

VERY LIGHT RAIL: TRANSPORT SOLUTIONS FOR THE FUTURE

Thursday 28th
November 2019
9am - 4pm

The Slate, the University
of Warwick, CV4 7AL

WMG
THE UNIVERSITY OF WARWICK

CATAPULT
High Value Manufacturing

RLB Rider
Levett
Bucknall



Very Light Rail: Transport Solutions for the Future

AGENDA

9:00 REGISTRATION AND COFFEE

Session 1

9:30 Welcome and Opening Remarks

- Archie MacPherson, CEO WMG HVM Catapult
- Cllr Jim O'Boyle, Cabinet Member for Jobs and Regeneration, Coventry City Council

9:45 Keynote Address – The need for change

- Steve Berry, Head, Highways Maintenance Branch, Local Transport Funding and Growth Division, Department for Transport

10:05 What is Very Light Rail and what does it offer?

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- Colin Knight, Director of Transportation and Highways, Coventry City Council
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- Tim Burleigh, Head of External Relations, Eversholt Rail
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12:15 VLR as part of the future West Midlands transport ecosystem

- Mike Waters, Director of Policy, Strategy and Innovation, Transport for West Midlands

12:30 What standards will apply to VLR systems and how will approval be achieved?

- Bridget Eickhoff, Principal Infrastructure Engineer, RSSB

12:45 LUNCH & NETWORKING DRINKS

Session 3

13:45 What is best practice for delivery of a safe VLR system?

- Peter Howarth, Independent Competent Person for the Coventry Very Light Rail project

14:00 How VLR can inform and complement traditional rail

- Rory Dickerson, Senior Engineer for Traction & Rolling Stock, Network Rail

14:15 Accessible urban rail solutions and the UK housing gap

Robin Butler, Managing Director, Urban and Civic plc

14:30 Panel Q&A

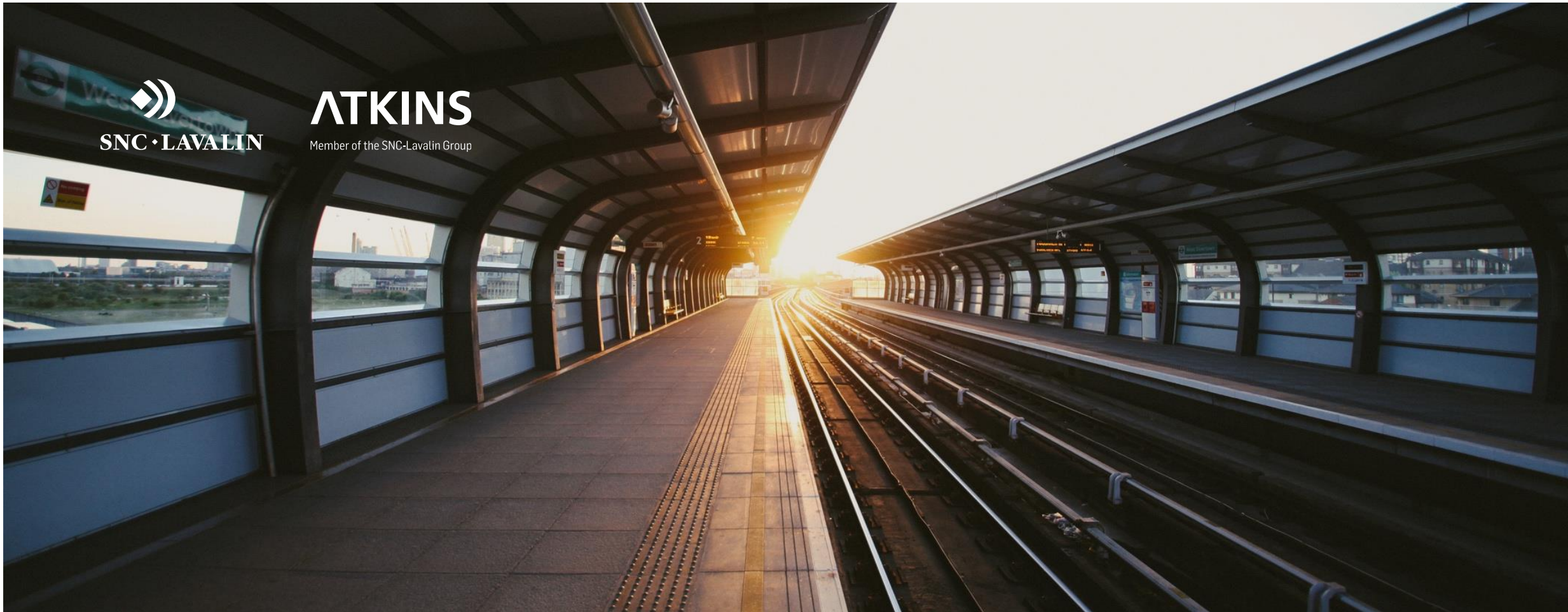
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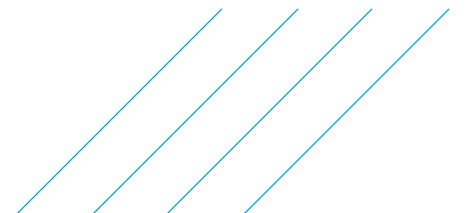
Safety Management of the Coventry VLR Project

