



Department
for Transport

Impacts of integrating land-use and transport planning: a rapid evidence assessment

November 2025

Department for Transport
Great Minster House
33 Horseferry Road
London
SW1P 4DR



© Crown copyright 2025

This publication is licensed under the terms of the Open Government Licence v3.0 except where otherwise stated. To view this licence, visit <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/> or contact, The National Archives at www.nationalarchives.gov.uk/contact-us.

Where we have identified any third-party copyright information you will need to obtain permission from the copyright holders concerned.

This publication is also available on our website at www.gov.uk/government/organisations/department-for-transport

Any enquiries regarding this publication should be sent to us at www.gov.uk/government/organisations/department-for-transport

Contents

Contents	3
Executive summary	5
Background	5
Policy context	5
Scope	6
Methodology	7
Definitions	7
Benefits and disbenefits of integrating the planning and delivery of sustainable land-uses	8
Immediate suggestions for policy makers making land-use and transport decisions	12
Introduction	13
Overview and background	13
Policy context	14
Aims and objectives of this work	15
Report structure	15
Methodology	17
Overall approach	17
REA Protocol	18
Overview of shortlist of papers reviewed	19
UK case studies	20
Limitations	20
Definitions used	21
Importance of definitions	21
What is meant by integrated land-use and transport planning	21
What is meant by mixed-land use	24
What is meant by densification	25
Implications of definitions	26

Transport outcomes	27
Scope of Transport outcomes	27
Characteristics of the evidence base	28
Key insights and synthesis: Transport outcomes	28
Evidence gaps: Transport outcomes	30
Economic outcomes	32
Scope of Economic outcomes	32
Characteristics of the evidence base	33
Key insights and synthesis: Economic outcomes	34
Evidence gaps: Economic outcomes	35
Environmental outcomes	37
Scope of Environmental outcomes	37
Characteristics of the evidence base	38
Key insights and synthesis: Environmental outcomes	39
Evidence gaps: Environmental outcomes	40
Social outcomes	42
Scope of Social outcomes	42
Characteristics of the evidence base	43
Key insights and synthesis: Social outcomes	44
Evidence gaps: Social outcomes	46
UK case studies	48
King's Cross, London	51
East Village, Stratford, London	52
Canary Wharf, London (Docklands Redevelopment 1980s – 2000s)	53
MediaCityUK, Salford, Greater Manchester	54
Birmingham Eastside (Curzon HS2 Masterplan)	55
Key take-aways for policy makers and next steps	57
Key take-aways	57
Barriers and enablers to effective integration of land use and transport planning	58
Suggestions for new research to inform policy in the medium term	60
Bibliography	63

Executive summary

Background

Integrated land use and transport planning is a policy and practice framework that aligns land development with the design and operation of transport networks. This approach recognises the reciprocal relationship between where and how people live, work and spend leisure time, and the travel options that are available to them. It seeks to establish institutional structures that harmonise land use and transport policies and objectives.

The Department for Transport's (DfT) Transport Appraisal Guidance notes that "wider impacts" of transport schemes, which could include interactions with land use planning, should be captured where it is proportionate to do so.¹ There is limited empirical evidence on the impact of integrated land use and transport planning. This work, commissioned by DfT to Frontier, summarises the available evidence and highlighted gaps. These gaps could be filled to better understand integration of land-use and transport planning.

Policy context

Reforming the planning systems is a key component of the Government's mission to "kickstart economic growth" by raising living standards in every part of the UK to increase prosperity and address regional inequalities.² Government has noted that: "The failure of the planning regime has not just left us without the homes we need. Britain also lacks other key infrastructure that we should be able to rely on such as transport and energy".³

Against this backdrop the interaction between how land is developed and how people travel has become an increasingly important focus for policymakers. Recent Government policy, such as the New Towns⁴ commitment to identify well-connected and sustainable locations, seeks to promote better integration of the transport and

¹ Available [here](#)

² Available [here](#)

³ Available [here](#)

⁴ Available [here](#)

planning systems. In January 2025 Defra launched a consultation on land use.⁵ This acknowledged growing demands on a fixed supply of land. The consultation sought views on implications of commitments to restore nature, support food production and deliver housing.

Scope

This review focussed on ex-post (after the intervention) evaluation evidence from the UK and from other economies identified as being similar to the UK. While prioritising this type of evidence, the review also draws on the best available international studies. It considers the robustness of the evidence and covers a range of transport modes. This evidence is complemented by other forward-looking studies which seek to model potential future impacts. The review addressed the following research questions:

- What ex-post evidence is available on the benefits and disbenefits of integrating the planning and delivery of sustainable transport with different land-uses?⁶ This considered outcomes such as increasing accessibility to jobs, education, and healthcare, unlocking homes, supporting regeneration, alleviating deprivation, generating growth, promoting agglomeration effects and reducing carbon emissions.
- Is there ex-post evidence to support the hypothesis that land-use mix,⁷ can facilitate shorter travel distances? To what extent does this lead to increases in carbon emissions abatement and active travel mode shares?
- What new research would be required to better understand integration of land-use and transport planning?

The outputs of this project will facilitate improved decision-making related to integrated land-use and transport. DfT were interested in four categories of outcomes.

⁵ Available in full [here](#)

⁶ Full definition provided below

⁷ Definition provided below

Figure 1 Benefits and disbenefits of integrating transport and land use

	Examples of potential benefits	Examples of potential unintended consequences
Transport outcomes	- Increased walking, cycling, usage public transport. - Reduced usage of private vehicles and emissions - Shorter commute times	If not properly managed, these schemes can increase traffic congestion and traffic bottlenecks.
Economic outcomes	- Growth due to alignment of needs with infrastructure - Increased ability to better connect employers with workers, customers, suppliers and other businesses - Support for agglomeration benefits - Supporting urban regeneration and redevelopment	- The complexity of coordinating multiple stakeholders with differing objectives can lead to delays, increased costs and challenges in reaching agreements on risksharing and funding responsibilities. - Integration may increase risk / fragility and reduce resilience as well as causing delays in delivery.
Environmental outcomes	- Reduced emissions from shorter journeys. - Provision of green infrastructure - Improving air and noise quality	Poorly planned integration can lead to environmental issues, such as increased pollution and loss of green spaces
Social outcomes	- Improved quality of life and greater social vibrancy - Improved access to essential services - Improved access to employment and education - Improved access for lowincome communities education/employment opportunity and essential services	- Implementing mixed-use developments can make areas more attractive, leading to higher demand this may result in the displacement of lowerincome residents - Mixed land use can lead to conflicts between different groups, such as noise complaints from residents living near commercial establishments, affecting the quality of life.

Source: Frontier

Methodology

We carried out a Rapid Evidence Assessment (REA) of the ex-post evidence of the benefits and disbenefits of integrating the planning and delivery of transport with different land-uses. A REA follows the principles of a Systematic Review⁸ to objectively assess a body of evidence but is undertaken over a much shorter timescale and does not attempt to capture all of the relevant evidence. We therefore developed a rigorous approach to prioritise what to review based on its relevance to the three research questions listed above.

All of our work was guided by a REA protocol which we agreed with DfT during the early stages of the project. The protocol provided transparency about how the review was designed and conducted, and how we analysed the evidence. We then implemented our protocol to identify evidence of interest and highlight the most relevant and robust sources.

First, we carried out an initial scan of evidence to generate definitions which underpinned the remainder of our work. Second, we carried out a detailed review of the most relevant sources and synthesised the results. This included describing the overall characteristics of the evidence base (e.g. the types of evidence available, research design used, jurisdictions studied, interventions studied, and outcomes measured). Third, we summarised the evidence base and its implications, including the consistency and convergence of the findings in different papers.

Definitions

Establishing clear and consistent definitions was a critical step in carrying out this evidence review. The definition for land-use and transport integration outlined below

⁸ Available [here](#)

derives from the published evidence, provided the conceptual foundation for our work and confined our review to the most relevant sources.

Land use and transport integration brings together land development with transport network design and considers interactions in all settings from urban to rural. Integration can be achieved by implementing an overarching governance framework across multiple organisations that are collectively responsible for meeting the infrastructure needs of a geographical area. This leads to planning and delivery of investment across systems that harmonise land use with transport policies, objectives, and standards. Land use and transport integration aims to improve housing supply in the right locations, decrease reliance on private vehicles and ensure an optimal distribution of services, including facilities for sustainable modes of transport at key origins and destinations (Murray, 2021; Taylor 2024).

Integration of land use and transport planning exists on a spectrum:

- Minimal integration land use and transport planning are conducted in silos, with little or no coordination between the respective agencies or stakeholders.
- Partial integration: some coordination exists between land use and transport planning, but it remains limited or project-based.
- Full integration: processes are seamlessly intertwined. Collaborative policy-making and joint implementation strategies mean development patterns and transport networks evolve in tandem.

Further definitions for related, but distinct, concepts such as mixed land use, densification and agglomeration are set out in the remainder of the report.

Benefits and disbenefits of integrating the planning and delivery of sustainable land-uses

We first present some over-arching conclusions before describing in a bit more detail the evidence as it relates to transport, economic, environmental and social impacts.

The integration of land use and transport planning has the potential to generate significant positive impacts. Our evidence review has found that integrated land use and transport planning, if implemented appropriately, can lead to reduced journey lengths, increased active travel, enhanced public transport performance, and economic gains from improved productivity and urban regeneration.

Isolated interventions are unlikely to unlock the full spectrum of benefits. Instead, a coordinated set of actions, providing certainty to stakeholders about the level of commitment to a shared strategic vision, are far more likely to produce meaningful improvements in economic, environmental and social outcomes. Integrating transport and land use planning can lead to trade-offs which need to be carefully managed. For example, densification, can lower overall greenhouse gas emissions and support active travel, yet it may also lead to higher concentrations of air

pollutants in urban cores. Proximity to transit hubs within a mixed-use environment can drive economic gains. However, this can also exacerbate housing affordability issues and elevate crime rates.

Robust governance frameworks are critical for successful integration. These frameworks are likely to be more effective where they overcome a range of barriers to effective integration including fragmented decision making, fiscal constraints and rigidity in existing practice. Case studies, such as those from regeneration projects at King's Cross, demonstrate that effective collaboration among public, private, and third-sector stakeholders can play a fundamental role in enabling action. The effectiveness of integrated planning depends on the context in which those interventions are rolled out. Factors such as existing transport infrastructure, economic conditions, and demographics shape outcomes. Emerging technologies, including autonomous vehicles and micromobility solutions, create opportunities and challenges for local areas to thrive. Planning will need to adapt to these external influences.

Transport outcomes

The evidence shows that creation of compact, mixed-use areas can foster shorter journeys, higher rates of active travel, increased public transport usage and less congestion when they are supported by strategic transport investments. Achieving these benefits depends on synergy across multiple factors, including the integration of housing, retail, and employment opportunities, high-quality transit services, and safe spaces for active travel.:

Integrated planning that co-locates residences, workplaces and essential services can substantially influence travel behaviour and transport outcomes. Research shows that a balanced job-housing mix and proximity to urban centres reduce journey length. Studies from Beijing and Hong Kong found shorter distances correlate with lower travel energy use and increased public transport and walking adoption (Zhang & Zhao, 2017; Lu et al., 2018). Evidence from Cambridge shows that compact, transit-oriented development reduces vehicle kilometres travelled (and emissions when paired with cleaner vehicle technologies) (Namdeo et al., 2019). However, Raman (2019) warns that if mixed use developments are not scaled properly, they can lead to increased congestion.

Well-connected urban forms promote active travel. Research from Hong Kong and Seoul indicates that increased residential and commercial density, along with mixed land use, significantly boost walking and cycling (Cerin et al., 2020; Seong et al., 2012). In addition, longitudinal research on Dutch cohorts indicates that a higher land use mix is associated with increased walking. Although the influence on cycling can be mixed depending on local conditions, the overall evidence supports that enhanced accessibility to varied destinations boosts non-motorised travel (Noordzij et al., 2021).

A multi-intervention approach is more effective in reducing congestion. A Southampton study (Sarri et al., 2024) compared three intervention scenarios: a

dedicated cycling network (SCN), city-wide traffic calming (TC), and a combined approach. The SCN scenario reduced private car usage by 12,500 vehicle-kilometres and increased cycling share to 37%. Only the combined scenario increased both cycling and walking.

Integrated planning increases public transport use. Evidence from Hong Kong demonstrates that proximity to central services and improved urban design correlate with higher public transport usage and increased passenger kilometres (Lu et al., 2018; Cerin et al., 2020). Transit-oriented communities benefit from reduced vehicle dependency.

Economic outcomes

The evidence we have identified and reviewed consistently supports the view that integrated land use and transport planning can enhance productivity, influence property values, and drive urban regeneration.

OECD/ITF (2007) estimates that doubling urban density can increase productivity by nearly 20%, particularly benefiting the service sector. Trubka (2011) finds that strategic densification in Australian cities can raise wages by up to 7.4%.

Proximity to transit infrastructure is positively correlated with house prices, as confirmed by Mi et al. (2016) in a meta-analysis of 52 studies. Moos et al. (2018) found that by 2006, 33% of owner-occupied households in Toronto's mixed-use zones spent over 30% of their income on housing, compared to 25% elsewhere. Rental affordability was similarly impacted.

Successful regeneration projects, such as King's Cross in London, highlight the importance of well-structured institutional frameworks and public-private partnerships (Yeu & Shi, unpublished). Thanks to the King's Cross regeneration, the number of employees based in the areas increased dramatically from about 8,000 in 2011 to 27,000 by 2019; ~279,000 m² of commercial space and 900 new homes had been delivered by 2017. Karadimitriou et al. (2013) emphasise that collaboration between public, private, and third-sector actors can enhance accessibility, boost local economic vitality, and improve transport links.

While economic benefits are evident, integrated planning can lead to affordability pressures and displacement risks, particularly in high-demand urban areas (Maket et al., 2024).

Environmental outcomes

Overall, the findings highlight the need for a balanced approach that integrates transport, land use, and environmental policies. Policymakers should leverage the environmental benefits of integrated planning while actively mitigating unintended social and ecological impacts.

The integration of land use and transport planning can support compact, mixed-use urban growth, leading to lower greenhouse gas (GHG) emissions by shifting travel away from private vehicles towards public transport. However, the relationship is complex. Evidence from Chinese cities suggests a U-shaped link between land use and emissions—moderate density reduces emissions, but excessive densification can reverse these benefits (Li et al., 2022). Broader research from cities including Xiamen, Shanghai, Albuquerque, and Cambridge (UK) indicates that optimising urban form alone is insufficient for substantial emission reductions (Yuan et al., 2017; Wang et al., 2023; Tavarani et al., 2018; Namdeo et al., 2019). Complementary measures, such as integrating ecological spaces with urban functions and reforming energy and industrial structures, are critical (Wang et al., 2023).

Densification can also improve air quality at an aggregate level. Studies from South and North America show that increased density often lowers pollutant levels (Valencia et al., 2023; Carozzi et al., 2023). However, denser urban cores may experience localised increases in harmful pollutants such as CO, O₃ and PM_{2.5}, presenting health risks.

A further trade-off exists between compact development and green space preservation. Evidence from Sydney suggests that densification may reduce private and public green spaces, affecting biodiversity and social equity (Lin et al., 2015). Disadvantaged communities, in particular, may struggle to access remaining green areas.

