
4.4 Changing attitudes towards brownfield development

The questionnaire sought to determine how and why the amount of brownfield development undertaken was changing. The results are not unexpected, with a majority of both commercial (65%) and residential developers (77%) stating that they had increased the amount of development undertaken on brownfield either slightly or significantly over the past 5 years (Figure 4.10). The change in output is more dramatic amongst housebuilders as, prior to the impact of PPG 3 (DETR, 2000a), commercial developers are more likely to have been building on previously developed sites anyway. Indeed, over one-third of commercial developers stated that the amount of development undertaken on brownfield sites had not changed over the past five years; this group had built practically all of their developments over the past year on brownfield land.

Only one housebuilder stated that their output on brownfield sites had decreased over the past 5 years, but in 2003 they were still producing 80% of completions on previously used land.

The direction of change in the amount of brownfield development amongst housebuilders was the same regardless of size, although the very smallest (1 - 10 units) and very largest operators (2,000+ units) were most likely to have increased their brownfield output 'significantly' over the past five years (Figure 4.11). As with commercial developers, housebuilders whose level of development on brownfield had not changed tended to already build extensively on brownfield sites (Table 4.8, Table A1).
The role of the UK development industry in brownfield regeneration

Figure 4.11: Change in brownfield development over past 5 years by size of housebuilder

The reason for the increase in output on brownfield land has been driven primarily by changes in the availability of suitable land, underpinned by government policy (Figure 4.12). However, there are also 'pull factors' at work with developers recognising the opportunities for profitable development. A smaller proportion of developers also consider that increasing their emphasis on brownfield sites gives them an advantage over their competitors.

Around 10% of commercial developers and 13% of housebuilders state that the increase in development on brownfield sites is in accordance with their company's own environmental policy. With the exception of one housebuilder, this was never the sole reason given for the increase, but rather one of a number of factors.

Where developers had maintained the same level of brownfield development over the past 5 years, the most common reason given amongst both housebuilders (40%) and commercial developers (44%) was ‘the opportunity for profitable development’. Whilst the change in the availability of land was still an important consideration, a high proportion of ‘other reasons’ was given, notably that the company had been set up solely for that purpose of undertaking brownfield development or that it formed an important part of company strategy. The presence of a company environmental policy promoting brownfield development was also of more importance in this group both for housebuilders (24%) and commercial developers (19%). These factors suggest that this group of developers were earlier than many of their peers in starting to engage in brownfield development, which already accounts for a higher proportion of their completions. This is supported by the figures for average completions on brownfield over the past year (Table 4.8).\textsuperscript{29}

\textsuperscript{28} See also Tables A1 and A2 in Appendix 2 for breakdown by size.
The role of the UK development industry in brownfield regeneration

Figure 4.12: Reasons for increase in brownfield development over past 5 years

<table>
<thead>
<tr>
<th>Reason</th>
<th>Housebuilder</th>
<th>Commercial developer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional risk &amp; costs</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Other reason</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Meeting customer preferences</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Land values prohibitively high</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Company environmental policy</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Competitive advantage</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Opportunity for profitable development</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Government’s planning policy</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Availability of suitable land</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

Table 4.8: Change in amount of brownfield development over past 5 years vs % brownfield completions over past year

<table>
<thead>
<tr>
<th>Change over past 5 yrs</th>
<th>Commercial developers</th>
<th>Housebuilders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td>Increased significantly</td>
<td>78</td>
<td>79</td>
</tr>
<tr>
<td>Increased slightly</td>
<td>75</td>
<td>64</td>
</tr>
<tr>
<td>Stayed the same</td>
<td>99</td>
<td>89</td>
</tr>
<tr>
<td>Decreased slightly</td>
<td>-</td>
<td>80</td>
</tr>
<tr>
<td>Decreased significantly</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Average</td>
<td>84</td>
<td>77</td>
</tr>
</tbody>
</table>

4.4.1 Future plans for brownfield development

On balance, the majority of developers plan to continue to increase their output on brownfield sites (Figure 4.13, Tables A3 - A4). Around 30% of developers intend to maintain their current level of brownfield development which, as above, already accounts for a high proportion of completions (Table 4.9).\(^{30}\)

\(^{30}\) See also Tables A5-A6 in Appendix 2 for breakdown by size.
The role of the UK development industry in brownfield regeneration

Figure 4.13: Change in amount of brownfield development over next 5 years

Only a very small proportion of developers planned to decrease development on brownfield sites. One housebuilder was planning to significantly decrease the number of units built on brownfield in future due to the high proportion of greenfield sites (90%) held in the company’s land bank.

Table 4.9: Future change in brownfield development vs % brownfield completions over past year

<table>
<thead>
<tr>
<th>change over next 5 yrs</th>
<th>Commercial developers</th>
<th>Housebuilders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased significantly</td>
<td>67</td>
<td>68</td>
</tr>
<tr>
<td>Increased slightly</td>
<td>86</td>
<td>73</td>
</tr>
<tr>
<td>Stayed the same</td>
<td>98</td>
<td>88</td>
</tr>
<tr>
<td>Decreased slightly</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Decreased significantly</td>
<td>-</td>
<td>75</td>
</tr>
<tr>
<td>Average</td>
<td>84</td>
<td>77</td>
</tr>
</tbody>
</table>

The reasons developers gave for their intentions to increase brownfield development over the next 5 years were not dissimilar to those which had led them to increase their brownfield output in the past. The three main drivers remain:

- changes in the availability of development land (66% of developers);
- government policy (50%); and
- the opportunity for profitable development (47%).

One-fifth of housebuilders also suggested that ‘prohibitively high land values’ was one of the reasons they were increasing brownfield development. This implies that in some areas competition for greenfield land with planning consent could be driving up values and forcing housebuilders to seek other development opportunities. Only a handful of developers considered that they were ‘meeting customer preferences’ by increasing their output on brownfield sites.

Thus, government policy has clearly been successful in shifting the pattern of development towards brownfield sites. Developers also perceive the opportunities inherent in brownfield development, as well as the problems. However, the...
government’s policy drive has coincided with a period of favourable market conditions and a downturn in the housing market could have an adverse impact.

4.4.2 Opinions on the recommendations of the Barker Review

The survey presented an opportunity to gauge housebuilders' opinions on the recommendations contained within the Barker Review (discussed in section 2.3 above). The question posed was whether the recommendations, if implemented as a package, would have a positive or negative impact on increasing housing supply (a) on brownfield sites and (b) on greenfield sites. This prompted a wide range of responses but, on balance, the suggestion was that the impact on supply would be slightly positive (Figure 4.14). Over a quarter of housebuilders were unsure, which is likely to reflect a 'too early to say' viewpoint rather than a lack of knowledge of the Barker Review.

It is interesting to note that volume housebuilders (producing over 2,000 units pa) were rather more positive in their views than smaller operators, especially in relation to the supply impact on greenfield sites.

![Figure 4.14: Opinions of the Barker Review's potential impact on housing supply](image)

4.5 Developing on contaminated sites

If the target for brownfield development is to be sustained, it is likely that contaminated sites will have to be developed in increasing numbers. The exploration of attitudes towards developing on contaminated sites formed an important part of the survey.

A surprisingly high proportion of developers surveyed – 96% of commercial developers and 94% of housebuilders – were prepared to undertake development on contaminated sites. Where contaminated sites were avoided this was due to the additional risks and uncertain costs involved, with one company stating that they were just too small to undertake this kind of development.

When questioned as to whether they had actually undertaken development on any contaminated sites over the past year, the figures were still high: at 74% of
commercial developers and 71% of housebuilders. Contaminated sites accounted for a slightly higher proportion of brownfield completions for commercial developers (50%) than for housebuilders (43%) over the previous year. Housebuilders were likely to develop contaminated sites whether or not they also undertook commercial development, suggesting that the necessary skills and knowledge are spreading throughout the industry and are not restricted to specialist operators.

In the housebuilding industry, the likelihood of developing on contaminated sites appears, in general, to increase with company output (Figure 4.15). This is not surprising given that larger companies are more likely to have the resources and breadth of knowledge to deal with any problems which may arise. This does not appear to hold true, however, for the very largest housebuilders, with the proportion of contaminated sites dropping to just under half of all brownfield completions.

There is less of a size differential amongst commercial developers in explaining the level of development on contaminated sites. Although, as with housebuilders, it was the medium-sized operators (in terms of geographic spread) that had the highest average proportion of completions on contaminated land (Table 4.10).

<table>
<thead>
<tr>
<th>All commercial developers</th>
<th>Mean</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single region</td>
<td>41</td>
<td>8</td>
</tr>
<tr>
<td>Small multi-regional (2-4 regions)</td>
<td>53</td>
<td>17</td>
</tr>
<tr>
<td>Large multi-regional (&gt;5 regions) or nationwide</td>
<td>51</td>
<td>21</td>
</tr>
<tr>
<td>Average</td>
<td>50</td>
<td>46</td>
</tr>
</tbody>
</table>

4.5.1 Contaminated sites and land banks

A majority of housebuilders (59%) were prepared to hold contaminated sites in their land banks and a further 23% would under certain conditions (Figure 4.16). Attitudes

31 See section 4.3.1 for details on the composition of housebuilders’ land banks in terms of brownfield / greenfield split.
The role of the UK development industry in brownfield regeneration
towards contaminated land clearly appear to have changed as housebuilders have
gained more experience of developing on brownfield sites. In a 1998 survey, only 4% of
housebuilders were prepared to hold unremediated sites in their land bank
(Fulford, 1998).

![Figure 4.16: Willingness of housebuilders to hold contaminated land in land bank](image)

<table>
<thead>
<tr>
<th>Yes, under certain conditions</th>
<th>No response</th>
</tr>
</thead>
<tbody>
<tr>
<td>23%</td>
<td>4%</td>
</tr>
</tbody>
</table>

Not surprisingly, larger housebuilders (particularly those building over 500 units per
annum) had fewer reservations about holding contaminated sites in their land bank
(Figure 4.17).

![Figure 4.17: Willingness of housebuilders to hold contaminated sites in their land banks by size](image)

Where housebuilders stipulated conditions under which they would hold contaminated sites in their land bank these generally related either to the extent of contamination and cost of remediation, the need for a remediation strategy to be agreed or in progress, or that the contamination would not pose an immediate threat to the surrounding area (Table 4.11).
The role of the UK development industry in brownfield regeneration

<table>
<thead>
<tr>
<th>Table 4.11: Conditions under which housebuilders would hold contaminated land in land banks</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent on extent of contamination &amp; remediation cost</td>
<td>38</td>
</tr>
<tr>
<td>Remediation strategy in place / work underway</td>
<td>12</td>
</tr>
<tr>
<td>Provided contamination poses no immediate threat</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
</tr>
<tr>
<td>No response</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

Housebuilders prepared to hold contaminated sites in their land bank unconditionally, had undertaken a higher proportion of completions on contaminated sites (50%) over the past year than housebuilders in the other categories. However, even housebuilders who were not prepared to stockpile contaminated sites had still developed 36% of their brownfield completions on sites requiring remediation. This suggests that they are not averse to developing on sites with contamination but are either likely to initiate remediation works immediately after purchase or only acquire sites after remediation has been carried out.

