



Stepping off the Road to Nowhere

How changing transport modelling can create green growth, sustainable transport and beautiful streets and homes



Project Team

Create Streets

David Milner
Director, Create Streets

Toby Lloyd
Create Streets Fellow

Ed Leahy
Urban Designer, Create Streets

Sustrans

Rachel Toms
Director of Urbanism, Sustrans

Flo Marshall
Principal Urban Designer, Sustrans

Benedicte Dubiez
Senior Urban Designer, Sustrans

Acknowledgements

This project would not have been possible without the generous support of our project sponsors, The Rees Jeffreys Road Fund and Foundation, for Integrated Transport.

We are also very grateful to Nicola Lodge and Geoff Burrage at Integrated Transport Planning (ITP) for their time and support on the 'vision-led' modelling in Chapter 3.

Our grateful thanks also to Jenny Raggett at Transport for New Homes CIC, for support throughout the project, and Ken McCall from CPRE Wiltshire, for twice hosting us in Chippenham.

Many thanks to the wider Create Streets and Sustrans teams for their dedicated work on this report: Nicholas Boys Smith MBE, Arthur Girling, Dan Simpson, Camila Tolorza, Joanna Clayton, Robert Kwolek, George Payiatis, Tom Noble, and Lauren Botterill.



Rees Jeffreys Road Fund



Any errors or omissions are the authors' sole responsibility. The report content reflects the views of the authors and not necessarily those of the Rees Jeffreys Road Fund, FIT, or Create Streets Foundation.

Sustrans is a registered charity no. 326550 (England and Wales) SC039263 (Scotland).
© Create Streets and Sustrans February 2024

We need to build many more affordable homes in rural England; but while doing so we have to get the design to be high quality and the location as well linked to towns and transport networks as possible, so that we prevent urban sprawl. This report is a welcome contribution to the debate on those issues.

Paul Miner, CPRE The Countryside Charity, Head of Policy and Planning

This report shows what can be achieved when planning and transport are considered together to deliver beautiful neighbourhoods that deliver for people, the environment and nature. It illustrates many of the principles IPPR has outlined in previous work which have called for an integrated approach to local planning.

Luke Murphy, Head of IPPR's Fair Transition Unit, Associate Director for Energy, Climate, Housing and Infrastructure

Vision-led approaches that create a greater sense of community, reduce travel distances, and development footprint should be welcomed across all new greenfield developments. This report is just the beginning of innovative means to creating liveable streets that maximise use of public transport and healthier commodious routes.

Chris Worrall, Chair Local Government and Housing, Fabian Society Policy Group

This report has shown the substantial theoretical benefits of moving to a vision-led approach to transport assessments. We now need a number of practical examples on the ground and the government needs to take a leading role in supporting this approach, in particular in respect of the reallocation of resources and government policies. The pace of change could then be substantially improved with the commensurate benefits to people, communities and society.

Lynda Addison OBE, Chair of the Sustainable Transport Panel of CIHT (The Chartered Institution of Highways & Transportation); Former Chair of the Transport Planning Society; 2019 CIHT Transportation Professional of the Year

Every planner, every community, every MP and minister and every council leader and chief executive should read this report. Great development as described, makes people, not roads the centre of attention, creates great communities that people love and greatly decreases pressure on the countryside. This is simply essential reading for everyone who cares about the future of all our communities and delivering attractive homes and places in ways that work.

Lord Taylor of Goss Moor

With this case study of Chippenham, Create Streets and Sustrans show how vision-led planning can lead to a greener transport future. By using less space and spending on

roadbuilding and more on sustainable transport, we can make where we live cleaner, greener and less congested.

Rosie Allen, Green Alliance

Those battling the tyranny of transport modellers have for a century battled to make their voices heard. However, thanks to a few brave souls – David Milner and Create Streets among them – it now looks like, finally, the revolution has come. We need to build places for people, not cars, and this report is yet another fusillade in a winning cause.

Ben Gummer, The Rt Hon. Ben Gummer is a Visiting Fellow of Practice at the Blavatnik School of Government at Oxford University and a Senior Adviser at McKinsey & Company; previously Minister for the Cabinet Office.

There are many debates about housing and planning and transport; many of these remain at the level of theory. It is exciting to see this proposal where new and good ideas are applied to a case study.

Richard Blythe, Head of Policy Practice & Research Royal Town Planning Institute

If, over the next 25 years, we are going to build the six million homes the UK needs, while simultaneously eliminating carbon emissions, restoring the natural environment and improving both health outcomes and living standards, then we need the structures in place to create the highest value for people and nature from scarce land. To that end Stepping off the Road to Nowhere is a vital contribution, demonstrating the art of the possible with recommendations at national level for how we can consistently achieve the multiple outcomes we all seek.

Edward Lockhart, CEO of the Future Homes Hub, working in partnership with House Builders Federation

Comprehensive and imaginative, this report brings 'vision and validate' to life. While dozens of towns could have been chosen, the example of Chippenham shows shared problems will still require well-considered, place-based and people-centred solutions.

Pete Dyson, co-author of "Transport For Humans" and doctoral researcher at University of Bath

'Road to Nowhere' gives policy makers an imaginative vision of what holistic transport planning could look like - Create Street's inspiring report demonstrates how to change the modelling to bring forward greener, happier, healthier and more cost-effective developments putting people and nature - not cars and concrete - at the heart of placemaking.

Emma Crane, Head of Policy and Legislation, Peers for the Planet

The rise to dominance of the motor car over the public realm characterised planning in the twentieth century. The idea that all else shall make way, so that road geometries, sight lines, street furniture, signage exist to ease the passage of the car has come to dominate. We must reverse the disastrous impact this has had on people and place in the twenty-first century. The Road to Nowhere report from Create Streets and Sustrans provides us with the evidence we need to win back the space and restore the sense of wellbeing we have lost as a result.

Benjamin Derbyshire, Dip Arch, Cantab PPRIBA, FRSA, HonAIA Chair, HTA Design LLP, Historic England Commissioner

I really like this report, it is well evidenced and argued but also very readable and imaginative.

Jonathan Bray, former director at the Urban Transport Group

This report sensibly reinforces arguments for design-led as opposed to traffic-led approaches to place-making. If we wish to make sustainable, healthy and engaging places for people, that is the only way to go.

Professor Matthew Carmona, Professor of Planning and Urban Design at The Bartlett School of Planning, UCL

Translink and myself are very supportive of the work Create Streets and Sustrans are undertaking. Bus Rapid Transit, in the form of the Glider or similar, is an efficient, flexible solution that can be delivered relatively quickly. It is relatively easy to accommodate within new development and can extend into and through constrained town and city centres with minimal impact on existing public realm and architecture. The Glider has been transformational for public transport in Belfast.

Robin Totten, Head of Strategic Network Design & Business Change at Translink

When building housing, we should consider how to build happy, healthy communities where people want to live. That includes giving people choice about how they travel, with public transport services close to where they live. This report helpfully outlines the assumptions which are holding this back and how we could get past that, improving the viability of public transport services across the country."

Mark Anderson, Customer and Commercial Director, Go-Ahead

Carbon-heavy road infrastructure is not just environmentally damaging but also severs neighbourhoods, and inhibits the gentle density achieved in so many of our favourite places. JTP welcome this report as a constructive reminder that things can, and should, be done differently. Like Create Streets, we advocate for places where

people and nature come first, and seek to predict their needs before providing for those of vehicles.

Marcus Adams. Managing Partner, JTP Urban Design

Transport is a vital component in quality of place, air and life as well as to the UK's commitment to decarbonise and to the cost of living. Building new places around the private car worsens the outlook on all of these. Building new places around sustainable transport options across public transport, walking, wheeling and cycling, car clubs, bike and scooter share improves that outlook and embeds opportunities instead. The choice is that stark and we at the national shared transport charity CoMoUK welcome this report from Create Streets and Sustrans which understands these links and that choice.

Richard Dilks. Chief Executive, CoMoUK

We are grateful to Sustrans and Create Streets for sharing this report and highlighting the need for sustainable development which is planned around the public transport network. Great Western Railway welcomes the opportunity to work with developers and local authorities in Wiltshire to consider ways in which sustainable travel choices can be promoted to existing and future residents.

Dan Okey, Head of Regional and Welsh Development, Great Western Railway



HST
S CAR
STOP

GWR

IND THE STEP

Do Not
Cross the
Railway

Do Not
Cross the
Railway

Passengers
Must Not
Stand
Here

10

10

No
Smoking

Contents

About this report	11	3. A road less travelled	36
Executive Summary	13	A case study in 'vision-led' transport planning	37
An alternative route: communities turning to 'vision-led' transport planning	15	Chippenham's failed growth plan	37
A road less travelled: applying 'vision-led' planning to Chippenham	17	Our vision for Chippenham's growth	38
Cost breakdown of the Big Moves	18	Designing a state of the art active travel network for Chippenham for £11million	46
1. The road to nowhere	22	Validating the vision: what is the effect on Chippenham's traffic?	50
Introduction	23	4. The road ahead	56
Build it, and they will drive: how transport modelling shaped the modern world	23	The road ahead: policy recommendations	57
Where the road to nowhere leads	25	A template for 'vision-led' transport planning	59
2. An alternative route	30	Where next? Scaling 'vision-led' modelling across Britain	60
Communities turning to the 'vision-led' approach	31	Endnotes	64
Case Studies	32		



King Alfred
Hall

About this report

This report takes Create Streets' work on traffic modelling one step further by investigating a real plan for a new housing extension to the market town of Chippenham that was based on a £75million large road scheme.

In partnership with Sustrans and industry experts we have redesigned the infrastructure, transport interventions and masterplan using the £75m Housing Infrastructure Fund (HIF) road budget, via a range of 'Big Moves' using a vision-led transport planning approach, rather than the standard 'predict and provide' traffic model.

This approach achieves the same number of homes with a far smaller loss of greenfield land, but also creates healthier communities, a net-zero impact on the planet and a more prosperous town - whilst allowing people to move around freely.

Our report demonstrates the benefits of taking this approach. It is not a detailed final plan that has been through background community engagement. We spoke with a limited number of community representatives to understand local concerns. We do not argue in principle with development, but rather show how it could be done if this development came forward.

During the writing of this report, plans for the Chippenham housing extension decreased in size from 7,500 homes to 4,000, before the HIF scheme was halted altogether. New housing figures for the area are being updated in the Wiltshire Local Plan, but our report uses the original HIF-scheme housing target to present a clear, comparable approach for a vision-led scheme versus predict and provide transport planning.



Executive Summary

How stepping off the ‘road to nowhere’ can create more homes, save money, save our countryside and create happier, greener places.

Too often new housing developments are designed as an appendage to a new, expensive, distributor road on the edge of existing towns. Each wide roundabout entrance is adorned with the housebuilder’s flags and if you’re lucky a decorative rock will signify you have arrived at the ‘gateway’ to the development. Densities of these new estates are typically low, often 20 to 25 dwellings per hectare, meaning that vast swathes of countryside are consumed by houses and the road infrastructure that accompanies them.

They generally have no centre and few, if any, shops and services, as they are planned as drive-to dormitory suburbs, not real towns. Everybody drives everywhere, so each home needs multiple car parking spaces, creating more congestion and more demand for new roads. In trying to build the homes we need, we have entrenched a self-reinforcing pattern of car dependency and bland, faceless estates that always require another new road: **a road to nowhere.**

Once established, this pattern is self-perpetuating, but its origins lie in the dominant paradigm of traffic modelling, known as ‘predict and provide’ which is based on flawed assumptions, and prescribes oversimplified solutions. Rooted in post-war predictions of the inevitable growth of car ownership and driving, these models assume that everyone will drive everywhere, and so require ever more roads to meet that demand.

Despite decades of evidence that driving does not necessarily increase relentlessly, and that development based on more fast roads only locks in the need for driving, transport planning processes have been slow to adapt, and largely continue to be based on ‘predict and provide’ models. Academics and planners, designers, developers and investors have long since realised that this is not the best approach. The transport planning process has not caught up however. Now it needs to.

The result is not only that we build impersonal, unattractive places. Car-dependent, low-density development based on the demands of ‘predict and provide’ transport models has further far-reaching impacts:



New housing developments are usually car-dependent dormitory suburbs added onto big new roads (image: Shutterstock)

Draining public funds. The Government has set aside a £27bn road building budget over a five-year period, on top of local government spend on highways and transport of £7.5bn per year and additional funding pots such as the £4.2bn Housing Infrastructure Fund (HIF).¹



Eating into the countryside. Large new roads and low-density housing developments are very land-hungry. According to 2018 government data, greenfield development averaged a density of just 28 dwellings per hectare.²



Unpopular places. There is plenty of evidence that people will also pay more for walkable, mixed-use neighbourhoods and that proximity to large roads lowers the value of homes.^{3,4}



Ever more congestion. Multiple studies have found that building new roads does not achieve the goal of reducing congestion. It simply generates more journeys and more traffic.⁵ Housing developments designed around new roads make this worse by locking in long-term car dependency, requiring yet more driving and generating further congestion.



Worsening climate change and air pollution. The domestic transport sector in the UK emits 27 per cent of all our CO₂ - more than any other sector.⁶ Air pollution from roads triggers respiratory diseases and can cause lung cancer.⁷ The worst effects of road and traffic pollution are distributed unevenly, with poorer areas suffering the worst levels of pollution, in contrast to more prosperous neighbourhoods.⁸



Severing communities, social isolation and ill health. Fast, heavily-trafficked roads make it harder for residents to move around within their neighbourhoods, with damaging consequences

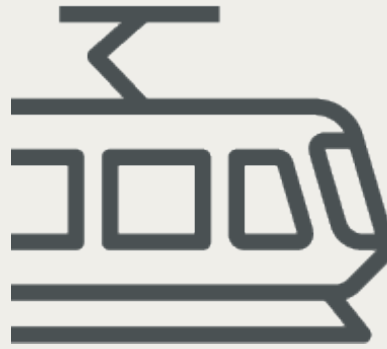
for personal connections, local social life, health outcomes and community cohesion. On top of this, car-dependency also entails more sedentary lifestyles.⁹



Exacerbating inequality. Built-in car dependency exacerbates inequalities for those unable or less likely to drive, such as women, people of colour, young adults, disabled people and those with low or no incomes, all of whom are less likely to own a car.¹⁰ People with low incomes are less likely to own a car but bear the brunt of road collisions and traffic-related air pollution, while communities experiencing greater deprivation are more likely to live in traffic-dominated areas and therefore experience more dangerous and unpleasant walking environments.¹¹



Undermining the viability of public transport. Low density development is more expensive to serve with public transport, so provision is often patchy, leaving residents in road-centric estates with no choice but to drive, locking in car dependency and reinforcing the assumption that road capacity is the primary constraint on new housing.

