



# Sustainable transport

**The key to unlocking the benefits  
of new housing**

A report to Greener Journeys

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# 1 Executive summary

This report explores the relationship between sustainable transport and housing, and the corresponding impacts on the economy and society. This work was funded by Greener Journeys in partnership with the Department for Transport and independently undertaken by KPMG.

## 1.1 Building successful and sustainable communities

There is a general consensus that we need to build somewhere in the region of 300,000 new homes per year for the foreseeable future to abate the UK's housing crisis<sup>1</sup>. There is less consensus however on where to build the new homes to deliver the best economic, social and environmental outcomes. Should we, for example, build more houses in the North or the South, in the 'core' cities or in more peripheral locations, or on 'greenfield' or 'brownfield' sites? These are difficult questions but they nevertheless need to be answered if we are to maximise the impact of housing on the outcomes that society cares about. This means thinking carefully about the way that we appraise the costs and benefits of public sector intervention in the market, and recognising that this is about more than just affordability.

The development of significant numbers of new homes can place an additional burden on transport infrastructure and services. If left unchecked, the increase in transport congestion and overcrowding arising from increased population densities could stifle the wider benefits that new housing can bring. This means

that investment in transport is not only needed to unlock specific sites for housing development, investment is also needed to improve the performance of wider transport networks to cater for additional demand. The nature of this investment will clearly depend on the scale and location of housing developments. Connections between housing, transport and labour markets mean that housing and transport together are enablers of growth, agglomeration and productivity.

In this report we explore the interaction between housing location, transport connectivity and economic, social and environmental outcomes. The analysis highlights the importance of the wider economic benefits from connecting workers to jobs and businesses to customers. It also underlines the material risks that traffic congestion can act as a limit to the realisation of these benefits and the potential of investing in public transport to mitigate this risk and strengthen agglomeration benefits.

The policy implications of the analysis are threefold. First, the appraisal of public expenditures to support housing developments should take account of the wider economic and social impacts

and their dependence on transport connectivity. Second, distribution impacts of interventions should be reviewed through considering sub-national implications and under taking distributional weighted analysis. Third, the appraisal of public expenditures needs to be undertaken at a programme as well as at a project level to make sure that the local transport network as a whole has sufficient capacity to cope with additional demand. The cumulative impact on transport networks of 300,000 new homes each year to the mid-2020s is likely to be significant, especially in growth areas.

A key conclusion of this report is that, where possible, the location of new housing should be sited to reduce car dependency and support the viability of sustainable transport networks including walking, cycling and public transport.

## 1.2 More than just a numbers game

If we are to deliver efficient economic, social and environmental outcomes, building new houses is more than just a numbers game, the location of developments and their interaction with transport networks have a material influence, both now and in the future.

**Source:** 1 House of Lords Select Committee on Economic Affairs, (2016), Building More Homes  
2 Hall, P (1997) Regeneration Policies for Peripheral Housing Estates: Inward- and Outward-looking Approaches  
3 KPMG (2016) A study of the value of local bus services to society. Report to Greener Journeys



### Housing and economic connectivity

With the right investment, new housing can help to unlock the building blocks for economic growth - land, labour and capital - and improve the efficiency of the production process through what are known as agglomeration impacts.

Countering the positive impacts associated with new housing is the relationship between economic density, travel demand and congestion which can act to dampen the positive impacts gained from agglomeration.

The economic thinking on agglomeration impacts can be applied to both transport and housing policy to guide investment decisions. By connecting workers to jobs and businesses to customers the location of new housing can impact the location of economic activity, productivity and growth. Indeed these relationships are at the heart of the economic case for projects such as Crossrail 2.

### Housing and social connectivity

In addition to the economic benefits of improved connectivity, there is a growing body of evidence showing the positive relationship between connectivity and social deprivation. For people to play an active part in society they need to live in places they can readily afford with access to employment, services and social activities.

The post war reconstruction phase and 1950s' and 1960s' social housing programme led to the development of new towns and peripheral housing estates that often moved households from poorer quality housing stock in well-connected inner-city areas to better quality housing stock in more isolated areas. This reduction in connectivity sometimes led to sub-optimal outcomes for economic and social welfare<sup>2</sup>.

Previous work developed for Greener Journeys by KPMG and the University of Leeds shows a 10% improvement in connectivity (by local bus services) is associated with a 3.6% improvement in economic, social and environmental deprivation as measured by the Ministry of Housing, Communities and Local Government's (MHCLG's) Index of Multiple Deprivation (IMD)<sup>3</sup>.

For the new wave of house building there is a need to learn the lessons from the past and build desirable accommodation in areas that are well connected. This means balancing the tension between the benefits created through agglomeration, the dis-benefits arising from congestion, and the resources available for construction. It also means planning, funding and appraising housing and transport in an integrated way.

### Longer term outlook

We are at the start of a technological, economic and social revolution which will bring challenges and opportunities to our communities and economy. The revolution will disrupt the need to travel and the choices people make about where to live and work and how to get around. It will also change the way that transport and housing interact.

The changing nature of work, the structure of labour markets and the location of production and consumption will continue to influence transport needs.

The population is getting older, and more urban, but social networks are increasingly physically dispersed. Alternatives to travel are getting better and are more integrated with modern life. New business models are shaping social attitudes towards asset ownership and the continuing development of the retail sector is changing how urban areas are used and serviced.

In transport markets, the advancement of autonomous technologies and the potential increase in shared use of assets is likely to have a material impact on the volume and type of travel undertaken. Some of the perceived and actual costs of travel may fall, stimulating demand and increasing urban sprawl. At the same time, the marginal cost of car use could increase, encouraging higher density living in urban areas.

In the same way that our cities were shaped by railways and trams in the 19th century, and the mass adoption of cars in the 20th century; the rise of autonomous vehicles has the potential to shape urban form in the 21st century<sup>4</sup>. Do we just let the market get on with it and see what society we get as a result? Or is there a potential opportunity to involve policymakers to nudge the way this technology plays into our lives, so that we get a better society out of it?

Nudging the housing market through planning reform and integrating this with transport provision is likely to be part of the solution. Focussing on regenerating urban areas, could mean making best use of urban land and building high quality, high density housing in city centres and around transport hubs. If planned carefully, a new wave of housebuilding could improve the attractiveness of urban areas by reducing costs and increasing the opportunity for residents to participate in economic and social activities.

### 1.3 Housing, productivity and congestion

Against this background we have collaborated with David Simmonds Consultancy, a specialist urban, regional and transport planning business, to undertake an analysis to illustrate the relationship between housing development, transport connectivity, and economic benefits.

The analysis uses a Land Use Transport Interaction (LUTI) model to compare the hypothetical economic benefits associated with residential and commercial developments as well as transport improvements in different locations within a major English city region. The locations for the analysis chosen were the regional centre and the

**Source:** 4 Thakur, P., Kinghorn, R., and Grace, R. (2016) Urban form and function in the autonomous era, Proceedings of the Australasian Transport Research Forum, Melbourne.



periphery of the urban fringe, representing areas with existing differences in population density and transport connectivity.

To ensure comparability between the locations in the analysis we have used a consistent volume of assumed permissible residential and commercial development in each case along with a constant corresponding public transport improvement in both the local and neighbouring areas. The public transport improvement is more significant in the local area containing the development. Details of the inputs are provide in Section 4.