4.5.2 Risk management and development on contaminated land

There are additional uncertainties in the development of contaminated land such as whether the full extent of the contamination is known and the possibility of pollutant migration onto neighbouring sites. Whilst known costs and liabilities are likely to have been taken account of in the price paid for a site, developers may also rely on warranties or insurance to mitigate or transfer additional risk.

The survey revealed that whilst developers make use of contractor’s warranties / indemnities and fixed price remediation contracts to control costs, they are much less likely to take out insurance such as Environmental Impairment Liability which protects against unknown contamination and third party claims (Figure 4.18). Relatively new products which allow bespoke outsourcing of liability are also rarely used as yet. Commercial developers are twice as likely as housebuilders to have used Environmental Impairment Liability Insurance but housebuilders (particularly the larger companies) are more likely to have experimented with outsourcing liability.
Volume housebuilders (>2,000 units pa) are much more definite about using contractor warranties or fixed price remediation contracts than smaller operators (Table A7). Similarly, large-scale commercial developers are more likely to use contractor warranties / indemnities but there is less of a size differential in the use of other methods of risk management (Table A8).

The relatively limited use of environmental insurance is surprising but alternative methods of managing risk will be investigated later in the research programme in relation to the case study sites.

4.5.3 Remediated sites and stigma

Given that the development of contaminated sites is likely to continue to increase, the survey sought to explore how important developers considered post-remediation stigma to be, in relation to both commercial and residential developments.

Although there was a range of opinions, a clear majority of housebuilders considered stigma to be a ‘significant’ or ‘very significant’ issue for purchasers intending to live in the property, as well as for residential valuers and mortgage lenders (Figure 4.19). This opinion was slightly more pronounced amongst smaller operators (1 - 30 units per annum). Stigma was generally considered to be a much less significant issue amongst tenants and investment purchasers.

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32 Table A9, Appendix 2.
Post-remediation stigma was, somewhat unexpectedly, considered to be just as important a consideration in relation to commercial property (Figure 4.20), presumably reflecting concerns about future liability in relation to residual contamination or remediation failure.33

Issues surrounding post-remediation stigma, in particular how information relating to site history is communicated to prospective purchasers, if at all, will be explored further in the case study work.

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33 Opinion is very similar amongst commercial developers regardless of size (see Table A10, Appendix 2).
4.5.4 Impact of the EU Landfill Directive

The survey presented an opportunity to gauge opinion on the potential impact of the EU Landfill Directive which, at the time, was the subject of much speculation. From 16th July 2004 the Directive banned the co-disposal of hazardous and non-hazardous waste resulting in a radically reduced number of sites permitted to accept hazardous waste. Estimates suggested that the number of sites would be cut from 200 to around 10 - 15 (Deanesly, 2004) resulting in capacity constraints and rising costs. At the time of writing (Aug 2004) 7 permits for hazardous waste sites have been issued and 15 are awaiting determination. This raises the following questions:

- Is the Directive likely to discourage development on contaminated sites?
- Is it leading to greater interest in alternative remediation technologies?

The results are of some concern. While a majority of commercial developers would not be discouraged from undertaking development on contaminated sites (62%), a significant minority (18%) would be less likely to undertake such development and a further 18% were unsure (Figure 4.21). The latter were perhaps intending to assess the system, post-Directive, before making a decision.

The opinion amongst housebuilders was more evenly split with 49% unlikely to be deterred from building on contaminated sites and 44% holding the opposite opinion. Size of company, in terms of output, does appear to be an important factor: 83% of housebuilders producing over 500 units per annum were unlikely to be discouraged from developing on contaminated sites, compared with around 43% of medium-sized operators building 31 - 100 units every year. Housebuilders with commercial experience were also more likely to continue to develop on contaminated sites than pure housebuilders (Figure 4.22).

![Figure 4.21: Impact of EU Directive in discouraging development on contaminated land](image)

Figure 4.21: Impact of EU Directive in discouraging development on contaminated land

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34 [www.hazardouswaste.org.uk](http://www.hazardouswaste.org.uk)
Given that there are no landfill sites in London or the South East currently with permits for hazardous waste, or even with applications pending, we have examined developers’ attitudes towards the Directive by regional representation. Developers operating only in London and the South East do express greater concern about the impact of the Directive than other developers. In fact they are twice as likely to suggest that the Directive will discourage them from undertaking development on contaminated sites (Figure 4.23). However, there is also a size factor in operation here as developers restricting their activities to London and the South East are typically smaller (average residential output of 70 units pa compared to 490 pa for all other developers).

Looking more broadly at regional representation, it is developers operating in the West Midlands, nationwide, the East and the South West who are least likely to be deterred from developing on contaminated land by the EU Directive (Table A11).

35 [www.hazardouswaste.org.uk](http://www.hazardouswaste.org.uk)
The EU Directive is likely to have stimulated interest in alternatives to ‘dig and dump’ with 56% of commercial developers and 51% of housebuilders investigating alternative remediation technologies. However, it is surprising that these figures are not higher given that the option to ‘dig and dump’ will become increasingly unfeasible. It may be that developers already consider that they have sufficient knowledge of remediation techniques and this is investigated in section 4.6 below. Larger housebuilders were more likely to be finding out about new remediation techniques (Figure 4.24), as were those with some experience of commercial development (60% of housebuilders in this group were investigating alternatives to ‘dig and dump’, compared to 43% of those developing only residential property). This ties in with the results above which suggested that these groups would be less likely to be discouraged from developing on contaminated sites after the Directive came into force.

### Figure 4.24: Proportion of housebuilders investigating alternatives to ‘dig & dump’

<table>
<thead>
<tr>
<th>Size of Development</th>
<th>Proportion of Housebuilders Investigating Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10 units</td>
<td>10%</td>
</tr>
<tr>
<td>11-30 units</td>
<td>20%</td>
</tr>
<tr>
<td>31-100 units</td>
<td>30%</td>
</tr>
<tr>
<td>101-500 units</td>
<td>40%</td>
</tr>
<tr>
<td>501-2000 units</td>
<td>50%</td>
</tr>
<tr>
<td>2000+ units</td>
<td>60%</td>
</tr>
<tr>
<td>Average</td>
<td>50%</td>
</tr>
</tbody>
</table>

#### 4.6 Knowledge and use of remediation technologies

Previous surveys of developers have shown that ‘dig and dump’ is the most commonly used method of cleaning up contaminated land (Fulford, 1998; The College of Estate Management, 1999). This remains the case – for both commercial and residential developers – although there are signs that a broader range of techniques is being utilised. Figure 4.25 shows frequency of use of different remediation technologies in the form of an average score ranging from never (1) to always (5).

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36 Some limited statistical testing was carried out to determine whether response was associated with size. For example, chi squared tests showed that this was indeed the case, giving a figure of 8.879 (3 degrees of freedom) at a 1% level of significance. This was based on a recoding of size to three categories. However, the usual caveat relating to small size categories applies.
'Dig & dump' is certainly the most frequently used method of clean-up, with an average score of 3.6. In fact 31% of commercial developers and 67% of housebuilders 'always' or 'often' use this method. This is much higher than the next most popular method, containment, where the equivalent figures are 15% for commercial developers and 28% for housebuilders. Commercial developers are more likely than housebuilders to have experimented with alternatives to these two processes and generally appear to have a wider awareness of the different technologies available (Figure 4.26). However, even amongst commercial developers awareness of thermal processes and, perhaps less surprisingly, emerging technologies such as electrokinetic extraction, was low.

In the housebuilding industry, company size clearly makes a difference in the likelihood of having used alternatives to 'dig and dump', although this was not apparent amongst commercial developers. The volume housebuilders (producing over 2,000 units per year) are much more likely than smaller operators to use alternative solutions and on average claim to use barrier methods, bioremediation and solidification slightly more frequently than 'dig and dump' (Table A13). This differential by company size can probably be attributed to resources, access to expertise and the type of development undertaken. Some remediation techniques, for example, are not appropriate or cost-effective on smaller sites. This may be due to the size of plant required or economies of scale; soil washing typically requires a minimum of 10,000 tonnes and may not be cost effective below this.\(^{37}\) As a consequence, it is not surprising that volume housebuilders, who typically develop larger sites, have greater experience of using alternative remediation techniques.

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\(^{37}\) Presentation by Guy Pomphrey, DEC Belgium, Brownfield Briefing Conference on Remediation, 17th Sep 2003.
A survey of local authorities and consultants on the subject of land remediation has also been undertaken for the SUBR:IM project by Cambridge University, Surrey University and Forest Research. This also revealed that ‘dig and dump’ was the most frequently used method of clean-up, although barrier / capping came a close second. As found in the survey of developers, these two methods were the most widely used. However, local authorities and consultants appear to have greater experience in the use of bio / phyto-remediation than developers.

![Figure 4.26: Awareness of remediation technologies](image)

Access to independent sources of information on remediation techniques was not considered to be a problem for the majority of developers, both commercial (77%) and residential (61%). Housebuilders who thought that they had inadequate access to information were more likely to be smaller operators (average output of 95 units pa against 714 units pa). This could imply that there is a greater role for government bodies such as the Environment Agency and DEFRA to publicise and disseminate information on remediation technologies to smaller developers.

A majority of developers considered that there had been recent improvements in the range of remediation techniques available (Figure 4.27) and were also positive, on the whole, about improvements in the effectiveness of remediation techniques and their sustainability, although in both these categories there was quite a high proportion of ‘don’t knows’. Opinions on cost, however, were more negative with over a quarter of developers suggesting costs had risen. Housebuilders were more likely to express this opinion than commercial developers (Table A14) and those operating across a wider geographic area were the most negative (Table A15).

On a more positive note housebuilders were more likely to believe that there had been some advance in the reliability of remediation techniques than commercial developers (Table A14).
Even excluding those developers who did not think they had adequate access to independent information on remediation techniques, the sentiments remain broadly the same, with only a marginally lower proportion of ‘don’t knows’.

4.7 Integration of sustainability into the development process

Developing on brownfield sites is often taken to be synonymous with “sustainable” development, but to what extent is this really the case? One of the research questions in this project is to determine whether “sustainability” is a consideration in the brownfield development process, particularly in relation to environmental and social issues.

4.7.1 Environmental policies and targets

Many of the larger, publicly quoted development companies have environmental policies, but it was not known whether this applied throughout the industry. Based on the survey results it would seem that unless the company is in the public eye, there is little incentive for developers to adopt an environmental policy. Indeed, only a third of both housebuilders and commercial developers in the sample had a formal policy or statement. Whilst companies of all sizes stated that they had environmental policies, in the housebuilding industry, it was more likely to be the larger developers (>500 units pa), operating in more than one region.

The largest publicly owned housebuilders commonly quote the proportion of their completions on brownfield land, with some setting a target to achieve. However, this does not appear to be a particularly widespread practice throughout the industry with very few developers having a formal target for the reuse of brownfield land in their development programme (only 13% of commercial developers and 22% of housebuilders). There was no clear pattern in the type or size of company likely to have a brownfield target. Some companies commented that all their developments were on brownfield sites, although this was not expressed as a formal target. Where
companies did have a target this ranged from 40% to 100% of completions but was typically set quite high, at 87% on average.