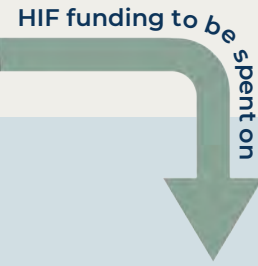
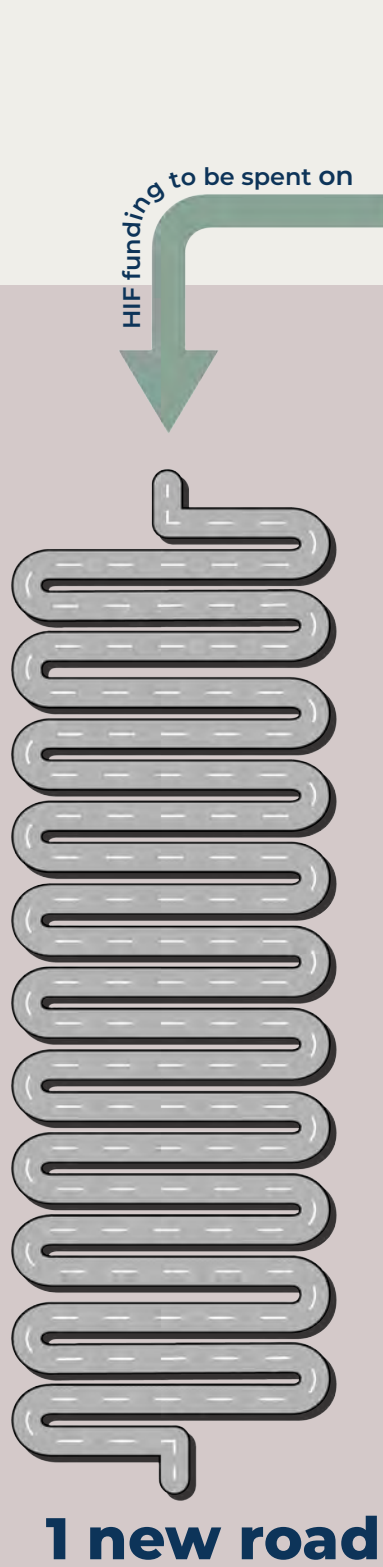


An alternative route: communities turning to 'vision-led' transport planning

Challenging the default post-war assumptions of endless traffic growth means working with residents, local authorities and developers to set a vision for how we want places to be and designing the transport and behavioural interventions to help us achieve this vision. This approach is known as '**vision-led transport planning**': unlike 'predict and provide' it focuses on the outcomes desired, not on predicting vehicle journeys based on historic data.

Putting this approach into action can make significant savings, as well as improving outcomes. For example, at the new Silverstone research and technology park, the £25m cost of standard 'predict and provide' development plans led to a rethink. A 'vision-led' approach created cycle paths, more pedestrian crossings, pavements and lower speed limits. Instead of a new roundabout, money went on improving bus routes and subsidising on-site gyms and nurseries to reduce car journeys. This made for happier workers making sustainable commutes. The spend on roads was reduced to just £2m, freeing up £23m to be spent on facilities for the whole community.¹²

Despite these huge potential gains, the transition from 'predict and provide' to a 'vision-led' approach remains frustratingly slow. There are many reasons for this inertia - but perhaps the biggest is a shortage of real-world examples that can allow people to experience better development and demonstrate that alternatives are not only possible but eminently practical. This is what this report seeks to provide.



'Predict and provide'

OR

'vision-led'





The gentle density masterplan (in green) takes up two-thirds less land on the edge of Chippenham than the original road-led masterplan (in red)

A road less travelled: applying 'vision-led' planning to Chippenham

Create Streets and Sustrans selected a 'predict and provide' led road scheme attached to a plan for 7,500 new homes on the outskirts of Chippenham, which was supported by central government with £75m from the Housing Infrastructure Fund.

We worked together to use the 'vision-led' approach to improve early-stage masterplans for Chippenham, demonstrating how investing this £75m into placemaking and a range of sustainable transport solutions could result in a healthier, happier, more productive and sustainable place. Our resulting 'gentle density' plan is for a walkable, well-connected and integrated extension of the existing town, with good air quality, less congestion and vibrant neighbourhoods. The plan shows how the same number of homes can be delivered, within the same budget, and with a far smaller land take – simply by reducing the assumed need for a major road.

Key Statistics:

9,300
more people walking and cycling every day with an active travel-orientated masterplan

2000
tonnes fewer carbon emissions per year due to fewer vehicular trips

12,000
fewer car trips per day with a denser masterplan of 7,500 homes

Cost breakdown of the Big Moves

A summary of our Big Moves and their costs shows the huge variety of public goods that can be achieved when the vast sums spent on a single road instead pays for improving existing infrastructure and beautifying our towns and cities:

	What	Cost	Impact
1	Intensify masterplan for gentle density design	£0m	Significantly reduced land take
2	Infill underused brownfield land with remediation and street votes	£2.5m	More homes within the existing town
3	A rail passing loop at Melksham	£15m	More trains at commuter frequency. Less congestion.
4	Improve streets within new development (down from initial £75m)	£10m	Accommodate expansion and road connectivity
5	Contribution to an improved high frequency bus network for 5 years.	£7.5m	More use of sustainable transport choices enabled. Less congestion.
6	Create car clubs and mobility hubs	£3m	Enable shifts to more sustainable transport choices
7	Contribute to town centre revitalisation and improvements	£10m	Improved town centre for existing and new residents
8	Support local businesses during development phase	£6.25m	Provision of more amenities for new residents within walking distance
9	Protected cycle links from new developments to key locations in town	£11m	More active travel and less car use
	Contingency / inflation or money returned to the government	£9.75m	
	Total	£75m	



An alternative 'gentle density' masterplan using 230ha less land than the road-led masterplan

By redeploying the £75m HIF road investment into more sustainable transport infrastructure, additional services and improvements to the existing town, our gentle density masterplan can achieve better place qualities, health and well-being than the original road-led masterplan whilst still giving people the freedom to move around at will:

- **Less land.** Land take will be reduced from 350 hectares to 120 hectares, for the same 7,500 homes. This is achieved by increasing density to 58 dwellings per hectare, the same as historic parts of central Chippenham.
- **Easier to get to the station.** Almost all the new homes will be within 2.5km of Chippenham Station and half will be less than 1.5km away.
- **More shops.** 125 new shops and amenities will be supported from the beginning of the new development.
- **Easier access to nature.** The number of

new and existing homes within a 10-minute walk of countryside will almost double, from 6,420 (in the road-led masterplan) to 12,400 (in our 'gentle density' masterplan).¹³

- **Less wasted space.** Due to a better transport offering the amount of land used for car parking will reduce from 28ha to 11ha - enough for around 20 new small parks or 700 new homes.¹⁴

Key Statistic:

230ha:
the amount of
countryside saved
by using a gentle
density masterplan

The road ahead: policy recommendations

Our gentle density revisioning of the proposed extension to Chippenham shows what can be achieved by taking a different approach to transport modelling for new development. To make this way of doing development the norm rather than the rare exception, we need to change policy and practice at the level of national government, local authorities and communities – and most importantly we need to change the assumptions and models behind development projects themselves.

The good news is that these proposals very much follow on from the proposals for Homes England

funding made in *Living with Beauty*, the 2020 final report of the Building Better Building Beautiful Commission which the government accepted warmly in principle.

Recent announcements by the Labour Party also indicate a clear willingness to move in this direction as the right way to create better and more sustainable places using less land. We are confident that public policy will move in this direction as it makes it easier to build more homes and supports happier and more prosperous lives. It is just a question of when.

For National Bodies	
1	The Department for Transport (DfT) should issue guidance mandating that local transport plans (LTPs) and Transport Assessments (TAs) use the 'vision-led' process for any transport modelling.
2	The DfT should provide a clear definition and technical guidance of what best practice 'vision-led' transport modelling looks like.
3	The DfT should create a role responsible for light rail (tram) within its Roads and Local Group division
4	The DfT should update Transport Analysis Guidance (TAG) to increase the share of costed benefits from broader social impact and reduce the dominance of 'time saving' as a costed benefit.
5	Active Travel England should prioritise financially supporting schemes that use 'vision-led' transport modelling, as well as using their role as a statutory planning consultee to implement 'vision-led' modelling on planning applications.
6	The Department for Levelling Up, Housing & Communities (DLUHC) to ensure Homes England prioritises financially supporting housing schemes using 'vision-led' transport modelling through a new Housing Infrastructure Fund (HIF) process that supports a more holistic package of financial support.
7	Homes England should conduct a rapid review of existing HIF funded schemes that have a 'road only' component to investigate if alternate cheaper and more sustainable infrastructure can instead be provided.
8	DLUHC should update the NPPF section 9 on promoting sustainable transport, and include wording in the upcoming NDMPs, to require a 'vision-led' approach when modelling for new developments. DLUHC should also update section 9 to allow easier implementation of parking maximums to support car-lite development. For full suggested text we will share an accompanying appendix'

9	DLUHC should update the NPPF sustainable transport section 9 to require that 'the design of schemes and sustainable transport has been provided that ensures a sustainable transport trip share aligned with the targets set in the local transport plan.' ¹⁵
10	DLUHC should create National Development Management Plans (NMDPs) on sustainable transport and active travel, with topics including the importance of walkable proximity and connectivity to services; and the protection and delivery of strategic walking, wheeling and cycling routes.
11	The DfT should update Section 16 of the Traffic Management Act 2004, which provides network management duty, to add in a placemaking and public health duty alongside expeditious movement duty.
12	The Road Traffic Reduction Act 1997, is in place and should be reviewed to update national targets.
13	DLUHC should adopt Manual for Streets as policy within the NPPF.

For local government and regional bodies

14	All Local Transport Plans (LTPs) should mandate the 'vision-led' process for any transport modelling.
15	Local planning authorities should allow reduced back-to-back distances (beyond the default 20 metres) to enable low-rise high-density urban extensions.
16	Local authorities should run a 12-hour transport model (ideally 24), instead of peak hour, for housing developments, especially when developments are held up by accompanying highways works.

For community groups and neighbourhood forums

17	Visions created by neighbourhood forums through the Neighborhood Planning or Local Development Order mechanisms (2011 Localism Act) should be material considerations for any vision-based modelling carried out in the area.
-----------	---

1. The road to nowhere

Traffic modelling in the dark ages



Introduction

Sometimes little questions we rarely think about have profound consequences. When is a road a street? When should a road be a dual carriageway? When should it have a bus lane or perhaps a tree-lined path for pedestrians and cyclists? And who, or rather what, decides this?

Designing new places is about balancing different desires. Bigger private gardens or a public park? More parking or more homes? Brick, stone or timber buildings? There is rarely one right answer and trade-offs must always be made. Urban designers, planners and ecologists try to resolve these tensions and find a balance that can create happy, sustainable and prosperous places to live. Many of these questions are rightly the subject of intense public debate, because the answers will do much to determine the nature of the development that occurs – or whether it occurs at all.

But there are also factors that are equally vital in shaping the pattern, nature, speed and cost of development which do not receive the same critical attention. The most powerful, and least challenged, of these hidden drivers of development outcomes is the system for planning and providing transport infrastructure.

Nothing else comes close to the power of transport planning in determining what new development looks and feels like, how much land it takes up, and how much it costs. The predicted need for transport connectivity, and above all the road capacity expected to keep traffic moving, fixes the parameters of what can be designed long before urban designers, ecologists or architects start work.

Yet despite its central importance, transport planning processes receive none of the attention or controversy that housing development, land use or architecture attract. This dominant 'predict and provide' approach to transport planning, and the rigid traffic models on which it is based, go largely unchallenged. Their predictions are treated as unquestionable facts, despite mounting evidence to the contrary.

The result is that we all live in a world shaped by transport engineers' predictive models of traffic flows, in which good design principles and common sense are cast aside as we are told the 'infrastructure won't

cope' or 'the junction can't take it.' The carefully-designed, pedestrian-friendly high street becomes an over-engineered dual carriageway, severing the development in two. The output of almost every traffic model is that 'computer says road.' However, it is increasingly obvious that it is a road to nowhere, literally and figuratively.

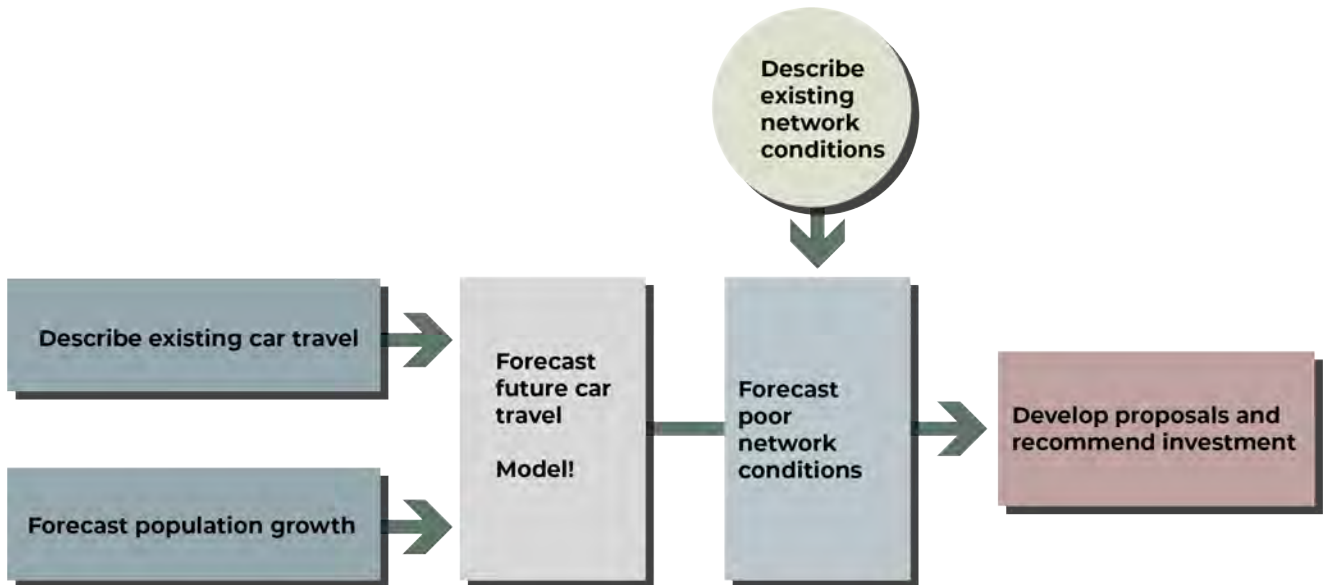
"We all live in a world shaped by transport engineers' predictive models of traffic flows, in which good design principles and common sense are cast aside"

The places that end up designed to fit around large, fast roads are often nowhere places: characterless, lacking any local specificity, blandly functional and inhuman. And as road-centric development is incredibly expensive and space-hungry, it requires ever more capital investment and the loss of ever more green space to produce a few more low-density housing estates, which lock in car dependency and require ever more roads for people to drive out of them.

If we are to build the homes we need, in attractive, healthy and sustainable places, at prices we can afford, we urgently need to understand and challenge these outdated models and replace them with planning processes designed to deliver better outcomes for people, places and the planet. We have to get off the road to nowhere.

Build it, and they will drive: how transport modelling shaped the modern world

It is essential to properly plan for infrastructure, especially for new developments, and transport is one of the most essential forms of infrastructure there is. Our greatest cities are still built around the roads and bridges that determined patterns of movement and fixed the locations of settlements laid out hundreds, even thousands of years ago. It really matters how these decisions are made. So it is unfortunate that the dominant paradigm of traffic modelling, known as



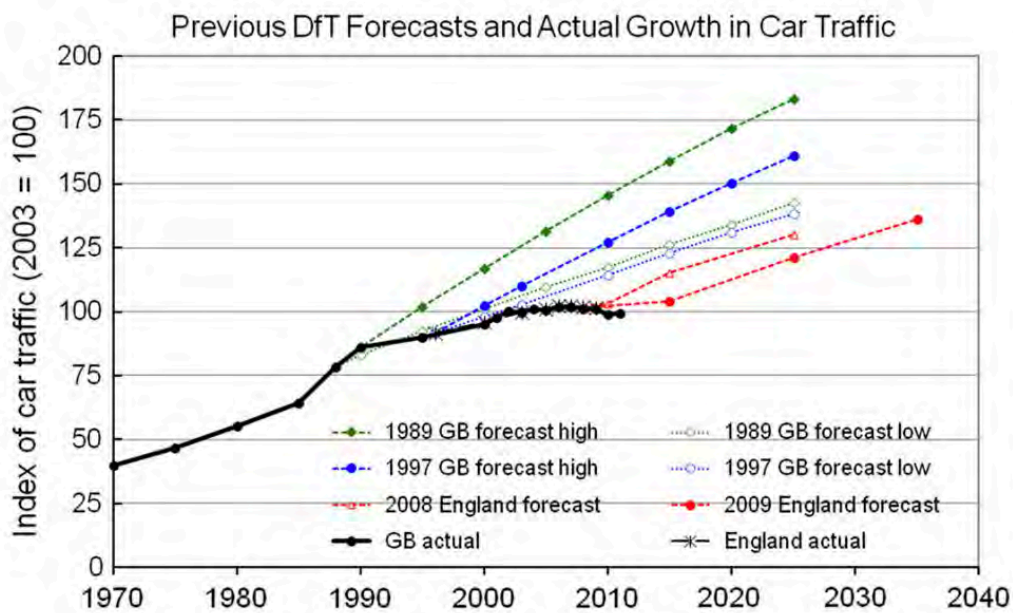
'Predict and provide' traffic modelling does not factor in alternative transport possibilities

'predict and provide' is based on flawed assumptions, and prescribes oversimplified solutions.