Delivering similar development and transport outcomes in these different locations would likely involve significant variances in cost level. For example a given improvement in the generalised cost of travel in the regional centre is likely to require a greater scale of investment than the urban fringe. This work has not sought to quantify these, and instead focuses solely on the assessment of the benefits. However recognition would need to be given in a full appraisal to the links between cost and delivery of the benefits.

The analysis considers the relative strength of the benefits delivered in each location compared to the base case under three additive scenarios, specifically including:

- (i) The potential impact of residential and commercial development
- (ii) The potential dampening of economic output as a result of additional transport congestion
- (iii) The synergetic impacts of improvements in public transport

**Table 1: Index of relative impact of mixed development on economic growth**

Location	Without transport congestion	With transport congestion	With public transport investment
Regional centre	100	92	156
Urban fringe	67	59	79

**Note:** Index = 100 for developments the regional centre with no transport congestion  
**Source:** David Simmonds Consultancy analysis

The key findings of the analysis are shown in Table 1, all of which demonstrate a positive impact relative to the outcome in the city region without the development or transport improvement. They suggest that the level of benefit can vary though and that the following themes are important to the development of housing policy:

- The expected economic impact associated with the development alone is stronger when it is located in the regional centre relative to the urban fringe. In this analysis, employment and agglomeration impacts can stimulate 50% more economic impact.
- The additional population, together with increased economic and social activity

associated with the development leads to increased levels of transport congestion, creating a drag on the economic gain equal to around 10% in both locations.

- Increasing the capacity of transport networks is clearly part of the solution, and an important way to help realise the benefits of new housing. This is especially true in regional centres where additional transport capacity is most easily provided by enhanced public transport.

These wider economic impacts associated with housing and transport investment are significant, especially if considered alongside social impacts.

**Planning for Growth**

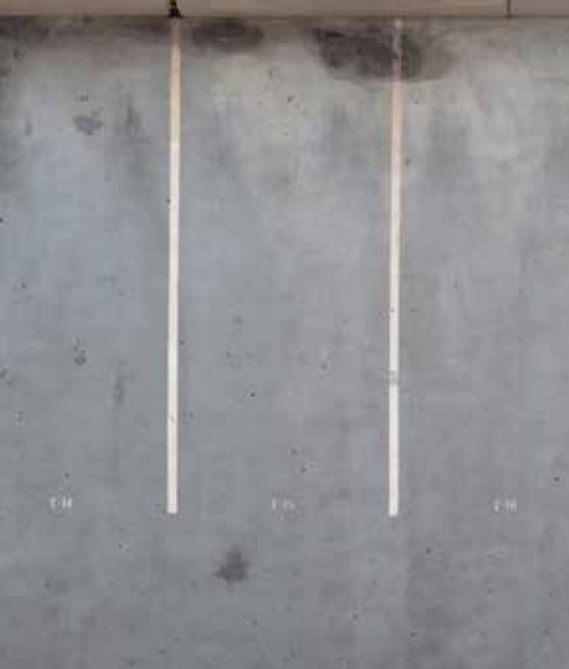
The development of 300,000 homes every year from now until the mid-2020s will require careful planning to make sure that:

- Homes are located where they are likely to generate high economic, social and environmental returns.
- Communities receive the necessary investment in infrastructure to support additional population and increased levels of economic and social activity.

The focus is likely to be on building high quality, high density homes in urban centres and around transport hubs. This will require specific investment to unlock developments that would struggle to go ahead together with more general investment to increase infrastructure capacity within growth areas.

To that end, the MHCLG has established a £5 billion Housing Infrastructure Fund for investment projects including new roads, cycle paths, flood defences and land remediation work to help unlock new homes in areas with the greatest





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housing demand. The funding forms part of the Government's Industrial Strategy which sets out a long term plan to boost economic productivity throughout the UK.

If the analysis presented in Section 4.2 of this report can be generalised, it is clear that developments that are well connected are likely to deliver much better economic returns. Therefore, investments that mitigate against the drag on productivity created by highway congestion are likely to be central to delivering value for money from the Housing Infrastructure Fund and other similar investments. This also implies that transport public investments that unlock new housing and improve connectivity for existing housing will also have better economic returns.

### 1.4 Making the right investment

The government has a responsibility to make sure that public resources are spent on activities that provide value for money. With a diverse set of challenges facing the housing sector and a diverse set of governmental objectives for the housing market, defining the right approach to measuring value is crucial to delivering efficient policies and investments. In this regard, MHCLG have defined their own guidance for assessing value for money based on the principles described in HM Treasury's Green Book. The approach centres on estimating land value uplift which captures many of the direct benefits from housing investment. However, there is less emphasis on the wider economic and social impacts from agglomeration and the importance of transport connectivity to delivering those benefits. Given the potential magnitude of the wider impacts, this approach needs further consideration.

### 1.5 Discussion

The UK has a well-documented housing crisis, driven in part by an imbalance in demand and supply. This imbalance has led to high property prices, restricting the ability of workers to move to areas with better employment opportunities.

Building new houses is clearly part of the solution but it is more than just a 'numbers game'. To deliver the best economic, social and environmental returns on investment, it's also about the type, location and affordability of dwellings.

We need to build desirable accommodation in areas that are well connected. This means balancing the tension between the benefits created via agglomeration economies, the dis-benefits arising from transport congestion and the resources available for housebuilding.

No single solution will fit all local contexts and a mix of settlement types are required. It is nevertheless important that the magnitude of the wider costs and benefits are understood and accounted for in the planning process. We need to recognise the interaction between transport and land-use and provide clear sight of the accompanying transport capital and revenue investment needed to deliver the most from housing growth.

For the new wave of house building we need to learn from the lessons of the past and build desirable accommodation in areas that are well connected. Highway congestion arising from increased urban densities however could stifle the wider economic and social benefits from new housing.

A joined-up approach to housing and transport is required, encouraging the development of higher density settlements located around transport networks and hubs. The changing structure of the economy and labour markets, together with changing transport technologies and emerging business models could make this joined-up approach potentially much more deliverable. For example, shared ownership of vehicles may enable for lower parking space requirements.

The appraisal methodologies used to assess the value for money of government interventions in housing markets need to take account of the latest evidence being developed to deliver the outcomes that society values. As such there is an opportunity to improve the appraisal guidance to account for:

- Wider economic, social and environmental impacts arising from improved connectivity as well as the potential disruptive impacts associated with increased transport congestion.
- Distribution impacts associated with interventions, through considering the sub-national implications and undertaking distributional weighted analysis. This will allow for greater understanding of who is benefiting from the intervention.
- Consideration of programme wide effects, especially where a number of sites are likely to have interlinking wider benefits and costs.

Overall through encouraging developments that facilitate a shift to more sustainable transport modes including walking, cycling and public transport there are likely to be better economic, social and environmental outcomes.

# 2

# Building successful and sustainable communities

## 2.1 Introduction

Housing is a diverse policy area impacting the whole of society. It influences where people can live and work, the schools they attend, who they socialise with and the essential services they can access. The scale of the housing-market challenge facing local and national policy-makers is substantial.

## 2.2 Housing market challenges

The Housing White Paper<sup>5</sup>, published in February 2017, described the housing market as ‘broken’, stating that we need to build between 225,000 and 275,000 new homes in the UK to keep up with population growth and start to tackle years of under-supply as a result of:

- Not enough local authorities planning for the homes they need.
- House building that is simply too slow.
- A construction industry that is too reliant on a small number of big players.