Social outcomes

Diverse land uses and compact urban forms which come about due to effective integration of transport and land use are linked to improved social capital, enhanced physical activity, and better mental health. The evidence also highlights trade-offs. Increases in mixed land use, may elevate crime rates and contribute to housing affordability pressures. These effects underscore the importance of adopting a tailored, evidence-driven approach. Key findings:

Well-designed environments which come about as a result of effective integration of transport and land use planning can increase social capital (e.g. the values or norms shared among members of a group which permits them to cooperate with one another). For instance, studies focused on Cairo demonstrate that an increase in the number of land uses (m² of commercial, industrial and public land uses in the neighbourhood divided by the number of housing units) can boost social capital (measured through an index that considers several parameters) (Nabil & Eldayem, 2015). The authors reported an even larger increase in social capital (0.92 units) when the quality of land use mix was factored in. In Oslo, compact urban forms and mixed land use have been shown to enhance social relationships by up to 0.15 standard deviations (Mouratidis, 2019).

Evidence from the Netherlands indicates that a 10% increase in the diversity of land use (e.g. incorporating multiple forms of land use side-by-side) can yield an

additional 11 minutes of walking per individual per week (Noordzij et al., 2021). Mental health outcomes are influenced by the presence of urban greenery and balanced land use. Increased park greenery in Switzerland is linked to an increase in life satisfaction of 0.24 standard deviations among older residents (Bahr et al., 2024).

Increased deployment of mixed land use in some studies has been associated with increases in crime rates (Wo et al., 2020; Zahnow, 2018). For example, Wo et al. (2020) report 134% more robberies in mixed land use neighbourhoods in San Francisco when compared with other neighbourhoods. This could be because land use heterogeneity weakens mechanisms of informal surveillance.

Immediate suggestions for policy makers making land-use and transport decisions

There are a number of short-term actions policymakers can take who are seeking to make integrated land use and transport decisions in the short term. These include:

- Setting out the specific outcomes that each scheme is targeting and consider how these outcomes will be monitored and evaluated going forward to determine success.
- Developing awareness of potential unintended consequences via short scoping studies ahead of major investments. This can enable mitigating action to be taken where appropriate. This in turn can help balance economic benefits with social equity and ensure that improvements in land use do not inadvertently disadvantage population subgroups.
- Ensuring effective governance processes are considered and then put in place. Meaningful integration requires shared risk and coordinates decision-making, as fragmented and unclear governance can impede realisation of anticipated benefits.
- Where possible policymakers should seek to develop an integrated strategy which goes beyond individual decisions and sets out a larger programme of work which signals a commitment to integrated planning and development.

Introduction

Overview and background

The integration of land use and transport planning has the potential to help deliver sustainable, efficient, and inclusive urban and rural environments. The UK is facing a number of significant challenges including shifting population demographics, urbanisation and climate change. In this context, aligning land use decisions with transport infrastructure development can be an important enabler of economic growth and other long-term social, and environmental goals. For example, integrating sustainable transport and new housing can connect people and homes with jobs and social infrastructure. In doing so this type of integrated development can deliver a range of benefits and support DfT strategic priorities as well as cross-government objectives (e.g. reaching net zero).

Land use planning in this context refers to regulating the location of activities, such as housing, employment and recreational facilities. Transport planning focusses on the identification and delivery of schemes focused on the movement of people and goods via multiple modes.⁹ Historically, these two aspects of infrastructure planning were often treated as separate domains. In some cases transport schemes have been developed reactively to accommodate existing land use patterns, rather than proactively shaping sustainable land use in rural and urban areas. This led to challenges in creating sustainable, accessible and efficient communities and may have contributed to various issues, including increased car dependency, urban sprawl, and reduced accessibility to essential services. A more integrated, vision-led approach – where land use and transport are planned together in pursuit of a shared long-term goal – can help address these challenges. Indeed, existing evidence suggests that the most successful transport schemes were those delivered as part of a broader package of interventions.¹⁰

DfT's Transport Appraisal Guidance notes that “wider impacts” of transport schemes (which could include interactions with land use planning), should be captured where it is proportionate to do so.¹¹ However, DfT has noted that despite the potential for

⁹ Further detail on definitions used throughout this study is presented in Section 4.

¹⁰ Further detail available [here](#)

¹¹ Available [here](#)

significant benefits, there is limited empirical evidence on the impact of integrated land use and transport planning.

Policy context

In the UK, the interaction between how land is developed and how people travel has become an increasingly important focus for policymakers, practitioners and the public. Growing concerns around potential economic growth bottlenecks, traffic congestion, air quality, and climate change indicate that there is a clear need to align land use decisions with transport investments and strategies. This approach aims to reduce car dependency, encourage active travel, improve accessibility, and foster economic growth.

Reforming the planning systems is a key component of the Government's mission to "kickstart economic growth" by raising living standards in every part of the UK to increase prosperity and address regional inequalities.¹² Government has noted that:

"The failure of the planning regime has not just left us without the homes we need. Britain also lacks other key infrastructure that we should be able to rely on such as transport and energy."¹³

Against this backdrop the interaction between how land is developed and how people travel has become an increasingly important focus for policymakers. Recent Government policy, such as the New Towns¹⁴ commitment aims to identify well-connected and sustainable locations. This initiative also seeks to promote better integration of the transport and planning systems, providing further opportunity to consider the benefits of a joined-up approach. In January 2025 DEFRA launched a consultation on land use.¹⁵ This acknowledged that there are growing demands on a fixed supply of land in England. The consultation sought views on the implications of commitments to restore nature, support food production, improve climate resilience and deliver new housing and infrastructure on land usage.

The most recent iteration of the National Planning Policy Framework (NPPF)¹⁶ published in December 2024, emphasised the importance of planning for sustainable transport solutions and prioritising development in accessible locations. Meanwhile, DfT's Transport Decarbonisation Plan¹⁷ and the broader cross-government Net Zero Strategy,¹⁸ have emphasised the need to shift travel towards low-emission modes and ensure that land development supports these objectives.

Collaboration among planners, transport professionals, and stakeholders is essential to deliver these policies and meet these ambitions.

¹² Further details on the Government's Growth Mission are available [here](#)

¹³ Further details on the Government's Growth Mission are available [here](#)

¹⁴ Further details on the New Towns programme are available [here](#)

¹⁵ Available [here](#)

¹⁶ Available [here](#)

¹⁷ Available [here](#)

¹⁸ Net Zero Strategy is available [here](#)

Aims and objectives of this work

Frontier Economics was commissioned by DfT to conduct a rapid evidence assessment (REA) of the literature evaluating the impacts of different approaches to integrated land use and transport planning. The review focussed on ex-post evaluation evidence, from the UK and other similar countries, which has been generated using rigorous and robust methods. This is complemented by other relevant studies which seek to model these effects ex ante, based on observed data.

This REA aimed to facilitate improved decision-making by providing up-to-date evidence on the intended and unintended impacts of integrated land-use and transport planning. The evidence that we have summarised in this report will help to improve policymakers' understanding of how transport and land use schemes can offer greatest value for money to deliver maximum regeneration, sustainable economic growth and decarbonisation impact (while minimising unintended consequences).

Research questions

The review addressed the following overarching research questions which were agreed with DfT at the outset of the work:

1. What ex-post evidence is available on the benefits and disbenefits of integrating the planning and delivery of sustainable transport with different land-uses? We have considered potential outcomes such as increasing accessibility to jobs, education, and healthcare, unlocking homes, supporting regeneration, alleviating deprivation, generating growth, promoting agglomeration effects and reducing carbon emissions.
2. Is there ex-post evidence to support the hypothesis that land-use mix close together, can facilitate shorter travel distances? To what extent does this lead to increases in carbon emissions abatement and active travel mode shares?
3. What new research would be required to better understand integration of land-use and transport planning?

Report structure

The remainder of this report is structured as follows:

- Section 3 sets out the methodology used to deliver this work.
- Section 4 presents the definitions that have been used throughout the work.
- Sections 5-8 present the domain specific findings of the REA covering transport outcomes, economic outcomes, environmental outcomes and social outcomes respectively.

Impacts of integrating land-use and transport planning

- Section 9 outlines examples of UK integrated development.
- Section 10 provides an overall synthesis of findings and sets out key take-aways for policymakers.
- Finally, Section 11 lists the sources that have been reviewed as part of this work.

Methodology

This section sets out the methodology used to carry out this rapid evidence assessment (REA).

Overall approach

We were commissioned to carry out a REA of the ex-post evidence that relates to the benefits and disbenefits of integrating the planning and delivery of transport with different land-uses. A REA follows the principles of a Systematic Review¹⁹ to objectively assess a body of evidence but is undertaken over a much shorter timescale and does not attempt to capture all of the relevant evidence. We therefore developed a rigorous approach to prioritise what to review based on relevance to the study and the three research questions (see Section 1.1).

We delivered the work via a four-stage approach illustrated below.

Figure 2 Methodology used



Source: Frontier

All of our work was guided by a REA protocol which we agreed with DfT during the early stages of the project. The protocol provided transparency about how the review was designed and conducted, and how we analysed the evidence.

¹⁹ The Magenta Book is available [here](#)

We then implemented our protocol to firstly identify evidence of interest and highlight the most relevant and robust sources via a multi-stage approach (see below for details). We then carried out an initial scan of evidence to generate definitions which underpinned the remainder of our work. We finally carried out a detailed review and synthesis of the most relevant evidence sources. Further detail on each stage is presented below.

REA Protocol

Outcomes of interest

This research aimed to synthesise the available evidence on the impact of integrated land-use and transport on a range of outcomes. The protocol we developed included a framework which outlined four categories of potential outcomes:

- transport benefits and dis-benefits;
- economic benefits and dis-benefits;
- social benefits and dis-benefits; and
- environmental benefits and dis-benefits.

Figure 3 Benefits / dis-benefit framework

	Examples of potential benefits	Examples of potential unintended consequences
Transport outcomes	- Increased walking, cycling, usage public transport. - Reduced usage of private vehicles and emissions - Shorter commute times	If not properly managed, these schemes can increase traffic congestion and traffic bottlenecks.
Economic outcomes	- Growth due to alignment of needs with infrastructure - Increased ability to better connect employers with workers, customers, suppliers and other businesses - Support for agglomeration benefits - Supporting urban regeneration and redevelopment	- The complexity of coordinating multiple stakeholders with differing objectives can lead to delays, increased costs and challenges in reaching agreements on risksharing and funding responsibilities. - Integration may increase risk / fragility and reduce resilience as well as causing delays in delivery.
Environmental outcomes	- Reduced emissions from shorter journeys. - Provision of green infrastructure - Improving air and noise quality	Poorly planned integration can lead to environmental issues, such as increased pollution and loss of green spaces
Social outcomes	- Improved quality of life and greater social vibrancy - Improved access to essential services - Improved access to employment and education - Improved access for lowincome communities education/employment opportunity and essential services	- Implementing mixed-use developments can make areas more attractive, leading to higher demand this may result in the displacement of lowerincome residents - Mixed land use can lead to conflicts between different groups, such as noise complaints from residents living near commercial establishments, affecting the quality of life.

Source: Frontier

Examples of specific outcomes that are in-scope and fall under each category are illustrated above (actual empirical results are presented in the remainder of this report). However, the above list is not intended to be exhaustive, and we have taken a broad approach to identifying evidence. To enable DfT to make best use of our work, where possible, we have also:

- highlighted the conditions under which positive or negative outcomes are more or less likely to be observed;
- assessed the scale of outcomes; and
- explored for whom outcomes are most likely to arise.

For more detail on the REA protocol, see Annex B.

Overview of shortlist of papers reviewed

The studies shortlisted for in-depth review were selected based on methodological rigour, relevance to the UK and comparable international contexts, and their ability to offer nuanced insights into the impacts of integrated planning interventions.

The final evidence base covered a breadth of geographies (Table 1) and spanned a range of research methodologies, including multi-level modelling, regression techniques, scenario-based simulations and both longitudinal and cross-sectional designs (Table 2). As well as individual quantitative studies our review has also identified meta-analyses and theory-driven studies that synthesise findings across multiple case studies and geographic contexts. Collectively, these studies provided a robust evidence base for our REA, capturing the dynamic interplay between land use and transport planning.

Table 1: Breakdown of studies shortlisted for in-depth review, by geography and outcome category

Geography	Transport outcomes	Economic outcomes	Environmental outcomes	Social outcomes
UK	2	2	1	-
Europe	1	1	-	4
North America	1	1	4	3
Australia	-	1	4	3
Asia	4	-	4	5
South America	-	-	1	-
Africa	-	-	-	1
International comparisons / theoretical studies	2	6	1	4
Total	10	11	12	19

Table 2: Breakdown of studies shortlisted for in-depth review, by methodology and outcome category

Methodology	Transport outcomes	Economic outcomes	Environmental outcomes	Social outcomes
-------------	--------------------	-------------------	------------------------	-----------------

Regression analysis	6	4	4	9
Quantitative modelling	2	1	7	6
Literature review	2	3	1	2
Case study analysis	-	3	-	2
Total	10	11	12	19

UK case studies

In addition to the studies referred to above we also identified a number of sources relating to example UK development case studies. Each of these case studies covered a specific example of integrated transport and land use development. The majority of sources relating to these examples are not academic or peer reviewed papers. Therefore, they are not included in our primary evidence review but instead are presented in a standalone section (Section 9). These examples help to place the evidence review in to a UK context.

Limitations

This report summaries a REA which was carried out over the course of five months. In line with Government guidance this REA can be considered a short but systematic assessment of a specific topic.²⁰ It is by nature less detailed and less comprehensive than a systematic review or a meta review.

In addition, while we have aimed to highlight existing gaps in the literature it was beyond the scope of this project to undertake any additional primary research to directly fill these gaps.

We have where possible, given greater emphasis to studies which focused on the UK or focused on countries which are similar to the UK. However, this has not always been possible given the available evidence base. Therefore, the precise applicability of all findings to a UK context is uncertain.

²⁰ REA definitions are available [here](#)

Definitions used

Importance of definitions

To carry out this evidence review, establishing clear and consistent definitions was a critical step. The definitions outlined below provided the conceptual foundation for our work and confined our review to the most relevant sources of evidence. Setting these parameters upfront also enabled meaningful comparisons across studies. This is particularly important in the context of integrated land use and transport planning, where the interplay between urban development and transportation systems involves complex and nuanced concepts.

Given multi-disciplinary interest in this broad topic and the large number of potential research questions it is unsurprising that the current evidence base lacks a universally accepted set of definitions for terms such as “integrated land use and transport planning”.

To address this challenge, we conducted an initial filtering of the literature to identify recurring themes and interpretations of key terms. Second, we refined these interpretations into a workable set of definitions that most closely aligned with our core research questions and the evidence that DfT wished to identify and assess. The final set of definitions that we have used provided a clear and consistent foundation for this review and ensured that the scope and focus were well-defined. This enhanced the rigour of our analysis and facilitated a more coherent synthesis of the evidence.

What is meant by integrated land-use and transport planning

Land use and transport integration brings together land development with transport network design and considers interactions in all settings from urban to rural. Integration can be achieved by implementing an overarching governance framework across multiple organisations that are collectively responsible for meeting the infrastructure needs of a geographical area. This leads to planning and delivery of investment across systems that harmonise land use with transport policies, objectives, and design standards. Land use and transport integration aims to

improve housing supply in the right locations, decrease reliance on private vehicles and ensure an optimal distribution of services in an area, including facilities for sustainable modes of transport at key origins and destinations (Murray, 2021; Taylor, 2024).