The output of 'predict and provide' modelling is usually that more, larger and faster roads are needed to accommodate the ever-increasing amount of driving that is predicted. But these conclusions are based on old data and even older assumptions, such as predictions on how we will move around for decades into the future.¹⁶ They assume growth in car use, growth in car ownership and poor network conditions. In fact the term 'predict and provide' was

originally intended as a criticism of the approach, coined by Stephen Plowden in his critique of post-war transport planning, *Towns Against Traffic*.¹⁷

The assumptions behind 'predict and provide' models have repeatedly proved inaccurate, as can be seen by comparing the Department for Transport's own forecasts with the actual results. The government's Decarbonising Transport plan acknowledges this problem, stating 'we need to move away from transport planning based on predicting future demand to provide capacity ('predict and provide') to planning



Traffic forecasts significantly overestimate future car use

that sets an outcome communities want to achieve and provides the transport solutions to deliver those outcomes.¹⁸

But there is little evidence that this realisation is feeding through to transport planning processes nationwide, which continue to be based on 'predict and provide' models.

Predicting the future based on previous experience will tend to arrive at the same conclusions and produce the same outcomes. After more than 70 years of 'predict and provide' we know exactly what it creates: large, fast roads and low density, car dependent sprawl.¹⁹

This pattern of development is self-reinforcing, as the residents of such developments have little choice but to drive everywhere, increasing demand for road capacity. It is also extremely expensive. For example, the planned Black Cat roundabout expansion near Bedford cost a staggering £1.4bn for one roundabout and 10 miles of new road.

These huge costs often result in road schemes requiring large housing developments to pay for them, as a developer will contribute thousands of pounds per house sold to fund a new road. This is money that could have otherwise been spent on improved local facilities. It's difficult to find a new housing development that isn't linked in some way to a major new road or widened junction, to the point where you would be forgiven for wondering if the roads are being built to serve the new homes or the homes to serve the roads.

We have become far too reliant on a single, flawed

model that does not deliver value for money – let alone wider social or environmental goals. Tragically, we have outsourced the responsibility for this crucial area of designing and planning our cities to spreadsheets.

Where the road to nowhere leads

We know that the nature and quality of the places in which we spend time hugely affects the quality, sociability and health of our lives. So it is no surprise that the dominance of 'predict and provide' transport planning over development patterns underlies many of the most damaging features of modern places. From air pollution to traffic congestion, from social cohesion to local government finance, the negative effects of car-centric development are felt everywhere.

Draining public funds

Major road infrastructure takes up a very large proportion of public capital investment. Central government is committed to spending £27bn on national road projects over 2020-25 through the Road Investment Strategy 3.²⁰ This is more than the £25.5bn set aside for the vital work of reducing carbon emissions in the same period.²¹

In addition, the Housing Infrastructure Fund provides £4.2bn of grant funding to English local authorities for 'infrastructure which will unlock housing in areas of high housing demand' up to 2028.²² Local authorities also allocated £7.5bn, or 29 per cent, of their total capital expenditure to highways and transport services in 2021. This is the single largest area of councils' capital spending (well above the next largest item, the £6.1bn spent on housing).²³



Between 2006-2012, 22,000 hectares of green space was lost to new development

Eating into the countryside

Large new roads that produce car-dependent, low-density housing developments are very land-hungry. According to 2018 government data, greenfield development averaged just 28 dwellings per hectare, described by CPRE as 'wastefully low densities'.²⁴ These sprawl developments eat into cherished countryside and reduce our access to local green space.

A landmark study in 2020 using satellite data estimated that countryside and greenspace areas equivalent to the size of Cornwall had been lost to suburbanisation since 1990.²⁵ Other research revealed that between 2006-2012, 22,000 hectares of green space was lost to new development, predominantly housing.²⁶ If new developments averaged just 50 homes per hectare (only three quarters of the density of typical Victorian suburban housing) we could have built nearly 50,000 more homes on the same land. If they had been built at typical Victorian densities of 75 homes per hectare, over 100,000 homes could have been built on the same land. Britain needs new homes, but new housing needlessly takes large swathes of countryside due to wrong assumptions and corresponding poor design. Denser development can enhance residents' access to nature, while taking up much less of our countryside.

"According to 2018 government data, greenfield development averaged just 28 homes per hectare, described by CPRE as 'wastefully low densities'"

Lower property values

Historic price premiums placed on cul-de-sac homes led to the assumption they were popular, and therefore a desirable urban form to replicate. Evidence suggests however this interpretation is the wrong way round: cul-de-sacs are only popular *in the context of large roads*. In other words, people will pay more to live further away from the noise, traffic and unsightliness of a large road. This should lead us to conclude that road-heavy development is unpopular, not that cul-de-sac developments are popular.²⁷ Research also suggests the urban quality of 'betweenness' (areas of transport and people flows) *decreases* property and land value. Space Syntax undertook a review of the prices of 63,245 properties consisting of 101,849 dwellings. They found that

'betweenness' at a local level reduced property prices, while at a global level was associated with higher house prices.²⁸ That is to say, a property on a quiet road near a well-connected train station was worth a lot, while a property on a busy road a long way from anywhere is worth much less. This tallies with known evidence that people will also pay more for walkable, mixed-use neighbourhoods with access to transport options.²⁹

The Housing Infrastructure Fund

The Housing Infrastructure Fund (HIF) is a government capital grant programme, originally of up to £2.3 billion, which aimed to help deliver up to 100,000 new homes in England between 2017/18 and 2020/21. This was then extended to £4.2 billion up to 2023/24. Funding was awarded to local authorities on a competitive basis, for new infrastructure intended to 'unlock' new homes in the areas of greatest housing demand.

Other aspects of road-led development measurably reduce neighbourhood value. Some studies have even managed to track the decrease of property value to an increase in decibel levels. One 2000 report estimated a 0.6 per cent discount on house prices for each decibel increase in noise, adding up to a 30 per cent price reduction on homes situated on or near busy roads.³⁰ People don't want to live by noise and will pay to avoid it if they can.

Ever more congestion

A common assumption is that more and wider roads will ease congestion. However, multiple studies have found that building new roads does not achieve this goal and is, instead, generating more journeys and more traffic. An American study found that there is an almost perfect one-to-one relationship between new roads and new traffic added.³¹ A study in Norway found similar results.³² When the M25 was widened from three to four lanes traffic increased at an almost perfect 33 per cent in one year.³³

A UK study by Professor Phil Goodwin found that traffic increased by an average of 47 per cent above background growth following road expansion projects.³⁴ In 2009 the National Audit Office stated that 'previous experience shows that new road capacity rapidly fills, reducing the benefits of making

more road available.³⁵ In summary, more roads can create new journeys due to the change in land-use adjacent to them, as opposed to taking the load from other roads. They do not reduce the time spent stuck in traffic but merely shift journeys from other types of transport or replace a Zoom call. Housing developments designed around new roads make this worse by locking in car dependency, requiring yet more driving, often to the centre of town from the suburbs, generating further congestion rather than alleviating it.

But are these additional journeys not a good thing? Well yes, and in some areas new roads may unlock productive journeys, however, the range of negative externalities as set out in this chapter show that it is preferable to give people the freedom to make them in more spatially efficient and sustainable means.

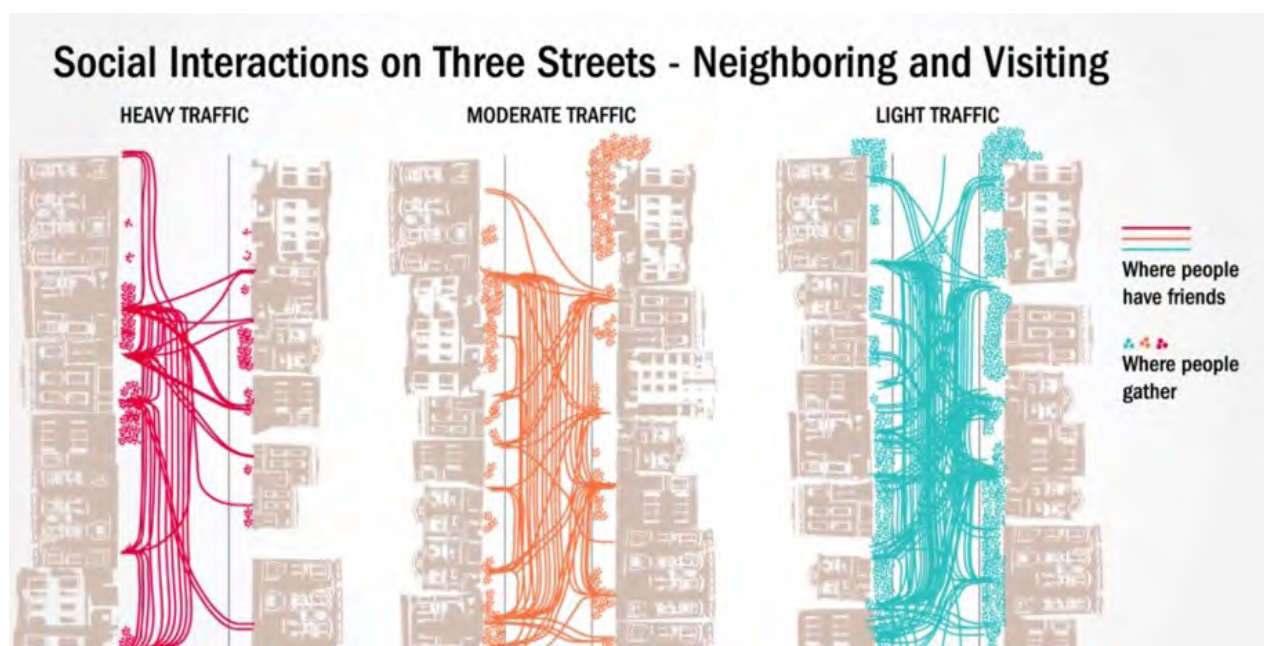
Worsening climate change and air pollution

The domestic transport sector in the UK emits 27 per cent of all our CO₂ - more than any other sector.³⁶ The more we build roads and predicate development around roads, the more people will drive, and the more carbon we will emit, in direct conflict with the UK government's commitment to carbon net neutrality by 2050. Electric vehicles do reduce pollution but they still generate roughly half the lifetime CO₂ emissions of a conventional car (during their manufacture), and the electricity they run on is still largely generated by fossil fuels.

Road transport is already one of the biggest polluters in the UK today, with 94 per cent of Britain's landmass now affected by elevated pollution from roads. A review of 700 studies worldwide found suggestive evidence of a causal relationship between traffic pollution and the onset of childhood asthma, respiratory disease, impaired lung function and heart disease.³⁷ It also demonstrated a causal relationship between traffic pollution and exacerbation of asthma among children.³⁸

Road pollution comes in the form of noxious gases, such as nitrogen oxide and, 'particulate matter': tiny particles emitted into the air from tyres, brakes and engine wear, and road surfaces. Even at low levels nitrogen oxide has been shown to irritate the eyes, nose, throat and lungs and cause coughing, wheezing, even nausea (as well as environmental issues such as acid rain, and nutrient pollution). In London it is estimated that 50 per cent of harmful nitrogen oxide emissions in the air come from road transport.³⁹

Particulate matter, known as PM_{2.5} and PM₁₀, are particles small enough to become embedded deep in our lungs, and can even enter the bloodstream, settling anywhere in the body, including the brain. Alongside triggering respiratory diseases, these particles carry harmful toxins and can cause lung cancer.⁴⁰ The worst effects of road and traffic pollution are distributed unevenly too, with poorer areas suffering the worst levels of pollution, in contrast to more prosperous neighbourhoods.⁴¹ Electric vehicles offer only a modest improvement as they still



Donald Appleyard's famous study showing higher social interactions on quieter streets (Image: Fast Company)

generate significant particulate matter through brake and tyre wear.^{42,43}

Severing communities, social isolation and ill health

Fast, heavy-traffic roads make it easier for people to drive *through* neighbourhoods, but at the cost of making it harder to move around *within* neighbourhoods. This has obvious consequences for personal connections, local social life and community cohesion. Donald Appleyard's famous 1969 study showed that there is a strong inverse correlation between traffic and friendships and gathering on the street. This study was recreated again in 2011 in Bristol finding similar conclusions.⁴⁴

It is now increasingly clear that the presence or absence of strong local social networks are not just important for people's happiness but are a key determinant of health. By designing places around high traffic roads we are literally building in poor health outcomes, increasing the amount of preventable illnesses and putting more demand on the NHS for generations to come.

Exacerbating inequality

We should all have the freedom to get around our cities, towns and villages easily, safely and comfortably, but many new neighbourhoods suffer from poor or absent public transport and walking and cycling infrastructure. Many shops, offices and cafes are also far from people's homes – because they were designed around the assumption of ever more driving. This car dependency exacerbates inequalities for those unable or less likely to drive, such as women, people of colour, disabled people and those with low or no incomes, all of whom are less likely to own a car.⁴⁵ For a range of reasons men are also more likely to have a driving license than women.⁴⁶ The cost of car ownership can drive those with lower incomes into poverty, which is exacerbated by the cost-of-living crisis.⁴⁷

"Car dependency exacerbates inequalities for those unable or less likely to drive"

People with low incomes are less likely to own a car but bear the brunt of road collisions and traffic-related air pollution. Children, particularly boys, in the most deprived areas in England are at highest risk of road traffic injury across all transport modes.⁴⁸

Communities experiencing greater deprivation are also more likely to live in traffic-dominated areas and therefore experience more dangerous and unpleasant walking environments.⁴⁹ In England, air pollution is higher in deprived neighbourhoods, particularly those where people of colour comprise over one-fifth of the population.⁵⁰ As people with low incomes suffer the worst impacts of car dependency it's no surprise that they would prefer to see greater public spending on walking (58 per cent), cycling (50 per cent) and public transport (65 per cent) than on driving (36 per cent).⁵¹

Undermining the viability of public transport

Low density development further outside town is more expensive to serve with public transport, so provision is often patchy, leaving residents in road-centric estates with no choice but to drive. This locks in car dependency and reinforces the assumption that road capacity is the primary constraint on new housing.

The Campaign for Better Transport calculated that in the 10 years up to 2022, the UK lost 5,000 bus routes, equating to 27 per cent fewer miles covered by buses.⁵² A recent survey by Transport for New Homes was also scathing of new housing developments, finding that of 20 greenfield developments surveyed, 17 would require a car for every journey made.⁵³ At a time when we need to be switching to public transport, low density, sprawling developments are making sure the numbers don't add up, undermining the viability of new transport networks.