4.7.2 Adoption of BREEAM standards

The Building Research Establishment introduced BREEAM as a method of assessing the environmental performance of buildings. The assessment is based on a broad range of factors which encompass management policy, health and wellbeing, energy use, pollution, transport, land use, ecology, materials and water consumption. A rating from ‘Pass’ to ‘Excellent’ can be awarded depending on the standard achieved. This has been taken up by housebuilders such as Countryside Properties who state on their website that all their developments are designed to achieve a ‘Good’ BREEAM rating.

The survey sought to establish how widely BREEAM was used in the industry but, for simplicity, the question asked only about the proportion of developments that aimed to comply with the minimum BREEAM (Pass) standard.

Over two-thirds of commercial developers in our sample and 36% of housebuilders aimed to achieve the minimum BREEAM standard in at least some of their developments (Figure 4.28). Moreover, half of all commercial developers aimed for the BREEAM standard in all their developments, compared to just 8% of housebuilders. Larger commercial developers operating over a wider geographical area aimed for the minimum BREEAM standard in a higher proportion of their developments than those working within a single region; this size differential was not apparent amongst housebuilders (Table A16).

Based on the number of ‘don’t knows’, however, there does seem to be limited awareness, if not of BREEAM itself, then of the standards required, especially amongst housebuilders.

38 Building Research Establishment Environmental Assessment Method (http://products.bre.co.uk/breeam/)

Other developers commented that they did design to BREEAM standards but didn’t apply for accreditation due to the cost involved. The cost of implementing higher environmental standards was an issue for some housebuilders who did not consider that homebuyers would be prepared to pay a higher purchase price.

4.7.3 Creating 'sustainable' developments
The government’s thinking on sustainable development has been set out most recently in documents such as The Sustainable Communities Plan (ODPM, 2003g) and the Consultation Draft of PPS 1 (ODPM, 2004a). The four main aims of sustainable development are described as: sustainable economic development, social inclusion, protection and enhancement of the environment and prudent use of resources (ODPM, 2004a). The survey sought to establish how much importance developers give to some of the factors that contribute to making a development sustainable (Figure 4.29).

On balance, the results were quite positive; the majority of developers rated the importance of access to public transport links, the proximity of local shops and services and minimising impact on site ecology quite highly. Over half of all developers also considered early consultation with the local community as ‘important’ or ‘very important’. The ratings given to these factors by commercial developers and housebuilders were very similar. Not surprisingly, housebuilders considered the provision of open space in a development to be more important than commercial developers.

Provision of affordable housing scored less highly, probably due to the greater impact this factor has on the profitability of a development. In fact this view was expressed by some developers who sought to avoid or minimise exposure to schemes where affordable housing would be required.

**Figure 4.29: Importance given to sustainability**

<table>
<thead>
<tr>
<th>Provision of open space in site layout</th>
<th>Minimising impact on local ecology in site design</th>
<th>Provision of affordable housing</th>
<th>Access to local shops &amp; services</th>
<th>Local public transport links</th>
<th>Early consultation with local community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t know</td>
<td>Unimportant</td>
<td>Important</td>
<td>Important</td>
<td>Important</td>
<td>Very important</td>
</tr>
<tr>
<td>% developers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The largest housebuilders (producing over 2,000 units per annum) placed greater importance than smaller operators on early consultation with the local community and the provision of affordable housing (Table A17).
Other important factors mentioned by developers were the need for good design and the importance of establishing a good working relationship with the local authority. The importance of profitability and the minimisation of risk were also noted.

4.8 Opinions on the potential impacts of climate change

The survey also contained questions for Project I within the SUBR:IM consortium which is investigating the impacts of climate change on pollutant linkages. There is a growing awareness in the property industry of the potential impacts on climate change; both the Investment Property Forum\(^{40}\) and the Institutional Investor Group on Climate Change\(^{41}\), for example, promote awareness and disseminate information on this topic. The aim of the survey was to establish to what extent climate change is currently considered in the development process and whether developers are concerned about potential impacts. The questions focused on general approaches to developing on sites in flood risk areas and opinions on the importance of climate change to property development. The findings are discussed briefly below.

Developers were asked at what stages in the development process they thought it was important to consider the potential impacts of climate change. Building design scored highest with half of all developers considering this ‘important’ or ‘very important’ (Figure 4.30). This is not unexpected, as ongoing changes to the Building Regulations, provisions contained in the Energy White Paper (DTI, 2003) and the forthcoming EU Directive on energy performance in buildings\(^{42}\), will all be raising awareness of how practical changes are being made to try and mitigate the impacts of climate change. Just under two-fifths of all developers thought that consideration of climate change impacts was as important at the site planning and construction stages, whilst only a quarter of developers thought it was of any importance in relation to remediation. The views of housebuilders and commercial developers were broadly similar (Table A18).

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\(^{40}\) [http://www.ipf.org.uk/](http://www.ipf.org.uk/)

\(^{41}\) [http://www.iigcc.org/](http://www.iigcc.org/)

\(^{42}\) The EC Directive on the Energy Performance of Buildings came into force on 4th Jan 2003. Implementation was required within 3 years with a further 3 years if needed to implement requirements on building certification and inspection of boilers and air-conditioning systems (DTI, 2003).
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Figure 4.30: The importance of potential climate change impacts at different stages of the development process

The majority of developers were most concerned by the prospect of increased flood risk and rising insurance costs as a result of climate change, but were much less concerned about the prospect of increasing average temperatures (Figure 4.31). When questioned more directly about the possibility of remediation failure as a result of climate change, this was considered to be of greater concern to developers. The views of housebuilders and commercial developers did not differ widely on these issues.

Smaller developers were as concerned as larger operators about the potential impacts of climate change and, indeed, attached greater importance to the possible increase in number and severity of storms and the increased risk of remediation failure (Table A19).

Figure 4.31: Potential climate change impacts of most concern

In some locations there is a conflict between increasing development on brownfields and avoiding development in areas at high risk from flooding. Between 1997 and 2000, on average nearly 15,000 dwellings were built each year in flood risk areas of
which two-thirds were on brownfield sites (ODPM, 2002). PPG 25 calls for a ‘balanced’ and ‘flexible’ risk-based approach towards determining planning applications in flood risk areas, with consideration given to future climate change (DETR, 2001). Thus, there would appear to be considerable scope for differing interpretation of policy guidelines at a local level. Consequently, the survey sought to determine how frequently developers implemented mitigation measures when developing on brownfield sites in flood risk areas.

On average around 20% - 30% of developers stated that this question was not applicable to them, as they did not undertake development in areas at risk of flooding. This figure rose to 85% of housebuilders developing up to 10 units per annum. Of the remaining developers, mitigation measures were most commonly implemented at the design stage through the alteration of both building and site layout to protect the most sensitive uses from flood damage; two-fifths of developers said they ‘always’ or ‘often’ did this. The provision of flood defences was much less usual, with around one-fifth of developers ‘often’ or ‘always’ allocating land for future defences or actually building the defences and these were typically medium to larger-sized housebuilders.

The provision of Sustainable Drainage Systems (not just applicable to sites at risk from flooding) was also quite commonly implemented; ‘often’ or ‘always’ incorporated into developments by just under half of all commercial developers and 36% of housebuilders (Table A20).

The survey results show that developers are beginning to consider the potential impacts of climate change in relation to property development, but these tend to be given most weight where there are accompanying regulations. Further consideration of flooding in relation to brownfields is beyond the scope of the SUBR:IM (Phase 1) project, but is an area in need of additional research.
5 Conclusions and further research

5.1 A summary of findings from the survey of developers

The survey of developers provided contextual evidence of how developers have responded to the government’s drive towards brownfield development and raises issues which will be explored further through interviews and case studies.

Developers were targeted according to whether their principal business was commercial property or housebuilding. There has been recent publicity surrounding prominent commercial developers intending to extend their activities to include residential development and the impact this could have on the housebuilding industry. The survey findings show that there is already considerable crossover between the two sectors, with over half of all commercial property developers in the survey also building housing and vice versa: the signs are that this is likely to increase.

5.1.1 The development industry’s approach to brownfield development

Differences in opinions and approach to brownfield development, revealed in the survey, can often be attributed to company type and size. Larger companies typically have the resources and access to expertise, whether internal or external, to tackle more complex and potentially riskier developments. A company’s geographic area of operation was generally much less important than size in explaining differences in approach.

The survey confirmed that brownfield development is now widespread throughout the housebuilding industry. It was already apparent that brownfield development was no longer the preserve of specialists and had been adopted by volume housebuilders. Findings from the survey show that small and medium-sized operators have also clearly shifted their output towards brownfield. Commercial property developers have a much longer history of developing on previously used land. The commercial developers in our survey built predominantly on brownfield sites. However, where they also undertook housing development this was restricted solely to recycled land.

Given the policy emphasis on brownfield development it is not surprising that housebuilders of all sizes are undertaking schemes on previously developed land, to a greater or lesser degree. Maintaining output on greenfield sites has become increasingly difficult in the recent planning climate. Indeed, ‘the availability of land’ or ‘government policy’ (which underpins the former) were the key reasons given by the majority of developers for increasing their output on brownfield over recent years. However, the move towards brownfield development has not been solely policy-driven; a significant proportion of developers – both commercial and residential – viewed it as an opportunity for profitable development in what has been a relatively buoyant property market.

At present, there appears to be a clear intention amongst developers to continue to increase the amount of brownfield development they are undertaking and for housebuilders this was supported by the composition of their land banks in which brownfield accounted for, on average, 70% of total plots.
5.1.2 Dealing with contaminated sites

Developing on sites with contamination is likely to become increasingly important if the brownfield target is to be sustained. The survey findings show that developers in both the commercial and residential sectors are clearly not averse to developing on contaminated sites. Practically all the survey respondents were prepared to undertake development on sites requiring remedial treatment and around three-quarters had actually developed on contaminated sites over the past year. Smaller developers are less likely to undertake schemes on contaminated sites; this is not unexpected given that they may not have the resources, the specialist knowledge or the financial reserves to carry the additional risks involved.

A majority of housebuilders were prepared to hold contaminated sites in their land banks. Attitudes towards contaminated land clearly appear to have changed as housebuilders have gained more experience of developing on brownfield sites.

The readiness of the development industry to tackle contaminated sites could, however, be threatened by the impact of the EU Landfill Directive. Over two-fifths of housebuilders were likely to be discouraged from undertaking development on sites with contamination following the implementation of the Directive. This was particularly true of smaller housebuilders and those without experience of commercial development. Commercial developers were less likely to be dissuaded from building on contaminated sites, but the Directive is clearly causing some uncertainty in the industry.

The Directive is causing concern because 'dig and dump' is still the most frequently used method of dealing with contamination. There is, however, evidence that in-situ treatments are being used, most commonly barrier methods and containment. Commercial developers typically had a greater awareness of alternative remediation techniques than housebuilders and were more likely to have experimented with them, particularly solidification / stabilisation and soil vapour extraction. Other techniques were generally used much less frequently.

The EU Directive does appear to have stimulated some interest in exploring alternatives to landfill; just over half of all developers said they were doing this. Of the remainder, around half stated that they were also likely to continue developing on contaminated land, suggesting that they already have sufficient knowledge of alternatives to landfill.

In terms of access to independent sources of information on remediation treatments, the majority of developers did not consider this to be a problem. Smaller housebuilders were less likely to share this view and this could suggest that there is a greater role for government bodies such as the Environment Agency to publicise and disseminate information more widely.