**Source:**

- 5 Department for Communities and Local Government (2017) Fixing our broken housing market
- 6 House of Lords Select Committee on Economic Affairs (2016) Building More Homes
- 7 Office for National Statistics (2017) Ratio of house price to workplace based earnings,(1997 to 2016)

The estimate of the number of houses needed to be built is similar to that stated by the House of Lords Select Committee on Economic Affairs which concluded that the United Kingdom needed at least 300,000 new homes to be built annually for the foreseeable future<sup>6</sup>.

One of the outcomes of this under-supply of housing is that the ratio of median house prices to median earnings has doubled since 1997 (Figure 1). This means that for many, finding a safe and secure home is becoming difficult and sometimes impossible across all areas.

## 2.3 Housing market objectives

The Government can play a significant role to support local authorities and developers work with local communities to plan and build better places to live for everyone. This includes building affordable housing, improving the quality of rented housing, helping more people to buy a home, and providing housing support for vulnerable people.

**Figure 1: Ratio of median house price to median gross annual earnings by region<sup>7</sup>**



Source: Office for National Statistics, Land Registry





## Delivering objectives for housing can in turn support wider economic, social and environmental objectives, including economic development, social cohesion, and environmental sustainability.

Delivering objectives for housing can in turn support wider economic, social and environmental ambitions, including economic development, social cohesion, and environmental sustainability.

### 2.4 Policy proposals for the housing market

Both central and local government decision-makers are aware of the challenges with housing and that they need to play a role in rectifying this. The 2017 White Paper identified four areas where action was needed, including:

- Planning for the right homes in the right places.
- Building homes faster.
- Diversifying the market.
- Helping people now.

To help facilitate a shift in policy, the Department for Communities and Local Government<sup>8</sup> published a further consultation document which sought views on the changes to national policy needed to help local authorities and communities plan and deliver the homes

they need<sup>9</sup>. Through this consultation, MHCLG published an indicative assessment of housing need for each local authority. The assessment was based on a standardised approach which sought to take account of need and affordability whilst placing constraints on growth in any one area.

With MHCLG supporting local areas to determine housing need, there is a renewed focus on how to make best use of local planning to support necessary market intervention. This focus makes use of the Housing Infrastructure Fund launched in 2017 and the Neighbourhood Planning Act 2017, which give additional powers and resources to local authorities to deliver housing.

#### A regional view

By way of example, Greater Manchester is working on a long term spatial strategy. Their draft Spatial Framework<sup>10</sup>, sets out the ambitions for the city region to deliver 227,000 new homes to support 300,000 new people and an additional 200,000

new jobs over the next two decades. The locations for this housing development are based on targeting strategic areas including city centre locations such as the HS2 development at Piccadilly, the Quays redevelopment, and along key transport corridors. The strategy supports Greater Manchester's ambitions to see more sustainable transport options, more energy efficient buildings, improving the natural environment and cutting carbon emissions, but also recognises the role transport and housing together play in delivering inclusive and sustainable growth by linking the focus of the changes with planned strategic investments.

**Source:** 8 The Department for Communities and Local Government (DCLG) is now the Ministry of Housing, Communities and Local Government (MHCLG). For simplicity, all references to DCLG in the remainder of this document are referred to as MHCLG.

9 MHCLG (2017) Planning for the right homes in the right places: consultation proposals

10 Greater Manchester Combined Authority (2016) Draft Greater Manchester Spatial Framework: Draft for Consultation

# 3 More than just a numbers game

## 3.1 Introduction

The location of housing and supporting investment in infrastructure is as important as the total housing amount being developed. In this section we review the links between housing developments and economic and social connectivity as well as the potential to positively harness the technological and social changes that are emerging.

## 3.2 Housing and economic connectivity

With the right investment, new housing can unlock the building blocks of economic growth - land, labour and capital - and improve the efficiency of the production process through agglomeration impacts. The fact that 83% of the UK population<sup>11</sup> choose to live in urban areas is testament to the economic and social benefits that are available there.

The latest academic evidence highlights the importance of transport, and public transport in particular, in supporting these positive urban agglomeration impacts. Figure 2 sets out the relationship between the factors of production and the role that housing can play in

unlocking land and labour productivity, leading to a stronger and more vibrant economy.

It is now more than 25 years since Paul Krugman published his paper on Increasing Returns and Economic Geography<sup>12</sup>. This paper changed the way that economists think about the dependence of local and national economies on spatial forces. Krugman's work ultimately led to changes to the way that the Department for Transport takes account of the wider economic impacts associated with transport policy and investment decisions – specifically, the link between transport connectivity and improvements in economic productivity driven by economies of agglomeration. Indeed the Department for Transport's 2014 TIEP report makes clear recognition of the substantial amount of econometric literature that quantifies this relationship between productivity and economic mass as well as the reasonable consensus as to the magnitude of the effects<sup>13</sup>.

The same economic thinking can be applied to housing policy and investment decisions. By connecting workers to jobs, and businesses to customers, the

location of new housing can impact the location of economic activity, productivity and growth. This interaction occurs through three main effects:

- Improving access to a wider pool of labour allowing for better skills matching at a given wage level.
- Reducing transaction costs, helping to promote specialisation and knowledge transfer.
- Improving access to customers and providing customers with greater choice.

Evidence suggests that by doubling a city size there appears to be an increase in productivity by an amount that ranges from 3-8%,<sup>14</sup> which would equate to an elasticity of 0.05-0.11. Other studies support this but suggest that the mean estimate of this elasticity is lower at 0.03 which would represent a 2.1% increase in productivity by doubling city size<sup>15</sup>.

There is also emerging evidence that estimates the impact of connectivity on a location's share of the most productive people and businesses, a key driver of differences in GVA per head between places and regions. One of the prominent debates in the spatial economics

**Source:** 11 World Bank (2016) Urban population (% of total)

12 Krugman, P. (1991) Increasing Returns and Economic Geography, *Journal of Political Economy*, Volume 99, Number 3

13 Venables, A, Laird, J & Overman, H (2014) Transport investment and economic performance: Implications for project appraisal (commissioned by Department for Transport)



Many factors that influence the level of economic benefit associated with agglomeration also play a role in driving negative congestion impacts, whereby:

- **Geographic:** The closer a development is to an economic centre the greater the size of the agglomeration effect with a counteracting greater pressure on an already highly utilised transport networks.
- **Development characteristics:** The greater the scale of a development the greater the size of the agglomeration effect expected whilst also the greater the demand on transport network.
- **Transport connectivity:** The better connected the development the greater the agglomeration effect as well as the greater the potential to mitigate negative congestion impacts.

literature is the relative importance of “people” and “place” factors in the relationship between economic mass and productivity. This was highlighted by seminal work for the Northern Way in 2009 by the Spatial Economics Research Centre (SERC) at LSE<sup>16</sup>. By reviewing these relationships SERC suggested there would be variations in economic performance according to specific sectors locating in the cities and countries in question.

New housing can place strains on the economies of local areas with additional demands on existing infrastructure, services and amenities. This can create resentment and opposition to housing developments when these costs are borne by existing residents. One of the most obvious forms is increased congestion, which can dampen the benefits that can be derived from agglomeration.

The level of demand for a given transport service or asset is heavily dependent on where people live in relation to the location of employment centres and key services. The location of housing will therefore likely have an impact on congestion levels.