Low density development undermines the viability of good public transport networks (Image: Adobe)



1/2 M CHIPPENHAM
2
4 M TOWN CENTRE
LACOCK

The Royal Bank
of Scotland

This is one of 1000 signposts
funded by the Royal Bank
of Scotland's 100th
anniversary

CHIPPENHAM
STATION
LACOCK

2. An alternative route

Communities turning to the 'vision-led' approach



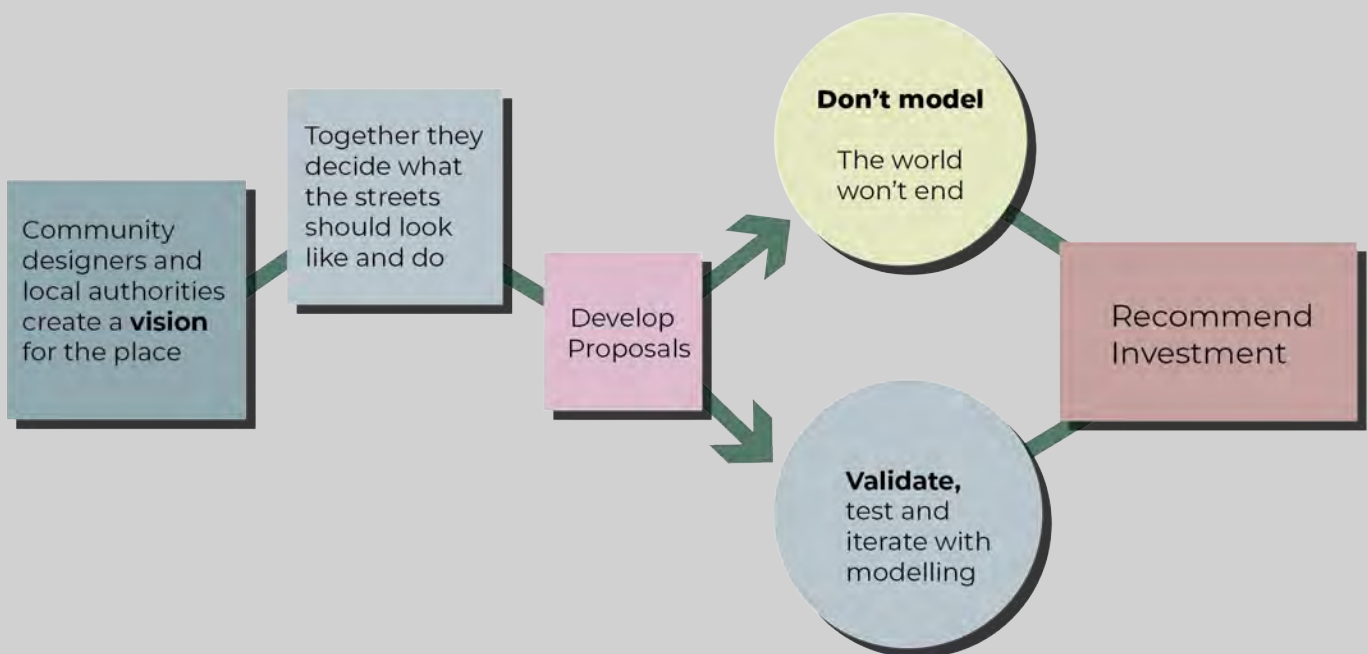
Communities turning to the 'vision-led' approach

Nevertheless there are grounds for optimism. Some planners, engineers and designers are challenging the default post-war assumptions of endless traffic and car ownership growth. Instead they are working bottom up, with residents, local authorities and developers to set a vision for how we want our towns and cities to be and how we want to move around them. It's these community priorities that inform the design of the streets and places that help to achieve a shared vision. This approach is known as 'vision-led', although there are also other terms such as 'decide and provide' and 'monitor and manage' representing the similar methods.

The 'vision-led' approach gives the communities who know their towns best the power to shape the places they will live in for the long-term enjoyment,

health and prosperity of their neighbourhood. Yet the social and financial value of the 'vision-led' approach is not factored into Transport Analysis Guidance (government guidance on the role of transport modelling), which massively overvalues travel time. It turns out that well-designed places, with proper active travel and public transport have huge financial and social benefits.

Rather than empty roads in dormitory suburbs, flourishing, well-designed streets lift the value of houses and businesses. A CABE study from 2007 concluded that simple improvements to London's street design could add 5.2 per cent to residential prices, and 4.9 per cent to retail rents.⁵⁴ The picture is the same for active travel too. By contributing to economic performance through reduced congestion,



'vision-led' planning begins with a vision for place decided by the people who live there

improved business activity and health benefits, the UK government calculated active travel to have a benefit to cost ratio of nearly 6:1, which it touts as 'very high value for money.'⁵⁵

The high value for money extends to better public transport too. Department for Transport analysis of 33 major bus schemes calculated a cost benefit ratio of 4:1, meaning the benefits of buses were roughly four times the costs.⁵⁶

Case Studies

Silverstone Park

At a new science, technology and business park in Silverstone, the standard 'predict and provide' models led designs for the development to include a new roundabout and road expansion, based on the usual predicted increase in traffic, at the cost of a cool £25m. But here the story took a different turn as the eye-watering price led to a rethink. Returning to the drawing board, new designs instead adopted a 'vision-led' approach which resulted in a revised proposal that went beyond road building (though it did include some smaller, necessary road improvements).



Silverstone Park opted to invest £25m into active travel rather than a road

This time, a list combining strategic active travel and public transport improvements was drawn up to give more travel options to workers, beyond getting in the car every morning. Better pedestrian crossings, pavements and cycle paths were added for £600,000. Recently the site has also unveiled a local cycle hire scheme, which is free to use for up to 48 hours. A further £1m went to improving bus routes, and another £100,000 to creating a bespoke car-sharing scheme reducing single occupancy car rides. Money also went into subsidising on-site gyms and

nurseries, meaning workers could walk or cycle there instead of driving to the gym a few miles away.⁵⁷

Silverstone Park now boasts a bespoke range of active travel and public transport options. With the new plans being rolled out, the spend on roads has been reduced from £25m to £2m with remaining funds to be spent on sustainable travel and facilities for the whole community.

M4 Relief Road, Wales

One of the most comprehensive alternative visions to a large road-led development emerged from the lengthy saga of the failed M4 Relief Road proposals. Plans to alleviate acute traffic during peak hours on the M4 between Newport and Cardiff in Wales, had been touted since 1991, with costs growing to £1.4 billion by 2018. The final bill was estimated at closer to £2bn.



Designs for a new active travel hub in Newport, Wales (Image: Burns Delivery Unit)

In 2018 The Welsh First Minister, Mark Drakeford, scrapped the scheme, citing its escalating costs and impact on the environment. As a response, the Burns Commission was setup to explore alternatives to the relief road. The commission proposed a bold set of public transport and active travel initiatives for almost a quarter of the cost. Instead of a £2bn road, the report made 58 recommendations for South Wales Transport to help decarbonise the transport system, improve air quality, increase fair access to transport and enable healthier lifestyles.

A special 'Delivery Unit' was established to accelerate the rollout of the recommendations. Several upgrades have already begun with plans unveiled for a new network of cycle lanes in Newport, improvement plans for the Severn Tunnel Junction railway station and safe cycle parking hubs opened in Cardiff and Newport. These upgrades will be incorporated into the wider South Wales Metro

plan, an integrated network of rail, bus and active travel, giving them even greater connectivity and economic value.

Monkton Heathfield Phase 2, Somerset

Somerset Council have embarked on a 'vision-led' approach to a new urban extension for 1,450 homes near Taunton. The initial plan for housing included a new fast road which dominated the urban form, severed residents from parks and left commercial use isolated from residential.

After the local authority reviewed the site with developers, a new approach based around 'vision-led' planning was embarked upon with the large road infrastructure replaced and the shopping and commercial area brought into a new centre, adjacent to a large new school. By co-locating high quality public and shared transport (a mobility hub) with this centre the aim is to reduce the number of new vehicle journeys and make it enjoyable and easy for new and neighbouring residents to move around by foot, bus, scooter and bike.



Artist's impression of Monkton Heathfield

The stated vision follows: 'We will have created – through a phased and deliverable masterplan - a safe, attractive, permeable place that has been designed to reduce the need to rely upon motorised transport for reaching everyday activities. Public transport and cycling connectivity to Taunton town centre, education and health facilities has helped lessen the dependence on private car use to/from the site.

It is a community where sustainable travel is a natural choice for travel within and beyond the development, supported by attractive alternatives to the private car, local availability of amenities and services, and emphasis on prioritising place over parking and movement space. It is a place that has a sense of civic pride with neighbourhood clubs and social functions.

Quality homes have been provided using local materials, designed to promote low carbon in their construction and utilisation and supporting the principle of climate resilience.'

Oberbillwelder, Germany

Plans in Germany for a new car-light suburb of 7,000 homes outside Hamburg, Oberbillwelder were adopted in 2021. Strikingly, the homes will have no driveways or on-street parking, with all vehicles located in garages dotted around the site, often as far as 300 metres from front doors. Meanwhile the streets have been designed for pedestrians, cyclists and the enjoyment of residents. 'It's not a car-free neighbourhood, but it's a parking-free street,' says the scheme's architects.



Oberbillwelder, Germany (Image: Adept)

Oberbillwelder is using car-share schemes, medium density housing that is well-linked to a train station (a fast connection to Hamburg), and its own centre for amenities and leisure. It follows the precedent set by compatriot scheme Vauban (now 20 years old) which also features car-free streets, and active-travel orientated streets on the outskirts of Freiburg.

Culm Garden Village, Devon

In Mid Devon a new garden village has been proposed following an adopted masterplan for 1,750 new homes. An opportunity has arisen due to the proposed re-opening of nearby Cullompton train station, which has allowed a 'vision-led' approach to be explored instead of potentially relying on a hugely costly new motorway junction. Design decisions are still at an early stage.

Cycling dutchman: Merwede opts for high density and low parking

Crowned the most bike-friendly city in the world in 2022, Utrecht has also recently taken active travel infrastructure to new heights, recently approving plans for an urban extension of 6,000 homes, with just one car space per three homes. The new site in

Merwede uses higher densities to achieve this with a sophisticated active travel networking linking it to the centre of Utrecht. 'By having this car-free area, we can design spaces without the straightjacket [or] rules of the car, and thus focus on essentials for a high density area, which is the quality of public space, city on eye level, green, biodiversity, climate adaptation and meeting places for social interaction' said the site's architect Marco Broekman.

Transport planning at a crossroads

The emerging 'vision-led' approach shows that we do not have to keep building unsustainable, unattractive and over-expensive places just because post-war transport models say we should. The examples above demonstrate both the scale of the opportunity and the approach that should be the starting point for planning new developments. Yet despite the huge gains to be had, the transition from 'predict and provide' to 'vision-led' remains frustratingly slow. This is largely due to:

- Industry and local authority inertia. 'The way it has always been done';
- Quantification bias and deference towards numerical models;
- Lack of direction from the national government on transport assessments;
- Lack of community representation at the design stage;
- Bias within the DfT and Treasury appraisal formulas towards time-saving economic benefits.

But perhaps the biggest barrier to more widespread adoption of 'vision-led' transport planning is simply a lack of awareness of the potential benefits. We are so used to seeing new development proceed on a standard pattern, and to new places looking and feeling the same, that we struggle to imagine that it could possibly be different.

What is needed are more real-world examples, at scale, that can allow people to experience better development and demonstrate that alternatives are not only possible but eminently practical. This is what we seek to do with the rest of this report.



3. A road less travelled

Applying the 'vision-led' approach to Chippenham



A case study in 'vision-led' transport planning

To demonstrate how a better approach to transport planning can transform development proposals we selected a 'predict and provide'-led road scheme attached to a plan for 7,500 new homes on the outskirts of Chippenham. The scheme was supported by central government with £75m from the Housing Infrastructure Fund.

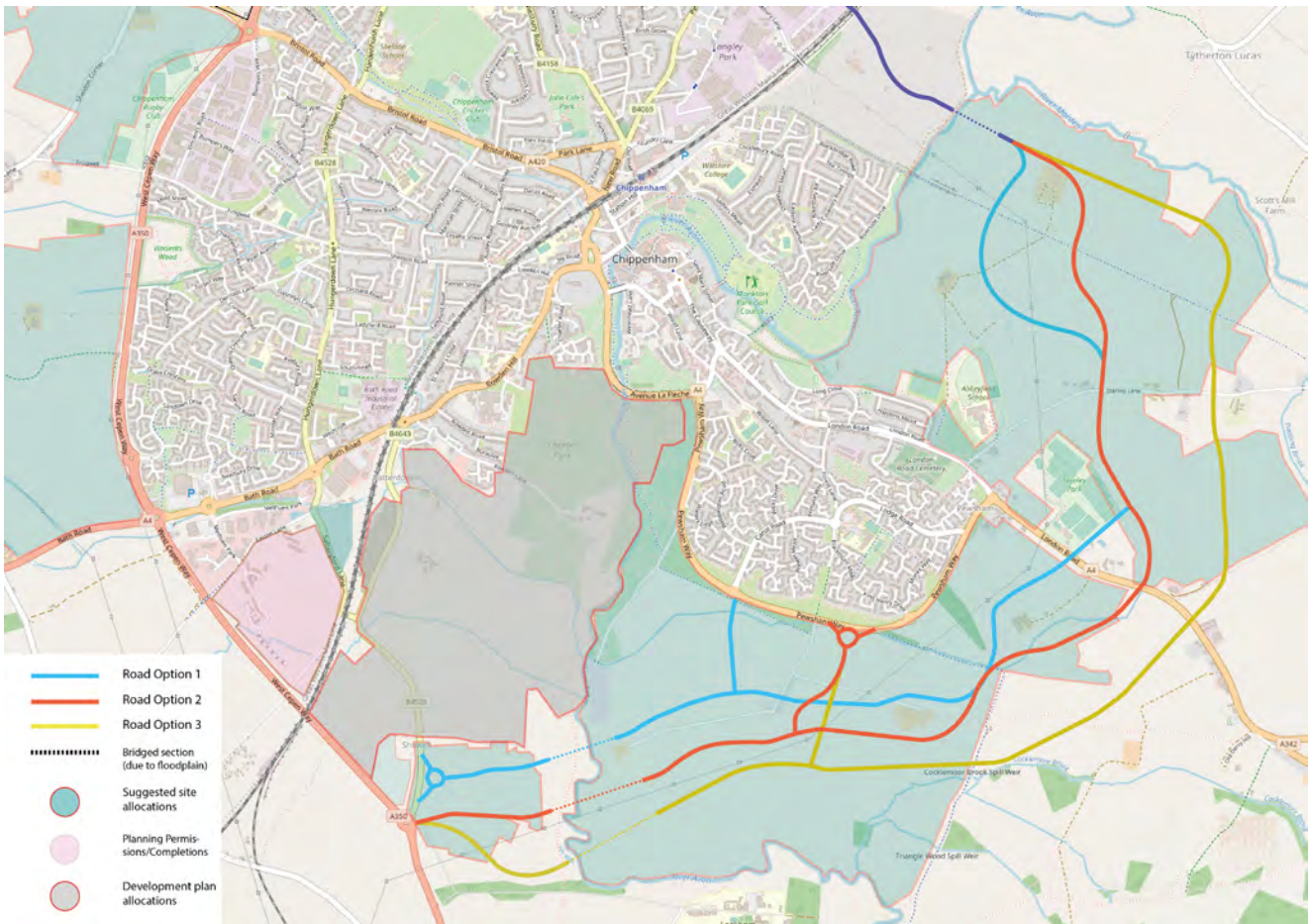
We selected this scheme from a longlist of ten as it was typical of so many low density, sprawling plans for new homes – and like many others had inspired significant local opposition. There was also clear potential to improve the wider town through better transport options and town centre improvements.

The similarities with other market towns and urban extensions means that solutions identified for Chippenham were likely to be replicable elsewhere, including the potential creation of new towns.

Chippenham's failed growth plan

Historically a small market town built around a crossing point of the River Avon, Chippenham's post-war growth saw an increasing number of large developments expand into the surrounding countryside, supported by a network of A-Roads and roundabouts.

In 2021 Wiltshire County Council unveiled plans for a new distributor road that would run through fields to the south and east of Chippenham, linking the A350 to the B4069, to be funded by £75million from the Housing Infrastructure Fund. Wiltshire County Council argued the road would help ease congestion in central Chippenham and unlock new sites for much needed housing.