5.1.3 Risk and stigma

The survey findings reveal that the use of Environmental Liability Insurance and newer products which allow bespoke outsourcing of liability is relatively limited as yet. Developers are more likely to rely on contractor warranties and fixed price remediation contracts to help manage risk and control costs. This is an issue which will be investigated in relation to site-specific conditions in the case study research.
Post-remediation stigma amongst purchasers, valuers and lenders was considered to be a significant issue by both housebuilders and commercial property developers. The impact this has in relation to the marketing of a scheme and end values will be explored in more depth through case study work.

5.1.4 Integration of sustainability into the development process and opinions on climate change

About a third of developers stated that they had a formal environmental policy or statement. However, this is not seen as a significant influence on attitudes towards brownfield development. Only a small minority of developers cited a company environmental policy as a motivating factor in undertaking brownfield development and this was alongside other influences such as government policy, availability of land and the opportunity for profitable development.

In terms of integrating the sustainability concept into their development projects (i.e. in relation to site location and masterplanning), the majority of developers were positive about the need for close proximity to public transport links, access to local shops and services and the need to minimise impact on site ecology. These are often matters that are addressed via the planning system through site allocations in local plans, policy requirements and S106 agreements.

Views on the importance of early community consultation regarding development schemes, again a requirement of the sustainability agenda, were more mixed depending on past experiences. Given the prevalence of NIMBYism some developers are clearly reluctant to engage with local communities, describing attempts as ‘counterproductive’. Others, perhaps recognising the benefits of tackling community concerns early in the planning process, placed greater importance on this, including the largest of the volume housebuilders.

The importance of providing affordable housing was also a more contentious issue due to the impact on development economics, with some developers actively avoiding schemes which would require an element of affordable housing.

Consideration of the environmental performance of buildings through the adoption of BREEAM standards was much less widespread in the industry and more commonly taken up by commercial developers.

There are some important issues in relation to this:
- there was a general lack of awareness, if not of BREEAM, then the exact standards required, especially amongst housebuilders;
- some developers claim they design to BREEAM standards but don't apply for accreditation due to cost;
- some housebuilders suggested that the cost of implementing higher environmental standards would not be met by house purchasers who aren't prepared to pay extra for them.

In public-private sector partnerships achieving higher environmental standards in building and site design is often a requirement; English Partnerships, for example, require buildings to achieve a ‘very good’ BREEAM rating\(^43\). Increasingly these matters will also be subject to regulation; consultation is currently underway for

\(^{43}\) [www.englishpartnerships.co.uk](http://www.englishpartnerships.co.uk)
changes to Part L of the Building Regulations to incorporate the requirements of the EU Energy Performance of Buildings Directive. As higher environmental standards become a necessity rather than an option, concerns about increased costs adding to the purchase price of a house will no longer be an issue for individual housebuilders but will apply equally throughout the industry.

There is a growing awareness in the development industry about the potential impacts of climate change. Consideration of possible effects is regarded as particularly important at the building design stage, probably at least partly a result of continuing changes to the Building Regulations. The impacts of most concern to developers are the possibility of rising insurance costs and increased flood risk.

5.2 Policy implications

Government policy has clearly been successful in shifting the pattern of development towards brownfield sites, but conflicting policy aims may start to create difficulties and threaten the continued success of the regeneration agenda. The attempt to reduce the amount of material going to landfill sites may slow down the development of brownfield sites as alternative methods of remediation have to be sourced and implemented and costs of disposal rise. Higher costs for dealing with contamination may threaten the viability of some brownfield redevelopments thus increasing reliance on public sector intervention. There also appears to be a greater need for the public sector to take the lead in disseminating and publicising the information that is available on alternative remediation treatments.

There are also mixed signals over the government’s continued commitment to urban regeneration with controversy over the amount of greenfield development in the growth areas and uncertainty over the direction policy will take following the Barker Review with its emphasis on increasing housing supply. This could potentially change the framework within which the development industry operates and shift resources away from brownfield development.

5.3 Further research

The survey has provided a snapshot of how the development industry is responding to government policy, but continuing research over the next 18 months will allow a more detailed investigation of issues surrounding brownfield development with reference to specific case studies. This local-level research may provide the opportunity to gain further insight into how smaller housebuilders are approaching brownfield development.

Issues to be addressed will include:

5.3.1 The development industry

- To what extent has brownfield development encouraged innovation in the development process and products used?
- What are the barriers to introducing more innovative methods of construction?
- To what degree are developers considering ‘sustainability’ in the development process and end product in relation to case study sites?
- At what stage in the development process do developers engage with other stakeholders including the local community, local authority officers, environmental consultants / engineers, statutory bodies? Can interaction be improved?
How do developers manage risk with reference to specific sites?

What are the decision-making processes in relation to deciding which method(s) will be used in cleaning up contaminated sites? What information sources do developers draw on? What role do external consultants have?

What impact does post-remediation stigma have on marketing times and end values? On remediated sites, to what extent, if at all, is the site history communicated to purchasers?

5.3.2 Policy and regulation

What are the main constraints to achieving brownfield development from different perspectives (e.g., developers, planning officers, etc.)?

How could the regulatory framework be streamlined?

What impact has the EU Landfill Directive had on the redevelopment of particular sites in terms of timescale and costs?

In regeneration areas where public sector intervention is often required to stimulate development, to what extent are current initiatives working (with reference to case study sites in the Thames Gateway and Greater Manchester)?

5.3.3 International experience

Can any lessons be learnt from approaches to brownfield redevelopment in other countries? In particular, we hope that we will engage with existing research programmes in Europe and USA. Current examples include CABERNET and NICOLE.44

Ultimately, the aim of the research is to produce recommendations and guidance in the form of a decision-making tool kit which will:

- Enable the range of actors and interests involved in the development process to better engage.
- Provide opportunities for using different remediation strategies and techniques, including the potential for process and product innovation, to be assessed.
- Enable associated barriers to the development and the reuse of brownfield sites to be overcome.

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44 Recent research projects, such as CARACAS (Concerted Action on Risk Assessment for Contaminated Sites in Europe) and NICOLE (Network on Industrially Contaminated Land in Europe), have been established to disseminate knowledge for dealing with contaminated sites in urban regeneration projects across Europe. Northern Europe appears to be leading the way in the development of alternative, and more sustainable, remediation technologies. Other countries, for example Belgium, have set up a specific body, OVAM (Openbare Afvalstoffenmaatschappij voor het Vlaams Gewest), to implement and monitor the clean-up of contaminated sites. Extensive, and full, national registers of polluted sites provide a step in the right direction for brownfield redevelopment, and such approaches provide food for thought for UK practice and policy.
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APPENDIX 1: QUESTIONNAIRE SURVEYS

Commercial Developers' Questionnaire – Part 1
Residential Developers' Questionnaire – Part 1
Commercial Developers' Questionnaire – Part 2
Residential Developers' Questionnaire – Part 2
Brownfield Development Research

Commercial Developers’ Questionnaire

The College of Estate Management is reviewing the role of the development industry in brownfield regeneration as part of a consortium study into brownfields* (SUBR:JM) funded by the Engineering and Physical Science Research Council (EPSRC), with high level support from government and the property industry. The results of the research will be disseminated to policy makers and government advisors.

This questionnaire survey comprises the first phase of the project. It should only take around 10 minutes to complete and you will receive a summary of the results once the research is complete.

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Contaminated land includes sites defined under Part II A of the Environmental Protection Act 1990 but also land where contamination may become an issue through change of use as in “land which has substances in, on or under it which, subject to investigation, might require measures to be undertaken to make the land suitable for a particular use” (BURA 2001).

YOUR ORGANISATION AND BROWNFIELD DEVELOPMENT

The information provided in this section will help with classification and statistical comparisons and will be treated in a strictly confidential manner.

Please fill in the following details (or attach business card)

Name: ____________________________

Position: __________________________

Company: _________________________

Q1 In which of the following UK regions does your company operate? (Please tick all that apply)

All UK regions

- London
- SE
- SW
- East
- East Midlands
- West Midlands
- Yorks & Humber
- N.W
- N.E
- Scotland
- Wales
- N.Ireland

Q2 In which of the following sectors is your organisation active in developing property? (Please tick all that apply)

- Retail
- Leisure (excl. bars & restaurants)
- Offices
- Industrial
- Residential
The role of the UK development industry in brownfield regeneration

**YOUR ORGANISATION AND BROWNFIELD DEVELOPMENT cont...**

Q3 If you undertake commercial development only at present, do you see your organisation moving into residential development in the next 5 years? (Please tick appropriate box)

- [ ] Yes – through direct company involvement
- [ ] Yes – through joint ventures with residential developer(s)
- [ ] No
- [ ] Don't know
- [ ] Not applicable

Q4 Please indicate your annual completions for 2003 or your latest financial year (either as total commercial area or sectoral breakdown)

<table>
<thead>
<tr>
<th>Commercial</th>
<th>Total sq ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail</td>
<td>sq ft</td>
</tr>
<tr>
<td>Leisure (incl. bars/restaurants)</td>
<td>sq ft</td>
</tr>
<tr>
<td>Offices</td>
<td>sq ft</td>
</tr>
<tr>
<td>Industrial</td>
<td>sq ft</td>
</tr>
<tr>
<td>Residential</td>
<td>Units</td>
</tr>
</tbody>
</table>

Q5 Please indicate the approximate split of completions by type of site for your latest financial year:

<table>
<thead>
<tr>
<th>% Brownfield</th>
<th>% Greenfield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial</td>
<td>% Total area (sq ft)</td>
</tr>
<tr>
<td>Residential (if applicable)</td>
<td>% Total units</td>
</tr>
</tbody>
</table>

Q6 Of the completions on brownfield sites over the last year, what proportion were sites with contamination which required remediation?

- [ ] % Brownfield sites contaminated

Q7a How has the amount of development on brownfield sites undertaken by your organisation changed over the past 5 years? (Please tick the relevant box)

- [ ] Increased significantly
- [ ] Increased slightly
- [ ] Stayed the same
- [ ] Decreased slightly
- [ ] Decrease significantly

Q7b Please indicate the reasons for your answer to Q7a (tick all that apply)

- [ ] Due to the direction of the government's planning policies
- [ ] In accordance with company's own environmental policy
- [ ] Changes in the availability of suitable land
- [ ] The opportunity for profitable development
- [ ] Competitive advantage
- [ ] Meeting customer preferences
- [ ] Land values prohibitively high
- [ ] Additional risk and costs associated with developing on brownfield sites
- [ ] Other (please state below):

Q8a Do you think the amount of development you undertake on brownfield sites over the next 5 years will:

- [ ] Increase significantly
- [ ] Increase slightly
- [ ] Stay the same
- [ ] Decrease slightly
- [ ] Decrease significantly

Q8b Please indicate the reasons for your answer to Q8a (tick all that apply)

- [ ] Due to the direction of the government's planning policies
- [ ] In accordance with company's own environmental policy
- [ ] Changes in the availability of suitable land
- [ ] The opportunity for profitable development
- [ ] Competitive advantage
- [ ] Meeting customer preferences
- [ ] Land values prohibitively high
- [ ] Additional risk and costs associated with developing on brownfield sites
- [ ] Other (please state below):

Q9a Has your organisation been involved with any brownfield schemes using public sector funding over the last 5 years?