Integrated land use and transport planning is a policy and practice framework that aligns land development with the design and operation of transport networks. At its core, this approach recognises the reciprocal relationship between where and how people live, work and spend leisure time, and the travel options that are available to them. It seeks to establish institutional structures that harmonise land use and transport policies, objectives, and design standards, ensuring that decisions on investment and operations are coordinated rather than made in isolation. By doing so, integrated planning aims to shape more functional and sustainable urban environments, reducing the negative impacts of uncoordinated growth and transport systems.

In practice, integrated land use and transport planning can serve several interrelated aims, which include:

- First, it is concerned with improving housing supply, choice and affordability while simultaneously reducing reliance on private vehicles. This is achieved by minimising the frequent need for long journeys, as well as improving access to public transport, walking and cycling options.
- Second, integrated planning strives to ensure optimal distribution of essential facilities and services such as schools, healthcare, commercial centres, and recreation spaces across the relevant area, making them accessible to all residents in ways that minimise adverse environmental impacts and maximise opportunities for sustainable economic development.
- Finally, successful integration also aims to provide the necessary infrastructure for environmentally friendly travel modes at key origins and destinations, ensuring that people can easily choose more sustainable forms of transport from their homes, workplaces, and community hubs.

Levels of integration

Integration of land use and transport planning exists on a spectrum, ranging from minimal to full coordination. Understanding these varying degrees of integration provides insight into the potential outcomes for urban development, social equity, economic viability, and environmental sustainability. To illustrate, simplified discrete levels of integration are set out below alongside the potential anticipated benefits in each case (actual empirical outcomes are presented in the remainder of the report):²¹

²¹ This taxonomy is the result of Frontier Economics Ltd's own analysis and is not directly derived from any of the sources reviewed in the literature.

- **Minimal integration:** land use and transport planning are conducted in silos, with little or no coordination between the respective agencies or stakeholders. Decisions regarding land development and transport infrastructure are made independently, frequently resulting in mismatches and contradictory schemes. A common example includes newly built developments that lack adequate transport links or future-oriented land use strategies being ignored in road or rail expansions. This degree of integration could lead to the following potential implications: **Transport-** Increased reliance on private vehicles due to inadequate or poorly connected public transport options. **Economic-** Higher infrastructure costs often arising from redundant or misaligned projects, as separate agencies pursue isolated priorities. **Social-** Reduced accessibility to services, schools, and employment opportunities, disproportionately affecting low-income or carless households. **Environmental-** Increased emissions, congestion and urban sprawl, as dispersed development patterns often encourage car dependency.
- **Partial integration:** partial integration occurs when some coordination exists between land use and transport planning, but it remains limited or project-based. Planners may consult each other on specific initiatives, such as a new transit line or a housing development but there is no systematic mechanism to ensure that both sets of policies and objectives are fully aligned. This level of integration can bring about noticeable improvements compared to siloed planning but still falls short leveraging the full range of benefits that come from truly coordinated efforts. Unintended consequences can still arise if areas of planning remain disconnected. This degree of integration could lead to the following potential implications: **Transport-** Moderate improvements in public transport accessibility and efficiency, yet some regions may still be underserved. **Economic-** possible localised gains in economic growth where collaboration occurs, though disparities in development and investment may remain across different areas. **Social-** incremental enhancements in access to services, especially in locations benefitting from coordinated policies, but inconsistent outcomes overall. **Environmental-** some reduction in emissions and containment of sprawl, but progress is uneven and often fails to realise the full potential of sustainability goals.
- **Full integration:** the highest level of coordination, where land use and transport planning processes are seamlessly intertwined. Collaborative policy-making, shared objectives, and joint implementation strategies ensure that development patterns and transport networks evolve in tandem. Rather than reacting to each other's decisions, planners pursue common goals. These goals can include reducing private car dependency, ensuring equitable access to essential services, and supporting sustainable urban growth. This degree of integration could lead to the following potential implications: **Transport-** well-designed public transport networks and active travel infrastructure reduce reliance on private vehicles and improve overall mobility. **Economic-** enhanced productivity and potentially higher property values, as improved accessibility fosters attractive, vibrant commercial and residential districts. **Social-** equitable access to services and employment opportunities across different demographic groups, reducing social exclusion and improving quality of life. **Environmental-**

substantial reduction in emissions and congestion, as well as more effective protection of green spaces through compact transit-oriented development.

Integration systems vs. integration tools

The existing literature makes a distinction between systems and tools associated with the successful integration of land use planning and transport (Crossland et al., 2022).

Systems refer to institutional frameworks and specific processes (e.g. shared governance) that enable integration. These include organisational structures, and regulatory mechanisms that facilitate or mandate the joint planning and or delivery of land use and transport (which in turn leads to a range of integrated outcomes).

Tools are specific development and design concepts, such as mixed-land use development or densification (see below for full definitions). These tools are used to achieve particular objectives. While they can be applied in isolation, their effectiveness may depend on the presence of system settings that support their consistent implementation in pursuit of strategic goals.

The majority of the literature included in this review focusses on the correlation of economic, social, environmental and transport outcomes with specific tools or design concepts (e.g. the linkage between mixed land use and productivity). Therefore, most studies are less clear on the detailed integration processes and systems which are most effective in unlocking the full benefits of the integration tools.

What is meant by mixed-land use

Mixed land use refers to the combination of multiple types of buildings and land functions within a specific area (e.g. residential, commercial, industrial uses). It aims to proximally co-locate facilities which serve complementary economic and social functions in doing so it seeks to promote desired activity patterns (Nabil et al., 2015; Shan et al., 2020).

Mixed land use refers to the deliberate development of a defined geographical area in which multiple types of buildings and land functions coexist. Rather than segregating residential, commercial, institutional, industrial, and recreational uses into distinct zones, mixed-use developments integrate these functions. Mixed-land use developments can come about as a result of effective integration of land-use and transport planning.

Mixed land use has several aims:

- Unlocking the potential for synergistic interactions among different activities. For instance, shops and restaurants benefit from foot traffic generated by nearby offices and residential areas, while residents enjoy convenient access to services, public amenities, and transport options. In many cases, this can lead

to shorter commute distances, reduced reliance on private vehicles, and greater opportunities for social interaction and community-building.

- Ensuring that facilities such as homes, offices, shops, schools, parks, and transportation hubs are located in close proximity, therefore creating a heterogeneous pattern of land use.

The effectiveness of mixed-use developments will depend on the specific combination of land uses and how well they align with local economic or social needs. A successful project will carefully select activities that not only complement one another economically (e.g. retail and residential land use near a major employment hub) but also foster desired behavioural patterns, such as active travel. When implemented thoughtfully, mixed land use can help create vibrant, diverse neighbourhoods that enhance residents' quality of life, support local businesses, and contribute to a more sustainable urban fabric.

What is meant by densification

Densification involves increasing the population and activity density within existing urban and semi-urban areas rather than expanding outward into undeveloped land. Deliberately planned densification can in some cases come about as a result of effective integration of land-use and transport planning. By concentrating housing, employment, and services within a smaller geographic footprint, densification can reduce travel distances, enhance walkability, and make public transport more viable. When implemented thoughtfully, it fosters more vibrant, efficient, and environmentally sustainable neighbourhoods that align with integrated land use and transport objectives.

In addition to physical density, the concept of effective density is also relevant. Even where the concentration of homes or jobs remains unchanged, improvements in connectivity – such as the introduction of a new transport corridor (e.g. a rail or rapid bus line) – can bring people and activities functionally “closer together”. This increases accessibility and supports many of the same benefits as physical densification, such as reduced car dependency and greater viability of local services.

Two related concepts, agglomeration and the compact city, shed light on the broader significance of densification.

Agglomeration

Agglomeration refers to the clustering of cities or urban areas into a closely connected network of economic, social, and infrastructural ties. As urban areas become more integrated, shared benefits arise from:

- Collaborative infrastructure that spreads costs and improves services;
- Knowledge exchange and innovation fuelled by proximity and competition;

- Economies of scale, lowering per-capita costs for services and goods.

Integration of transport and land use can lead to static agglomeration (whereby the effective size of a specific existing cluster is increased) and/or dynamic agglomeration (whereby the location or intensity of activity is changed, and a new cluster is created).²²

Compact city

A compact city is characterised by:

- Dense and proximate development patterns, locating diverse land uses such as housing, offices, shops and recreation close together.
- Urban areas linked by public transport systems, reducing car dependency and congestion.
- Accessibility to local services and jobs, fostering social inclusion and local economic vibrancy.

Densification strategies often rely on these compact city principles, deliberately concentrating development in ways that minimise the need for sprawling suburban growth. By situating homes, workplaces, and amenities in closer proximity, such strategies can also help reduce traffic congestion and environmental impacts (Nabil et al, 2015; Shen et al., 2020).

Implications of definitions

The definitions laid out above set the boundaries around the evidence base which we have reviewed. They also articulate in detail how these practices impact urban sustainability, economic development, and social equity. By articulating clear meanings for these terms for the purposes of this review, we have created a common ground from which different studies can be compared and synthesised.

By highlighting why each concept matters, these definitions help reveal the economic, societal and environmental consequences of urban planning decisions. Evidence on these potential outcomes is discussed in the next chapters.

²² Further details are available [here](#)

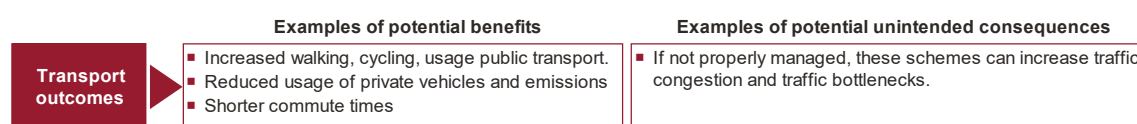
Transport outcomes

This section presents a summary of existing evidence on the potential impact of integrating land-use and transport planning on transport outcomes (see figure below for details).

Scope of Transport outcomes

Transport outcomes encompass a broad range of indicators that collectively describe the efficiency, accessibility, and sustainability of mobility within a geographic area. These outcomes extend beyond measures of traffic flow or congestion levels and also include how easily people can access services and employment,²³ the availability and quality of public transport, and the balance between private vehicle use and more sustainable modes such as walking and cycling.²⁴

Figure 4 Positive impacts and unintended consequences of land use and transport integration: Transport



Source: Frontier

The key transport outcomes that could be anticipated to be influenced by integrated land use and transport planning relate to the volume of journeys undertaken, the mode of travel, journey length, and journey time (for a given distance):²⁵

- Journey length: compact, well-planned developments can reduce the distance between residential, employment and recreational destinations. Shorter journeys not only cut down travel times but can also lower associated costs such as fuel and parking and potentially lessen stress for commuters.

²³ See Section 6 on Economic Outcomes

²⁴ See Section 7 on Environmental Value.

²⁵ See [Crossland et al., \(2022\)](#); [OECD \(2012\)](#); and [PTEG \(2011\)](#).

- Use of active travel modes: improving walkability and cycling infrastructure encourages people to choose active travel options. This can have significant health benefits, increase social interaction, and decrease reliance on cars.
- Congestion: traffic congestion can be alleviated by designing urban spaces that minimise car use, promote public transport and distribute travel demand across different modes and times. Well-integrated land use and transport policies often lead to less time spent in traffic, improved road safety and better air quality.
- Change in public transport utilisation: when development patterns complement transit corridors, bus and rail services can become more frequent, reliable and financially viable. This, in turn, can improve access to jobs, services, and amenities particularly for households without a private vehicle.

The extent to which these outcomes materialise depends on how land use and transport planning is implemented and the specific context of each intervention.

While integrated planning is intended to deliver positive transport outcomes, unintended consequences may arise. These include changes in travel behaviour that strain existing public transport capacity, increased road network pressure in newly developed areas, or mismatches between planned infrastructure and actual mobility patterns, leading to inefficiencies.

Characteristics of the evidence base

Our review includes ten empirical studies assessing the impact of integrated land-use and transport planning on transport outcomes. These studies cover a geographically diverse range including high-density Asian cities (Hong Kong, Seoul, Beijing) to European urban centres (including UK examples such as Southampton, Cambridge and Dutch cities), and studies focused on the US. Publication dates range from 2017 to 2024.²⁶

Methodologically, the studies employ a spectrum of approaches including multi-level modelling, regression and scenario-based simulations, as well as both cross-sectional and longitudinal analyses.

Key insights and synthesis: Transport outcomes

- Shorter journey lengths: Integrated planning that leads to the co-location of residences, workplaces, and essential services in close proximity can shorten journey lengths. For example, Zhang and Zhao (2017) in Beijing found that areas with a better jobs–housing balance (with more employment opportunities located within 5 km of residences) tend to have lower travel energy use, implying that trips are generally shorter and less carbon intensive. Similarly, Lu et al. (2018) in Hong Kong reported that a 10% decrease in the distance to the urban centre is associated with approximately a 2.7% increase in the likelihood of walking. Namdeo et al. (2019) show that in Cambridge, compact, transit-

²⁶ See Annex A for more detail.

oriented development reduces vehicle kilometres travelled (VKT) (and carbon dioxide emissions when paired with cleaner vehicle technologies). Raman (2019) warns that if mixed-use developments are not appropriately scaled, they might inadvertently force longer trips or contribute to congestion.

- **Increased active travel modes:** Dense, mixed-use environments, which can come about as a result of the effective integration of transport and land use, tend to promote walking and cycling by enhancing local connectivity and accessibility. These types of environments bring residences, services and workplaces into closer proximity, improving street network connectivity and naturally encourage active travel. Sarri et al. (2024) in Southampton demonstrated that under a dedicated cycling infrastructure scenario, cycling's share could increase to 37% of trips (with about 12,500 fewer vehicle-kilometres) while, in a traffic-calming scenario alone, the cycling share was lower at 32%; only the combined scenario produced an increase in walking (approximately 4% above the base case). In addition, Cerin et al. (2020) showed that in Hong Kong, a 1,000 dwellings/km² increase in residential density leads to a 0.8% increase in the frequency of walking trips and a 1.5% increase in the duration of walking trips—effects mediated by higher retail and street intersection density that also help reduce car ownership. Seong et al. (2021) in Seoul found that higher density of commercial facilities and a more diverse land use mix significantly boost the likelihood of walking over driving.
- **Moderated traffic congestion:** Although direct measures of congestion are less common in the existing evidence base, several studies indicate that integrated land use and transport measures can moderate traffic volumes and reduce delays. Sarri et al. (2024) found that a traffic-calming scenario in Southampton—implementing a city-wide 20 mph speed limit without reallocating road space—resulted in an additional 13,600 car kilometres compared to the baseline, showing that such measures alone may not reduce congestion. Conversely, integrated Smart Growth strategies, as noted by Litman (2024), can lead residents in compact, multimodal communities to own 20–60% fewer vehicles and drive 20–80% less, which substantially alleviates congestion. Raman (2019) cautions, however, that uncontrolled density and mixing of land uses may contribute to congestion and associated issues like noise and parking overspill.
- **Enhanced public transport utilisation:** Improved accessibility through integrated planning can boost public transport utilisation. Lu et al. (2018) found that in Hong Kong, proximity to the urban centre was associated with a 23% higher likelihood of public transport use. In Southampton, Sarri et al. (2024) reported that while dedicated cycling infrastructure can reduce transit ridership (due to modal competition), a traffic-calming scenario led to a 35–45% increase in public transport passenger-kilometres relative to the base case. Raman (2019) underscores that thoughtfully integrated transit corridors within mixed-use developments are key to ensuring high-quality and widely accessible public transport options.