The original distributor road options would have seen 4.6km of new road encircle Chippenham

Different routes for the road were proposed, but in the face of a public backlash, a portion of the planned road was axed, reducing its length to 4.6km with the number of proposed homes cut from 7,500 to 4,000. Indicative masterplans for the new housing sites covered an expansive area, stretching at its farthest point 3.5km southeast of Chippenham town centre and train station.⁵⁸

Following increasing public hostility to the road scheme and rising costs, Wiltshire County Council announced in December 2022 that it would be scrapped entirely, along with the corresponding proposals for 4,000 new homes, withdrawing from the £75m HIF allocation. Despite this, residents fear a new link road proposal will return in the future - and the urgent need for new homes remains unmet. We aim to provide an alternate approach to answer these questions.

Our vision for Chippenham's growth

with Sustrans' expertise in the design and delivery of sustainable transport. Together we have used the 'vision-led' modelling approach to show how improving the original masterplan, investing in place and spending on a toolbox of sustainable transport solutions can result in a healthier, happier, more productive and sustainable place. Our resulting 'gentle density' plan is for a walkable, well-connected and integrated town extension with good air quality, less congestion and vibrant neighbourhoods. The plan shows how the same number of homes can be delivered as the sprawling road-led scheme, within the same budget, and with a far smaller land take.

We have taken the £75m that was allocated for the original 'road-led' plan and instead invested in a range of interventions to help improve the quality of place, tackle pollution and keep people moving. We have conducted transport modelling with leading experts ITP to show that these changes will also keep people moving freely. Under our 'gentle density' plan, Chippenham would provide much-needed new



An impression of the alternative gentle density masterplan, featuring a walkable centre and segregated cycle paths

We have combined Create Streets' master-planning experience and research into relationships between design, value, well-being and health together

homes by growing organically to the east of the town centre. Residents would be able to walk 20 minutes to reach the train station and high street, which is far

closer than the proposed expansion to the south. Schools, nurseries and convenience shops will be nestled within the new development, while terraced homes and mansion blocks will provide more homes close to its centre.

To ensure new homes don't add to congestion within the town, north-south rail links to Melksham, Swindon and Trowbridge will be improved from once every two hours to hourly or better, allowing commuters to travel by rail. Segregated and shared cycle lanes throughout will allow new and existing residents to safely make their way to school, the shops or to simply see friends on the other side of town. For those unable to cycle, Chippenham's 2016 public transport strategy will be funded to provide a high-quality bus service within the town.

Residents of Chippenham would see large new investment into their local high street to improve historic buildings and the public realm, particularly around the Market Place. The combined effect of greatly improved active and public transport options would significantly decrease car dependency for new and existing Chippenham residents, encouraging a move from car dependency to reliance on a wider range of transport options. Currently, people use cars for 67 per cent of their journeys to work and cycling and walking for just 18 per cent.⁵⁹

What we mean by 'gentle density'

Underlying the masterplan is the principle of 'gentle density'. Density is often misunderstood as meaning tall buildings; naturally unpopular for rural or suburban settings. But in actual fact higher densities which don't eat up land, require lots of roads, cars and more infrastructure spending can be achieved with low and mid-rise buildings arranged thoughtfully. This is the principle of gentle density.

With 7,500 dwellings across a 120 hectare site, our 'gentle density' plan has a density of 58 dwellings per hectare, putting it in the category of a 'garden community or large sustainable development' according to the Essex Design Guide. At this density, the masterplan deploys a connected network of streets (and no cul-de-sacs) featuring 2-4 storey homes, making use of mews and smaller building plots to produce a high plot coverage. Much of the space used is also gained from having fewer parking spaces. Many homes have gardens, there are no tall buildings, and there is high-quality green space with much easier access to the countryside than existing plans).



Denser development is better for sustainable transport and can be done with low and mid-rise buildings

The Big Moves

Our 'gentle density' plan rests on a series of 'big moves': major changes to the original road-based masterplan that have been worked up following our visioning workshops and analysis of the town. These moves add up to an alternative use for the £75m HIF funding allocated to the now scrapped road scheme.

It is likely not all the big moves would need to be deployed on the final masterplan and no doubt some adjustments would be made following further technical work, but the purpose here is to demonstrate that it is possible to change travel

1. Move one: intensify the masterplan to use less land for a gentle density development.

Land take reduced from 350 hectares to 120 hectares.

Cost £0m.⁶⁰

The critical change from the original masterplan is, gently, to increase the density of new housing so that development is necessary on fewer fields. Increasing density from an ultra-low level of 21.5 homes per hectare (gross, i.e. including parks and schools) to a



The alternative denser masterplan extends Chippenham to the East, reducing land take from 350 hectares to 120 hectares

behaviours so that the existing road infrastructure is used more efficiently and new distributor roads are not needed, for the same price or for less than a new major road.

still very popular and liveable 58 homes per hectare (also gross) would still permit the creation of the types of place that people love in streets of two to four storeys. However, it would also permit reducing the approximate size of the developed areas by two thirds from 350 hectares to 120 hectares, whilst delivering as many homes.

This increase in density is made possible by:

- Reducing parking requirements to become a 'car-lite' development, in which each home has space for a car, but residents probably share or hire a second vehicle for all except larger edge of site homes;
- Providing more terraced homes, reducing back-to-back distances, reducing the size of highways infrastructure and increasing site coverage;
- Providing more shops, schools and services within walking distance; and
- Boosting active travel and bus links. (see big moves 4 and 5).



The vision-led masterplan (in green) showing significantly less land take than the road-led masterplan (in red)



An alternative block plan using the gentle density principle

Parking requirements

By increasing the availability of car clubs, public transport and active travel, alongside mixing amenities and homes, fewer trips are dependent on cars. Therefore, the amount of space given over to parking can be reduced. Our gentle density masterplan still provides one parking space per house (with car clubs abundant for when a second vehicle is needed), in a mix of on-street parking and peripheral parking, but this means that significantly less land is used to accommodate cars. More land can therefore accommodate people, compared to the original masterplan.

Wiltshire's Parking Strategy stipulates an average of 2.3 parking spaces for each two or three bedroom home, so a development of this size would normally require around 18,750 parking spaces. This means over quarter of a million square metres of land, or 28 hectares, would be dedicated to park cars. Reducing the requirement to one space per home means that instead 135,000 square metres, or 11.25 hectares, is needed for parking: 17 hectares less than the initial plan. That's the equivalent to saving 17 rugby pitches for homes, parks, schools and trees.

Back-to-back distances and perimeter blocks

Planning policies, or general guidance, often require a distance of 21 metres or more between the backs of houses. This restricts the scope for medium to high density low-rise development and forces designers to push houses further apart, creating more sprawl and eating up more land.⁶¹ While this guidance is increasingly rejected, its effects linger, and new development persists with unnecessarily large and sprawl-inducing back-to-back distances.

Developments such as Poundbury in Dorset show that it is perfectly possible to design homes that are closer together without any problems of overlooking.⁶² Our gentle density masterplan borrows from these design choices to create closer back to back distances, without reducing privacy.

Providing public spaces, shops and services

With so many more homes closer together, more services could be provided nearby allowing new residents to walk or cycle to pick up a loaf of bread rather than always having to get in the car. New developments often put amenities on the edge of town, due to modelling for 'passing trade' in the early

years of a developments build out. This means once the site is built out many people are too far from the shops to walk. By creating a new centre, in the right place, new and existing residents can walk to their local shops, or cycle to a nearby salon. This keeps cars off the road, lays the foundations of a vibrant community, and provides a physical heart to new development.

Contrary to many urban extensions today, our gentle density masterplan ditches the concept of large 'country parks' and other big open spaces which – rather than providing easily accessible local greenery little and often – can promote greater sprawl by taking up huge swathes of developable land and pushing homes further away from the town centre. Instead, our plan provides compact neighbourhoods that make it easier for residents to access the existing countryside that has been spared from development by the reduction in land take.

2. Move two: intensifying the existing town with consent.

Cost £2.5m

There is enough brownfield land in Chippenham town centre for 250 new homes at an equivalent density to the existing old town (estimate based on the Wiltshire Council Local Plan). Underused sites in the existing town centre are the most sustainable places to locate new homes, due to proximity to existing services and transport, and would boost the local economy and high street spend too, as 34 per cent of shop visitors tend to walk or cycle from nearby.⁶³ Providing 250 additional homes on these sites reduces the number needed from greenfield land.⁶⁴

Brownfield sites are often more expensive for developers than greenfield land. This is why government provides subsidies to level the playing field. We propose to increase the subsidy to remediate these sites to £2.5m, or £10,000 per home paid for from the £75m HIF budget– which is almost three times more than the amount per home awarded under the Brownfield Land Release Fund 2 to encourage more use of brownfield sites.⁶⁵

In addition to the identified brownfield sites there is potential for new homes and apartments to be added to the housing stock by allowing existing residents to extend their homes upwards or infill the spaces between detached or semi-detached homes. The government is currently legislating to introduce street

votes – a democratic process through which a majority of residents could agree to add new homes to their own street under a strict design code.

Making light of light rail

Across Europe, light rail, such as trams and urban transit systems have been making a comeback in recent years, following their decline during the post-war years⁷¹. City authorities are increasingly recognising the huge benefits of light rail as a means of urban transport and economic regeneration. Alongside reducing congestion, light rail is quieter, journey times are predictable and they emit no exhaust fumes or particulate matter (owing to its steel wheels). When using clean energy, trams also emit zero carbon emissions (such as Melbourne's solar powered trams).

For these reasons, in the larger towns and small to large cities light rail can be a better choice than improved bus routes, and can boast increased passenger capacity, as well as lower revenue costs. France has seen 25 cities deploy new tram networks in the past 30 years, with Angers (150,000 people) the latest small city to announce a new fleet of trams.



(Image: Adobe)

As a voluntary opt-in measure this would not be expected to happen everywhere, but we estimate if the 300 appropriate suburban streets in Chippenham with semi-detached housing voted to add just one more home each on average it would add a further 300 homes, again reducing pressure on greenfield land.

3. Move three: creating a rail passing loop.

Cost £15m.⁶⁶

Many residents commute to nearby towns from Chippenham for work, but with trains only running every one or two hours, most commute by car. A new passing loop to the south of Chippenham would enable an increase in the frequency of north-south trains to one every 30 to 60 minutes – enough to allow commuting between Chippenham, Melksham, Swindon and Trowbridge. This would help reduce the number of vehicle trips and congestion for existing as well as new residents, including those of new developments within the other towns.

4. Move four: creating new and improved roads.

Cost £10m

Our gentle density masterplan and the additional investments outlined above are designed to remove the need for a major new road, but some highways infrastructure would still be expected to accommodate the expansion of town and those road journeys that are less easy to shift to sustainable means. We have allocated £10m to fund some improvements to existing roads and ensure road connectivity for the new development.⁶⁷

5. Move five: Paying for an improved high-frequency bus network.

Cost: £7.5m

It is often assumed that everyone in places like Chippenham drives – but already 15 per cent of Wiltshire residents don't have a car, rising to 54 per cent of households in the lowest income quintile.⁶⁸ Car ownership is even lower in the main settlements of Chippenham, Trowbridge and Salisbury. A major new development like this is an opportunity to give existing residents in Chippenham seamless access to the whole of the town and neighbouring job markets by improving the accessibility and frequency of local buses, thereby reducing existing congestion further. We have allowed for £7.5m of combined capital and revenue costs over 5 years for a range of bus service improvements based on figures from the 2016 Chippenham Transport Strategy.⁶⁹

Public Transport Measure ⁷²	
Bath corridor upgrade including bus network supporting measures on A4 Bath Road corridor	
Bus corridor upgrade including bus network supporting measures on London Road Corridor	
Bus network supporting measures, including passenger information and improved waiting facilities on key bus services	
Improve public transport links between Wiltshire College's Lackham Campus and other campuses	
Divert existing and provide new bus services to serve South West Chippenham and Hunters Moon	
Divert existing/provide new bus service to serve Rawlings Green	
Divert existing/provide new bus service from North Chippenham to town centre and Abbeyfield School	
Indicative Total Capital Cost	£2.5m
Indicative Total Revenue Cost (per annum)	£1m

6. Move six: creating car clubs, mobility hubs and 'nudge services.'

Cost: £3m

Car clubs are becoming more popular and can significantly reduce both cars on the road and the need for lots of car parking space. They work particularly effectively when they are integrated with mobility hubs that offer active travel transport options such as bike hire. They often cater to 'last mile' trips, such as from the train station to home.

Our gentle density development would create two physical transport or 'mobility hubs' and a virtual mobility hub in key destinations such as workplaces and schools, to help make sustainable journeys practical and appealing.

The physical hubs would provide a public transport interchange, with regular bus services, making it easy for residents to connect from public transport to bikes, e-bikes, scooters, cargo bikes, hire cars or hire vans. Hubs would also provide parcel collection services, and logistic points for last mile delivery via cargo bikes. They are also the natural place to display transport information including personalised travel advice for residents and outreach support to schools

and workplaces to help residents make sustainable transport achievable and appealing.

The virtual mobility hub, delivered via an app, would provide a single online place where residents can find all the travel information they need, plus a programme of incentives and rewards for travelling sustainably, such as an exchange programme for residents to trade in a car for bikes, a bike trailer and membership of a car club. These incentives must be provided early on in the development to help establish new patterns of transport, since moving home is when new travel habits can be formed. We have allocated £3m in funding to install and deliver these services for five years.

7. Move seven: paying for town centre revitalisation and improvements.

Cost: £10m



Coventry's The Burges before and after a £10m revitalisation scheme (Image: Google)

Releasing funds to support the existing town centre will be an important part of revitalising Chippenham's offering of retail, services and leisure. Diverting funding from new roads and putting it into our town centres can transform our high streets and make them more attractive for local residents, increasing visitor numbers and retail revenues. It will also reduce the desire to drive out of town. We have allocated a substantial £10m for town centre and street (public realm) improvements such as shop front improvements, tree planting, and new street surfaces.

Do car clubs and mobility hubs work to reduce car journeys?

Evidence is increasingly emerging that car clubs and mobility hubs reduce congestion, shrink the space required for parking and provide accessible on-demand choice

Car clubs provide vehicles to rent on-demand, parked in designated spots distributed across a neighbourhood. Following the growth of businesses like ZipCar they are increasingly familiar, meaning households that use a car only occasionally can choose not to bother owning one. CoMoUK, the UK's national organisation for shared mobility, estimate that in 2021 car clubs removed 116,811 cars from the road, with one car club vehicle replacing 20 private cars. Renting cars also helps with the cost of living, with 73 per cent of users saying it was cheaper than owning a private car for their needs.^{73 74}

Mobility hubs incorporate car club spaces alongside rental bikes and e-bikes, which are located adjacent to bus stops and train stations. This makes them effective for 'last mile' trips, such as from the train station to the front door. In Bremen, Germany, they have taken 6,000 cars off the city's roads (five years sooner than predicted).⁷⁵

They've proven so successful that Bremen is now expanding its network, locating hubs in 300m intervals across the city. In Bergen, Norway, car sharing increased 70 per cent after the introduction of mobility hubs, leading to a significant reduction in the number of residential parking permits sold.⁷⁶



(Image: CoMoUK)

8. Move eight: Supporting local businesses during development phase.

Cost: £6.25m.

New shops and other local businesses often struggle to be viable until major developments are completed and populated – by which time early residents have established patterns of driving elsewhere to go shopping that can be hard to change.

Supporting new shops and services financially during the early stages of development can help overcome this problem, allowing them to be located at the heart of new developments and closer to future residents, rather than on the side of busy roads as is often the case now. This helps make new places feel active and attractive, and allows more trips to be walked, cycled or made by bus. Poundbury supported commercial and retail premises in the early years of development that has significantly contributed to its high share of trips made by walking within the development. We have estimated a cost of £6.25m for this, based on providing 50 per cent discount on business rates in the new development (assuming annual business rates of

£20,000) for 125 retail or commercial premises over five years.⁷⁰

9. Move nine: creating new cycle links from new developments to key locations in town.

Cost £11m

With all homes less than 3km away from the town centre, Chippenham would be an ideal size for cycling, walking and wheeling, if it had safe and pleasant infrastructure.

Connecting development areas with the train station, schools, high street, industrial estates and parks via safe and direct active travel routes will give new and existing residents the freedom to travel by different means. We have planned for a network of world-class new segregated and shared cycle routes, including links to the new development and improvements to benefit the whole town at a cost of £11m.