- [ ] No Please go to Q10
- [ ] Yes Please go to Q9b

Q9b Please list the sources of public sector funding you have used over the past 5 years:

---

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The role of the UK development industry in brownfield regeneration

YOUR ORGANISATION AND BROWNFIELD DEVELOPMENT cont...

Q10 Is your company generally willing to undertake development on contaminated sites?

Yes [ ]
No [ ]

Please go to Q11

If no, please give reasons: ______________________

__________________________ Please go to Q12

Q11 From July 2004 the EU Landfill Directive bans the co-disposal of hazardous and non-hazardous wastes. It is predicted that there will be a shortage of hazardous waste sites, leading to constraints on capacity and an increase in the cost of transporting waste.

a) Is your company investigating alternative remediation methods to excavation and disposal in landfill? (please tick)

Yes [ ]
No [ ]
Don’t know [ ]

b) Is the Directive likely to discourage your company from undertaking development on contaminated land?

Yes [ ]
No [ ]
Don’t know [ ]

Q12 Would you be willing to participate in an interview to enable us to explore some of the issues raised in this questionnaire further?

Yes [ ]
No [ ]

Q13 As a second stage of the research we would like to send your organisation a short questionnaire on issues relating to sustainability and dealing with contaminated land. We would be grateful if you could give us an appropriate contact within your company who would be able to answer these questions.

Name: ________________________________

E-mail address: ________________________

Thank you for your assistance with this questionnaire

We will send you a summary of the findings when the research is complete
Brownfield Development Research

Residential Developers’ Questionnaire

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1. YOUR ORGANISATION

Please fill in the following details (or attach business card)

Name: ____________________________
Position: __________________________
Company: _________________________

Q1 In which of the following UK regions does your company operate? (please tick all that apply)

- All UK regions
- London
- SE
- SW
- East
- West Midlands
- East Midlands
- Yorkshire & Humber
- N West
- NI
- Wales
- Scotland
- N Ireland

Q2 As well as residential, is your organisation involved in developing property in any of the following sectors? (please tick all that apply)

- Retail
- Leisure (incl. bars & restaurants)
- Offices
- Industrial

Q3 What form does this involvement take?

- Direct company involvement
- Joint ventures with other developers
- Other (please state below): ____________________________

Please turn over
## 2. RESIDENTIAL DEVELOPMENT AND BROWNFIELD SITES

The following questions relate to residential development. The information provided in this section will help with classification and statistical comparisons and will be treated in a strictly confidential manner.

### Q4a Please indicate your annual completions for 2003 or your latest financial year:
- [ ] total housing units of which:
  - [ ] social housing units

*% developed under S106 agreement / for housing association

### Q4b Please indicate the proportion of your latest annual completions by product type:

<table>
<thead>
<tr>
<th></th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>New build</td>
<td></td>
</tr>
<tr>
<td>Conversions / refurb</td>
<td></td>
</tr>
</tbody>
</table>

### Q4c flats:
- Terraces / town houses
- Semi-detached houses
- Detached houses
- Other

### Q6 What was the average selling price of your residential units in 2002 or your latest financial year? (Please tick appropriate box)
- [ ] < £100,000
- [ ] £100,000-£150,000
- [ ] £150,001-£200,000
- [ ] £200,001-£250,000
- [ ] £250,001-£300,000
- [ ] £300,001-£350,000
- [ ] £350,001-£400,000
- [ ] > £400,000

### Q7a Please indicate the split of housing unit completions by type of site for 2003 or latest financial year:
- [ ] % brownfield
- [ ] % greenfield

### Q7b Of the completions on brownfield sites over the past year, what proportion were sites with contamination which required remediation?
- [ ] % brownfield sites contaminated

### Q8a How much land with planning consent do you hold in your land bank? (Please tick appropriate box)

<table>
<thead>
<tr>
<th>Number of plots</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-500</td>
</tr>
<tr>
<td>501-1,000</td>
</tr>
<tr>
<td>1,001-2,000</td>
</tr>
<tr>
<td>2,001-5,000</td>
</tr>
<tr>
<td>5,001-10,000</td>
</tr>
<tr>
<td>10,001-20,000</td>
</tr>
<tr>
<td>20,001-30,000</td>
</tr>
<tr>
<td>&gt; 30,000</td>
</tr>
</tbody>
</table>

### Q8b What is the composition of plots in your land bank in terms of brownfield / greenfield split?

<table>
<thead>
<tr>
<th>% of total plots</th>
</tr>
</thead>
<tbody>
<tr>
<td>% brownfield</td>
</tr>
<tr>
<td>% greenfield</td>
</tr>
</tbody>
</table>

### Q8c Are you prepared to hold contaminated sites in your land bank? (Please tick appropriate box)

- [ ] Yes, under certain conditions

### Q9a How has the amount of development on brownfield sites undertaken by your organisation changed over the past 5 years? (Please tick the relevant box)

- Increased significantly
- Increased slightly
- Stayed the same
- Decreased slightly
- Decreased significantly

### Q9b Please indicate the reasons for your answer to Q9a (tick all that apply)

- due to the direction of the government’s planning policies
- In accordance with company’s own environmental policy
- Changes in the availability of suitable land
- The opportunity for profitable development
- Competitive advantage
- Meeting customer preferences
- Land values prohibitively high
- Additional risk and costs associated with developing on brownfield sites
- Other (please state below):

---
2. RESIDENTIAL DEVELOPMENT AND BROWNFIELD SITES cont...

Q10a Do you think the amount of development you undertake on brownfield sites over the next 5 years will:
(please tick the relevant box)
- Increase significantly?
- Increase slightly?
- Stay the same?
- Decrease slightly?
- Decrease significantly?

Q10b Please indicate the reasons for your answer to Q10a (tick all that apply)
- Due to the direction of the government’s planning policies
- In accordance with company’s own environmental policy
- Changes in the availability of suitable land
- The opportunity for profitable development
- Competitive advantage
- Meeting customer preferences
- Land values prohibitively high
- Additional risk and costs associated with developing on brownfield sites
- Other (please state below):

Q11a Has your organisation been involved with any brownfield schemes using public sector funding over the last 5 years?
- Yes
- No
- Please go to Q12

Q11b Please list the sources of public sector funding you have used over the past 5 years:

Q12 If the recommendations of the Barker Review into housing supply were implemented as a package, what impact do you think this would have on increasing housing supply:
Please circle the appropriate values

<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Negative Impact</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>on brownfield sites?</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>on greenfield sites?</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

Q13 Is your company generally willing to undertake development on contaminated sites?
- Yes
- No
- Please go to Q14

If no, please give reasons:

Q14 From July 2004 the EU Landfill Directive bans the co-disposal of hazardous and non-hazardous wastes. It is predicted that there will be a shortage of hazardous waste sites, leading to constraints on capacity and an increase in the cost of transporting waste.

a) Is your company investigating alternative remediation methods to excavation and disposal in landfill?
- Yes
- No
- Don’t know

b) Is the Directive likely to discourage your company from undertaking development on contaminated land?
- Yes
- No
- Don’t know

Q15 Would you be willing to participate in an interview to enable us to explore some of the issues raised in this questionnaire further?
- Yes
- No

Q16 As a second stage of the research we would like to send your organisation a short questionnaire on issues relating to sustainability and dealing with contaminated land. We would be grateful if you could give us an appropriate contact within your company who would be able to answer these questions.

Name: ____________________________________________

E-mail address: ________________________________________

Thank you for your assistance with this questionnaire

We will send you a summary of the findings when the research is complete
Brownfield Development Research
Commercial Developers’ Questionnaire - 2
Contamination & Sustainability

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We would be grateful if you could return this questionnaire in the pre-paid envelope by Monday 26th July at the latest.

Please fill in the following details (or attach business card)

Name:__________________________________________
Position:_______________________________________
Company:_____________________________________

Q1 Does your company undertake development on contaminated sites? (please tick)

Yes ☐ Please go to Q2

No ☐ Please go to Q7
The role of the UK development industry in brownfield regeneration

**SITE ASSESSMENT AND CONTAMINATION**

Q2 Of the following remediation methods:  

<table>
<thead>
<tr>
<th>Method</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>excavation &amp; removal to landfill (&quot;dig &amp; dump&quot;)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>barrier methods / containment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>soil washing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>soil vapour extraction / air venting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bioremediation (eg bioreventing, biopiles) / phyto remediation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>chemical treatments (eg oxidation / solvent extraction)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>solidification / stabilisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>thermal processes (eg desorption, incineration)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>electrokinetic extraction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(c) Are there any other techniques you have used on site (please state):  

__________________________________________________________

Q3 Do you consider that you have adequate access to independent sources of information on remediation techniques?  

Yes [ ]  

No [ ]

Q4 Do you think that there have been recent advances in remediation technology in terms of:  

(please tick all that apply)

<table>
<thead>
<tr>
<th>Advance</th>
<th>Significant advance</th>
<th>Some advance</th>
<th>Neutral</th>
<th>Disadvantage</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a greater choice of solutions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>more effective and reliable end results</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>improved sustainability of techniques</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lower cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

other (please state):  

__________________________________________________________

Q5 In your experience of remediated sites, how significant are concerns about previous contamination amongst the following groups (for example expressed in terms of increased marketing time or impact on values)?  

(please tick the relevant boxes)

<table>
<thead>
<tr>
<th>Group</th>
<th>Very significant</th>
<th>Significant</th>
<th>Neutral</th>
<th>Significant</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial purchasers (owner occupiers) / tenants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial valuers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial investors / lenders</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The role of the UK development industry in brownfield regeneration

SITE ASSESSMENT AND CONTAMINATION cont...

Q6 How frequently have you used any of the following to manage the additional risks of developing on contaminated sites?

- Always
- Often
- Sometimes
- Rarely
- Never

contractor warranties / indemnities
fixed price remediation contracts
environmental impairment liability insurance
bespoke outsourcing of liability (e.g. Active Transfer)
other (please state): ____________________________

SUSTAINABILITY

Q7 Does your company have a formal environmental policy or statement?

- Yes
- No
- Don’t know

Q8 Does your company have a formal target for re-using brownfield land? If so please state:

Yes % (proportion of all new development)
No
Don’t know

Q9 In what proportion of new developments do you aim to achieve at least the minimum BREEAM [PASS] standard? (please tick the relevant boxes)

Commercial

- None
- 1%-9%
- 10%-24%
- 25%-49%
- 50%-74%
- 75%-99%
- 100%
- Don’t know

Residential – EcoHomes (if applicable)

- None
- 1%-9%
- 10%-24%
- 25%-49%
- 50%-74%
- 75%-99%
- 100%
- Don’t know

Q10 How much importance do you place on the following factors when developing on brownfield sites? (please tick the relevant boxes)

- Very important
- Important
- Neutral
- Unimportant
- Don’t know

early consultation with local community
accessibility to local public transport links
access to local shops and services
provision of affordable housing
minimising impact on local ecology in site design
provision of open space in site layout
other (please state): ____________________________

PLEASE TURN OVER
The role of the UK development industry in brownfield regeneration

SUSTAINABILITY cont...