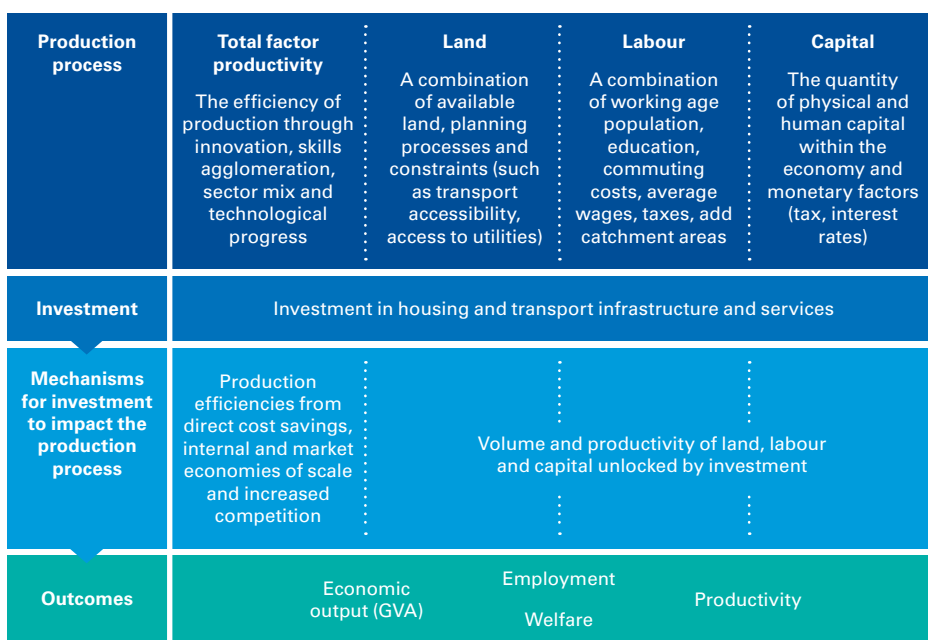
In order to maximise the economic gains associated with development and to minimise issues around congestion, policy needs to account for supporting investment in local infrastructure alongside housing development.

### 3.3 Housing and social connectivity

In addition to the relationship between housing location and economic performance, evidence is also emerging on the relationship between transport connectivity and social deprivation. For people to play an active part in society they need to live in places where they can readily access employment and social activities through transport networks. We know that this often takes the form of local public transport, as 3.5 million people travel to work via bus and buses being responsible for facilitating 29% of all city centre expenditure<sup>17</sup>. Ensuring housing is built with close connections to transport is one way to help support these links.

The benefits of improving social connectivity can be multifaceted including, direct, indirect and spill over effects. The direct benefits of transport and social connectivity are improved outcomes for individuals, including enabling skills to be developed through accessing training opportunities or better health through easier access to care. The indirect benefits arise from these direct

Figure 2: Relationship between factors of production and outcomes



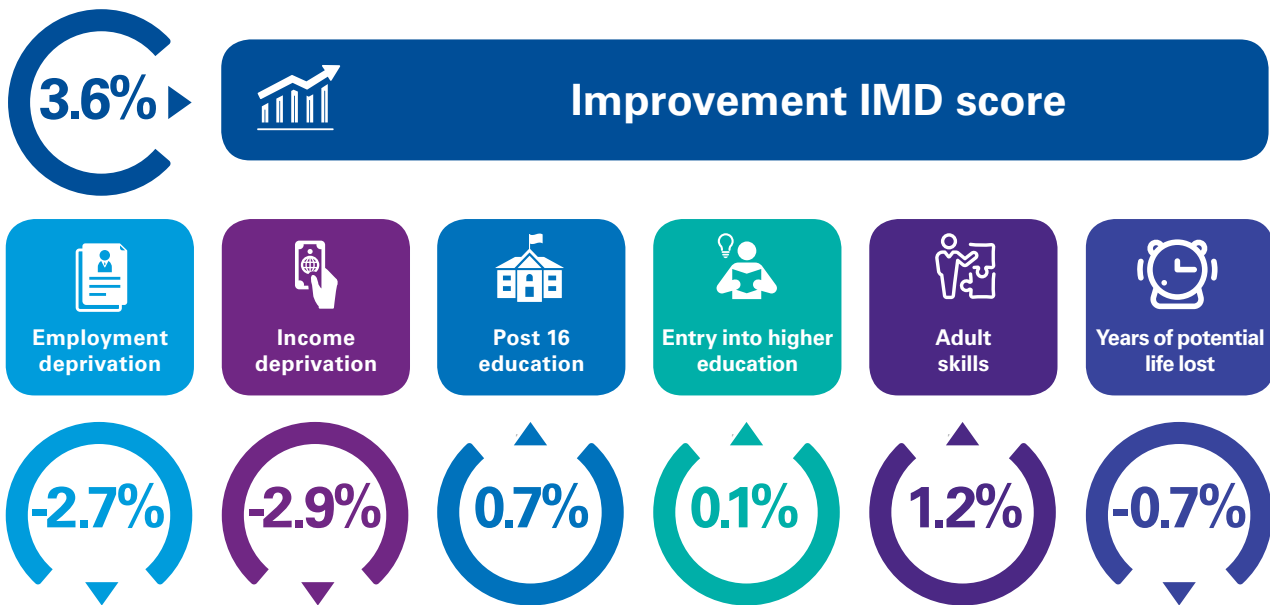
Source: KPMG Analysis

**Source:** 14 Rosenthal, S.S. and Strange, W.C. (2004) Evidence on the Nature and Sources of Agglomeration Economies, in J. V. Henderson and J.F. Thisse, eds., Handbook of Urban and Regional Economics, Volume 4.  
 15 Melo, P.C, Graham, D.J. and Noland, R.B. (2009) A meta-analysis of estimates of urban agglomeration economies, Regional Science and Urban Economics, (2009), vol. 39, issue 3, 332-342.  
 16 A useful overview of this work can be found in - Overman, Henry G. and Gibbons, et.al (2009) Strengthening economic linkages between Leeds and Manchester: feasibility and implications. <http://eprints.lse.ac.uk/43146>. Also referred to in the TIEP report.  
 17 Mackie, P.J., Laird, J.J. and Johnson, D.H (2012) Buses and Economic Growth. Institute for Transport Studies, University of Leeds





Figure 3: Impact of a 10% improvement in connectivity on IMD



Source: KPMG Analysis (2016)

impacts, an example being access to a job may prevent an individual falling into a vicious circle of poverty and social exclusion. The spill-over effects of this can be considerable to the wider community, including improving the liveability of neighbourhoods and greater integration between social groups.

Evidence developed by KPMG and the University of Leeds shows a 10% improvement in connectivity (by local bus services) is associated with a 3.6% improvement in economic, social and environmental deprivation as measured by the MHCLG’s Index of Multiple Deprivation (IMD). This includes improvements across income, employment levels, improvements in skills and fewer years of potential life lost as shown in Figure 3.

Reducing social deprivation is a gain to both individuals whose lives are improved as well as to society as a whole. This is important with almost one in four people in the UK at risk of social exclusion<sup>19</sup>. Both housing and transport have a role in reducing this, as the most effective results will occur with interdependent policy supporting new housing developments that are appropriately connected to ensure they deliver and support communities access to places of work, training and essential services.

### 3.4 Future of mobility

Technological progress in transport is becoming more rapid, supported by complementary social changes, means that expectations on how people will travel in the future are shifting. This has implications and opportunities for the development of housing. Presenting a solution to the challenge in getting people to reduce their dependency on car ownership and choose the right mode of travel. Recent trends suggest a more sustainable and efficient future is approaching, specifically we see two trends that could enable this shift:

- **Technological development.**

Automation, electrification, digitalisation are disrupting markets, creating new opportunities to improve connectivity and increase mobility. These technologies have the opportunity to deliver more developed Mobility as a Service (MaaS) offerings as well as improved public transport solutions.