Why mixed-use supports walkable neighbourhoods and is good for business

Neighbourhoods in which residents can easily walk to local shops and services have less cars, less traffic, less pollution and healthier people. Neighbourhoods like this mean that people don't have to get in their car to buy a pint of milk or pick up a prescription.

Many studies have shown how density and land-use diversity is correlated with more walking and less driving.⁷⁷



(Image: Adobe)

By providing new homes close to smaller local centres and existing high streets businesses can take advantage of more people in their vicinity, who are less inclined to drive to out of town retailers.

Research is also showing how shops in walkable, pedestrian-orientated locations tend to have higher revenues and more successful businesses. It is estimated that walking and cycling improvements can produce 30 per cent increase in retail sales.⁷⁸

A 2016 study claimed that people who walk to their high street also spend 40 per cent more than those who drive.⁷⁹ A good example of this in action is in Exeter, where a town centre pedestrianisation scheme between 2000-2010 resulted in a 30 per cent footfall increase.⁸⁰

In a time when bricks and mortar shops are competing with online retail, easy and pleasant access to shops in attractive locations are essential to thriving town centres. Car dependent suburbs on the other hand, favour the development of big out-of-town shopping malls, which drains the life and business away from historic town centres.

Designing a state of the art active travel network for Chippenham for £11million

The proposed active travel network for Move Nine is designed to enable walking, wheeling and cycling for local trips – between people’s homes, work, schools, leisure and shopping destinations. The active travel network has been informed by:

- The existing transport network
- Trip attractors and generators
- Population data from the 2021 census
- Past collisions involving pedestrians and cyclists
- Data from the Propensity to Cycle Tool, which shows where cycling has the greatest potential to grow
- English indices of deprivation 2019

To understand local demand for active travel infrastructure, the key origins and destinations were mapped across the study area, showing how people move around the town, and how and where additional movement is expected to take place as the town grows. Key clusters of activity were identified, and direct ‘desire lines’ were drawn connecting the areas,

to identify the key links to be provided by the active travel network (see appendix ii).

Our map shows indicative proposed cycling and walking links between the new development and key destinations in Chippenham, in line with current guidance for achieving safe, convenient and attractive active travel routes.



Investment in new cycle routes can provide attractive links between existing and new development (Image: Sustrans)



Key

- Proposed active travel links to new development
- Existing cycle route
- Chippenham Rail Station
- Alternative masterplan
- School
- Chippenham centre

New cycling and walking infrastructure can connect the denser masterplan to Chippenham centre, station and schools for £11 million⁸¹

Creating safe, welcoming streets to get people out and about

Streets in the new development are designed to promote active travel by creating safe, ultra-convenient routes for walking, wheeling and cycling and enabling vehicular access without creating opportunities for 'rat-running' (cut-through routes for vehicles on longer trips).

This is achieved with the help of zones - which include features such as 'filters' (e.g. planters or bollards), and 'shared paths' - to support the passage of pedestrians, cycle users and emergency access over and above other forms of vehicle movement.

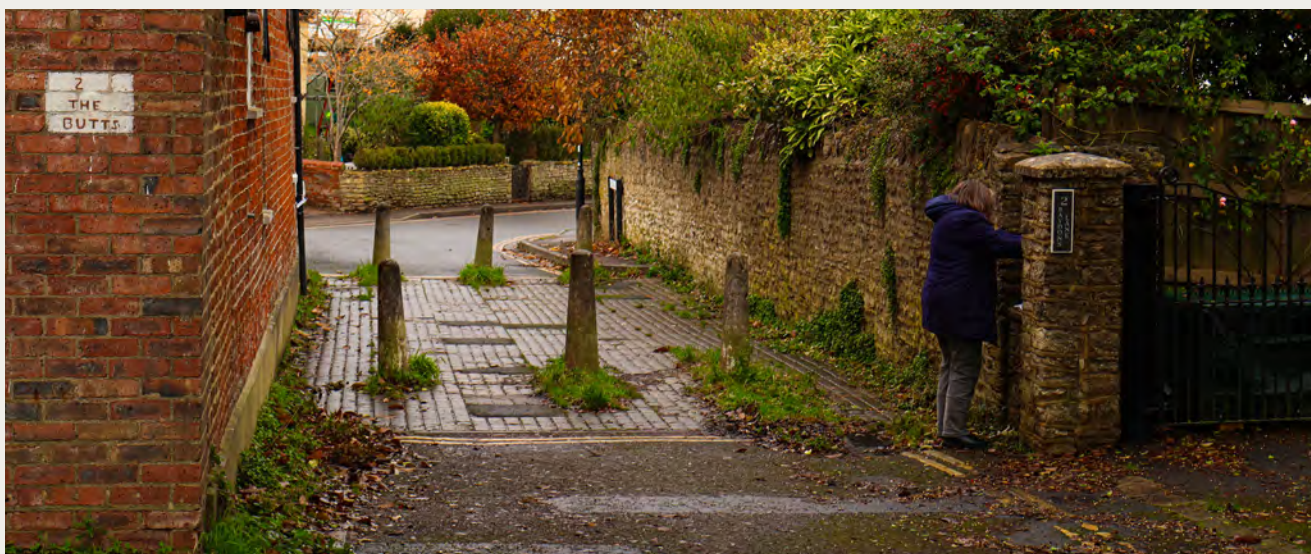
Across the new development, streets are designed in response to building densities and uses, and to carefully manage its 'place' and 'movement' functions, including vehicle access and speed, so that the public realm serves people of all ages, abilities, means and needs.

Where the buildings along streets are mixed-use, including residential, commercial and leisure functions, space for relaxation, interaction and servicing is created and travel modes are typically segregated to avoid conflict.

In primarily residential streets, the public realm is designed to enable play, socialising and very slow movement, with shared space for access by pedestrians, cycles and motor vehicles, inspired by the Dutch 'home zones' approach – and in some cases, traffic-free streets.



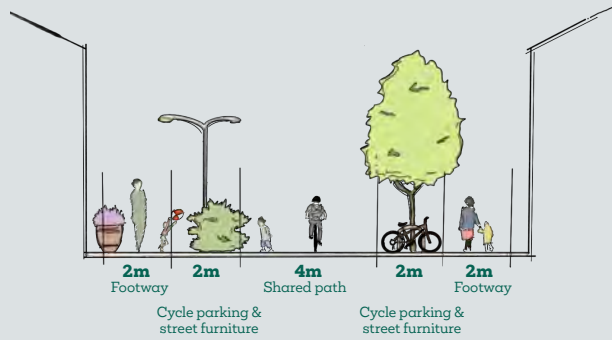
Chippenham's existing cycle paths can be connected to new routes



A local modal filter in Chippenham allows cyclists to pass through

1. Traffic-free residential streets (shared use)

These residential, traffic-free streets provide an attractive, safe place for people to meet, play and rest, and include planting and cycle parking. A 4m wide traffic-free path is shared by people walking and cycling, with separate pedestrian-only space along the edge of the properties. Vehicle access to these streets is restricted to allow access for emergency vehicles only.

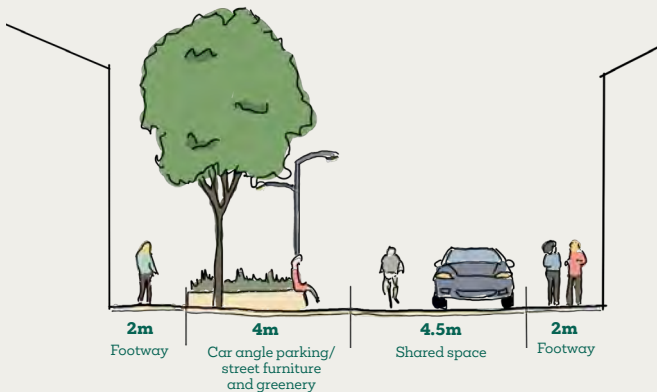
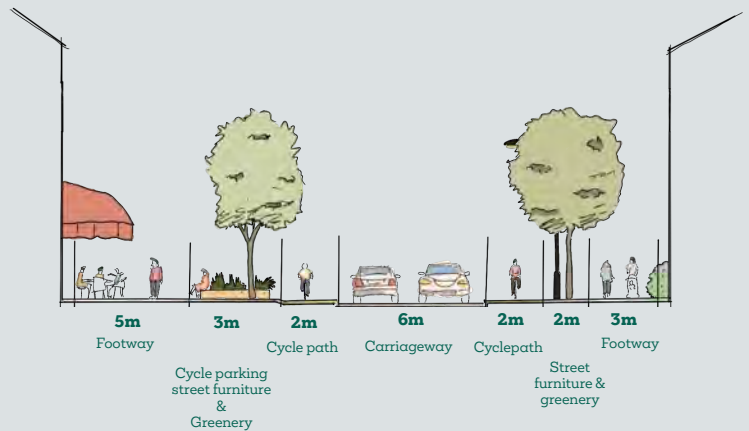


2. Mixed-use streets (mixed traffic)

These mixed-use streets are low speed environments with parking to one side, alternating with planters, trees, seating and cycle parking provision. A clear and safe 2m wide pavement is provided on each side, and a 4.5 wide carriageway is shared by vehicles and cycles, with painted road markings indicating the presence of cycles.

3. Principal mixed-use street (segregated)

The primary road in new development would be designed as a tree-lined boulevard, with one-way segregated cycle lanes adjacent to new shops and commercial uses. This design promotes a 20mph environment. The street offers a large pavement, seating areas and a welcoming spaces in front of shops and other businesses.



4. Slow residential street (shared space/home zone)

These streets are designed to facilitate active travel and community interaction, with access for slow motor vehicles. Sharing road space are pedestrians, cycles and low volumes of motor traffic travelling at very low speed (0-10mph), with pedestrian-only footways for inclusivity. Streets include angled residential car parking, cycle parking planters, seating and trees. The treatment and surface finishes of the street define it as an environment where pedestrians can expect to be safe at all times.



Segregated cycle path



Shared use path



Mixed-traffic carriageway

Validating the vision: what is the effect on Chippenham's traffic?

Transport modelling and figures provided by ITP

In a 'vision-led' approach, the sustainable travel Big Moves are firstly identified, aligning with the vision, and then the number of trips these could accommodate can be quantified. Only when these are understood are the residual car-based trips, and resultant mitigation, considered. The funding is therefore spent first on infrastructure and design choices which embed sustainable travel.

In this approach, just like the reallocation of HIF spending, the total number of trips being made by people on any given day is likely to be broadly similar, but the way in which they make them (their travel mode) might reappportion to different modes. Spending funds on public transport and active travel infrastructure also tends to result in higher Benefit Cost Ratios and because the infrastructure is less expensive, there are often relative gains in terms of what can be delivered, compared with highway-based infrastructure.

Outcomes of a Predict and Provide approach in the Chippenham extension

To quantify potential trip making associated with the new Chippenham development, the industry standard 'TRICS' software can initially be used. Using it to empirically predict future trip making is a long-

established approach, albeit now the dial is changing on how best to make those predictions (including in guidance released by TRICS themselves). The chart below shows the number of trips the Chippenham extension can expect to generate on a typical weekday.

Some of these might stay within the site boundary ('internal trips') and some will travel externally, but often these are not differentiated in conventional approaches, meaning that the design responses are not reflective of different types of trip length and purpose. Even if some assumptions are applied to those internal trips - in that more would likely be made by walking or cycling - there would still be a significant volume of vehicles generated onto London Road, Pewsham Way and the A350 every day.

Applying a Vision-led approach in Chippenham

The predict and provide approach assumes that development will replicate what has gone before in terms of how it operates and how we model it. But, most places in the UK that feature in the TRICS database have not achieved good sustainable mobility outcomes, and so the trip generation and modelling approach is perpetuating that cycle.

There are, however, some new developments which have broken the mould in how they are designed and delivered, and the outcomes are demonstrated in the mode shares they achieve. The information around outcomes in these 'sustainable places' is less frequently cited or made use of, but it is out there.

Mode	Percentage mode share		
	Baseline mode share (daily)	Mode shifts based on appraisal of Big Moves	Resultant mode share
Vehicles	72%	-26 percentage points	46%
Public transport users	3%	6 percentage points	9%
Walking and cycling	25%	20 percentage points	45%
Total	100%	100%	100%

'vision-led' transport modelling shows a significant decrease in vehicle mode share and significant increase in walking and cycling when using a gentle density masterplan

There are many factors which influence the ability of places to achieve these outcomes, but amongst those are a clear vision and commitment to change, with political will, funding and planning systems geared towards sustainable mobility. By establishing the roadmap to their success, and applying the same principles to the Chippenham extension, an alternative, but tangible, future which breaks away from the 'predict and provide' model could be delivered within and around the development sites.

The sustainable case studies mentioned have introduced measures which could broadly be categorised into four themes:

1. Frequent, reliable public transport networks, close to dense population centres, and with smart and integrated ticketing systems.
2. Direct, convenient and safe walking and cycling networks which are designed into the public realm and offer quicker journeys than the equivalent by car.
3. Traffic and parking demand management, such as low-car and low-speed development, off-plot parking, and people-focused masterplanning.
4. High quality placemaking, integrated with land-use planning and town centre revitalisation, to encourage shorter distance, local trip-making.

The nine Big Moves for Chippenham all contribute to these themes to varying degrees, and they will influence trips differently depending on the length of those trips:

The chart below highlights that many of the Big Moves will have the greatest influence on internal or shorter distance trips. Well-planned, large-scale developments (where a range of services are provided) could expect around 30 per cent of all trips to remain within the site boundary, and so facilitating walking and cycling for these shorter distance trips can have big impacts on how many cars are generated overall.

Some Big Moves might also influence trips around the town or even further afield, for example through improving rail connectivity and revitalising the town centre

Key Statistics:

9,300 more people walking and cycling every day with a gentle density masterplan

12,000 fewer car trips per day with a denser masterplan of 7,500 homes

2000 tonnes fewer carbon emissions per year due to fewer vehicular trips

72% to **46%** Mode share drop in car use by using the 'vision-led' model

Measuring the mode share impact of our Big Moves

Key: Major impact Medium impact Minor impact Neutral impact

Big Move	Percentage mode share			
	Public transport	Walking and cycling	Demand management	Placemaking and planning
1. Intensify masterplan for gentle density design	Will positively influence viability of public transport services, across a range of trip lengths	Will positively influence internal and short distance trips, by creating a walkable place	Some positive influence if walking and cycling to access services is easier because of shorter distances	Will positively influence internal and short distance trips by creating a more walkable place
2. Infill underused brownfield land	Will positively influence viability of public transport services, across a range of trip lengths	Will positively influence internal and short distance trips, by creating a walkable place	Neutral impact	Will positively influence internal and short distance trips by creating a more walkable place
3. A rail passing loop at Melksham	Will positively influence longer distance trips	Neutral impact	Neutral impact	Neutral impact
4. Protected cycle links	Could positively influence multi-stage, longer trips to public transport interchanges	Will positively influence active travel trips across all trip lengths	Creating more people-focussed streets, which prioritise walking and cycling, will reduce vehicle dominance	Will positively influence the look and feel of streets within the masterplan area, and could benefit the wider town
5. Contribution to an improved high frequency bus network	Will positively influence trips to and from Chippenham and potentially further afield	Could bring public transport closer to people, where it becomes more attractive to walk / cycle to a transport interchange	Creating corridors with bus priority, and friction created by buses, could reduce vehicle dominance	Reducing private vehicle dominance in favour of buses could improve streets and places
6. Car clubs and mobility hubs	Co-location of car clubs and mobility hubs at public transport interchanges is likely to influence trips of all lengths, as it becomes possible to travel to them more sustainably	Reduced car ownership and greater options for active travel will positively influence active travel trips across all trip lengths	Reduced car ownership and greater priority for active and micro-mobility modes could reduce vehicle dominance	Reduced car ownership and greater priority for active and micro-mobility modes could reduce vehicle dominance
7. Contribution to town centre revitalisation and improvements	A mix of dense land uses around public transport interchanges, from the outset, will help support viability	Will positively influence internal and short distance trips by creating a more walkable place	Some positive influence of walking and cycling to access services is embedded as a behaviour from the outset	Will positively influence internal and short distance trips by creating a more walkable place
8. Supporting local businesses during development phase	Could help support overall viability of public transport services in Chippenham, and could keep more trips within the town where there is more scope to influence travel	Could make walking and cycling within the town centre more attractive, supported by a network of mobility hubs which connect the centre to the suburbs	Depending on interventions, car travel could become more or less attractive. Town centre parking availability and tariffs will influence car-based trips into town	Improved public realm in the town centre could make it a more attractive place to travel to, keeping more trips within the town where there is more scope to influence travel
9. Highways improvements where necessary	If well designed, road improvements could reduce delays for public transport	Road capacity upgrades which improve journeys for the private car are unlikely to encourage more walking and cycling	Road capacity upgrades are unlikely to feature measures that restrict or reduce demand	Road capacity upgrades are unlikely to improve streets and places

The extent to which the Big Moves could deliver similar conditions achieved in the sustainable places informs the extent to which they might achieve similar mode shares. Whilst the Chippenham extension is unlikely to achieve the vehicle mode share of Houten or Freiburg, for example, the vision-led approach assumes that introducing similar measures would embed more sustainable habits from the outset, and the mode shares should be assumed higher than the TRICS baseline as a result. In effect, some 'mode shift' would occur, albeit that the baseline is higher as a starting point.