Q11) Do you monitor the sustainability of your brownfield developments from the start of the project through to completion?

Never/Rarely
Occasionally
Sometimes
Frequently
Always

If yes, what is your preferred way of monitoring?

Q12) In developing on brownfield sites in areas at risk from flooding, how frequently do you implement the following mitigation measures?

- Alteration of site layout (e.g. open space in higher risk areas)
- Alteration of building design (e.g. less sensitive uses at lower levels)
- Provision of sustainable drainage systems
- Allocation of land within site layout for future flood defences
- Provision of flood defences
- Other (please state):

Q13) How important do you think it is to consider the potential impacts of climate change in the following stages of the development process? (please tick the relevant boxes)

- Site remediation
- Masterplan/site layout
- Building design
- Construction process

Q14) Which of the following potential climate change impacts are of most concern to you?

- Rising insurance costs
- Increased flood risk
- Increasing average temperatures
- Increase in severity and frequency of storms
- Increase in risk of failure of remediation schemes
- Other (please state):

Q15) Would you be willing to participate in an interview to enable us to explore some of the issues raised in this questionnaire further? Yes ☐ No ☐

Thank you for your assistance with this questionnaire
Brownfield Development Research
Residential Developers’ Questionnaire - 2
Contamination & Sustainability

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Please fill in the following details (or attach business card)

Name: ____________________________________________
Position: _________________________________________
Company: _________________________________________

Q1 Does your company undertake development on contaminated sites? (please tick)

Yes Please go to Q2
No Please go to Q7

PLEASE TURN OVER
The role of the UK development industry in brownfield regeneration

**SITE ASSESSMENT AND CONTAMINATION**

Q2 Of the following remediation methods:

<table>
<thead>
<tr>
<th>Remediation Method</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavation &amp; removal to landfill (&quot;dig &amp; dump&quot;)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barrier methods / containment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil washing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil vapour extraction / air venting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bioremediation (e.g., bioventing, bioreactors) / phytoventing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical treatments (e.g., oxidation / solvent extraction)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solidification / stabilisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal processes (e.g., desorption, incineration)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrokinetic extraction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a) Which are you aware of? (please tick)

b) How frequently have you used each method?

---

c) Are there any other techniques you have used on site (please state):

---

Q3 Do you consider that you have adequate access to independent sources of information on remediation techniques?

Yes [ ]

No [ ]

Q4 Do you think that there have been recent advances in remediation technology in terms of:

(please tick all that apply)

- A greater choice of solutions
- More effective and reliable results
- Improved sustainability of techniques
- Lower cost

Other (please state):

---

Q5 In your experience of remediated sites, how significant are concerns about previous contamination amongst the following groups (for example, expressed in terms of increased marketing time or impact on values)?

(please tick the relevant boxes)

- Residential purchasers - owner occupiers
- Residential investors (e.g., buy to let)
- Residential tenants
- Residential valuers
- Residential mortgage lenders

---

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The role of the UK development industry in brownfield regeneration

### SITE ASSESSMENT AND CONTAMINATION cont...

Q6 How frequently have you used any of the following to manage the additional risks of developing on contaminated sites?

<table>
<thead>
<tr>
<th>Contractor warranties / indemnities</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed price remediation contracts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental impairment liability insurance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bespoke outsourcing of liability (eg Active Transfer)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please state):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SUSTAINABILITY

Q7 Does your company have a formal environmental policy or statement?

- [ ] Yes
- [ ] No
- [ ] Don't know

Q8 Does your company have a formal target for re-using brownfield land? If so please state:

- [ ] Yes
- [ ] No
- [ ] Don't know

Q9 In what proportion of new developments do you aim to achieve at least the minimum BREEAM [PASS] standard? (please tick the relevant box)

- [ ] Residential
- [ ] (EcoHomes)

<table>
<thead>
<tr>
<th>0%</th>
<th>1% - 9%</th>
<th>10% - 24%</th>
<th>25% - 49%</th>
<th>50% - 74%</th>
<th>75% - 99%</th>
<th>100%</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q10 How much importance do you place on the following factors when developing on brownfield sites? (please tick the relevant boxes)

- [ ] Early consultation with local community
- [ ] Accessibility to local public transport links
- [ ] Access to local shops and services
- [ ] Provision of affordable housing
- [ ] Minimising impact on local ecology in site design
- [ ] Provision of open space in site layout

Other (please state):
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**SUSTAINABILITY cont...**

**Q11** Do you monitor the sustainability of your brownfield developments from the start of the project through to completion?

- Never/Not at all
- Occasionally
- Sometimes
- Frequently
- Always

If yes, what is your preferred way of monitoring?

**Q12** In developing on brownfield sites in areas at risk from flooding, how frequently do you implement the following mitigation measures?

- Alteration of site layout (e.g. open space in higher risk areas)
- Alteration of building design (e.g. less sensitive uses at lower levels)
- Provision of sustainable drainage systems
- Allocation of land within site layout for future flood defences
- Provision of flood defences

Other (please state):

**Q13** How important do you think it is to consider the potential impacts of climate change in the following stages of the development process? (Please tick the relevant boxes)

- Site remediation
- Masterplan / site layout
- Building design
- Construction process

**Q14** Which of the following potential climate change impacts are of most concern to you?

- Rising insurance costs
- Increased flood risk
- Increasing average temperatures
- Increase in severity and frequency of storms
- Increase in risk of failure of remediation schemes

Other (please state):

**Q15** Would you be willing to participate in an interview to enable us to explore some of the issues raised in this questionnaire further?  Yes  No

Thank you for your assistance with this questionnaire
APPENDIX 2: ADDITIONAL SURVEY TABLES

Table A1: Average % completions on brownfield over past year: by size and change in amount of brownfield development over past 5 years (housebuilders)

<table>
<thead>
<tr>
<th>Size</th>
<th>Increased significantly</th>
<th>Increased slightly</th>
<th>Stayed the same</th>
<th>Decreased slightly</th>
<th>Decreased significantly</th>
<th>Average</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10 units</td>
<td>92</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td>94</td>
<td>9</td>
</tr>
<tr>
<td>11-30 units</td>
<td>63</td>
<td>56</td>
<td>91</td>
<td></td>
<td></td>
<td>72</td>
<td>23</td>
</tr>
<tr>
<td>31-100 units</td>
<td>82</td>
<td>66</td>
<td>83</td>
<td>80</td>
<td></td>
<td>78</td>
<td>41</td>
</tr>
<tr>
<td>101-500 units</td>
<td>79</td>
<td>65</td>
<td>85</td>
<td></td>
<td></td>
<td>74</td>
<td>26</td>
</tr>
<tr>
<td>501-2000 units</td>
<td>67</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
<td>81</td>
<td>6</td>
</tr>
<tr>
<td>2000+ units</td>
<td>62</td>
<td>87</td>
<td></td>
<td></td>
<td></td>
<td>71</td>
<td>6</td>
</tr>
<tr>
<td>Average</td>
<td>79</td>
<td>64</td>
<td>89</td>
<td>80</td>
<td></td>
<td>77</td>
<td>112</td>
</tr>
</tbody>
</table>

Table A2: Average % completions on brownfield over past year: by size and change in amount of brownfield development over past 5 years (commercial developers)

<table>
<thead>
<tr>
<th>Size</th>
<th>Increased significantly</th>
<th>Increased slightly</th>
<th>Stayed the same</th>
<th>Decreased slightly</th>
<th>Decreased significantly</th>
<th>Average</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>60</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td>80</td>
<td>5</td>
</tr>
<tr>
<td>&lt; 100,000 sq ft</td>
<td>75</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td>94</td>
<td>10</td>
</tr>
<tr>
<td>100,000 - 249,000 sq ft</td>
<td>81</td>
<td>72</td>
<td>100</td>
<td></td>
<td></td>
<td>80</td>
<td>15</td>
</tr>
<tr>
<td>250,000 - 499,000 sq ft</td>
<td>73</td>
<td>75</td>
<td>98</td>
<td></td>
<td></td>
<td>87</td>
<td>9</td>
</tr>
<tr>
<td>500,000 sq ft +</td>
<td>75</td>
<td>75</td>
<td>100</td>
<td></td>
<td></td>
<td>83</td>
<td>6</td>
</tr>
<tr>
<td>Average</td>
<td>78</td>
<td>75</td>
<td>99</td>
<td></td>
<td></td>
<td>84</td>
<td>46</td>
</tr>
</tbody>
</table>

Table A3: Change in the amount of brownfield development over the next 5 years (housebuilders)

<table>
<thead>
<tr>
<th>Size</th>
<th>Increase significantly</th>
<th>Increase slightly</th>
<th>Stay the same</th>
<th>Decrease slightly</th>
<th>Decrease significantly</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10 units</td>
<td>33%</td>
<td>67%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>9</td>
</tr>
<tr>
<td>11-30 units</td>
<td>17%</td>
<td>48%</td>
<td>35%</td>
<td>0%</td>
<td>0%</td>
<td>23</td>
</tr>
<tr>
<td>31-100 units</td>
<td>24%</td>
<td>37%</td>
<td>37%</td>
<td>0%</td>
<td>2%</td>
<td>41</td>
</tr>
<tr>
<td>101-500 units</td>
<td>31%</td>
<td>42%</td>
<td>19%</td>
<td>4%</td>
<td>4%</td>
<td>26</td>
</tr>
<tr>
<td>501-2000 units</td>
<td>17%</td>
<td>17%</td>
<td>67%</td>
<td>0%</td>
<td>0%</td>
<td>6</td>
</tr>
<tr>
<td>2000+ units</td>
<td>33%</td>
<td>33%</td>
<td>33%</td>
<td>0%</td>
<td>0%</td>
<td>6</td>
</tr>
<tr>
<td>Average</td>
<td>25%</td>
<td>41%</td>
<td>31%</td>
<td>1%</td>
<td>2%</td>
<td>112</td>
</tr>
</tbody>
</table>
Table A4: Change in the amount of brownfield development over the next 5 years (commercial developers)

<table>
<thead>
<tr>
<th>Size</th>
<th>Increase significantly</th>
<th>Increase slightly</th>
<th>Stay the same</th>
<th>Decrease slightly</th>
<th>Decrease significantly</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>40%</td>
<td>40%</td>
<td>20%</td>
<td>0%</td>
<td>0%</td>
<td>5</td>
</tr>
<tr>
<td>&lt; 100,000 sq ft</td>
<td>40%</td>
<td>20%</td>
<td>40%</td>
<td>0%</td>
<td>0%</td>
<td>10</td>
</tr>
<tr>
<td>100,000 - 249,000 sq ft</td>
<td>27%</td>
<td>53%</td>
<td>13%</td>
<td>7%</td>
<td>0%</td>
<td>15</td>
</tr>
<tr>
<td>250,000 - 499,000 sq ft</td>
<td>11%</td>
<td>44%</td>
<td>44%</td>
<td>0%</td>
<td>0%</td>
<td>9</td>
</tr>
<tr>
<td>500,000 sq ft +</td>
<td>33%</td>
<td>17%</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
<td>6</td>
</tr>
<tr>
<td>Average</td>
<td>30%</td>
<td>37%</td>
<td>30%</td>
<td>2%</td>
<td>0%</td>
<td>46</td>
</tr>
</tbody>
</table>