- **Social changes.**

Young people are learning to drive and buying cars much later in life than their parents. They appear to be less concerned with asset ownership and are more accepting of the 'sharing economy'.

These types of transport revolutions have demonstrated an ability to influence how cities have grown and been shaped<sup>19</sup>, with previous generations of light rail and automobiles allowing for greater urban growth whilst still retaining access to central places of work. Future connected and autonomous vehicles are likely to encourage this trend further and allow for greater expansion of cities along transport corridors where allowed whilst retaining comparable or improved access than that experience at these locations currently.

These technologies and a social shift to 'sharing' based economies could also support greater inner city densification by providing high quality, greater choice and cheaper transport options for those in society who choose to live without car ownership.

A new wave of housebuilding, if planned carefully, could further improve the attractiveness of sustainable transport networks by aggregating demand near viable public transport routes. For example in encouraging denser city centre housing there will be a need for appropriate support to allow people to make use of public transport and shared assets, such that car ownership is not required.

### 3.5 Discussion

When these various economic and social interactions are considered there is greater awareness of the impact that housing linked with transport can have in both supporting strong economies and communities. The evidence suggests that for a given development that is better connected to both economic and social centres there will be a greater benefit to both the economy and society through a mix of agglomeration effects and reductions in social exclusion than developments located in periphery or rural environments.

Due to significant technological developments and social trends there is likely to be an expansion of connectivity, with both improvements in journey times and costs expected. This may improve the desirability of both the outer spheres of cities where significant benefits will be seen as well as in inner cities which may be able to support increased densification through improvements in quality and cost of transport and facilitated through the sharing of assets.

The key message is both planning where housing development is located and understanding whether there is a need for supporting infrastructure, is crucial to solving the housing crises.

The latest academic evidence highlights the importance of transport, and public transport in particular, in supporting these positive urban agglomeration impacts.

**Source:** 18 Eurostat (2016) People at risk of poverty or social exclusion, European Commission

19 KPMG (2016) No U-turn: How autonomous vehicles will reshape our cities, KPMG Australia

# 4 Housing, productivity and congestion

## 4.1 Introduction

We have collaborated with David Simmonds Consultancy, a specialist urban, regional and transport planning business, to undertake an analysis to illustrate the relationship between housing development, economic agglomeration, and transport connectivity. With the aim being to further understand how the benefits associated with development vary by location.

The analysis uses a Land Use Transport Interaction (LUTI) model to consider the benefits of residential and commercial developments as well as transport improvements on the economic output of a large metropolitan area in England. Further details of the LUTI model used are set out in Appendix 1.

The analysis compares the impact of a 'mixed use' development at two different locations as follows:

- A well-connected **regional centre**. It has high population density and good transport connectivity.
- A peripheral location on the **urban fringe**. It has lower population density and lower transport connectivity.

For each location we conducted three demonstration tests:

- The first test estimated the economic

impact of the development without including adverse impacts on highway congestion on economic performance.

- The second test estimated the economic impact of the development after making an allowance for the adverse impacts of the development on highway congestion.
- The third test explored the economic impact of the development including the adverse impacts of the development on highway congestion but with supporting public transport improvements.

In the following section we report the findings of this analysis for specific sites at different locations. The results are presented as an index of the annual relative impact at a city region level in 2046, the final year of the model, over the base case scenario.

## 4.2 Development impacts at different locations

Figure 4 provides a graphical illustration of the relative strength of the economic benefit for each location and each demonstration test. In terms of the inputs to the LUTI model, the hypothesised development, at each location includes 45,000m<sup>2</sup> of residential space, 3,000m<sup>2</sup> of retail space, 20,000m<sup>2</sup> of office space and 6,000m<sup>2</sup> of industrial space. For the public transport investment scenario

this includes a 15% improvement in the generalised cost of travel by public transport within the development zone. There is a further 5% improvement in the generalised cost of travel by public transport between the development zone and the surrounding area. The generalised cost of travel being the sum of monetary and non-monetary costs per journey.

The public transport improvement could be driven by new assets such as bus rapid transit and tram lines or a combination of local policies with investments that target congestion and thereby reduce journey times.

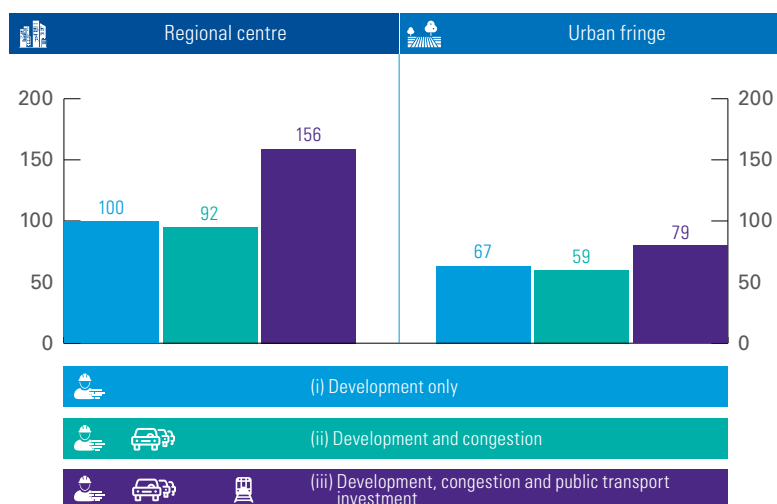
Delivering the developments and transport outcomes in these scenarios at different locations would likely involve significant variances in associated costs as well as scale of the transport infrastructure required. This work has not sought to identify this scale of investment or quantify these costs and instead focuses solely on assessing the relative benefits.

All of the scenarios identified demonstrate a positive economic impact relative to the outcome in the city region without the development or transport improvement. The level of benefit varies though, notably:





**Figure 4: Index of the relative impact of the benefit on GVA in 2046**



Relative GVA impact: Regional centre, development only = 100

Source: David Simmonds Consultancy analysis

- The expected economic impact of the development alone is stronger when it is located in the regional centre relative to the urban fringe. In this analysis, the combined additional employment and productivity impacts can stimulate more than 50% additional economic benefit.
- The additional population, together with increased economic and social activity associated with the development leads to increased levels of highway congestion, creating a drag on the productivity gain equal to around 10% in both locations.
- Increasing the capacity of transport networks is clearly part of the solution, and an important way to help realise the benefits of new housing. This is especially true in urban centres where additional transport capacity is most easily provided by enhanced public transport.

There should be recognition of the expected differences in scale of costs associated in delivering these levels of benefits in different locations, and only through a full appraisal would it be possible to understand the associated trade-offs in specific circumstances. However, the results provide a number of useful insights, notably that wider benefits associated with development and public transport improvements are significant and these can vary by location. Moreover that the role of public transport plays a crucial role in maximising economic benefits from new development.

### 4.3 Planning for growth

The government is committed to facilitating the development of 300,000 homes every year from now until the mid-2020s. This will require careful planning to make sure that:

- Homes are located where they are likely to generate high economic, social and environmental returns
- Communities receive the necessary investment in infrastructure to support additional population and increased levels of economic and social activity.

The focus is likely to be on building high quality, high density homes in urban centres and around transport hubs. This will require specific investment to unlock developments that would struggle to go ahead together with more general investment to increase infrastructure capacity within growth areas.