Combining these mode shifts across the different themes and the different Big Moves would result in different trip generation predictions for the Chippenham extension:

Mode	Baseline mode share (daily)	Mode shifts based on appraisal of Big Moves	Resultant mode share
Vehicles	72%	-26 percentage points	46%
Public transport users	3%	6 percentage points	9%
Walking and cycling	25%	20 percentage points	45%
Total	100%	-	100%

If those mode shares are applied to the 7,500 homes, the trip generation would look different too:

Mode	Baseline mode share (daily)	Mode shifts based on appraisal of Big Moves	Resultant mode share
Vehicles	37,700	-12,300	25,400
Public transport users	1,450	3,000	4,450
Walking and cycling	13,250	9,300	22,550
Total	52,400	--	52,400

This shows that the Big Moves could save over 12,000 vehicle trips in a day. In the peak hours, the saving is over 1,000 vehicles. The trips that would have been made by vehicle are instead made by walking, cycling or public transport, and so these need to be facilitated instead.

This underlines the importance of adopting a vision-led approach from the outset and seeing it through

to planning and construction. These predictions assume that the infrastructure planned is delivered, and that people living in the new development site would make use of that infrastructure. As a result, there is a reduced need to build costly highway infrastructure and so funding that would have been assigned to that can be used elsewhere.

Even better, delivery of the Big Moves does not just benefit new residents, but also those in existing communities who are adjacent to new cycling or bus routes, for example. Whilst the mode shift of development trips could be in the order of 20 or 30 per cent, introducing high quality infrastructure along corridors which already accommodate high levels of movement associated with existing communities could also see reductions in vehicles of around 5 per cent, if not more.

This can have significant benefits when considering that the daily vehicle movements on London Road (as an example) are in the order of 18,000 vehicles. A reduction of 5 per cent would represent nearly 1,000 fewer vehicles every day travelling on London Road, with 1,000 more people travelling by active and sustainable modes. The cumulative impacts across all of the local roads in Chippenham could lead to a very different quality of place in the town, and significant savings in transport-borne emissions.

Its worth noting that this is still a large number of vehicles being produced by the development, which is unsurprising considering the town would be growing in population by almost 50 per cent. The overarching principle is that the nature of the new homes and development is shaping the movement and transport around it, whereas before the large, fast road was shaping the nature of the homes and neighbourhoods being created.

Additionally vehicle journeys resulting on the existing roads will be mitigated by the following:

- A proportion of the journey's modelled will remain within the boundary of the development and not impact the existing roads;
- Of those journeys, it will be split between those using London Road and those exiting to roads to the north, where they will link up to the existing A350 bypass;
- The existing traffic on the road network is estimated to reduce between 5 per cent and 10 per cent due to the vast array of Chippenham-

wide transport improvements (many thousands of daily trips).

- The development will be built over many years so the impact will be gradual. Increases won't be overnight; and
- Over the next two decades the local authority will spend money on transport improvements that can further improve connectivity in the town. These transport improvements will be shaped by the gentle density development.

Overall, there will be an impact on roads, but this is no different than the development with the £75m road scheme, which would have had to take the load of all the new traffic, without the 12,300 vehicle trips saved, alongside existing through traffic that was intended to use this new infrastructure.

Paying for the vision

The changes envisioned by our 'gentle density' masterplan and the associated moves outlined above are not cheap: we estimate that these investments and interventions would cost £75m, with a £9.75m buffer for inflation and contingency. However, these costs are equivalent to just one grant award for a single road that under our 'gentle density' plan would no longer be needed, as supported by the transport modelling within this report.

Our budget does not account for the vastly reduced land take, which could represent a huge reduction to the total development cost over and above the transport costs modelled here. This could allow further improvements to be made, or reduced costs to housebuilding in Wiltshire.

Abandoning the HIF-funded road scheme and adopting our 'gentle density' plan instead would require greater flexibility from the Treasury over how public money is spent and accounted for. For example, HIF funding is overwhelmingly for capital costs, while some of our proposals include revenue funding over a fixed number of years.

These barriers to smart investment in high-quality development need to be overcome to make this vision a reality. Our purpose here has been to demonstrate that better quality, more sustainable, more attractive and more value-enhancing approaches to transport and development can cost the same or less than the existing, dominant, road-centric model.

Cost Breakdown of the Big Moves

	What	Cost	Impact
1	Intensify masterplan for gentle density design	£0m	Significantly reduced land take
2	Infill underused brownfield land with remediation and street votes	£2.5m	More homes within the existing town
3	A rail passing loop at Melksham	£15m	More trains at commuter frequency. Less congestion.
4	Improve streets within new development (down from initial £75m)	£10m	Accommodate expansion and road connectivity
5	Contribution to an improved high frequency bus network for 5 years.	£7.5m	More use of sustainable transport choices enabled. Less congestion.
6	Create car clubs and mobility hubs	£3m	Enable shifts to more sustainable transport choices
7	Contribute to town centre revitalisation and improvements	£10m	Improved town centre for existing and new residents
8	Support local businesses during development phase	£6.25m	Provision of more amenities for new residents within walking distance
9	Protected cycle links from new developments to key locations in town	£11m	More active travel and less car use.
	Contingency / inflation or money returned to the government	£9.75m	
	Total	£75m	



A new shared path linking the gentle density masterplan to Chippenham town centre

4. The road ahead

Policy recommendations



The road ahead: policy recommendations

Our gentle density revisioning of the proposed extension to Chippenham shows what can be achieved by taking a different approach to transport modelling for new development.

To make this way of doing development the norm rather than the rare exception, we need to change policy and practice at the level of national government, local authorities and communities. Most importantly we need to change the assumptions and models behind development projects themselves. Fundamental to achieving this will be much greater

integration of spatial planning with transport planning at the local level to create a clear plan for how each authority will achieve its placemaking and sustainability vision. This would require planning and transport departments working together on the choice of local site selections, on how new development can best connect with existing settlements, and how transport development can support local sustainability ambitions.

For National Bodies	
1	The Department for Transport should issue guidance mandating that local transport plans (LTPs) and Transport Assessments (TAs) use the 'vision-led' process for any transport modelling.
2	The DfT should provide a clear definition and technical guidance of what best practice 'vision-led' transport planning looks like.
3	The DfT should create a role responsible for light rail (tram) within its Roads and Local Group division
4	The DfT should update Transport Analysis Guidance (TAG) to increase the share of costed benefits from broader social impact and reduce the dominance of 'time saving' as a costed benefit.
5	Active Travel England should prioritise financially supporting schemes that use 'vision-led' transport planning, as well as using their role as a statutory planning consultee to implement 'vision-led' modelling on planning applications.
6	DLUHC to ensure Homes England prioritises financially supporting housing schemes using 'vision-led' approach through a new Housing Infrastructure Fund (HIF) process that supports a more holistic package of financial support.
7	Homes England should conduct a rapid review existing HIF funded schemes that have a 'road only' component to investigate if alternate cheaper and more sustainable infrastructure can instead be provided.
8	The Department for Levelling Up, Housing & Communities (DLUHC) should update the NPPF section 9 on promoting sustainable transport, and include wording in the upcoming NDMPs, to require a 'vision-led' approach when modelling for new developments. DLUHC should also update section 9 to allow easier implementation of parking maximums to support car-lite development. For full suggested text we will share an accompanying appendix.

9	DLUHC should update the NPPF sustainable transport section 9 to require that 'the design of schemes and sustainable transport has been provided that ensures a sustainable transport trip share aligned with the targets set in the local transport plan.' ⁸⁴
10	DLUHC should create National Development Management Plans (NMDPs) on sustainable transport and active travel, with topics including the importance of walkable proximity and connectivity to services; and the protection and delivery of strategic walking, wheeling and cycling routes.
11	The DFT should update section 16 of the Traffic Management Act 2004, which provides network management duty, to add in a placemaking and public health duty alongside expeditious movement duty.
12	The Road Traffic Reduction Act 1997, is in place and should be reviewed to update national targets.
13	DLUHC should adopt Manual for Streets as policy within the NPPF.

For local government and regional bodies

14	All Local Transport Plans (LTPs) should mandate the 'vision-led' process for any transport modelling.
15	Local planning authorities should allow reduced back-to-back distances (beyond the default 20 metres) to enable low-rise high-density urban extensions.
16	Local authorities should run a 12-hour transport model (ideally 24), instead of peak hour, for housing developments. Especially when developments are held up by accompanying highways works.

For Community groups and neighbourhood forums

17	Visions created by neighbourhood forums through the Neighbourhood Planning or Local Development Order mechanisms (2011 Localism Act) should be material considerations for any vision-based modelling carried out in the area.
-----------	--

Of course, funds cannot simply be redirected from one item to others in this way, as the UK government mandates how grants can be spent. Abandoning the HIF-funded road scheme and adopting our gentle density plan instead would require much greater flexibility from the Treasury over how public money is spent. For example, HIF funding is overwhelmingly for capital costs, while some of our proposals include revenue funding over a number of years.

The brownfield subsidy envisaged here would also be significantly higher per home than is currently allowed under the Brownfield Release Fund. The nature of government funds will need to change. The good news is that this is very much in line with the proposals for Homes England funding made in Living with Beauty, the 2020 final report of the Building Better Building Beautiful Commission which the government accepted warmly in principle.⁸² Recent announcements by the Labour Party also indicate a

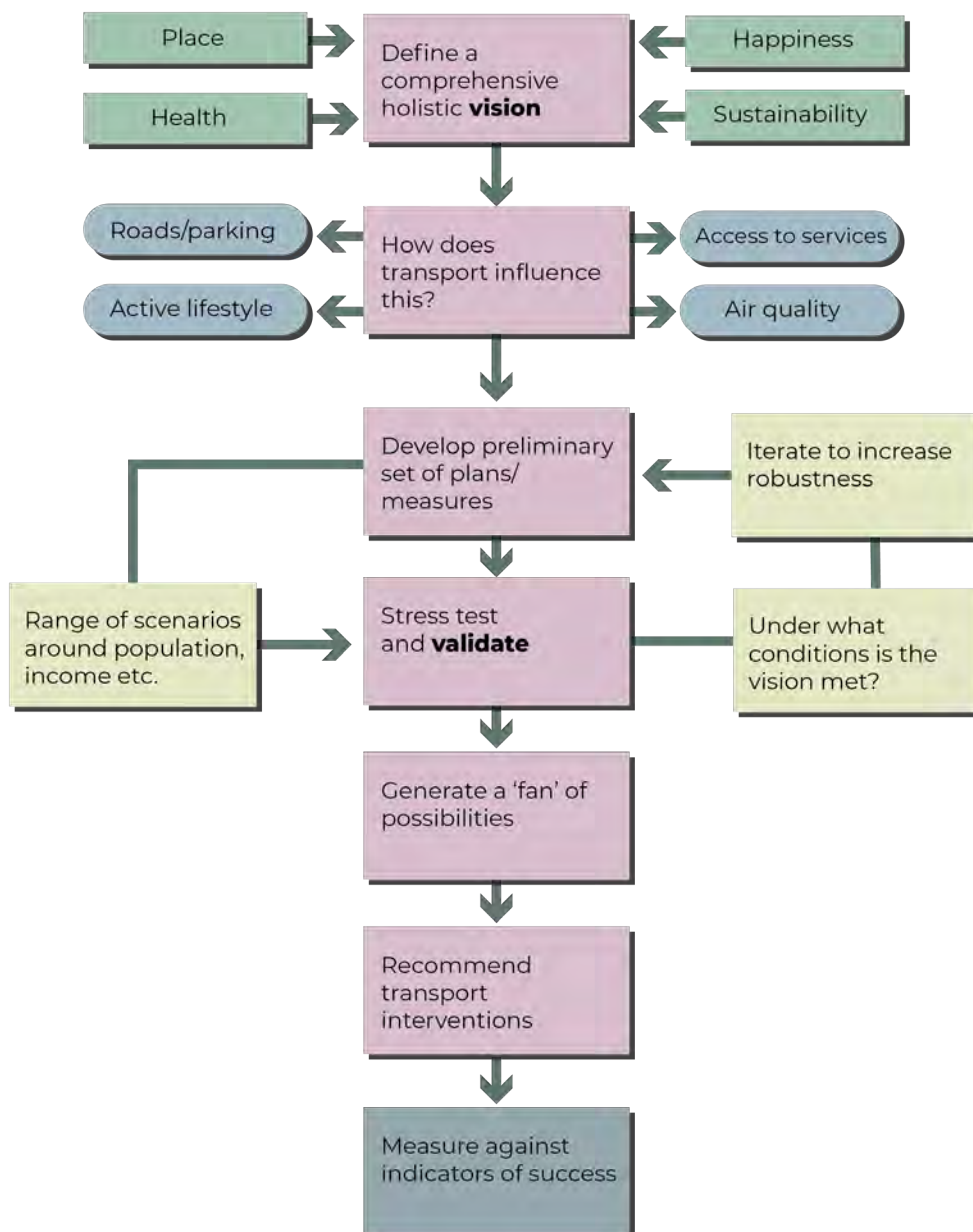
willingness to move in this direction as the right way to create better and more sustainable places using less land.⁸³

Our purpose here has been to demonstrate that better quality, more sustainable, more attractive and more value-enhancing approaches to transport and development can cost the same or less than the dominant road-centric model.

A template for 'vision-led' transport planning

On the basis of our calculations at the end of Chapter 3, and whilst the 'vision-led' approach does not have a succinct or definitive method, the narrative around it could be paraphrased as: *"to define a comprehensive vision, identify what role transport plays in delivering that, and then develop and test the measures required to achieve it, taking account of uncertainty."*

An interpretation of this process is set in the diagram below:



Where next? Scaling 'vision-led' modelling across Britain

Chippenham is typical of many similar housing developments based on the heavy road infrastructure demanded by 'predict and provide' transport modelling. The following are just some current examples of schemes that could and should be reconsidered with alternative 'vision-led' masterplan and transport plan.



Didcot, Oxfordshire

Oxfordshire County Council adopted vision-based transport modelling as a policy in 2022. This bold move, alongside adopting parking maximums and requiring car-free or car-lite urban extensions has put everything in place to create genuinely sustainable new homes for the county. There is currently a £272m Housing Infrastructure Fund project attempting to facilitate sites in and nearby Didcot. Due to cost increases and local and regional concerns about the deliverability and sustainability of these plans there is an opportunity to apply 'vision-led' modelling in the same way this report has, to discover if there is a better approach to this generational opportunity for new infrastructure in Oxfordshire.