Table A5: Average % completions on brownfield over past year: by size and change in amount of brownfield development over next 5 years (housebuilders)

<table>
<thead>
<tr>
<th>Change in amount of brownfield development over next 5 years</th>
<th>Size</th>
<th>Increase significantly</th>
<th>Increase slightly</th>
<th>Stay the same</th>
<th>Decrease slightly</th>
<th>Decrease significantly</th>
<th>Average</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-10 units</td>
<td>100</td>
<td>90</td>
<td>86</td>
<td>94</td>
<td>94</td>
<td>99</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>11-30 units</td>
<td>78</td>
<td>60</td>
<td>86</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>31-100 units</td>
<td>52</td>
<td>78</td>
<td>95</td>
<td>80</td>
<td>80</td>
<td>79</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>101-500 units</td>
<td>75</td>
<td>73</td>
<td>73</td>
<td>100</td>
<td>100</td>
<td>99</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>501-2000 units</td>
<td>61</td>
<td>70</td>
<td>89</td>
<td>81</td>
<td>81</td>
<td>81</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>2000+ units</td>
<td>59</td>
<td>72</td>
<td>81</td>
<td>71</td>
<td>71</td>
<td>71</td>
<td>6</td>
</tr>
<tr>
<td>Average</td>
<td>68</td>
<td>73</td>
<td>88</td>
<td>100</td>
<td>75</td>
<td>75</td>
<td>77</td>
<td>112</td>
</tr>
</tbody>
</table>

Table A6: Average % completions on brownfield over past year: by size and change in amount of brownfield development over next 5 years (commercial developers)

<table>
<thead>
<tr>
<th>Change in amount of brownfield development over next 5 years</th>
<th>Size</th>
<th>Increase significantly</th>
<th>Increase slightly</th>
<th>Stay the same</th>
<th>Decrease slightly</th>
<th>Decrease significantly</th>
<th>Average</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>60</td>
<td>100</td>
<td>100</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>&lt; 100,000 sq ft</td>
<td>88</td>
<td>100</td>
<td>100</td>
<td>94</td>
<td>94</td>
<td>94</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>100,000 - 249,000 sq ft</td>
<td>68</td>
<td>81</td>
<td>90</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>250,000 - 499,000 sq ft</td>
<td>45</td>
<td>85</td>
<td>100</td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>500,000 sq ft +</td>
<td>50</td>
<td>100</td>
<td>100</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>6</td>
</tr>
<tr>
<td>Average</td>
<td>67</td>
<td>86</td>
<td>98</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>46</td>
</tr>
</tbody>
</table>
The role of the UK development industry in brownfield regeneration

### Table A7: Frequency of use of warranties and insurance products by housebuilder size

<table>
<thead>
<tr>
<th></th>
<th>Contractor warranties / indemnities</th>
<th>Fixed price remediation contracts</th>
<th>Environm’t impairment liability insurance</th>
<th>Bespoke outsourcing of liability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10 units</td>
<td>3.0</td>
<td>2.0</td>
<td>1.6</td>
<td>1.4</td>
</tr>
<tr>
<td>11-30 units</td>
<td>2.9</td>
<td>2.7</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>31-100 units</td>
<td>3.4</td>
<td>3.0</td>
<td>1.2</td>
<td>1.4</td>
</tr>
<tr>
<td>101-500 units</td>
<td>3.1</td>
<td>2.7</td>
<td>1.5</td>
<td>1.9</td>
</tr>
<tr>
<td>501-2000 units</td>
<td>2.0</td>
<td>2.5</td>
<td>1.5</td>
<td>1.0</td>
</tr>
<tr>
<td>2000+ units</td>
<td>4.3</td>
<td>4.3</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>3.2</td>
<td>2.8</td>
<td>1.3</td>
<td>1.5</td>
</tr>
</tbody>
</table>

*Average score where 1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always*

### Table A8: Frequency of use of warranties and insurance products by size (commercial developers)

<table>
<thead>
<tr>
<th></th>
<th>Contractor warranties / indemnities</th>
<th>Fixed price remediation contracts</th>
<th>Environm’t impairment liability insurance</th>
<th>Bespoke outsourcing of liability</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>2.3</td>
<td>1.0</td>
<td>2.0</td>
<td>1.0</td>
</tr>
<tr>
<td>&lt; 100,000 sq ft</td>
<td>3.7</td>
<td>3.0</td>
<td>1.3</td>
<td>1.0</td>
</tr>
<tr>
<td>100,000 - 249,000 sq ft</td>
<td>4.6</td>
<td>3.6</td>
<td>1.5</td>
<td>1.1</td>
</tr>
<tr>
<td>250,000 - 499,000 sq ft</td>
<td>4.5</td>
<td>2.7</td>
<td>2.2</td>
<td>1.0</td>
</tr>
<tr>
<td>500,000 sq ft +</td>
<td>5.0</td>
<td>3.3</td>
<td>2.0</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>4.3</td>
<td>3.0</td>
<td>1.8</td>
<td>1.1</td>
</tr>
</tbody>
</table>

*Average score where 1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always*

### Table A9: Housebuilders’ opinions on post-remediation stigma by size

<table>
<thead>
<tr>
<th></th>
<th>Residential purchasers (owner occupiers)</th>
<th>Residential investors (eg buy to let)</th>
<th>Residential tenants</th>
<th>Residential valuers</th>
<th>Residential mortgage lenders</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10 units</td>
<td>3.4</td>
<td>2.7</td>
<td>2.3</td>
<td>3.4</td>
<td>3.8</td>
</tr>
<tr>
<td>11-30 units</td>
<td>3.4</td>
<td>2.7</td>
<td>2.2</td>
<td>3.6</td>
<td>3.4</td>
</tr>
<tr>
<td>31-100 units</td>
<td>2.6</td>
<td>2.2</td>
<td>2.0</td>
<td>3.2</td>
<td>3.2</td>
</tr>
<tr>
<td>101-500 units</td>
<td>2.8</td>
<td>2.3</td>
<td>1.7</td>
<td>2.9</td>
<td>3.0</td>
</tr>
<tr>
<td>501-2000 units</td>
<td>2.5</td>
<td>2.0</td>
<td>2.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>2000+ units</td>
<td>2.7</td>
<td>1.7</td>
<td>2.0</td>
<td>2.7</td>
<td>2.7</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>2.8</td>
<td>2.3</td>
<td>2.0</td>
<td>3.2</td>
<td>3.2</td>
</tr>
</tbody>
</table>

*Average score (excl. "don’t knows") where 1 = insignificant, 2 = neutral, 3 = significant, 4 = very significant*
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Table A10: Commercial developers’ opinions on post-remediation stigma by size

<table>
<thead>
<tr>
<th>Size</th>
<th>Commercial purchasers (owners occupiers) / tenants</th>
<th>Commercial valuers</th>
<th>Commercial investors / lenders</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>2.5</td>
<td>3.0</td>
<td>3.5</td>
</tr>
<tr>
<td>&lt; 100,000 sq ft</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>100,000 - 249,000 sq ft</td>
<td>3.4</td>
<td>3.1</td>
<td>3.4</td>
</tr>
<tr>
<td>250,000 - 499,000 sq ft</td>
<td>3.3</td>
<td>3.2</td>
<td>3.5</td>
</tr>
<tr>
<td>500,000 sq ft +</td>
<td>3.3</td>
<td>3.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Average</td>
<td>3.2</td>
<td>3.1</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Average score (excl. "don’t knows") where 1 = insignificant, 2 = neutral, 3 = significant, 4 = very significant

Table A11: Impact of EU Landfill Directive on development of contaminated land by area of operation

<table>
<thead>
<tr>
<th>Region</th>
<th>Don’t know</th>
<th>Won’t discourage</th>
<th>Will discourage</th>
<th>Sample size*</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Midlands</td>
<td>3%</td>
<td>85%</td>
<td>12%</td>
<td>34</td>
</tr>
<tr>
<td>all UK</td>
<td>8%</td>
<td>77%</td>
<td>15%</td>
<td>13</td>
</tr>
<tr>
<td>East</td>
<td>19%</td>
<td>75%</td>
<td>6%</td>
<td>16</td>
</tr>
<tr>
<td>South West</td>
<td>11%</td>
<td>70%</td>
<td>19%</td>
<td>37</td>
</tr>
<tr>
<td>Wales</td>
<td>15%</td>
<td>69%</td>
<td>15%</td>
<td>13</td>
</tr>
<tr>
<td>North West</td>
<td>8%</td>
<td>68%</td>
<td>24%</td>
<td>37</td>
</tr>
<tr>
<td>Yorks &amp; Humber</td>
<td>16%</td>
<td>66%</td>
<td>19%</td>
<td>32</td>
</tr>
<tr>
<td>London</td>
<td>17%</td>
<td>62%</td>
<td>21%</td>
<td>29</td>
</tr>
<tr>
<td>East Midlands</td>
<td>11%</td>
<td>58%</td>
<td>31%</td>
<td>36</td>
</tr>
<tr>
<td>North East</td>
<td>20%</td>
<td>53%</td>
<td>27%</td>
<td>15</td>
</tr>
<tr>
<td>South East</td>
<td>14%</td>
<td>50%</td>
<td>36%</td>
<td>58</td>
</tr>
<tr>
<td>Scotland</td>
<td>29%</td>
<td>43%</td>
<td>29%</td>
<td>21</td>
</tr>
<tr>
<td>N Ireland</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>2</td>
</tr>
</tbody>
</table>

*Adds up to more than total sample as many developers operate in more than one region
The role of the UK development industry in brownfield regeneration

Table A12: Frequency of use of different remediation technologies

<table>
<thead>
<tr>
<th></th>
<th>Commercial developers</th>
<th>Housebuilders</th>
<th>All developers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dig &amp; dump</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>0%</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>Rarely</td>
<td>15%</td>
<td>4%</td>
<td>7%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>54%</td>
<td>23%</td>
<td>33%</td>
</tr>
<tr>
<td>Always / Often</td>
<td>31%</td>
<td>67%</td>
<td>55%</td>
</tr>
<tr>
<td><strong>Barrier / containment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>27%</td>
<td>21%</td>
<td>23%</td>
</tr>
<tr>
<td>Rarely</td>
<td>23%</td>
<td>14%</td>
<td>17%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>Always / Often</td>
<td>15%</td>
<td>28%</td>
<td>24%</td>
</tr>
<tr>
<td><strong>Soil washing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>73%</td>
<td>82%</td>
<td>80%</td>
</tr>
<tr>
<td>Rarely</td>
<td>4%</td>
<td>11%</td>
<td>8%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>19%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>Always / Often</td>
<td>4%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Soil vapour extraction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>50%</td>
<td>67%</td>
<td>61%</td>
</tr>
<tr>
<td>Rarely</td>
<td>12%</td>
<td>19%</td>
<td>17%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>35%</td>
<td>5%</td>
<td>14%</td>
</tr>
<tr>
<td>Always / Often</td>
<td>4%</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Bioremediation / phytoremediation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>65%</td>
<td>75%</td>
<td>72%</td>
</tr>
<tr>
<td>Rarely</td>
<td>19%</td>
<td>12%</td>
<td>14%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>15%</td>
<td>9%</td>
<td>11%</td>
</tr>
<tr>
<td>Always / Often</td>
<td>0%</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Chemical treatments</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>69%</td>
<td>86%</td>
<td>81%</td>
</tr>
<tr>
<td>Rarely</td>
<td>12%</td>
<td>5%</td>
<td>7%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>15%</td>
<td>7%</td>
<td>10%</td>
</tr>
<tr>
<td>Always / Often</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Solidification / stabilisation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>54%</td>
<td>67%</td>
<td>63%</td>
</tr>
<tr>
<td>Rarely</td>
<td>0%</td>
<td>12%</td>
<td>8%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>42%</td>
<td>12%</td>
<td>22%</td>
</tr>
<tr>
<td>Always / Often</td>
<td>0%</td>
<td>7%</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Thermal processes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>77%</td>
<td>89%</td>
<td>86%</td>
</tr>
<tr>
<td>Rarely</td>
<td>4%</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>15%</td>
<td>2%</td>
<td>6%</td>
</tr>
<tr>
<td>Always / Often</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Electrokinetic extraction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>92%</td>
<td>95%</td>
<td>94%</td>
</tr>
<tr>
<td>Rarely</td>
<td>0%</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>4%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Always / Often</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
The role of the UK development industry in brownfield regeneration