Evidence gaps: Transport outcomes

Research strongly suggests that integrated land use and transport planning has significant potential to improve transport outcomes. However, several important evidence gaps remain in relation to transport outcomes in particular. These gaps highlight the need for further investigation to inform more effective policies and interventions aimed at optimising transport efficiency, accessibility, and modal choices. Below we outline the key evidence gaps and propose directions for future research:

- **Establishing causality:** Most available studies rely on cross-sectional analysis or modelling, which can identify associations between land use planning and transport behaviour but only examine the relationship between integration and outcomes of interest at a single point in time. This limits their ability to establish causality (as they cannot control for exogenous changes over time). Longitudinal approaches could be used to help control for unobservable confounders in this context. While some longitudinal studies exist,²⁷ they are relatively rare and often constrained by short timeframes or limited scope. More long-term, panel-based research is needed to track how changes in urban form influence travel behaviours over time and to distinguish planning effects from other confounding factors.
- **Understanding differential impacts:** Several studies indicate that land use and transport planning may affect different transport user groups in distinct ways.²⁸ However, the extent to which different income groups, age cohorts, and mobility-impaired individuals experience benefits or disadvantages remains underexplored. Future research should examine how transport accessibility, affordability, and travel time efficiency vary across different demographic groups.
- **Urban density threshold and congestion effects:** Some studies have examined the role of densification in reducing car dependency. However, less attention has been given to how different urban density levels affect transport network efficiency, congestion, and travel times. Furthermore, densification alone is unlikely to drive a modal shift; sufficient and adequate public transport provision is essential for car users to switch to alternative modes. Future research should evaluate whether there is an optimal density threshold and establish the minimum levels of public transport provision required to maximise the benefits of integrated planning while mitigating potential congestion effects.
- **Interactions with emerging technologies:** There is limited research on how integrated land use and transport planning interacts with emerging transport technologies such as ride-hailing services, micromobility (e-scooters, bike-

²⁷ For example, *Land use mix and physical activity in middle-aged and older adults: a longitudinal study examining changes in land use mix in two Dutch cohorts*, J M Noordzji et al., 2021

²⁸ For example, *How urban densification shapes walking behaviours in older community dwellers: a cross-sectional analysis of potential pathways of influence*, E Cerin et al., 2020; and *Land use mix and physical activity in middle-aged and older adults: a longitudinal study examining changes in land use mix in two Dutch cohorts*, J M Noordzji et al., 2021

sharing), and autonomous vehicles. Future research should investigate how these technological shifts impact public transport ridership, road congestion, and active travel trends within different urban forms.

- **Geographic concentration of evidence:** Existing evidence is geographically concentrated in high-density Asian cities and select Western contexts. However, there is limited research on the effectiveness of integrated land use and transport planning in lower-density, car-dependent and rural regions. More comparative research is required to determine how different urban morphologies influence transport modal share and trip patterns.
- **Leveraging big data and AI for transport analysis:** In the future, the adoption of big data analytics, GPS tracking, and AI-enhanced modelling could enhance the precision of transport behaviour studies, allowing for better ex-post evaluation of land use and transport interactions.

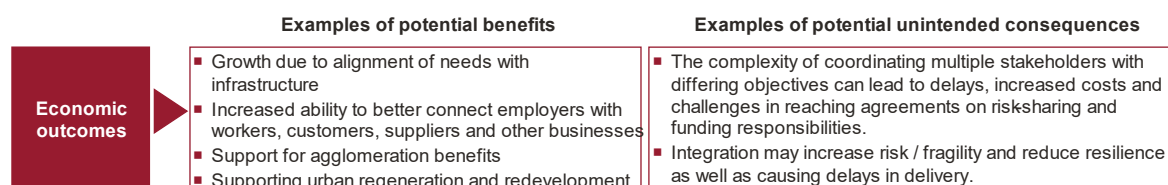
Economic outcomes

This section presents a summary of existing evidence on the impact on integrating land use and transport planning on economic outcomes, both in terms of benefits and unintended consequences.

Scope of Economic outcomes

Economic outcomes in the context of integrated land use and transport planning encompasses the broad spectrum of potential impacts that affect local and national prosperity. This includes GDP growth, productivity, employment opportunities, and overall living standards.

Figure 5 Economic outcomes



Source: Frontier

Below we have set out key areas of interest in conceptual terms, actual empirical results are then presented in subsequent subsections:²⁹

- Economic growth: improved connectivity and strategic land use decisions can bolster local growth and facilitate inward investment, enhancing business competitiveness and supporting higher-value activities.
- Willingness to pay for mixed-use development: by increasing convenience and access to amenities, mixed-use housing developments and neighbourhoods are often associated with higher property values (holding other factors constant). Examining willingness to pay for property in different areas can shed

²⁹ See [Crossland et al., \(2022\)](#); [PTEG \(2011\)](#); [OECD and International Transport Forum \(2007\)](#); and [OECD \(2012\)](#).

light on how much residents and businesses value well planned environments where housing, commerce and services intersect and co-exist.

- **Agglomeration, clustering and densification:** integrated transport and land use planning can drive both static agglomeration, where the effective scale of existing economic clusters is expanded through improved connectivity and accessibility, and dynamic agglomeration, where new clusters emerge or activity shifts to more productive locations. Static agglomeration enhances efficiency by allowing businesses to leverage shared infrastructure, benefit from knowledge spillovers, and access a larger labour pool. Meanwhile, dynamic agglomeration fosters innovation and structural economic change by enabling the formation of new economic hubs, unlocking latent demand, and encouraging investment in emerging sectors. Both forms contribute to higher productivity, competitiveness, and long-term urban resilience.
- **Accessibility to jobs:** integrated planning that reduces travel barriers and concentrates employment opportunities in areas that are well-served by transport infrastructure may can improve the functioning of labour markets by increasing access to jobs. This in turn can facilitate a better matching between employers and job seekers and allow firms to tap into deeper “local” labour market. This can help drive down unemployment and lower commuting costs. The resulting productivity gains may translate into a combination of higher wage premiums for employees and higher profits for employers.
- **Addressing inequalities:** improvements to land use and transport planning can benefit disadvantaged communities and reduce spatial inequities. Over the long term, improved transport infrastructure that is linked to housing developments can facilitate access to key public services such as education, healthcare and employment. This in turn can uplift economically marginalised areas.

Characteristics of the evidence base

We reviewed in-depth 11 studies that assess the impact of integrated land use and transport planning on economic value. We reviewed a heterogeneous mix of studies that include individual empirical analyses, meta-analyses which attempt to draw together results from multiple individual studies, and theory-driven conceptual research. The literature that we identified and subsequently reviewed includes studies focused on Australia, Europe, and less developed regions. We have also included multiple case studies which examine the economic impacts of integrated land use and transport planning in the UK and North America. Publication dates range from 2007 to 2024. Where possible we have given more weight to relatively more recent evidence. Methodological approaches include:

- Hedonic regression models³⁰ and meta-analyses (e.g. Mi et al., 2016; van Meerkerk, 2015) that quantify the effect of urban design components on property values.
- Dynamic panel methods³¹ and spatial econometrics (e.g. Maket et al., 2024) to assess the impact of agglomeration on regional economic performance.
- Comparative case study analyses (e.g. Karadimitriou et al., 2013; Yeu and Shi) that evaluate mixed land use regeneration and institutional frameworks.
- Theoretical studies and reviews (e.g. Thisse, 2017) that underscore the need for an integrated approach across housing, transport, and labour market policies.

This multi-faceted evidence base enabled us to take a holistic view of how integrated transport and land use planning can drive economic value (and in some cases lead to unintended economic outcomes).

Key insights and synthesis: Economic outcomes

- Agglomeration economies and productivity gains: Agglomeration is a critical driver of productivity and can come about as a result of targeted and well managed efforts to integrate the planning of land use and transport schemes. Static and dynamic agglomeration effects can be induced via effective transport orientated investments which in turn can stimulate wage growth. The literature we have reviewed demonstrates that Integrated land use and transport planning can drive significant productivity improvements through agglomeration. OECD/ITF (2007) found that doubling effective density—reflecting improved transport-related accessibility to a central economic mass—is associated with nearly a 20% increase in productivity, with the service sector benefiting at more than twice the elasticity of manufacturing. Trubka (2011) supports these findings in Australian cities, reporting that in Melbourne, doubling employment density was linked to a 7.4% increase in average wages. The benefits are particularly pronounced in knowledge-intensive sectors, where elasticities reach up to 0.3, meaning that a 1% increase in agglomeration translates to nearly a 0.3% boost in productivity. However, these effects are highly context-dependent. Maket et al. (2024) show that while larger urban concentrations can drive economic performance in European settings, they may hinder growth in less developed contexts unless underpinned by robust infrastructure and governance. Thisse (2017) argues that fully capitalizing on agglomeration benefits requires integrating housing, transport, and labour market policies to avoid inefficiencies. Additionally, Morikawa (2011) and Jones et al. (2010) highlight that urban density creates stable demand, reducing the

³⁰ Hedonic regression models are statistical techniques use to estimate the impact of various factors (such as location, accessibility, and design features) on property values by isolating contributions from overall price variations.

³¹ Dynamic panel methods are econometric techniques used to analyse data across time and entities (e.g. regions or firms)m, allowing for the identification of causal relationships by controlling for unobserved heterogeneity and time-dependent effects.

spatial extent of catchment areas for both social and private services. This effect is particularly relevant for knowledge-intensive industries, which rely on a dense concentration of workers, clients, and suppliers.

- **Property values and market dynamics:** The impact of integrated planning on property values is complex, with both positive and negative implications. Mi et al. (2016)'s meta-analysis of 52 studies confirms that higher densities and closer proximity to transit stops are modestly associated with increased housing premiums. Van Meerkerk (2015) finds that while specific land-use elements such as urban parks can boost property values, the overall mix or fragmentation of land uses does not exert a significant impact on prices. However, rising property values can create affordability challenges, particularly for lower-income groups. Moos et al. (2018) show that in Toronto, mixed-use zones, although economically vibrant, have become less affordable. By 2006, around 33% of owner-occupied households in mixed-use zones spent over 30% of their income on housing, compared to roughly 25% elsewhere. Similarly, nearly 47% of rental households in these zones exceeded the 30% affordability threshold, versus 45% in other areas. This suggests that while integrated land use and transport planning can enhance property values, without targeted policies to ensure affordability, it risks exacerbating socio-economic disparities.
- **Mixed-use regeneration and institutional frameworks:** Successful urban regeneration projects often hinge on the interplay between mixed-use development and robust institutional frameworks. The evidence underscores that coordinated risk-sharing and proactive public–private partnerships are crucial to stabilise regeneration initiatives and secure long-term economic benefits. Karadimitriou et al. (2013) compared mixed-use regeneration schemes across European cities and found that delivering housing and public amenities successfully depends heavily on effective risk allocation among public, private, and third-sector actors. Without clear frameworks for investment and responsibility-sharing, regeneration efforts may fail to deliver sustainable economic benefits. Yeu and Shi (unpublished)'s analysis of the King's Cross and Olympic Legacy projects in London illustrates that integrated land use and transport planning can stimulate local economic and social vitality—but only if underpinned by robust institutional frameworks that facilitate meaningful, rather than tokenistic, integration and risk-sharing. Regeneration efforts that prioritise public-private collaboration tend to yield better long-term economic stability by ensuring that infrastructure investment is aligned with housing, business development, and local workforce needs. However, if institutional structures are weak, regeneration efforts can become fragmented and fail to produce the intended economic multiplier effects.

Evidence gaps: Economic outcomes

Several critical evidence gaps remain, necessitating further research:

- **Establishing causality:** Much of the current evidence is cross-sectional or model-based, and therefore only examine the relationship between integration

and outcomes of interest at a single point in time. This limits their ability to establish causality (as they cannot control for exogenous changes over time). Longitudinal approaches could be used to help control for unobservable confounders in this context and are needed to definitively establish causality between specific integrated planning interventions and sustained economic improvements.

- **Distributional impacts:** While overall productivity gains are evident, few studies sufficiently examine how these benefits are distributed across different socio-economic groups. In particular, the adverse housing affordability impacts that we have highlighted in relation to mixed-use zones warrant closer scrutiny.
- **Context-specific analysis:** There is a need for more comparative research across varied urban, semi-urban and rural areas, especially in lower-density, car-dependent regions, to understand the optimal conditions for realising agglomeration benefits.
- **Institutional frameworks:** While some studies mention the influence of governance on economic returns from integrated planning, the specific mechanisms remain underexplored. In this context, “institutional quality” refers to the effectiveness of governance structures – encompassing transparency, accountability, inter-agency collaboration and the capacity to implement coordinated policies. Research is needed to clarify how these factors shape the distribution and magnitude of economic benefits.

Understanding multi-modal journeys: Current studies tend to focus on single modes or simple comparisons of urban density and transit proximity. However, there is a notable gap in the evidence regarding complex, multi-modal journeys – such as combinations of e-scooter trips, rail travel and walking – that are increasingly common in urban settings. Better insight into these integrated travel patterns is essential for assessing how well different modes complement each other and contribute to overall economic outcomes like productivity and local business growth.

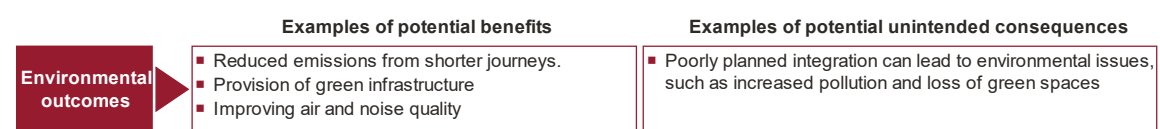
Environmental outcomes

This section presents a summary of the evidence that we have identified and reviewed which relates to the impact of integrated land use and transport planning on environmental outcomes. It examines both the intended benefits and unintended consequences across key environmental domains such as air quality, greenhouse gas emissions, water quality and biodiversity. This section therefore serves to illustrate how planning strategies and transport-oriented development interact with natural ecosystems.

Scope of Environmental outcomes

Environmental outcomes refer to the range of (beneficial and adverse) impacts that integrated land use and transport planning can have on natural ecosystems.

Figure 6 Environmental outcomes



Source: Frontier

Improvements in infrastructure and mobility can drive economic and social benefits. However, there may also be environmental trade-offs associated with this form of development including impacts on biodiversity and natural landscapes. Further detail on empirical findings are presented in the remainder of this section. However, conceptual areas of interest include:³²

- Air quality: changes in land use and transport patterns may directly affect journey distances, journey mode choice and firms' location decisions (see Section 5 and Section 6). This in turn will impact the volume and location of pollutant emissions (such as Ammonia, NMVOC,³³ Nitrogen oxides, PM2.5 and

³² See [Crossland et al., \(2022\)](#); [OECD \(2012\)](#); and [PTEG \(2011\)](#).

³³ Non-methane volatile organic compounds are a large group of organic compounds which differ widely in their chemical composition but can display similar behaviour in the atmosphere. NMVOCs are emitted to the air from a range of sources, including combustion, petrol vapour, solvents, air

Sulphur dioxide)³⁴ from vehicles and industry. This can impact local air quality. Integrated planning that reduces private car dependency, promotes public transport and encourages active travel can significantly improve air quality.