Status: HIF scheme rejected by councillors. Objection 'called in' by national government.

Tendring and Colchester, Essex

Local authority plans in Essex for 7,000 to 9,000 new homes received £100m from the Housing Infrastructure Fund, a significant part of which will be spent on expansion of dual carriageways and a new link road.

Status: Link road granted planning permission in 2021.



Bailrigg, Lancashire

Lancaster City Council have targeted 5,000 homes on greenfield south of Lancaster, dubbed Bailrigg Garden Village, to be connected by a new link road to bring the A6 and A588 together. The council received HIF funding to the tune of 100m for the link road, yet spiralling costs and inflation have put the scheme on hold.

Status: Halted due to cost inflation.



Horsham and Crawley

Part of the Gatwick Diamond Economic Area, 10,000 homes are proposed in Horsham and Crawley to alleviate housing need, with the 'Crawley Western Relief Road' planned to link the development. The cost of the road is estimated to be £100m, with locals strongly objecting to the urban sprawl the plan will bring.

Status: Under consultation



Welborne, Hampshire Garden Village

In Welborne, near Fareham, 6000 homes are proposed in a garden village near the coast, with plans to support the development by upgrading the M27 at a cost of £75.5m. Homes England agreed to fund £41.25m of this.

Status: Planning permission granted

Lidsing, Kent

In Maidstone, 2000 new homes are proposed in a garden community along with one primary school. A new link road on the M2 J4 has been proposed to join the new settlement to the motorway. Despite no publicly available finance information on the scheme, locals have objected to the planned road's potential to encroach on an AONB.

Status: Under consultation.



Mountfield Park, Canterbury

Mountfield Park, a significant development of 4,000 homes to the south of Canterbury, will be built using transport modelling conducted a decade ago, with a standard 'predict and provide' approach. As a result, the transport model required the inclusion of a large, multi-million pound grade-separated junction on the edge of the development and a dual carriageway running through it, severing the development and promoting long-term car use, despite being just 2km from Canterbury centre.

Status: Planning permission granted.

Community voices: responses from Chippenham

We visited Chippenham and spoke with some local campaigners and councillors to understand their concerns with new development and subsequently their thoughts on the alternative, gentle-density masterplan.

We explained that the plan is an exercise - independent of local politics - to show how, nationwide, we might create and steward better places with better access to services, shops and sustainable transport. Encouragingly, most were very supportive of the principles of gentle density, where homes are built on much less land, with better access to services, avoiding big new roads, and better walking, cycling and public transport:

"I applaud what you're trying to do and I agree with it."

"This is the way forward"

"We have got to get car use down, and until we get proper infrastructure that's not going to happen – this is a really interesting way forward."

"I agree with the concept – it backs everything I think about doughnut economics, sustainability, revitalising town centres, densification and active transport."

There were criticisms of the precise location of the masterplan, owing to local concerns, in particular the presence of a county farm for training agricultural students, as well as concerns over its proximity and partial encroachment onto a flood zone:

"I agree with everything here but the area you have chosen is a hot potato."

"The east would be the wrong site for 7,500 homes."

To demonstrate the adaptability of the gentle density principle, we subsequently discussed how using the gentle principle, the development could occur in two areas, to the east and also to the south of Pewsham, with the same number of homes at the same density.

Many also commented that the 7,500 homes target has reduced on the latest Local Plan. For the principle of this report we have deliberately sought to compare like with like against the original 7,500 home plan, to emphasise the strength of the gentle density principle.

Clearly it will be up to the local authority to decide if development is better coming forward to the east, south or both. We are encouraged that the gentle density plan, designed around sustainable transport was so positively received for when new homes are built.



Endnotes

- 1 Statista data for 2021/22
- 2 The Planner, 2018, Loss of Green areas increases by 58%, CPRE says, available at: <https://www.theplanner.co.uk/2018/06/04/loss-green-areas-increases-58-cpre-says> [Accessed July 2023]
- 3 Boys Smith, N. Venerandi A., & Toms, K., 2017 op cit. pp.74-75
- 4 Wilhelmsson, M., 2000, The Impact of Traffic Noise on the Values of Single-Family Houses. *Journal of Environmental Planning and Management*. 43 pp.799-815.
- 5 Gilles Duranton & Matthew A. Turner, 2011. "The Fundamental Law of Road Congestion: Evidence from US Cities," *American Economic Review*, *American Economic Association*, vol. 101(6), pages 2616-52
- 6 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/984685/transport-and-environment-statistics-2021.pdf
- 7 *Ibid*, p.8
- 8 Logika Noise Air Quality Consultants, 2021, Air Pollution and Inequality in London: 2019 update, p.25
- 9 Public Health England (2016) *Working together to promote active travel: A briefing for local authorities*, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/523460/Working_Together_to_Promote_Active_Travel_A_briefing_for_local_authorities.pdf [Accessed November 2023]
- 10 *Loc. Cit*
- 11 Sustrans and Arup, 2022, Walking for everyone <https://www.sustrans.org.uk/our-blog/research/all-themes/all/walking-for-everyone>
- 12 See the Silverstone Business Park case study in Chapter 2
- 13 Where a 10-minute walk is defined as 800m, then this number is the approximate number of new and existing homes which are kept within 800m to the countryside boundaries of developed area.
- 14 At a density of 50 homes per hectare.
- 15 This is a strategic aim within the DFT's Decarbonisation Plan. An example of local targets is in Greater Manchester that has a 50% target for public transport, walking and cycling
- 16 Milner, D. (2022) Computer Says Road: why outdated transport models ruin new developments and how to fix them, *Create Streets*
- 17 Plowden, S. (1972), *Towns Against Traffic*, HarperCollins
- 18 Department for Transport (2021), *Decarbonising Transport: A better, greener Britain*, p.158
- 19 Qiao, F., Liu, T., Sun, H. et al., 2021, Modelling and simulation of urban traffic systems: present and future. *International Journal of Cybernetics and Cyber-Physical Systems*, 1. pp. 1-32
- 20 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1045938/planning-ahead-for-the-strategic-road-network-developing-the-third-road-investment-strategy.pdf
- 21 Office for Budget Responsibility, Climate-related measures in the budget and spending review, available at: <https://obr.uk/box/climate-related-measures-in-the-budget-and-spending-review/> [Accessed July 2023]
- 22 <https://www.gov.uk/government/publications/housing-infrastructure-fund>
- 23 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932817/Local_Authority_Capital_Expenditure_and_Receipts__England_2019-20_Final_Outturn.pdfThe Planner, 2018, Loss of Green areas increases by 58%, CPRE says, available at: <https://www.theplanner.co.uk/2018/06/04/loss-green-areas-increases-58-cpre-says> [Accessed July 2023]
- 24 The Planner, 2018, Loss of Green areas increases by 58%, CPRE says, available at: <https://www.theplanner.co.uk/2018/06/04/loss-green-areas-increases-58-cpre-says> [Accessed July 2023]
- 25 UK Centre for Ecology & Hydrology, 2020, Almost 2 million acres of GB grassland lost as woodland and urban areas expand, available at: <https://www.ceh.ac.uk/press/almost-2-million-acres-gb-grassland-lost-woodland-and-urban-areas-expand> [Accessed July 2023]
- 26 University of Leicester Centre for Landscape and Climate Research, 2015, Large-scale changes in environment revealed through land cover map of UK, available at: <https://le.ac.uk/news/2015/june/large-scale-changes-in-environment-revealed-through-land-cover-map-of-the-uk> [Accessed July 2023]
- 27 Boys Smith, N. Venerandi A., & Toms, K., 2017, Beyond Location: A study into the links between specific components of the built environment and value, *Create Streets*, pp.73-74
- 28 Chiaradia, Alain., Hillier, B., Barnes, Y. & Schwander, C., 2009, Residential property value patterns in London: space syntax spatial analysis
- 29 Boys Smith, N. Venerandi A., & Toms, K., 2017 op cit. pp.74-75
- 30 Wilhelmsson, M., 2000, The Impact of Traffic Noise on the Values of Single-Family Houses. *Journal of Environmental Planning and Management*. 43 pp.799-815.
- 31 Duranton, G. & Turner, M. (2011) The Fundamental Law of Road Congestion: Evidence from US Cities, *American Economic Review*, *American Economic Association*, vol. 101(6) pp 2616-52
- 32 <https://www.sciencedirect.com/science/article/pii/S136192091830628X>
- 33 Gilles Duranton & Matthew A. Turner, 2011. "The Fundamental Law of Road Congestion: Evidence from US Cities," *American*

- Economic Review, American Economic Association, vol. 101(6), pages 2616-52
- 34 <https://www.cpre.org.uk/wp-content/uploads/2019/11/TfQLZ-ZTheZImpactZofZRoadZProjectsZinZEnglandZ2017.pdf>
- 35 <https://www.nao.org.uk/wp-content/uploads/2010/11/1011566es.pdf>
- 36 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/984685/transport-and-environment-statistics-2021.pdf
- 37 Health Effects Institute, 2010, Traffic-related air pollution: a critical review of the literature on emissions, exposure, and health effects
- 38 *Ibid*
- 39 London Councils, 2018, Demystifying Air Pollution in London, p.7
- 40 *Ibid*, p.8
- 41 Logika Noise Air Quality Consultants, 2021, Air Pollution and Inequality in London: 2019 update, p.25
- 42 Hausfather, Z (2019) *Factcheck: How electric vehicles help to tackle climate change*, CarbonBrief, available at: <https://www.carbonbrief.org/factcheck-how-electric-vehicles-help-to-tackle-climate-change> [Accessed December 2020]
- 43 Milovanoff, A (2020). *Why Electric Cars Alone Won't Save the Planet*, The National Interest, available at: <https://nationalinterest.org/blog/reboot/why-electric-cars-alone-wont-save-planet-171158> [Accessed December 2020]
- 44 Hart, J., & Parkhurst, G., 2011, Driven to excess: Impacts of motor vehicles on the quality of life of residents of three streets in Bristol UK. *World Transport Policy and Practice*, 17(2), 12-30
- 45 *Ibid*
- 46 Women's Budget Group, 2021, Towards Gender-Inclusive and Sustainable Transport Systems <https://wbg.org.uk/wp-content/uploads/2021/06/Gender-inclusive-transport-systems-V3.pdf>
- 47 CPRE, 2021, Every village, every hour 2021 buses report, <https://www.cpre.org.uk/resources/every-village-every-hour-2021-buses-report-full-report/>
- 48 O, Toole, S. & Christie, N. (2018) 'Deprivation and Road Traffic Injury Comparisons for 4 to 10 and 11 to 15 year-olds' *Journal of Transport and Health* 11: 221–229
- 49 Sustrans and Arup, 2022, Walking for everyone <https://www.sustrans.org.uk/our-blog/research/all-themes/all/walking-for-everyone>
- 50 Fecht, D., Fischer, P., Fortunato, L., Hoek, G., de Hoogh, K., Marra, M., Kruize, H., Vienneau, D., Beelen, R. & Hansell, A. (2015) 'Associations between air pollution and socioeconomic characteristics, ethnicity and age profile of neighbourhoods in England and the Netherlands' *Environmental Pollution* 198: 201 – 210
- 51 Sustrans, 2022, Helping people through the cost of living crisis and growing our economy <https://www.sustrans.org.uk/media/11397/cost-of-living-report.pdf>
- 52 Campaign for Better Transport, 2022, Funding local bus services in England: How to ensure every community gets the bus service it needs, p.3, available at: https://bettertransport.org.uk/wp-content/uploads/2022/07/Funding_local_bus_services_in_England_June_2022.pdf [Accessed July 2023]
- 53 Transport for New Homes,
- 54 CABE (2007). Paved with gold: the real value of good street design, p.6
- 55 Department for Transport (2014). Claiming the Health Dividend: A summary and discussion of value for money estimates from studies of investment in walking and cycling, p.3
- 56 Department for Transport (2016), Value for Money Assessment for Major Bus-Related Schemes, p.17
- 57 Silverstone Park, Together We Travel, available at: <https://silverstone-park.com/silverstone-park-today/together-we-travel/> [Accessed August 2023]
- 58 Wiltshire Council (2021), *Wiltshire Council Local Plan: Looking to the Future*, pp.10-18
- 59 Atkins (2016) Chippenham Transport Strategy Draft: Strategy Refresh, p.32
- 60 Reducing the amount of land needing to be used should actually be an opportunity to reduce the cost as less of the projects budget would be used to purchase the land in the first place. We have not modelled this, but its likely to be significant.
- 61 The draft Wiltshire County Council design guide states a minimum of 20m bac-to-back distance should be respected, unless higher densities are appropriate, where it may be reduced.
- 62 Harper, P (2022). Edwardian morals, Thatcher and bad design: why Britain's homes are so hot, *The Guardian*, available at: <https://www.theguardian.com/commentisfree/2022/jul/20/britain-worst-built-homes-europe-extreme-weather-upgrade> [Accessed August 2023]
- 63 Wiltshire Local Cycling and Walking Infrastructure Plan
- 64 The 250-home figure is taken from the Wiltshire Council Local Plan: Looking to the Future, p.4 (with 10 additional homes added to round the cost figure).
- 65 Department for Levelling Up Housing and Communities (2023). Thousands of new homes to be built on regenerated brownfield land, available at: <https://www.gov.uk/government/news/thousands-of-new-homes-to-be-built-on-regenerated-brownfield-land> [Accessed August 2023]
- 66 Cost based on upper price estimates for installing passing loops and previous passing loop installation, such as the Penryn passing loop (which cost £7.8m) and the Beccles passing loop (which cost £4m).

- 67 A breakdown of Wiltshire County Council's costs of highways works demonstrates the number and types of improvements that can be made with £10m: <https://www.wiltshire.gov.uk/article/1281/Costs-of-highway-works>
- 68 Wiltshire Local Cycling and Walking Infrastructure Plan
- 69 Atkins (2016) Chippenham Transport Strategy Draft: Strategy Refresh
- 70 See Appendix on calculating business rates discounts
- 71 Atkins (2016), *Op Cit*
- 72 Krebs, E. (2022), Europe's New Trams are Reviving a Golden Age of Transport, Reasons to be Cheerful, available at: <https://reasonstobecheerful.world/europe-tram-systems-revival/>
- 73 CoMo UK (2022). *Annual Car Club Research Reports - 2022*, available at: <https://www.como.org.uk/shared-cars/overview-and-benefits#car-club-annual-reports> [Accessed December 2023]
- 74 CoMo UK (2021), *Car Club Report 2021: Key Findings*, available at: https://uploads-ssl.webflow.com/6102564995f71c83fba14d54/62a8acc694bf3158do4ebd5d_CoMoUK%20UK%20Car%20Club%20Report%202021%20Key%20Findings.pdf [Accessed July 2023]
- 75 CoMoUK (2022) Mobility hub evidence – a dossier of evidence compiled by CoMoUK, p.1
- 76 *Op. Cit.* p.2
- 77 Friends of the Earth (2019) *Planning for Less Car Use*
- 78 Lawlor, E (2014). *The Pedestrian Pound: The business case for better streets and places*, Just Economics, p.11
- 79 Rajé F, and Saffrey A (2016), *The Value of Cycling*, cited in Transport for London, *Walking & Cycling: The Economic Benefits*
- 80 Lawlor, E (2014), *Op. Cit.* p.12
- 81 Proposals developed before publication of the Local Cycling and Walking Investment Plan.
- 82 See the Government response to the Building Better Beautiful Commission, available at: https://assets.publishing.service.gov.uk/media/60184066egoe07128c35eeff/BBBBC_response.pdf
- 83 Swinford, Steven, & Smyth, Chris (2023) *We'll build new towns and Georgian-style homes, Keir Starmer to pledge*, The Times, available at: <https://www.thetimes.co.uk/article/well-build-new-towns-and-georgian-style-homes-keir-starmer-to-pledge-gcxdz622w>
- 84 This is a strategic aim within the DFT's Decarbonisation Plan. An example of local targets is in Greater Manchester that has a 50% target for public transport, walking and cycling