Table A13: Frequency of use by housebuilders of different remediation technologies by size

<table>
<thead>
<tr>
<th>Technology</th>
<th>1-10 units</th>
<th>11-30 units</th>
<th>31-100 units</th>
<th>101-500 units</th>
<th>501-2000 units</th>
<th>2000+ units</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavation &amp; removal to landfill</td>
<td>5.0</td>
<td>3.8</td>
<td>3.6</td>
<td>3.8</td>
<td>4.0</td>
<td>3.0</td>
<td>3.8</td>
</tr>
<tr>
<td>Barrier methods / containment</td>
<td>2.0</td>
<td>2.4</td>
<td>2.7</td>
<td>2.8</td>
<td>3.5</td>
<td>3.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Soil washing</td>
<td>1.5</td>
<td>1.0</td>
<td>1.2</td>
<td>1.1</td>
<td>1.0</td>
<td>2.3</td>
<td>1.2</td>
</tr>
<tr>
<td>Soil vapour extraction / air venting</td>
<td>2.0</td>
<td>1.1</td>
<td>1.5</td>
<td>1.3</td>
<td>1.0</td>
<td>2.7</td>
<td>1.5</td>
</tr>
<tr>
<td>Bioremediation / phytoremediation</td>
<td>1.3</td>
<td>1.0</td>
<td>1.2</td>
<td>1.4</td>
<td>1.5</td>
<td>3.3</td>
<td>1.4</td>
</tr>
<tr>
<td>Chemical treatments</td>
<td>1.3</td>
<td>1.0</td>
<td>1.1</td>
<td>1.1</td>
<td>1.0</td>
<td>3.0</td>
<td>1.2</td>
</tr>
<tr>
<td>Solidification / stabilisation</td>
<td>1.8</td>
<td>1.7</td>
<td>1.2</td>
<td>1.8</td>
<td>2.0</td>
<td>3.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Thermal processes</td>
<td>1.3</td>
<td>1.0</td>
<td>1.0</td>
<td>1.3</td>
<td>1.0</td>
<td>1.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Electrokinetic extraction</td>
<td>1.3</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Average score where 1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always

Table A14: Opinions on advances in remediation technology

<table>
<thead>
<tr>
<th>Greater choice of solutions</th>
<th>Commercial developers</th>
<th>Housebuilders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don't know</td>
<td>15%</td>
<td>9%</td>
</tr>
<tr>
<td>Deterioration</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>No advance</td>
<td>8%</td>
<td>11%</td>
</tr>
<tr>
<td>Some advance</td>
<td>62%</td>
<td>67%</td>
</tr>
<tr>
<td>Significant advance</td>
<td>15%</td>
<td>14%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>More effective and reliable end results</th>
<th>Commercial developers</th>
<th>Housebuilders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don't know</td>
<td>31%</td>
<td>16%</td>
</tr>
<tr>
<td>Deterioration</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>No advance</td>
<td>23%</td>
<td>14%</td>
</tr>
<tr>
<td>Some advance</td>
<td>38%</td>
<td>61%</td>
</tr>
<tr>
<td>Significant advance</td>
<td>8%</td>
<td>7%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Improved sustainability of techniques</th>
<th>Commercial developers</th>
<th>Housebuilders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don't know</td>
<td>27%</td>
<td>18%</td>
</tr>
<tr>
<td>Deterioration</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>No advance</td>
<td>27%</td>
<td>26%</td>
</tr>
<tr>
<td>Some advance</td>
<td>46%</td>
<td>49%</td>
</tr>
<tr>
<td>Significant advance</td>
<td>0%</td>
<td>4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lower cost</th>
<th>Commercial developers</th>
<th>Housebuilders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don't know</td>
<td>15%</td>
<td>16%</td>
</tr>
<tr>
<td>Deterioration</td>
<td>19%</td>
<td>30%</td>
</tr>
<tr>
<td>No advance</td>
<td>42%</td>
<td>40%</td>
</tr>
<tr>
<td>Some advance</td>
<td>23%</td>
<td>9%</td>
</tr>
<tr>
<td>Significant advance</td>
<td>0%</td>
<td>2%</td>
</tr>
</tbody>
</table>
### Table A15: Opinions on advances in remediation technology by geographical extent

<table>
<thead>
<tr>
<th>Feature</th>
<th>Single Region</th>
<th>Small Multi-regional (2-4 regions)</th>
<th>Large Multi-regional (&gt;5 regions) or Nationwide</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commercial developers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater choice of solutions</td>
<td>2.8</td>
<td>3.2</td>
<td>3.1</td>
</tr>
<tr>
<td>More effective and reliable end results</td>
<td>2.7</td>
<td>2.9</td>
<td>2.7</td>
</tr>
<tr>
<td>Improved sustainability of techniques</td>
<td>2.3</td>
<td>2.6</td>
<td>2.9</td>
</tr>
<tr>
<td>Lower cost</td>
<td>1.3</td>
<td>2.5</td>
<td>1.9</td>
</tr>
<tr>
<td><strong>Housebuilders</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater choice of solutions</td>
<td>3.0</td>
<td>3.1</td>
<td>2.8</td>
</tr>
<tr>
<td>More effective and reliable end results</td>
<td>2.8</td>
<td>2.9</td>
<td>3.0</td>
</tr>
<tr>
<td>Improved sustainability of techniques</td>
<td>2.5</td>
<td>2.9</td>
<td>3.0</td>
</tr>
<tr>
<td>Lower cost</td>
<td>1.9</td>
<td>1.7</td>
<td>1.3</td>
</tr>
</tbody>
</table>

*Average score where 4=significant advance, 3=some advance, 2=no advance, 1=deterioration*

### Table A16: Achievement of minimum BREEAM standard in new developments by geographic extent of developer’s operations

<table>
<thead>
<tr>
<th>% of new developments</th>
<th>Single Region</th>
<th>Small Multi-regional (2-4 regions)</th>
<th>Large Multi-regional (&gt;5 regions) or Nationwide</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>14%</td>
<td>22%</td>
<td>25%</td>
</tr>
<tr>
<td>1% - 49%</td>
<td>21%</td>
<td>0%</td>
<td>25%</td>
</tr>
<tr>
<td>50% - 99%</td>
<td>12%</td>
<td>11%</td>
<td>25%</td>
</tr>
<tr>
<td>100%</td>
<td>5%</td>
<td>17%</td>
<td>0%</td>
</tr>
<tr>
<td>Don't know</td>
<td>43%</td>
<td>50%</td>
<td>0%</td>
</tr>
<tr>
<td>No response</td>
<td>5%</td>
<td>0%</td>
<td>25%</td>
</tr>
</tbody>
</table>

#### Housebuilders

#### Commercial developers

### Table A17: The importance given to sustainability issues by housebuilders

<table>
<thead>
<tr>
<th>Sustainability Issue</th>
<th>1-10 units</th>
<th>11-30 units</th>
<th>31-100 units</th>
<th>101-500 units</th>
<th>501-2000 units</th>
<th>2000+ units</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early consultation with local community</td>
<td>2.6</td>
<td>2.9</td>
<td>2.5</td>
<td>2.5</td>
<td>3.0</td>
<td>3.7</td>
<td>2.6</td>
</tr>
<tr>
<td>Accessibility to local public transport links</td>
<td>2.4</td>
<td>3.0</td>
<td>3.0</td>
<td>2.7</td>
<td>2.0</td>
<td>3.3</td>
<td>2.9</td>
</tr>
<tr>
<td>Access to local shops &amp; services</td>
<td>2.4</td>
<td>3.1</td>
<td>3.0</td>
<td>2.5</td>
<td>2.5</td>
<td>3.0</td>
<td>2.8</td>
</tr>
<tr>
<td>Provision of affordable housing</td>
<td>1.8</td>
<td>2.4</td>
<td>2.6</td>
<td>2.2</td>
<td>2.0</td>
<td>3.0</td>
<td>2.4</td>
</tr>
<tr>
<td>Minimising impact on local ecology</td>
<td>2.6</td>
<td>3.0</td>
<td>2.8</td>
<td>2.8</td>
<td>3.5</td>
<td>3.0</td>
<td>2.8</td>
</tr>
<tr>
<td>Provision of open space in site layout</td>
<td>2.4</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>2.0</td>
<td>3.0</td>
<td>2.6</td>
</tr>
</tbody>
</table>

*Average score where 1=unimportant, 2=neutral, 3=important, 4=very important*
### Table A18: Importance given to the potential impacts of climate change on the development process

<table>
<thead>
<tr>
<th></th>
<th>Commercial developers</th>
<th>Housebuilders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site remediation</td>
<td>1.9</td>
<td>2.0</td>
</tr>
<tr>
<td>Masterplan / site layout</td>
<td>2.1</td>
<td>2.2</td>
</tr>
<tr>
<td>Building design</td>
<td>2.4</td>
<td>2.5</td>
</tr>
<tr>
<td>Construction process</td>
<td>2.2</td>
<td>2.2</td>
</tr>
</tbody>
</table>

*Average score where 1=irrelevant, 2=neutral, 3=important, 4=very important*

### Table A19: Opinions on potential climate change impacts amongst developers by extent of operation

<table>
<thead>
<tr>
<th></th>
<th>Single region</th>
<th>Small multi-regional (2-4 regions)</th>
<th>Large multi-regional (&gt;5 regions) or nationwide</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rising insurance costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don't know</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Unimportant</td>
<td>7%</td>
<td>3%</td>
<td>6%</td>
</tr>
<tr>
<td>Neutral</td>
<td>33%</td>
<td>16%</td>
<td>25%</td>
</tr>
<tr>
<td>Important</td>
<td>50%</td>
<td>61%</td>
<td>63%</td>
</tr>
<tr>
<td>Very important</td>
<td>11%</td>
<td>19%</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Increased flood risk</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don't know</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Unimportant</td>
<td>11%</td>
<td>0%</td>
<td>0%</td>
</tr>
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The role of the UK development industry in brownfield regeneration

Table A20: Implementation of mitigation measures on brownfield sites in flood risk areas

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<th>Housebuilders</th>
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