- Greenhouse gas (GHG) emissions: coordinated strategies for land use and transport can help curb GHG emissions by reducing long-distance commutes, incentivising low-carbon mobility, and avoiding sprawling development. This is crucial for achieving government Net Zero targets³⁵ and limiting the extent climate change more broadly.
- Water quality: urban development and transportation infrastructure can influence the quantity and quality of stormwater runoff, affecting rivers, lakes and groundwater. Thoughtful design such as green infrastructure and reduced impervious surfaces helps maintain healthier water systems and prevent pollution.
- Biodiversity and natural landscapes: a compact, mixed-use approach to development can preserve ecologically sensitive areas, maintain habitats for wildlife, and minimise encroachment on green spaces. Additionally, integrating green corridors, parks, and conservation sites within urban planning strengthens local ecosystems.
- The outcomes we have identified above are broadly consistent with DfT's guidance on environmental impact appraisal.³⁶ DfT note that environmental impacts fall into two main categories:
 - impacts that arise in the surrounding area as a result of new or improved transport infrastructure and associated development (including landscape effects, biodiversity and the water environment); and
 - impacts that arise as a result of changes in traffic (including both road and rail traffic) using transport infrastructure (including noise, air pollution and greenhouse gases).

Characteristics of the evidence base

We have reviewed in-depth 12 empirical studies that assess the impact of integrated land use and transport planning. The reviewed literature spans a range of contexts, geographical areas and forms of integration. The shortlist of studies that we have reviewed in detail include quantitative analyses focused on transport and planning in China, the United States, Australia, South America and the UK.

Methodologies range from regression analysis (using OLS and instrumental variable approaches) to integrated land use-transport-emission models and scenario-based

fresheners, cleaning products, and perfumes. NMVOCs can have negative impacts on health and the environment. Further details are available [here](#)

³⁴ Further detail is available [here](#)

³⁵ Net Zero Strategy is available [here](#)

³⁶ DfT's TAG Guidance is available [here](#)

simulations. These studies have evaluated the impact of varied planning strategies including mixed land use, urban densification, and compact growth versus urban sprawl. Collectively they provide nuanced insights on the role of land use and transport integration on key environmental metrics.

As we outline below in several cases the underlying evidence identifies complex or nuanced relationships between transport and land use integration and environmental outcomes. For example, some studies identify non-linear relationships between mixed land and carbon dioxide emissions. In line with other categories of outcome (e.g. economic / social impacts) several studies emphasise that the environmental outcomes of planning integration strategies are highly context specific and sensitive to the intensity and type of integration.

Key insights and synthesis: Environmental outcomes

- **Greenhouse gas emissions reduction and U-shaped relationships:** Integrated land use and transport planning can contribute to significant reductions in greenhouse gas (GHG) emissions, though the relationship is not always linear. Li et al. (2022) identify a U-shaped relationship in Chinese cities, where initial increases in mixed land use yield approximately a 6% reduction in emissions. However, beyond an optimal level, further mixing leads to an 8.2% increase in emissions, highlighting the need for a balanced approach to land-use planning. Yuan et al. (2017) report similar findings from Xiamen, where compact urban growth encouraged a shift from private vehicles to public transport, resulting in a nearly 17% reduction in overall traffic emissions. However, these reductions often come at the cost of increased pollutant concentrations in central areas. In Shanghai, Wang et al. (2023) and Shi et al. (2023) further illustrate that increasing land-use mixing can lower the total amount and intensity of carbon dioxide emissions, particularly when applied to industrial zones. However, they caution that megacities cannot achieve carbon balance through land use planning alone. The increasing carbon emission density of hybrid industrial land suggests that a combined strategy—integrating land conservation and intensive use policies with industrial and energy structure adjustments—may be necessary for achieving net reductions in emissions. Additionally, research from Albuquerque (Tayarani et al., 2018) and Cambridge (Namdeo et al., 2019) emphasises that urban form changes alone are insufficient for deep emission reductions. Their findings highlight that a combination of compact development, high vehicle taxes, and substantial shifts toward active travel modes are required to achieve meaningful carbon reductions. Namdeo et al. (2019) specifically note that improvements in vehicle technology could yield greater emission reductions than urban form changes alone, suggesting that integrated planning must work alongside advances in clean transport technologies.
- **Air quality trade-offs:** While integrated planning can reduce overall emissions by decreasing reliance on car travel, densification may also lead to higher local concentrations of pollutants, negatively impacting air quality. Valencia et al. (2023) demonstrate that under a densification scenario, a higher concentration of residents in the city centre results in increased exposure to pollutants such as carbon monoxide, ozone and particulate matter, with a larger proportion of

the population living in areas exceeding local air quality limits. In contrast, a sprawl scenario disperses the population more widely, thereby reducing exposure to high pollutant levels in central hotspots. Similarly, Carozzi et al. (2023) find that increased urban density in American cities is linked to a statistically significant rise in particulate matter exposure. This suggests that while densification can reduce overall emissions, it may also concentrate air pollution in certain areas, posing health risks to urban populations. These findings highlight the challenge of balancing urban compactness with air quality management, particularly in cities where high-density development is not accompanied by adequate pollution mitigation strategies. Without targeted policies such as low-emission zones, improved building ventilation, and green infrastructure integration, the air quality benefits of reduced vehicle travel may be offset by higher pollutant concentrations in densely populated neighbourhoods.

- Impacts on green space, biodiversity and natural landscapes: Compact, mixed-use development can contribute to emission reductions and transport efficiency, but it also risks reducing green space, which can negatively impact biodiversity and social equity. Lin et al. (2015) demonstrate that in Sydney, higher residential density is significantly associated with lower levels of both private green space (such as residential tree cover) and public parkland. The reduction in green infrastructure not only compromises biodiversity but also disproportionately affects disadvantaged communities that may have limited access to remaining public green spaces. These findings suggest that while compact growth strategies aim to reduce carbon footprints, they must be carefully balanced against the need to preserve urban greenery and ecological habitats. The OECD (2012) argues that compact cities can help conserve farmland and promote stronger urban–rural linkages, with nearby farming reducing food transport emissions. However, compact cities may also be more vulnerable to environmental risks such as flooding, fires, and other natural disasters. Built-up areas at high risk of flooding, for example, may not be appropriate for densification. As cities densify, careful planning is needed to mitigate environmental risks while ensuring that urban populations continue to benefit from access to natural landscapes and green public spaces.

Evidence gaps: Environmental outcomes

Despite a robust evidence base, several gaps remain that warrant further investigation:

- Water quality impacts: Few studies directly address how integrated planning affects water quality, particularly in relation to stormwater management and the protection of aquatic ecosystems.
- Geographic focus: The majority of studies we identified and reviewed related to non-European jurisdictions. UK policy making could be better informed in the future if additional research which focused on the UK in particular was carried out.

- Trade-offs in air quality: There is a need for more granular analysis on the trade-off between aggregate emission reductions and the potential for heightened localised pollutant concentrations in dense urban cores.
- Biodiversity and green space distribution: Research on the long-term effects of densification on biodiversity is limited, especially in rapidly growing metropolitan areas.
- Contextual variability: More comparative studies across diverse geographical and socio-economic contexts are needed to understand how local urban morphology influences environmental outcomes, particularly in underrepresented regions.
- Environmental outcomes in non-urban areas: While urban contexts have been extensively studied, there is a notable lack of evidence on the environmental benefits of integrated land use and transport planning in semi-urban and rural areas. Research is needed to assess how integrated planning can influence emissions, land conservation, and ecosystem health in lower-density environments, where car dependency remains high and public transport options are more limited.

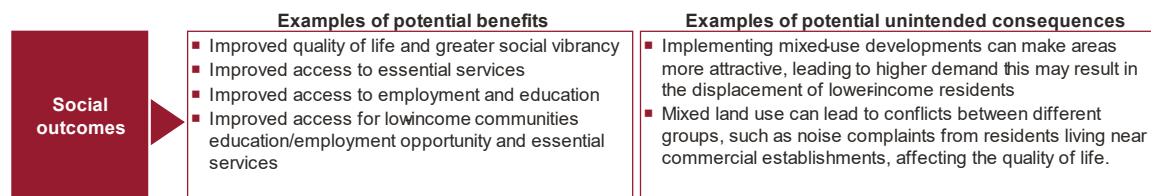
Social outcomes

This section presents a summary of the existing evidence on the impact of integrating land use and transport planning on social outcomes. Social value refers to the wide-ranging impacts on people's daily lives and long-term well-being. This includes community cohesion, access to services, and overall quality of life.

Scope of Social outcomes

Social outcomes in this context encompasses the diverse effects that coordinated land use and transportation policies can have on communities and individuals (excluding the transport, economic and environmental outcomes set out in previous sections of this report).

Figure 7 Social outcomes



Source: Frontier

From a conceptual point of view these impacts include (empirical findings are presented in subsequent subsections):³⁷

- Building social capital via thoughtfully planned neighbourhoods with good public transport access, active travel infrastructure, accessible communal spaces, walkable streets and local gathering spots. This can foster community cohesion and facilitate beneficial social interactions which strengthen trust and social ties.

³⁷ See [K Crossland et al., \(2022\)](#); [OECD \(2012\)](#); and [PTEG \(2011\)](#).

- Addressing regional inequalities via coordinated planning efforts which help bridge socio-geographic disparities and direct land-use and transport investment toward underserved areas.
- Impacts on physical activity and reduced frailty via integrating active travel infrastructure such as walking and cycling routes, into urban, semi-urban and rural land use. This can encourage regular exercise and helps prevent health issues linked to sedentary lifestyles. Over time, this can lower rates of chronic disease and frailty among residents.
- Impacts on mental health and life satisfaction: well-designed environments that reduce stressors like long commutes and traffic congestion can have positive effects on mental health. A greater proliferation of green spaces, recreational facilities, and accessible amenities (which can come about as a result of mixed land use policies) can increase overall life satisfaction and sense of well-being.
- Impacts on accidents and mortality: improved road layouts, traffic-calming measures and better pedestrian and cycling infrastructure developed in parallel with residential and commercial land usage can also reduce accidents and fatalities. Safe, inclusive designs help protect vulnerable road users, such as children, older adults and people with disabilities.
- Accessibility of education, healthcare and other services: effective integration of land use and transport ensures that essential facilities such as schools, hospitals and community centres are reachable by multiple modes, particularly for those without private vehicles. This can mitigate social exclusion and improve overall life outcomes.
- Accessibility of social and recreational infrastructure: equitable access to cultural venues, sports facilities, parks, and public spaces contributes to healthier lifestyles and supports diverse community activities, reinforcing social ties and civic engagement.
- Unlocking housing supply and changes in house prices: integrated planning can open up new residential developments in areas with good transport links, addressing housing shortages and potentially affecting property values. Ensuring a range of housing options is crucial to maintaining inclusivity as neighbourhoods evolve.

Characteristics of the evidence base

Our review synthesised findings from a diverse set of 20 empirical studies. These studies included systematic literature reviews and international comparative assessments as well as longitudinal analyses and spatial modelling. The evidence base spans multiple geographic contexts, including North America, Europe, Asia, Australia, and emerging economies. A variety of integration forms have been examined in the underlying literature such as compact city policies, mixed land use interventions, and transport-oriented development.

Methodologically, the studies employ techniques including regression analysis, network and spatial analysis, deep learning, and dynamic simulation modelling.

Key insights and synthesis: Social outcomes

Social capital and community cohesion

- **Diverse land uses and social interaction:** In their study of the Greater Cairo Region, Nabil and Eldayem (2015) report that an increase in the diversity of land use within a given area leads to an increase in social capital. They define social capital as the set of informal values or norms shared among members of a group that permits them to cooperate with one another. The authors assess the composition of land use (measured as the ratio of commercial, industrial, and public land to housing units) and conclude that an increase in mixed-land use leads to an increase in social capital by 0.92 units.³⁸ Furthermore, the authors note that a higher average length of the road network, which encourages vehicular dependency, is linked to a decrease in social capital (0.81 units per unit increase). Therefore the balance of land use mix matters when trying to foster community cohesion.
- **Context-specific urban form:** In Oslo, Mouratidis (2019) found that compactness in urban form can have positive effects on social interactions. A one unit increase in compactness (which can come about as a result of effective integration of land-use and transport planning) is associated with a 0.09 unit improvement in satisfaction with personal relationships and a similar boost in perceived health.³⁹ This effect becomes even more pronounced when the authors control for other issues like noise and safety. This suggests that the social benefits of urban compactness are significant and can also help to mitigate adverse urban stressors.

Physical activity and health

- **Land use mix and active travel:** Longitudinal data from Dutch cohorts (Noordzij et al., 2021) indicate that a 10% increase in land use mix within a 1000-metres

³⁸ Measure of land use mix: (m2) of commercial, industrial, and public land uses in the neighbourhood divided by the number of housing units; the higher the ratio, the greater the land use mix. Social capital is measured through an index that considers the following parameters: i) availability of informal and formal existing social networks; ii) the number of civil society organisations operating in the zone; iii) the number of members of civil society organisations operating in the zone; iv) ability to collective action; v) the existence of a strong information network of the district or zone; vi) the existence of representatives from the local bodies in the zone; vii) the extent of trust available among the populations (community cohesion); viii) the extent of trust available among the populations and the government; ix) the existence of groups that operate for a common goal of the zone; x) the availability of laws monitoring the government performance; xi) the extent of security and good monitoring available in the zone; xii) the number of religious institutions in the zone.

³⁹ Units in this context are measured in terms of standar deviations of the relevant metrics.

buffer from an individual's home is associated with an additional 11.10 minutes of walking per week. However, the results are sensitive to the spatial scale used in the analysis. For instance, when the analysis is restricted to a 500 m area a 10% increase in land use mix actually correlates with fewer minutes of walking. These mixed findings suggest that while diverse neighbourhoods generally promote walking, the precise spatial scale of land use interventions can yield different impacts on overall physical activity.

- Integrated health benefits: Simulation models such as those presented by McClure (2015) further reinforce that integrated land use and transport interventions boost physical activity and can as a result reduce chronic disease burdens. The authors measure disease burdens using disability-adjusted life years (DALYs).⁴⁰ They identified significant impacts on cardiovascular disease burden across the population in Melbourne (e.g. a reduction of 622 DALYs per 100,000 population). Therefore, there may be substantial health benefits when land-use planning is coupled with supportive active travel infrastructure.

Subjective well-being and mental health

- Life satisfaction: Evidence from Oslo (Mouratidis, 2019) and Beijing (Wu et al., 2022) reveals that compact urban forms and mixed land use have nuanced impacts on subjective well-being. For example, a more compact neighbourhood can slightly enhance personal relationships and perceived health, although initial adverse emotional responses may occur if urban stressors are not simultaneously addressed.
- Greenery and mixed use interactions: In Switzerland, Bahr (2024) provides an age-stratified analysis which shows that for residents over 65, a one standard deviation increase in local tree coverage leads to a 0.14 standard deviation boost in life satisfaction. A similar increase in grass covered areas is associated with an even higher gain of about 0.24 standard deviations. In Beijing, Wu et al. (2022) demonstrate that a one-unit increase in mixed land use can raise the probability of a one-unit increase in life satisfaction in residential and workplace settings by respectively 1.44 and 2.77 times.