To that end, the MHCLG has established a £5 billion Housing Infrastructure Fund for investment projects including new roads, cycle paths, flood defences and land remediation work to help unlock new homes in areas with the greatest housing demand. The funding forms part of the government's Industrial Strategy which sets out a long term plan to boost economic productivity throughout the UK. Funds are awarded to local authorities on a competitive basis.

If the analysis presented in Section 4.2 of this report can be generalised, it is clear that developments that are well connected are likely to deliver much better economic returns and that investments that mitigate against the drag on productivity created by highway congestion are likely to be central to delivering value for money from the Housing Infrastructure Fund.

# 5 Making the right investments

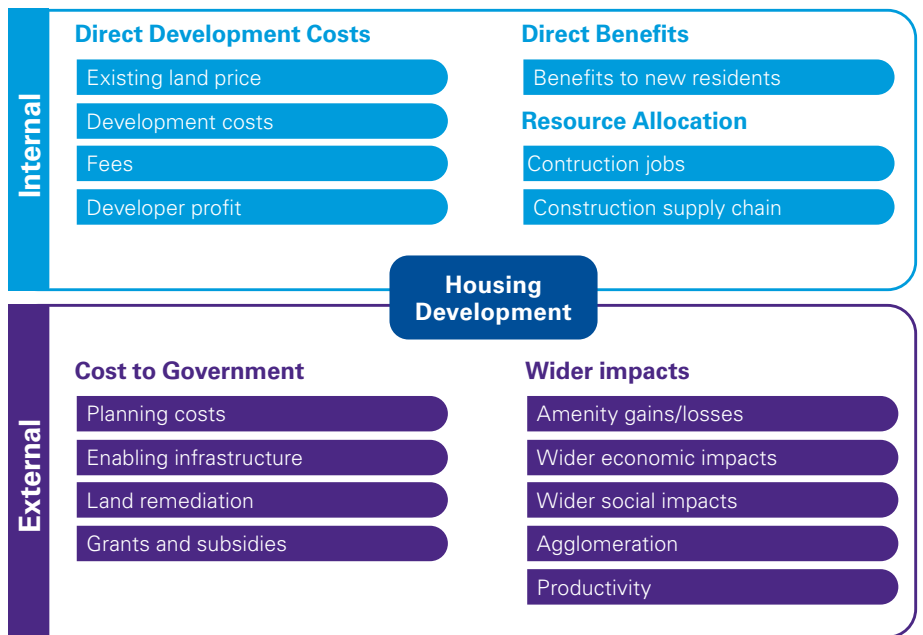
## 5.1 Introduction

The government has a responsibility to make sure that public resources are spent on activities that provide value for money and deliver the outcomes that society wants. With a diverse set of challenges facing the housing sector and a diverse set of governmental objectives for the housing market, defining the right approach to measuring value is crucial to delivering efficient policies and investments, and to holding decision-makers to account. In this regard, MHCLG have defined their own guidance for assessing value for money based on the principles described in HM Treasury’s Green Book. This section considers this framework and discusses the potential for additional applications of analysis to support it in light of the analysis presented in Section 4.2.

## 5.2 Costs and benefits of housing development

Every year thousands of housing developments occur across the country. All of these require inputs of land, labour, raw materials and a developer. For the majority of these developments, direct government intervention is not required and the housing is delivered effectively by the market. There are times however when the development will only come forward if assisted by government intervention, such as where land needs special preparation or new infrastructure needs to be built.

Figure 5: Internal and external impacts of new housing



Source: KPMG Analysis

The benefits of new housing accrue to those who eventually live there, landlords, developers and those involved in the supply chain such as land owners, suppliers of raw materials, architects and planners.

Housing developments though do not just impact on those directly involved. As discussed in the previous sections, there are wider impacts, both positive and negative. It is by no coincidence that

housing developments are often controversial due to the real and perceived impacts to existing people and firms. This includes potential congestion impacts through more people using transport in an area, loss of amenity benefits as well as changes in demand levels on local public services (see Figure 5).

There may be occasions where markets do not deliver an efficient allocation of resources due to a variety of reasons that economists refer to as ‘market failures’





or ‘market imperfections’. In housing markets, market failures centre on the presence of positive and negative externalities including wider economic, social and environmental impacts.

The government can intervene in the market to correct possible market failures through both demand-side and supply-side policies, including planning initiatives, enabling infrastructure, land remediation and various grants and subsidies to reduce costs for developers and/or residents. The potential costs and benefits likely to arise from government intervention should be identified and reliably estimated to appraise whether or not the intervention is efficient and effective in mitigating against market failure.

### 5.3 MHCLG appraisal guidance

MHCLG is responsible for developing guidance to review the costs and benefits associated with housing market interventions, and thereby facilitating a consistent approach to appraising interventions in the housing market. This guidance is based on HM Treasury’s Green Book approach, taking account of market factors and evidence relevant to property development and intervention.

In the most recent update of the appraisal guidance<sup>20</sup>, the focus of appraising benefits has shifted to assessing land value uplift. This is seen as a market-based approach to value the benefits

accruing to those that move into property developments. A benefit of this being it provides a more balanced method to consider the impacts of residential developments compared with commercial developments.

The guidance sets out assumptions and metrics which should be the default when carrying out appraisal for policy development and advice, business cases and impact assessments. Through achieving greater consistency in appraisal this should enable the estimated benefit-cost ratio and value for money assessment of projects to be more comparable between schemes.

The cost-benefit analysis that should be applied is set out in Figure 6.

**Figure 6: MHCLG ‘initial’ Cost-Benefit Analysis (CBA) equation**

		Consumer and business impacts	External impacts and public sector finance impacts
Cost Benefit Analysis Equation	Present Value Benefits (numerator)	<p><b>Private benefits (e.g. land value uplift)</b></p> <p><b>To be included if not captured in land value:</b></p> <p>[Private sector costs]</p> <p>Public sector grant or loan</p> <p>[Public sector loan repayments]</p>	<p><b>As per Green Book guidance:</b></p> <p>External benefits</p> <p>[External costs]</p>
	Present Value Costs (denominator)		<p><b>Public sector grant or loan</b></p> <p>[Public sector loan repayments]</p> <p>Other public sector costs</p> <p>[Other public sector revenues]</p>

Source: MHCLG Guidance

The benefit-cost ratio is based on the assumptions and evidence as set out within the guidance. There is an option to present an ‘adjusted’ benefit-cost ratio, where this may include additional estimates of impacts using a wider evidence base. However MHCLG guidance provides limited insights into what should be included in this as well as the weight given to any additional analysis. This is also the case with non-monetary benefits, which can also be listed and recognised, but limited insight given into the importance placed on these with the decision-making process.

As MHCLG develops their appraisal guidance, there will be the opportunity to develop this approach including by:

- Bringing some of the additional areas of analysis into the ‘initial’ BCR as the evidence base is developed. Discussion of this is set out in Section 5.4.
- Providing greater guidance around the value of the ‘adjusted’ BCR in the decision making process.
- Developing a more standardised overview of what and how additional impacts should be included in the ‘adjusted’ BCR.

This is likely to require MHCLG to undertake more specific research into the subject, as well as reviewing other appraisal guidance. Further details of the process to calculate an ‘initial’ and ‘adjusted’ BCR and a discussion around this is provided in Appendix 2.

### 5.4 Development of the appraisal methodology

The use of land value uplift has a number of potential implications for the types and location of the developments supported. Taking account of our review of the current approach as well the analysis we have undertaken and set out in Sections 3 and 4, there are a three specific areas where the guidance could be further developed, including analysis of external impacts, redistributive effects and reviewing the benefits of programme level developments.

Source: <sup>20</sup> Department for Communities and Local Government, 2016, The DCLG Appraisal Guide



**Inclusion of a standardised approach for wider economic, social and environmental impacts**

Our analysis, as set out in the previous sections, demonstrates there are significant external impacts associated with developments and these can vary based on localised factors. This includes agglomeration benefits, congestion costs as well as improvements in social outcomes. Only through incorporating these impacts in appraisal of interventions to support developments will it be possible to consider the value to society.

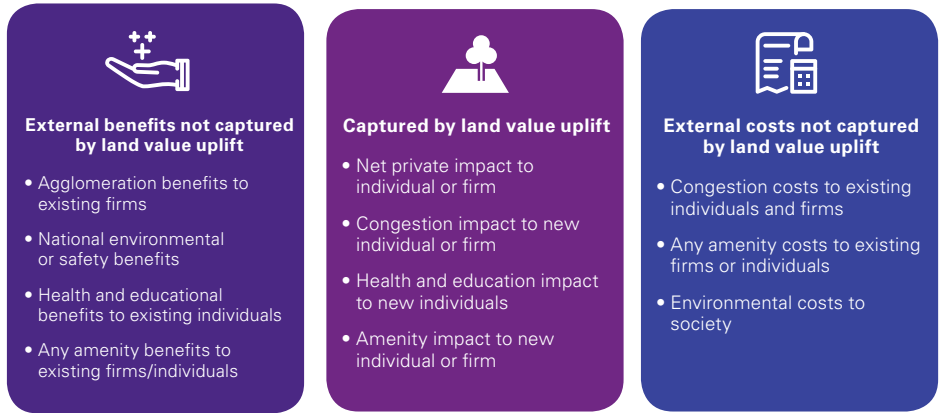
Estimating these impacts is an important area of welfare analysis, and the Green Book guidance already allows for the inclusion of many external impacts<sup>20</sup> in the ‘initial’ BCR analysis. However in regards to housing intervention guidance there is a lack of a standardised approach to allow for this. This may mean that these potential impacts are not considered consistently or in detail. By excluding some external factors through a land value uplift approach, it may lead to a focus on specific types of developments. What is captured and what isn’t captured in the current appraisal is set out in Figure 7.

MHCLG already recognise their current guidance and its focus on land value uplift does not currently cover all the potential external benefits and costs associated with interventions. MHCLG have therefore made the commitment in future guidance to seek to include values for agglomeration impacts on third parties and transport externalities associated with development, and our research supports this aim.

**Reviewing the distributional impacts of intervention**

Land value estimates vary significantly across the country. An appraisal methodology that is based off this approach will therefore be heavily influenced by existing variations. This may have an impact on the value for money assessment of different

**Figure 7: Benefits and costs which are not captured in land value uplift**



Source: MHCLG Guidance

interventions. The most significant benefits would be expected to accrue in scenarios of converting ‘Greenfield’ land to residential in areas with the highest existing land values. Table 2 below provides a range of current residential land values by Local Authority and Region.

**Table 2: Residential land value estimates**

Post permission residential land value estimates, per hectare	
Highest land value estimate by Local Authority	£134,030,000
Lowest land value estimate by Local Authority	£370,000
Highest land value estimate by Region	£29,100,000
Lowest land value estimate by Region	£1,000,000

Source: MHCLG Appraisal Guide Data Book

The current approach may therefore have inherent distributive impacts through suggesting areas which have existing high land values are the most beneficial to support. In order to account for this there is likely be benefits associated with reviewing sub-national implications of interventions and also to undertake distributional weighted analysis. Through undertaking sub-national analysis, there is the opportunity to consider the relative scale of the impacts of the invention on local economies. Whilst the use of distributional weighted analysis allows for the opportunity to consider the impact on different income groups and account for these.

**Undertake programme level analysis**

The MHCLG guidance is applied to specific developments, with the intervention at each individual site being considered rather than a combined impact taking account of interlinking external effects between a portfolio or programme of sites.

This means any intervention would need to individually present value for money at a given location. This rationale in a standard approach although it assumes there is no interlinking effects between developments. However this approach may not necessarily led to the optimal outcome when a selection of sites has compelling interlinking costs and benefits.

Where a significant programme of sites have been identified it is useful to consider analysis at the programme level so as to account for these interlinking costs and benefits.

Source: <sup>21</sup> Including air quality, crime, private finance initiatives, environment, transport, Public Service Transformation, distributional effects, Asset Valuation, Competition, Energy use and greenhouse gas emission

Our analysis, as set out in the previous sections, demonstrates there are significant external impacts associated with developments and these can vary based on localised factors. This includes agglomeration benefits, congestion costs as well as improvements in social outcomes. Only through incorporating these impacts in appraisal of inventions to support developments will it be possible to consider the value to society.



# 6

# Conclusions

The potential policy impacts of housing are both complex and far reaching. If the state is to intervene to accelerate the delivery of housing schemes it needs to prioritise activities that deliver the best value for money for the taxpayer.

The government needs to learn the lessons from the past and take advantage of evidence on the drivers of economic and social prosperity. It therefore should encourage developments in areas that are well-connected so that residents can easily participate in economic and social activities.

Housing numbers alone therefore are not the end of the story but instead consideration needs to also be given to encourage housing in the right locations. Where good connectivity does not already

exist attention needs to be given to how improvements in transport and public transport in particular can be made.

The analysis reported here suggest that the benefits of doing so could be material:

- Greater economic impacts are observable when developments are located in well-connected as opposed to less well-connected areas, with the employment and agglomeration impacts stimulating 50% more economic benefit.
- Congestion impacts of developments are observable in both well-connected and less well-connected areas. These congestion impacts can dampen economic benefits potential by around 10%.

- Significant investment in public transport can not only mitigate against the negative impacts of congestion, it can provide growth synergies for the wider area, especially in built-up areas.

A joined-up approach to housing and transport might encourage the development of higher density settlements located around transport networks and hubs. The changing structure of the economy and labour markets, together with changing transport technologies and emerging business models could make this joined-up approach potentially much more deliverable.

Housing numbers alone therefore are not the end of the story but instead consideration needs to be given to encourage housing in the right locations.





The appraisal methodologies used to assess the value for money of government interventions in housing markets need to take account of the latest evidence being developed to deliver the outcomes that society values. As such there is an opportunity to improve the guidance to account for:

- Wider economic, social and environmental impacts arising from improved connectivity as well as the potential disruptive impacts associated with increased transport congestion.
- Distribution impacts associated with interventions, through considering the sub-national implications and undertaking distributional weighted analysis.
- Consideration of programme wide effects, especially where a number of sites are likely to have interlinking wider benefits and costs.

Overall through encouraging developments that facilitate a shift to more sustainable transport modes including walking, cycling and public transport there are likely to be better economic, social and environmental outcomes.

A joined-up approach to housing and transport might encourage the development of higher density settlements located around transport networks and hubs.

# Appendix 1

## Evidence base / methodology

### LUTI analysis

The LUTI model used in this work is a 'best-in-class' regional model that is able to provide a robust mechanism to measure the economic impact of investments in a spatial context. It can be used to consider site specific or a programme of schemes including transport infrastructure and land use changes.