Neighbourhood safety and crime

- Impacts on safety: The relationship between mixed land use and crime is multifaceted. Wo (2019) reports that in Los Angeles, a one standard deviation increase in mixed land use within a neighbourhood is associated with subsequent rises in crime (increase in robbery rate of 4.5% and aggravated assault rate of 5%).
- In San Francisco, Wo et al. (2020) highlight that a one standard deviation increase in residential land use is associated with a 27–30% reduction in various crimes (e.g., robberies, assaults), whereas a similar increase in retail

⁴⁰ Definition of DALY is available [here](#)

land use can result in an 18–26% increase in these crimes. Mixed-use effects vary: commercial mixed use (defined as buildings that combine distinct land uses in the absence of residential land use) is linked to a 7–7.4% increase in crime, while residential mixed use (defined as buildings that combine residential land use with any type of non-residential land use) corresponds to a 9–14% reduction. High overall land use heterogeneity can be especially problematic, with one standard deviation above the mean leading to up to 134% more robberies, 127% more assaults, 39% more burglaries, and 121% more larcenies.

Housing and affordability

- Impact on housing prices and affordability: Gao and Feng (2023) quantify the effect of mixed land use on housing prices in Qingdao. Their analysis shows that in areas dominated by a “commercial-service” mix,⁴¹ housing prices are approximately 4.3% lower than in other configurations, while a “public-commercial-balanced” mix⁴² is associated with about a 9.2% reduction. These results, however, vary spatially. Moos et al. (2018) focused on Toronto and concluded that in 2006, 33% of owner households in mixed-use zones were spending over 30% of their income on housing (versus 25% elsewhere), and rental households in these zones faced similarly higher burdens. Therefore, without targeted affordable housing policies, mixed-use zoning may exacerbate affordability challenges and contribute to gentrification.
- Gentrification concerns: The OECD (2012) cautioned that while compact city policies which can come about as a result of transport and land use integration can shorten travel distances and lower travel costs, they may lead to gentrification and displacement of lower-income residents, thereby undermining the social inclusivity of urban developments.

Evidence gaps: Social outcomes

Several notable evidence gaps remain:

- Causality and long-term social impacts: Many studies rely on cross-sectional analysis or short-term modelling, and therefore only examine the relationship between integration and outcomes of interest at a single point in time. This limits their ability to establish causality (as they cannot control for exogenous changes over time). Longitudinal approaches could be used to help control for unobservable confounders in this context. Longitudinal research tracking social capital, community cohesion, or public health over time is needed.
- Context-specific outcomes: The mixed findings across different studies suggest that the social benefits or drawbacks of integrated planning may vary significantly with local context, demographic characteristics and urban form. More detailed research (and a higher volume of UK specific research) that

⁴¹ Areas with absolute dominance of land for commercial service facilities.

⁴² Areas with a similar number of public services and commercial facilities.

explicitly considers these local variations is needed to understand which strategies work best in different settings.

- **Interdisciplinary measures:** There is limited integration between studies that examine physical activity, mental health, and community cohesion. Future research should simultaneously measure these dimensions and analyse how they interact, providing a clearer picture of how integrated planning affects overall social well-being.
- **Scalability and spillover effects:** Several studies indicate that the benefits of mixed land use may be counteracted by spillover effects in adjacent areas (e.g. increased crime or reduced affordability). Further investigation into optimal spatial scales and strategies for mitigating negative externalities is warranted.
- **Lack of UK specific evidence:** our search through the literature did not find studies focussing on the social outcomes of integrated land use and transport planning in the UK. Future research should address this gap to understand how such planning strategies impact social cohesion, public health and affordability in the UK context.

UK case studies

This section sets out examples of integrated investments and developments that have occurred in the UK in recent years. These examples help to place results from our evidence review in a UK context. We have drawn on a number of sources to identify these examples and explore the impacts. Ex-post evaluations of UK major projects of this nature remain limited, with much of the available evidence stemming from ex-ante appraisals and interim assessments. The most robust evidence on the potential benefits of integrating land use and transport planning is the academic evidence summarised in the previous sections of the report.

The table below provides a summary of examples of integrated investments and developments that have taken place in the UK in recent years. Further detail is then presented in the remainder of this section.

Impacts of integrating land-use and transport planning

Table 3 UK case studies

Case study	Intervention type	Transport outcomes	Economic outcomes	Environmental outcomes	Social outcomes
King's Cross, London	Transformation of a 67-acre former industrial area into a vibrant mixed-use district. Driven by the Channel Tunnel Rail Link (HS1) and the 2004 London Plan.	Anchored around King's Cross–St Pancras rail hub, prioritising public transport. Walkable district with new cycle routes, pedestrian spaces, and minimal car parking. Very high public transport mode share.	Active firms doubled (2010–2021); employment grew from 8,000 (2011) to 27,000 (2019). Major global firms established offices in the area. Office rents increased to 19% above London average.	Compact, sustainable design with a district heating network. 60% carbon reduction target (2000–2050); BREEAM “Outstanding” buildings. High waste recycling rates (>80%) and extensive green infrastructure.	Mixed-use neighbourhood with housing, education (Central St Martins), and culture. Gentrification concerns: 900 new homes but limited affordable housing. Residential population grew from 7,900 (2010) to 12,200 (2020). New public spaces, parks (Granary Square), and community amenities.
East Village, Stratford, London	Former Athletes' Village (2012 Olympics) transformed into a sustainable residential community. Strong focus on transport connectivity, sustainability, and housing.	Stratford station became one of the UK's busiest interchanges. East Village is a transit-oriented hub with rail, Tube, and bus links. Increased reliance on public transport and active travel.	25,000 jobs created on and around the Olympic Park (2022); projected 40,000 jobs in the Park by 2025. Infrastructure investment attracted businesses, boosting incomes and land values.	Brownfield redevelopment created London's largest urban park. 10+ hectares of new green space, wetlands, and trees. 25% energy use reduction (2015 – present).	Half of East Village homes designated as affordable, allocated to local people. 12,000 homes built across the Olympic Park area. New schools, health centres, and sports facilities improved local amenities.
Media City, Salford, Greater Manchester	Peel Group secured planning permission (2007); ITV moved in 2013. Defined as an area across the ship canal, part of a tourism initiative.	Investments: Metrolink tram line and MediaCityUK tram stop. Investment in cycling infrastructure. Challenges: Surveys showed only 59% commutes via sustainable modes.	Catalyst for media-sector jobs and investment in Greater Manchester. Employment impact: 15,000 jobs expected from BBC relocation. BBC's move boosted GVA by £277M annually (by 2015).	81-hectare brownfield regeneration achieved BREEAM “sustainable community” status. Low-carbon on-site energy plant. Waterfront cleaned and landscaped.	Mixed-use regeneration: 378 apartments, shops, restaurants, and a hotel. University of Salford opened MediaCity campus (2011, 1,500 students) to develop local media talent.
Birmingham Eastside (Curzon HS2 Masterplan)	Eastside is a district of Birmingham that is currently being redeveloped. This redevelopment is linked to new transport infrastructure, notably the HS2 high-speed rail project.	Curzon Street Station in Eastside will become the HS2 terminus. The station is being designed as a multimodal hub, with “seamless” connections to local transit including the West Midlands Metro tram line, as well as new bus	Eastside's transport oriented redevelopment is projected to create significant economic benefits. The City Council's Curzon Masterplan (2015) forecasts 36,000 new jobs in the Curzon/Eastside area over 30 years as a result of	Environmentally, new buildings in Eastside (like BCU's campus buildings) have been built to BREEAM Excellent standards, and the Curzon HS2 Station is designed with sustainable principles in mind.	Plans include 4,000 new homes around the Curzon/Eastside area.. The project is also strengthening education and skills: the area now hosts Birmingham City University's city centre campus (opened 2013–2015)

Impacts of integrating land-use and transport planning

		routes, improved pedestrian routes, and cycling infrastructure.	HS2 and associated development.		and campuses for Aston University are adjacent.
Canary Wharf	The London Docklands Development Corporation was set up in 1981 to regenerate the docklands area of London. The LDDC was responsible for regenerating an area of 22 square kilometres (8.5 sq mi) in the London Boroughs of Newham, Tower Hamlets and Southwark.	Mass transit investment was the linchpin of Canary Wharf's land-use transformation. In the late 1980s, the Docklands Light Railway (DLR) opened to connect the area with the City. The Jubilee Line Extension added a Tube link into Canary Wharf in 1999. These projects, along with new road links, improved connectivity to what was previously a relatively isolated area	Canary Wharf is one of the most significant urban regeneration success stories in terms of economic impact. From a very low base of commercial activity in 1980, it grew into the UK's largest single employment centre with ~120,000 jobs on site by 2018.	The redevelopment of Canary Wharf turned polluted, derelict docks into a high-density, transit-served business district. 20 acres of public space was created, including four new urban parks and plazas. Canary Wharf Group has powered the estate with 100% renewable electricity in its managed areas since 2012, helping to cut operational carbon dioxide emissions	The Docklands redevelopment had profound social impacts on the surrounding East London communities. In the early 1980s, the collapse of the docks left parts of Tower Hamlets with 50% unemployment and severe poverty. Canary Wharf has since created tens of thousands of jobs, helping to drastically reduce local unemployment and raising skill levels.

King's Cross, London⁴³

The King's Cross regeneration which began in the mid-2000s transformed a former industrial area (covering 67 acres on the periphery of central London) into a vibrant mixed-use district. Before the intervention, the King's Cross area was characterised by low demand for space, within an otherwise increasingly high demand London. The integrated intervention was triggered by the Channel Tunnel Rail Link (HS1). This transport investment was complemented by the 2004 London Plan which provided substantial new office space in the area. Commercial and retail complexes were also subsequently put in place. While some of the following impacts have been assessed ex-post, many economic and social projections remain based on pre-development appraisals.

- **Transport outcomes:** The location is anchored around the revitalised King's Cross–St Pancras rail hub. The brownfield site was transformed into a dense, walkable district adjacent to major train and Underground lines. New internal streets, cycle routes, and pedestrian spaces were put in place which prioritise active travel, while minimal on-site parking discourages car use. This transit-oriented approach means most commuters and visitors arrive by rail or Tube (with a very high public transport mode share).
- **Economic outcomes:** King's Cross has become a major commercial hub. The number of firms actively trading on-site roughly doubled to 800 between 2010 and 2021. The number of employees based in the areas increased dramatically from about 8,000 in 2011 to 27,000 by 2019. Global companies like Google, Facebook and Universal Music opened offices in the King's Cross area. Office rents were previously below central London averages and are now 19% above the London average, reflecting strong demand. By 2017, ~279,000 m² of commercial space and 900 new homes had been delivered with £3 billion in construction investment.
- **Environmental outcomes:** The redevelopment was designed as a compact, sustainable urban quarter. A 2004 sustainability plan set ambitious goals, including a 60% reduction in carbon emissions (2000–2050) and a district heating network supplying 99% of heat and hot water needs. The King's Cross area achieves high rates of waste recycling (>80% of public waste) and features extensive green roofs and green walls for biodiversity. Several buildings (e.g. at Pancras Square) earned BREEAM "Outstanding" ratings. Reusing a central brownfield site avoided outward sprawl, aligning with London's climate and "compact city" policies.
- **Social outcomes:** The King's Cross regeneration created a new mixed-use neighbourhood with housing, education, and cultural land use sitting side-by-side. However, the development faced gentrification critiques. It delivered around 900 new homes. However, provision of affordable housing was "limited". The local residential population grew from ~7,900 to 12,200 between 2010 and 2020 as people moved into the new apartments. New parks, green spaces and public areas were put in place (e.g. Granary Square) alongside a university campus (Central St Martins), and community amenities.

⁴³ For further details see reports by [Frontier Economics](#), [Centre for Cities](#), [Adelfio et al.](#)

East Village, Stratford, London⁴⁴

Originally constructed as the Athletes' Village for the 2012 Olympics, East Village has been reimagined as a sustainable residential community. Its design prioritised high-quality connections to multiple transport networks (e.g. the London Underground, Docklands Light Railway, and national rail) which yielded significant increases in public transport use and active travel.

- **Transport outcomes:** The 2012 Olympics led to significant transport upgrades in Stratford, East London. Stratford Station became one of the UK's busiest interchanges with over 128 million annual passengers in 2019 (an increase of ~90 million in 13 years). The former Olympic Village (now East Village) was planned as a transit-oriented community: residents have immediate access to rail, Tube and bus services, plus excellent walking and cycling links through the 560-acre Queen Elizabeth Olympic Park. This connectivity has enabled a major shift toward public transport use in the area.
- **Economic outcomes:** The Stratford regeneration has delivered significant economic benefits in East London. As of 2022, around 25,000 jobs have been created on and around the Olympic Park. By 2025, projections suggest that there may be 40,000 jobs in the Park alone, and an estimated 125,000 additional jobs in surrounding boroughs by 2030. Flagship investments include Westfield Stratford City mall (opened 2011, 10,000 jobs created) and the Here East tech campus (which by 2021 housed 10,300 jobs, contributing £700m GVA in that year). The infrastructure that was put in place ahead of the Olympics led to inward investment and attracted businesses ranging from global corporates to startups. This in turn boosted local incomes and land values.
- **Environmental outcomes:** Sustainability was a core goal of the Olympic legacy. The East Village and park were built on brownfield land which turned a polluted industrial area into one of London's largest urban parks. Over 10 hectares of new parkland with thousands of trees and wetlands were created, providing habitat for wildlife and flood mitigation. Since 2015, the Legacy Corporation's operations have achieved a 25% reduction in energy use, moving toward a net-zero carbon target by 2030. East Village's housing is high-density and energy-efficient apartment blocks with excellent insulation lose less heat than equivalent low-rise homes. Green roofs were installed on several buildings to foster biodiversity. By concentrating development in a transit-rich node, the project also cut transport emissions per capita.
- **Social outcomes:** The Olympic legacy focused on housing and community regeneration in a historically deprived part of London. Half of the new apartments in East Village were classified as affordable. All affordable units were allocated to local people on the housing waiting lists of four East London boroughs, with priority for residents with disabilities. Across the wider Olympic Park area, over 12,000 homes have been built to date (with a target of 33,000 by 2036, of which 35% will be affordable). New schools, health centres, and sports facilities were also delivered which further improved local amenities. There are ongoing debates about

⁴⁴ For further details see reports by [London Legacy Development Corporation](#), [London Assembly](#), [London & Partners](#).

gentrification and concerns that regeneration created “new homes for wealthy incomers” rather than meeting social housing needs.

Canary Wharf, London (Docklands Redevelopment 1980s – 2000s)⁴⁵

The London Docklands was once the largest and most successful trading port in the world. However, by the start of the 1980s the London Docklands were virtually empty as the increasing using of industrial shipping containers greatly reduced the need for ship access. The London Docklands Development Corporation (LDDC) was set up in 1981 to regenerate this area of London. The LDDC was responsible for regenerating an area of 22 square kilometres (8.5 sq mi) in the London Boroughs of Newham, Tower Hamlets and Southwark. Importantly LDDC had a full range of planning authority powers which enabled the strategic and integrated development and land use and transport.