The LUTI model framework applied builds on 6 core elements:

- 1. Zonal model:** A detailed spatial model representing approximately 100 zones within a regional geography and the surrounding area plus a simpler zone system for the rest of Great Britain, drawing on a national model. This forms the heart of the model, capable of predicting the movement of jobs and residents in response to changes in land use, housing, and labour demand.
- 2. Macro zone model:** A regional model built on travel-to-work areas (i.e. labour markets). This appraises the effect of investment and industrial change which have long-term implications on urban and regional growth, as well as the trade flows and competition between regions.
- 3. Productivity model:** Provides a detailed matrix of productivity (GVA/worker) estimates by zone, industry, and socio-economic level, and then calculates how changes in location and density affect GVA per worker.
- 4. Business development and skills model:** sub-model to estimate the direct economic impacts of skills and business development.
- 5. Migration model:** Represents the household movements between different labour market areas which has identified the key drivers of internal migration at different distances (for example, medium-distance 'quality of life' migration versus long-distance 'economic migration').
- 6. Highly strategic transport model (HSTM):** Provides an aggregated view of the transport system, using the outputs of an existing geographically applied transport model.





# Appendix 2 - MHCLG Guidance - 'initial' and 'adjusted' BCR

## 'Initial' BCR

The main approach to assess the benefit within the MHCLG guide 'initial' BCR is land value uplift.

Land value uplift represents a market based approach to estimate the willingness-to-pay of individuals and firms moving into the development, to receive the benefits associated with the intervention. Land value uplift is calculated as the gross development value (GDV) less the development costs, fees and developer profit. The GDV is highly influenced by the type, scale and location of development.

GDV should be estimated based on the definitions of 'market value' (MV) as used in the 'RICS Valuation of Professional Standards' (the Red Book). With the focus of the analysis being the change in value associated with a change in the use class at a development, i.e. from Greenfield to residential or retail to office.

On the following page we set out a worked example as provided in the MHCLG guidance as to how to apply the latest approach to appraise an intervention.

In order to reduce the burden on appraisers MHCLG provides benchmark land values by use class across areas. The guidance does recommend using a market based approach taking account of insights from property consultants, to provide location specific analysis.

The benchmarked land values which MHCLG has produced can be used for high level appraisal, as well as to sense check the analysis. With regards the Housing Infrastructure Fund, MHCLG produced an Economic Case 'Ready Reckoner' which uses these benchmarked values to provide an easier process for an approximation of the benefits for potential bidders.

As with the previous guidance issued by MHCLG, there is recognition of the need to account for additionality effects in order to ascertain the impact of the policy at a national level. When interventions increase housing over and above that observed in the counterfactual, it is important to consider to what degree the outcomes would have occurred in the absence of the intervention. In considering this additionality guidance exists, produced by the Homes and Communities Agency (Homes England) which covers how to approach deadweight and displacement effects

### 'Adjusted' BCR

MHCLG sets out the option for practitioners to provide an 'adjusted' BCR as part of the appraisal process.

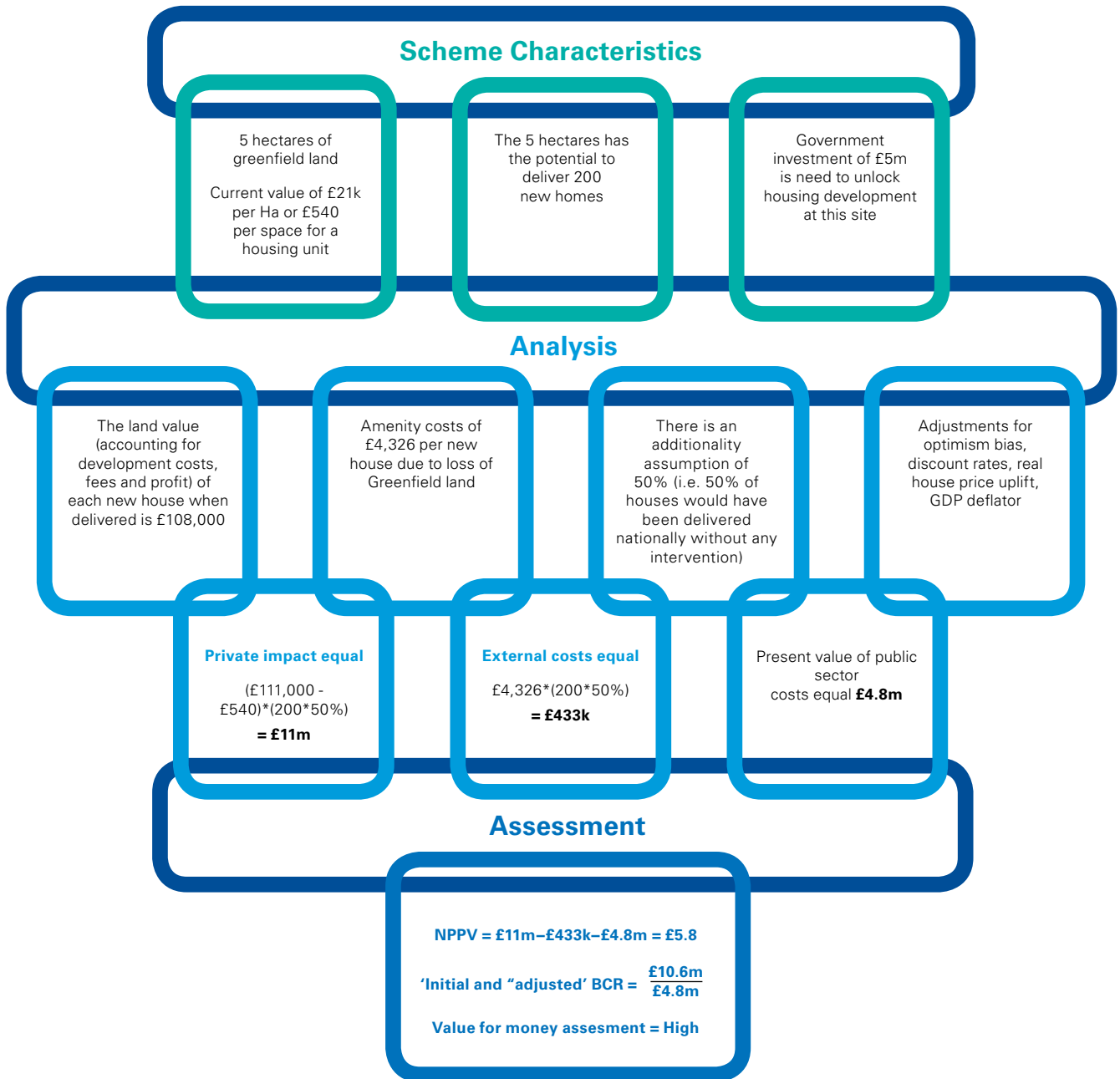
The 'adjusted' BCR may include additional estimates of impacts, based on evidence not currently incorporated in the guidance or include those that are mentioned within the guidance but which MHCLG recognises as not currently have sufficient evidence for, such as distributional or health impacts.

An 'adjusted' BCR is meant to provide greater flexibility in the analysis as well as enable specific factors that might be highly relevant for an intervention to be included in the overall review. Appraisers are required to provide justification and their own evidence to support the rationale for including any additional factors applied in the 'adjusted' BCR.

There does exist issues with the current 'adjusted' BCR approach, including:

- Limited insight into the value placed within the decision making process on the 'adjusted' BCR, which may act as a disincentive to undertaking the additional analysis associated with this.
- Underlying question of how relevant impacts should be accounted for. With practitioners likely to have similar views on additional impacts but having the potential to have discrepancies in how these are applied.

Figure 8: MHCLG example of appraisal of a residential development







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