- **Transport outcomes:** Mass transit investment was the linchpin of Canary Wharf's land-use transformation. In the late 1980s, the Docklands Light Railway (DLR) opened to connect the depressed Docklands area of London with the City. Subsequently the Jubilee Line Extension added a full-capacity Tube link into the heart of Canary Wharf in 1999. These projects, along with new road links (like Limehouse Link tunnel), dramatically improved connectivity to what was previously a relatively isolated area. The transport upgrades unlocked vast development potential. For example, the Elizabeth Line alone is credited with unlocking 3.25 million m² of commercial space and 57,000 new homes along its route (including Canary Wharf). Canary Wharf's developers part-funded the Elizabeth line station (~£150m) and later heavily backed the new Crossrail station, underlining the value of transit access. Today the estate is served by DLR, two Tube lines, and the Elizabeth Line, and as a result over 80–90% of workers commute by public transport.
- **Economic outcomes:** Canary Wharf is one of the most significant urban regeneration success stories in terms of economic impact. From a very low base of commercial activity in 1980, it grew into the UK's largest single employment centre with ~120,000 jobs on site by 2018. It now forms part of London's dual financial core (alongside the City). A 2018 analysis found the Canary Wharf development supports nearly 400,000 jobs across the UK when including its supply chain and ancillary employment. Within one local borough alone (Tower Hamlets) total employment rose 199% since 1987. The estate itself hosts over 17 million sq ft (~1.6 million m²) of office space in 40+ buildings. Major banks, law firms, media companies, and tech firms have clustered here. This concentration of high-value jobs on former dockland has boosted London's economy.
- **Environmental outcomes:** The redevelopment of Canary Wharf turned polluted, derelict docks into a high-density, transit-served business district. 20 acres of public space was created, including four new urban parks and plazas. Canary Wharf Group has powered the estate with 100% renewable electricity in its managed areas since 2012, helping to cut operational carbon dioxide emissions. Modern skyscrapers on site adhere to evolving building standards (with newer towers targeting BREEAM

⁴⁵ For further details see reports by [Exeter University](#), [Canary Wharf Group](#), [Ferrini](#).

Excellent ratings, for example). However, the intense construction did come with a large embodied carbon cost.

- **Social outcomes:** The Docklands redevelopment had profound social impacts on the surrounding East London communities. In the early 1980s, the collapse of the docks left parts of Tower Hamlets with 50% unemployment and severe poverty. Canary Wharf has since created tens of thousands of jobs, helping to drastically reduce local unemployment and raising skill levels. The developer actively tried to integrate with the local community: Canary Wharf Group directed £1.59 billion of its procurement to East London small businesses and invested over £15 million in local community programs and charities (e.g. youth sports, cultural groups). However, social challenges remain as the benefits described above initially skewed to commuters and higher-income workers and new housing in Canary Wharf itself was relatively limited. New housing projects in the area (e.g. 3,600 new homes in the adjacent Wood Wharf expansion) include affordable units to ensure a more inclusive community going forward.

MediaCityUK, Salford, Greater Manchester⁴⁶

The BBC announced in 2004 that it was moving certain aspects of production to Manchester. The chosen site (Salford Quays) was the last undeveloped site at Manchester Docks at the time. In line with the example above Salford Quays was previously an active dockyard which closed in the early 1980s. The Peel Group was granted planning permission to develop the site in 2007. ITV Grenada also moved to the area in 2013. The regenerated area is referred to as MediaCityUK, which is defined as an area on both banks of the ship canal, is part of a tourism initiative between Salford City Council and Trafford Borough Council encompassing The Quays, Trafford Wharf and parts of Old Trafford.

- **Transport outcomes:** Transit-oriented planning was pivotal in regenerating Salford Quays into MediaCityUK. A Metrolink tram line to the area was added in 1999, and a dedicated MediaCityUK tram stop opened in 2010 to directly link the new studios with Manchester city centre. This ensured that thousands of BBC and ITV workers and visitors could reach the site by frequent light rail. Complementing the tram, new roads (like Broadway link) and pedestrian footbridges were built to improve local connectivity across the ship canal. Cycling infrastructure was also enhanced (a £1.2m Local Sustainable Transport Fund investment created bike routes between MediaCity and central Manchester), and a new pedestrian bridge now links MediaCity with the Imperial War Museum side of the canal. Despite these efforts, early travel surveys showed only 59% of commutes were by “sustainable” modes, which was lower than Manchester’s city centre. To address this, workplace Travel Plans were developed and implemented and further transit improvements (like the 2020 tram extension through Trafford Park) have been added. The expectation is that as MediaCity expands and transit improves, car reliance will decrease.
- **Economic outcomes:** MediaCityUK has been a major catalyst for jobs and investment in Greater Manchester’s media sector. The BBC’s decision to relocate several departments from London to Salford came with predictions that up to 15,000 jobs would be created in the area (including spillovers in hospitality and support services). Between 2011 and 2016, employment at MediaCity increase by 43% (adding ~4,600

⁴⁶ For further details see reports by [Centre for Cities](#), [Manchester Geographical Society](#), [Place North West](#).

jobs). This was driven largely by media and tech companies (the BBC North complex itself houses over 2,500 staff, and ITV moved production of *Coronation Street* to new studios there in 2013). Over 40 smaller media firms have also set up at the Quays. By 2014/15 the BBC's move alone had UK's GVA by £277m annually (from 2015 KPMG analysis). These outcomes are partly redistributed jobs (BBC relocated about 1,800 roles from London). However, local employment in Salford's media sector grew faster than the national trend.

- **Environmental outcomes:** The project aimed to set high sustainability standards, reusing an 81-hectare brownfield docklands site. MediaCityUK was one of the first developments in the world to achieve BREEAM "sustainable community" status. It features its own low-carbon energy generation plant on-site and an ultra-modern communications network (20 million metres of fibre optic cable) to facilitate digital working and reduce the need for physical travel. The layout is high-density and mixed-use, which supports walking and transit use. The waterfront location was cleaned and landscaped and water quality in the Manchester Ship Canal was improved as part of Salford Quays' regeneration. Green spaces and plazas were created along the docks. MediaCity's design explicitly sought to minimise car dependence with its transit links and cut emissions. Initially the carbon savings from transit were not fully realised (given the still significant car usage by staff), but as the area grows, its per-capita emissions are expected to drop well below those of more car-centric developments.
- **Social outcomes:** Community regeneration in Salford Quays has accompanied the development of new office space and studios. The development introduced a residential population into what was an abandoned dockyard (378 apartments were built in the first phase), along with a supermarket, shops, restaurants, a hotel, and other amenities to create a liveable neighbourhood. Multiple educational institutions opened and the University of Salford also established a campus at MediaCity in 2011, bringing 1,500 students to the site and fostering local talent development in media and digital fields. The property market in Salford Quays has strengthened which can be seen as a sign of success. However, as noted previously this also raises concerns about housing affordability for some.

Birmingham Eastside (Curzon HS2 Masterplan)⁴⁷

Eastside is a district of Birmingham that is currently being redeveloped. Given that this project is ongoing, no ex-post evaluations of outcomes exist. Instead, anticipated impacts are based on ex-ante projections and interim monitoring.

- **Transport outcomes:** The Eastside regeneration in Birmingham is fundamentally linked to new transport infrastructure, notably the HS2 high-speed rail project. The planned Curzon Street Station in Eastside will become the HS2 terminus, dramatically cutting travel times to London. The station is being designed as a multimodal hub, with "seamless" connections to local transit including the West Midlands Metro tram line. This Midland Metro Eastside Extension will link the Curzon HS2 site to the city centre, Digbeth, and the wider region. In addition, the Curzon masterplan provides for new bus routes, improved pedestrian routes, and cycling infrastructure to ensure the area around the station is highly accessible without cars.

⁴⁷ For further details see reports by [HS2 Ltd.](#), [WMCA](#), [Target Surveys](#)

The goal is a major modal shift: future commuters and residents in Eastside should rely on rail, tram, bus, cycling and walking. Many of these transport outcomes are still under construction or at the planning stage.

- **Economic outcomes:** Eastside's transport oriented redevelopment is projected to create significant economic benefits. The City Council's Curzon Masterplan (2015) forecasts 36,000 new jobs in the Curzon/Eastside area over 30 years as a result of HS2 and associated development. This includes jobs in an expanded city centre office district around the HS2 station, a creative quarter in Digbeth, and growth in education, retail, and leisure. Alongside the transport investment up to 600,000 m² of commercial space is envisioned (offices, retail, hotels, R&D) to extend Birmingham's central business district. The construction of HS2 itself is also providing direct employment (over 1,000 jobs during main works for the station) and contracts for local firms. Longer-term, the presence of HS2 is already boosting investor confidence. For example, several major development schemes (totalling £724m investment) have been launched in anticipation of HS2. Birmingham's city centre has attracted record levels of private investment since HS2 was announced, and Eastside is now home to Birmingham City University's expanded campus and multiple startups. A recent study estimates HS2-related regeneration will add £10 billion to the West Midlands economy over 10 years.
- **Environmental outcomes:** Environmentally, new buildings in Eastside (like BCU's campus buildings) have been built to BREEAM Excellent standards, and the Curzon HS2 Station is designed with sustainable principles (e.g. energy-efficient materials, rainwater harvesting and provision for a district heating network). The plan also entails flood mitigation and clean-up of contaminated land in Eastside. By concentrating thousands of homes and jobs next to a high-speed rail hub, the development should reduce carbon emissions from transport. This benefit is explicitly noted in the HS2 Growth Strategy. Also the conversion of long-derelict land into a vibrant, green neighbourhood is already a positive environmental outcome for the city.
- **Social outcomes:** The Eastside regeneration aims to deliver significant social benefits to Birmingham, especially in the Digbeth and East Birmingham communities. Plans include 4,000 new homes of various types around the Curzon/Eastside area – creating new city centre living options. A proportion of these will be affordable housing. The project is also strengthening education and skills: the area now hosts Birmingham City University's city centre campus (opened 2013–2015) and campuses for Aston University are adjacent. A new Science Museum (STEAMhouse) and other innovation centres in Eastside provide training and community programs. The redevelopment of Curzon Street Station will include new public spaces (Curzon Square, Station Plaza) designed for community use. There are social challenges which require careful navigation. Property values are rising, and some residents fear being priced out or displaced as areas like Digbeth become gentrified.

Key take-aways for policy makers and next steps

Key take-aways

This section synthesises the critical lessons emerging from the evidence on integrated land-use and transport planning:

- Overall the existing evidence base indicates that the integration of land use and transport planning has the potential to generate significant positive impacts. Our evidence review has found that integrated land use and transport planning, if implemented appropriately, can unlock a wide range of benefits including reduced journey lengths, increased active travel, enhanced public transport performance, and economic gains from improved productivity and urban regeneration.
- Existing evidence shows that isolated interventions are unlikely to unlock the full spectrum of benefits. Instead, a coordinated set of actions (which collectively provide certainty to other stakeholders), embedded within a strategic vision, are far more likely to produce meaningful improvements in transport, economic, environmental and social outcomes.
- Integrating transport and land use planning can lead to trade-offs which need to be carefully managed. For example, densification, can lower overall emissions and support active travel, yet it may also lead to higher concentrations of air pollutants in urban cores. Proximity to transit and a mixed-use environment can drive economic gains and increased property values. However, this can also exacerbate affordability issues and even elevate crime rates. It is vital that policymakers are aware of these potential unintended consequences and can take corrective action. This will help balance economic benefits with social equity and ensure that improvements in land use do not inadvertently disadvantage certain population subgroups.
- Robust governance frameworks are critical for successful integration. Case studies, such as those from regeneration projects at King's Cross, demonstrate that effective collaboration among public, private, and third-sector stakeholders is essential. Meaningful integration requires shared risk and coordinated decision-making, as weak governance can impede the realisation of anticipated benefits.

- The effectiveness of integrated planning depends on context in which those interventions are rolled out. Factors such as existing transport infrastructure, economic conditions, and demographics shape outcomes. Emerging technologies, including autonomous vehicles and micromobility solutions create both opportunities and challenges. Land use and transport planning will need to adapt as these external influences evolve

Barriers and enablers to effective integration of land use and transport planning

Koksal et al. (2021) identified several barriers (structural, financial and cultural) to the successful integration of land use and transport planning in England specifically.

Fragmented governance

Strategic planning in England was impacted by the dissolution of regional spatial strategies and regional planning bodies in 2010. This has in some cases contributed to a further fragmentation of the planning system. Koksal et al. (2021) also noted that local transport plans are often separate from broader local planning strategies, resulting in misaligned investment flows and conflicts which undermine sustainable transport initiatives. Recent legislative reforms have granted more powers to combined authorities which may help to overcome this issue in major urban areas.

An often-understated requirement is ensuring that the myriad policies, standards, and analytical tools used by institutions are aligned toward integration. Levin-Keiten and Reeker (2021) find that the policy dimension requires a paradigm shift, resulting in an increased focus on cross-cutting goals such as sustainable development instead of sectoral targets, and giving more weight to qualitative (e.g. social and environmental) aspects of the transport system. They conclude that soft governance instruments in informal and flexible network structures are a necessary precondition and a first step towards integration, whereas political will, shared strategies and institutional design are necessary to ensure the real integration of planning approaches at some point.

Fiscal constraints

Post financial crisis funding cuts were implemented by successive governments since 2010. This has meant that local authorities have not always been able to implement the visions set by local planning authorities. This has in some cases led to reactive planning that undermines strategic, sustainable development, as short-term, piecemeal infrastructure projects may not address long-term needs. Inconsistent levels of national funding may force local authorities to abandon integrated sustainable transport projects in favour of other priorities.

Effective integration, therefore, demands a reconfiguration of funding streams (this can be achieved through devolved funding, pooled budgets, or fiscal incentives) to align financial mechanisms with integrated land use–transport outcomes (Koksal et al., 2021; KPMG, 2019). Such reforms must provide stable, long-term financial support that encourages innovation rather than short-term fixes.

Lack of shared knowledge domains and practice

In general either a public sector organisation or an organisation regulated by the public sector is responsible for the actual delivery of transport infrastructure. Provision is therefore assessed against an objective to deliver maximum social benefit subject to certain constraints (e.g. project affordability and risks). In many cases the development of land for other uses (e.g. housing / retail) will be overseen by private sector developers who will generally seek to maximise profits. The public sector planning system exists to overcome any market failures which may exist in this context and ensure that the resulting pattern of development is reflective of societal preferences. However, there will still be significant differences between the methods used by transport planners and those used by land use planners.

Land use and transport planning are managed by different government departments and teams. They generally operate at different scales and are underpinned by distinct methods. This makes integration practically challenging. Koksall et al. (2021) noted that land use planning is rooted in communicative, deliberative rationality that emphasises collaborative action and reimagining futures. However, transport planning in some cases relies more heavily on quantitative data and predictive models. Therefore, a shared framework for decision making could be necessary to overcome these divergent approaches and facilitate integration.

Rigidity in approach to strategic planning and transport investment appraisal

The current approach to planning and investment in England mostly reinforces existing practice, and rarely tests and experiments with new methods. Since 2017, the government has promoted joint-local planning through incentives like funding (e.g. the Strategic Infrastructure Tariff) and penalties, yet the effectiveness and clarity of these collaborative arrangements remain largely untested and open to varying interpretations. Scheme-by-scheme appraisal of transport investments, along with rigid assessment criteria, fails to capture the cumulative benefits of integrated sustainable transport and development, thus favouring conservative projects over innovative, placemaking-led approaches.

For example, current transport appraisal (e.g. cost-benefit analysis for new roads or rail) often does not give full weight to land use outcomes – the “holistic benefits of integrated transport and development are rarely considered” in early stages (KPMG, 2019). The Chartered Institution of Highways & Transportation (CIHT) and others recommend reforming appraisal to assess transport and land use interventions together in terms of economic, social, and environmental impact. One approach is to require scenario testing in plan-making (e.g. testing different spatial options with their transport implications) and using accessibility planning tools to choose sites that minimise car travel. Another aspect is design standards and development control: integrated planning needs supportive development management, such as street layout standards that allow bus penetration and safe walking/cycling from day one of a new development. Ensuring sustainable transport is “designed-in from the outset” – e.g. reserving transit corridors, limiting car parking, phasing infrastructure with building – is cited as a key practice for integration at the project level (KPMG, 2019).

Lack of modal coordination

Transport infrastructure is in some cases implemented separately for different modes. This can result in a haphazard approach that prioritises speed and movement over integrated placemaking and encouraging modal shifts. Koksai et al. (2021) noted that there is poor collaboration between public bodies like local authorities, Network Rail and National Highways and also between public and private sectors. The lack of integrated planning, including issues such as non-coordinated fare systems and delayed consultation with key transport agencies, compromises the sustainability and operational viability of public transport routes within strategic planning.

Early engagement is another requirement – transport providers (like bus or rail companies) should be involved at the plan-making stage, not only after plans are set (KPMG, 2019). Overall, the institutional culture must reward cross-departmental collaboration instead of silo achievement. This might be supported by joint training programs, unified project teams (for example, a major urban extension project team including both transport and planning officers), and leadership that clearly expects integrated thinking.

Policy implications

To overcome these barriers and unlock the full potential of integrated planning, government should consider the establishment of integrated governance frameworks and consider how best to enhance funding stability and long-term investment. Greater levels of knowledge sharing, and collaborative practice can break down knowledge barriers and support a shared vision across land-use planning and transport.

Governance coordination, strategic frameworks, funding alignment, collaborative culture, and aligned tools can all create an institutional environment where integrated land use and transport planning can flourish. If any of these is lacking, integration tends to be more difficult. The UK's experience illustrates this, as many of the barriers to integration correspond to gaps in these very areas.

Suggestions for new research to inform policy in the medium term

Significant evidence gaps remain in relation to the positive and negative impacts of land use and transport integration. These gaps highlight the need for new evidence to inform more effective policies and interventions.

- Most studies reviewed rely on cross-sectional data (and therefore only examine the relationship between integration and outcomes of interest at a single point in time) or rely on model-based analyses (and therefore are not based on actual observed results). This limits their ability to establish causality (as they cannot account for other factors that can affect outcomes). Longitudinal approaches could be used to help control for unobservable confounders in this context. While some longitudinal studies exist (e.g. Noordzji et al., 2021), they are relatively rare and often constrained by short timeframes or limited scope. More long-term, panel-based research is needed to capture the dynamic interplay between land use and transport mode choices over time.

- Our work has focused on published articles and reports. We did not therefore separately review current transport and/or land-use models which are currently used by policymakers in England. These models can serve as valuable planning tools and facilitate effective coordination in some cases. Future work could include a review of the use of such models to inform integrated planning.
- The majority of studies we identified and reviewed related to non-European jurisdictions. UK policy making could be better informed in the future if additional research which focused on the UK in particular was carried out.
- We have identified multiple studies which suggest that integrated land use and transport development can lead to higher property prices (e.g. Moos et al., 2018). These impacts can be characterised either as disbenefits (because lower income households are priced out of certain areas) or benefits (because they suggest that there is a higher willingness to pay for housing in areas characterised by mixed land-use). Future work could explore this specific topic in more depth and determine the extent to which higher prices primarily reflect the perceived increase in the inherent quality of a place versus the additional increase in accessibility which come about as a result of transport-oriented development.
- Several studies indicate that integrated land use and transport planning may affect different user groups in distinct ways (e.g. Cerin et al., 2020). However, the extent to which different income groups, age cohorts, and mobility-impaired individuals experience benefits or disadvantages remains underexplored. Likewise, multiple studies note that overall productivity gains are evident (e.g., OECD, 2007; Trubka, 2011). However, few studies examine how these benefits are distributed across socio-economic groups.
- Some studies have examined the role of densification in reducing car dependency (e.g., Seong et al., 2021; Litman, 2024). However, less attention has been given to how different density levels affect transport network efficiency, congestion, and travel times. Densification alone is unlikely to drive a modal shift; adequate public transport provision is essential for car users to switch modes. Future research should evaluate whether there is an optimal density threshold and establish the minimum levels of public transport provision to maximise the benefits of integrated planning while mitigating congestion.
- There is limited research on how integrated land use and transport planning interacts with emerging transport technologies such as ride-hailing services, micromobility (e-scooters, bike-sharing), and autonomous vehicles. Future research should investigate how these technological shifts impact public transport ridership, congestion, and active travel trends.
- There is a need for more comparative research across varied urban, semi-urban and rural areas, especially in lower-density, car-dependent regions, to understand the optimal conditions for realising benefits in these contexts.
- There is a need for more granular analysis on the trade-off between aggregate emission reductions and the potential for localised pollutant concentrations in dense urban cores.

- Several studies indicate that the benefits of mixed land use may be counteracted by spillover effects in adjacent areas (e.g. increased crime or reduced affordability). Further investigation into optimal spatial scales and strategies for mitigating negative effects on neighbouring areas is warranted.

Bibliography

1. Bahr, Sebastian, 2024. The Relationship between Urban Greenery, Mixed Land Use and Life Satisfaction: An Examination Using Remote Sensing Data and Deep Learning. *Landscape and Urban Planning*, 251, 105174.
2. Berghauser Pont, Meta Y., Haupt, Per, & Marcus, Lars, 2020. A Systematic Review of the Scientifically Demonstrated Effects of Densification. *IOP Conf. Ser.: Earth Environ. Sci.* 588, 052031
3. Carozzi, Federico, Roth, Samuel, & Colmer, Jonathan, 2023. Dirty Density: Air Quality and the Density of American Cities. *Journal of Environmental Economics and Management*, 118, 102767
4. Cerin, Ester, Barnett, Anthony, Zhang, C. Jason P., Lai, P., Sit, C. H. P., & Lee, R. S. Y., 2020. How Urban Densification Shapes Walking Behaviours in Older Community Dwellers: A Cross-Sectional Analysis of Potential Pathways of Influence. *International Journal of Health Geographics*, 19(1), 14.
5. Chandrabose, Mohan, Rachele, Jerome N., Gunn, Lydia, & Giles-Corti, Billie, 2019. Urban Densification and 12-Year Changes in Cardiovascular Risk. *Journal of the American Heart Association*, 13 (199)
6. CIHT (The Chartered Institution of Highways & Transportation), Better Planning, Better Transport, Better Places, 2019.
7. Gao, Yanfang, & Feng, Chuan, 2023. Impact of Mixed Land Use on Housing Prices, Spatial Differentiation and Implications: Empirical Analysis Based on Qingdao. *Applied Spatial Analysis and Policy*, 16:1345–1370
8. Joint Transport Research Centre, 2007. Agglomeration Economies and Transport Investment. OECD, International Transport Forum
9. Karadimitriou, Nikos, & Magalhães, Claudio, 2013. Housing Delivery Through Mixed-Use Urban Regeneration Schemes: A European Comparison. In book: *The Routledge Companion to Urban Regeneration* (pp.320-329).

10. Koksai C., Wong C., Baker M., Hayes T., Koschany N., Joined Up Thinking in Uncertain Times – Links between Strategic Planning and Transport, Final report to Planning Advisory Service, 2021.
11. KPMG, Integrating the Planning and Delivery of Sustainable Transport with New Housing Development, 2019.
12. Lee, Jonghoon, Park, Sangwon, & Kim, Hyunji, 2021. Stakeholder Views About Land Use and Transport Integration in a Rapidly-Growing Megacity: Social Outcomes and Integrated Planning Issues in Seoul. *Sustainable Cities and Society*, 67 102759.
13. Li, Qiang, & Wu, Jiahong. Can Mixed Land Use Reduce CO₂ Emissions? A Case Study of 268 Cities. *Sustainability*, 2022, 14, 1511
14. Lin, B., Meyers, J., & Barnett, G. Understanding the Potential Loss and Inequities of Green Space Distribution with Urban Densification. *Urban Forestry & Urban Greening*, 14(4), 2015, 952-958.
15. Litman, Todd. Land Use Impacts on Transport: How Land Use Factors Affect Travel Behaviour. Victoria Transport Policy Institute, 2024.
16. Lu, Yifan, Sun, Ge, Sarkar, Chinmoy, Gou, Zhen, & Xiao, Yu. Commuting Mode Choice in a High-Density City: Do Land-Use Density and Diversity Matter in Hong Kong? *International Journal of Environmental Research and Public Health*, 2018, 15(5), 920
17. Maket, Isaac, & Mulugeta, Girma, 2024. Urban Agglomeration and Regional Economic Performance Connectedness: Thin Ice in Developing Regions. *Regional in Globalization*, 2024, Volume 8, 100211.
18. Meerkerk, Ruben van. Mixed Land Use in the Urban Environment: Exploring the Impact of Physical Diversity on Residential Property Prices in Rotterdam. Thesis Master Urban Port & Transport Economics, 2015
19. McClure, R. J., Bonfiglioli, C., & Lee, J.. Simulating the Dynamic Effect of Land Use and Transport Policies on the Health of Populations. *American Journal of Public Health*, 105(S2), 2015, S223-S229.
20. Mi, Peng Yu, & Zhang, Ming. A Statistical Meta-Analysis of the Design Components of New Urbanism on Housing Prices. *Journal of Planning Literature*, 2016, 31(4), 435–451.
21. Moos, Markus, & Skaburskis, Andrejs. Planning for Mixed Use: Affordable for Whom? *Journal of the American Planning Association*, 2018, 84:1, 7-20.
22. Mouratidis, K.. Compact City, Urban Sprawl, and Subjective Well-Being. *Cities*, 2019, 92, 261-272.
23. Namdeo, Anil, Ball, Alex, & Namdeo, Geeta. Land Use, Transport and Vehicle Technology Futures: An Air Pollution Assessment of Policy Combinations for the Cambridge Sub-Region of the UK. *Cities*, 2019, 89, 296-307.

24. Nabil, Nagwa A., & Eldayem, Ghada. Influence of Mixed Land Use on Realising Social Capital. Housing and Building National Research Centre, 2015, 11, 285-298.
25. Noordzij, J. M., Zuidersma, Marieke, & Stolk, Rob P.. Land Use Mix and Physical Activity in Middle-Aged and Older Adults: A Longitudinal Study Examining Changes in Land Use Mix in Two Dutch Cohorts. *International Journal of Behavioral Nutrition and Physical Activity*, 2021, 18:29.
26. Organisation for Economic Co-operation and Development (OECD). *Compact City Policies: A Comparative Assessment*. OECD Green Growth Studies, 2012.
27. Pinch, Steven, & Sunley, Peter. Do Urban Social Enterprises Benefit from Agglomeration? Evidence from Four UK Cities. *Regional Studies*, 2016, 50:8, 1290-1301.
28. Raman, Rajesh. Taxonomy of Urban Mixed Land Use Planning. *Land Use Policy*, 2019, 88, 104102.
29. RTPI (Royal Town Planning Institute), *A Smarter Approach to Infrastructure Planning – Overcoming Complexity in City-Regions and Counties*, RTPI Research Paper, 2019.
30. Runenberg, H., & Forsberg, B.. The Health Dilemma of Urban Densification: A Study on the Health Effects of Urban Densification in Three Swedish Cities. Master Thesis for Linköping University, Department of thematic studies: Technology and Social change, 2023.
31. Sarri, Peter, Anciaes, Paulo R., & Jones, Peter. Incorporating Land Use and Transport Interaction Models to Evaluate Active Mobility Measures and Interventions in Urban Areas: A Case Study in Southampton, UK. *Sustainable Cities and Society*, 2024, 105, 105330.
32. Seong, Eun Young, & Lee, Sangmin. Relationship Between Land Use Mix and Walking Choice in High-Density Cities: A Review of Walking in Seoul, South Korea. *Sustainability*, 2021, 13, 810.
33. Shi, Yan, & Zhang, Bin. Mixed Land Use and Its Relationship with CO₂ Emissions: A Comparative Analysis Based on Several Typical Development Zones in Shanghai. *Land*, 2023, 12, 1675.
34. Stevenson, Mark, & Thompson, James. Land Use, Transport, and Population Health: Estimating the Health Benefits of Compact Cities. *The Lancet*, 2016, Volume 388, Issue 10062, pages 2925-2935.
35. Tayarani, Mohammad, & Rowangould, Greg. Can Regional Transportation and Land-Use Planning Achieve Deep Reductions in GHG Emissions from Vehicles? *Transportation Research Part D* 63, 2018, 222-235
36. Thisse, Jacques F., 2017. Human Capital and Agglomeration Economies in Urban Development. *The Developing Economies* 56, 2018,, 117-139

37. Trubka, Roman L.. Agglomeration Economies in Australian Cities: Productivity Benefits of Increasing Urban Density and Accessibility. PhD thesis of Curtin University Sustainability Policy (CUSP) Institute, 2011.
38. Valencia, V., & Carrasco, J. A., 2023. Densification versus Urban Sprawl: Modelling the Impact of Two Urban Growth Scenarios on Air Quality. *Atmospheric Environment* (310), 2023, 119963
39. Wang, Yi, Zhao, Pengjun, & Yuan, Min. High Carbon Expansion or Low Carbon-Intensive and Mixed Land Use? Recent Observations from Megacities in Developing Countries: A Case Study of Shanghai, China. *Journal of Environmental Management* 348, 2023, 119294.
40. Wo, Jonathan C., Mixed Land Use and Neighbourhood Crime. *Social Science Research* 78, 2019, 170-186.
41. Wo, J. C., & Hipp, J. R.. Neighbourhood Effects on Crime in San Francisco: An Examination of Residential, Non-Residential and Mixed Land Uses. *Deviant Behavior*, 43:1, 2020, 61-78.
42. Wu, W., & Dong, G., 2022. Urban Greenness, Mixed Land-Use and Life Satisfaction: Evidence from Residential Locations and Workplace Settings in Beijing. *Landscape and Urban Planning* 224, 2022, 104428.
43. Yeu, Yan, & Shi, Hao. How Could the Integration of Land Use and Transport in Planning Practice Contribute to Achieving Sustainable Urban Form? A Case Study Analysis of King's Cross and Olympic Legacy in London. Dissertation, Tongji University, South China University of Technology, unpublished.
44. Yin, C., & Xu, Y.. Mixed Land Use Has Opposite Associations with Subjective Well-Being through Social Capital: Spatial Heterogeneity in Residential and Workplace Neighbourhoods. *Travel Behaviour and Society* 35, 2024, 100724.
45. Yuan, M., & Lu, Y.. Evaluating the Effects of Compact Growth on Air Quality in Already High-Density Cities with an Integrated Land Use-Transport Emission Model: A Case Study of Xiamen, China. *Habitat International*, 69, 2017, 37-47.
46. Zagow, Martin. Does Mixed-Use Development in Metropolis Lead to Less Carbon Emissions? *Urban Climate*, 34, 2020, 100676.
47. Zagow, Martin. The Impact of Mixed-Use Development, Small Businesses, and Walkability on Carbon Emissions in Cool Climate Cities. Research Square, Preprint research article, 2022.
48. Zahnow, R., & Corcoran, J.. Mixed Land Use: Implications for Violence and Property Crime. *City & Community*, 17(4), 2018, 1119-1142.
49. Zhang, B., & Li, W.. Improvement in the Quality of Living Environment with Mixed Land Use of Rural Settlements: A Case Study of 18 Villages in Hebei, China. *Applied Geography* 157, 2023, 103016.

50. Zhang, Ming, & Zhao, Peng, 2017. The Impact of Land-Use Mix on Residents' Travel Energy Consumption: New Evidence from Beijing. *Transportation Research Part D* 57, 2017, 224-236.