Dr P J Howarth

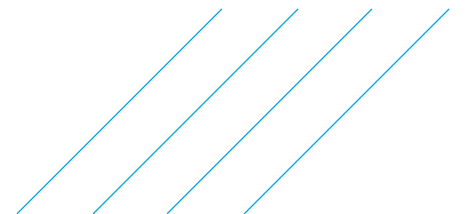


Objective

- › To Design, Build, Introduce to Service, Operate and Maintain a tramway which is safe for its users (passengers and staff) and does not endanger other users of the highway

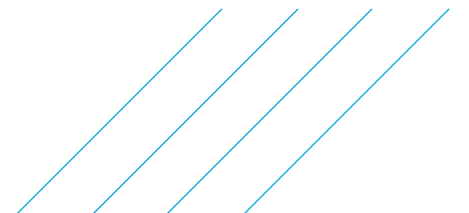


- › Qn. Who is responsible for achieving this objective?
- › Ans. Coventry City Council



Legislation

- › Health and Safety at Work etc Act 1974
- › The Railways and Other Guided Transport Systems (Safety) Regulations 2006 ROGS – A statutory instrument under the H&S Act
- › The Tramcars and Trolley Vehicles Regulations 1992



What does ROGS require?

Appointment of:-

- › A Responsible Person
- › An ICP



Roles of the players

- › ICP – Advise, Monitor, Recommend, Carry out Safety Verification
- › ORR – No approval function. Visits by Field Officers to view from construction onwards
- › LRSSB – Advise on safety standards. Owners of Tramway Principles & Guidance (TPG)
- › DfT – Transport & Works Act



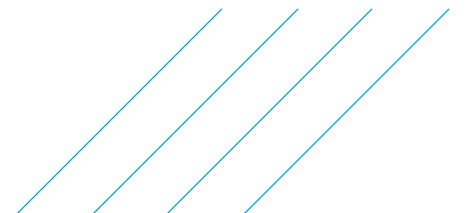
How do we produce a safe system?

- › By ensuring that all risks are assessed and mitigated ALARP by:-
 - › Reference to standards
 - › Comparison with other systems
 - › By sound engineering analysis and design
- › By the project having a sound BCR



Current Project Status

- › Vehicle
- › Track
- › Route
- › Operations



*Our values are the essence of our company's identity.
They represent how we act, speak and behave together,
and how we engage with our clients and stakeholders.*

S~~A~~~~F~~~~E~~~~T~~~~Y~~

We put safety at the heart of everything we do, to safeguard people, assets and the environment.

I~~N~~~~T~~~~E~~~~G~~~~R~~~~I~~~~T~~~~Y~~

We do the right thing, no matter what, and are accountable for our actions.

C~~O~~~~L~~~~L~~~~A~~~~B~~~~O~~~~R~~~~A~~~~T~~~~I~~~~O~~~~N~~

We work together and embrace each other's unique contribution to deliver amazing results for all.

I~~N~~~~N~~~~O~~~~V~~~~A~~~~T~~~~I~~~~O~~~~N~~

We redefine engineering by thinking boldly, proudly and differently.

Very Light Rail: Transport Solutions for the Future

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How Very Light Rail can inform and compliment traditional railway

Rory Dickerson
Senior Engineer, Traction & Rolling Stock
For Prof. Andy Doherty

Traditional Railways

- A separated train/convoy philosophy providing a uniquely capable transport system
- Steel wheel on steel rail provides a environmentally sustainable transport mode
- But capacity and performance can be limited by adhesion
- Over many years railways have developed complex Train Control, Traffic Management, and automation to improve safety, capacity and capability
- Very effective at High Speed, Heavy Suburban Passenger and Long Distance Freight applications
- But regional, rural, light rail and tram applications can be cost-prohibitive

Autonomous Car Technology

- We can buy cars with adaptive cruise control, lane guidance and self parking - this is now business as usual
- Convoying of Freight Lorries is under test and is perhaps only a few years away from normal operation
- Fully autonomous cars are in test in traffic in many places in the world
- We run trains in ATO at huge 'railway' costs, but the above technology is in a £100 electronic chip in a car – a different cost base



***Reopening disused railway lines in
the traditional manner often proves to
be prohibitively expensive***

The Regional Railway Cost Challenge

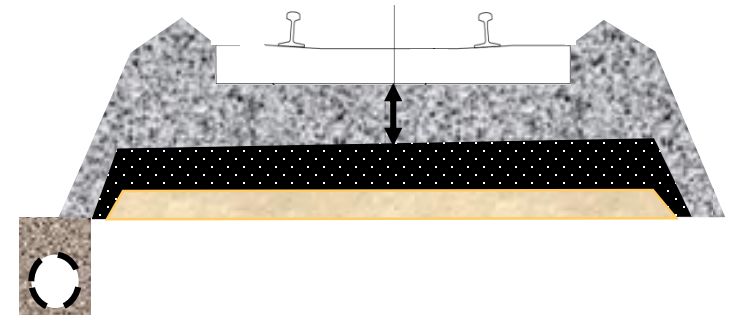
- The Network Rail standard solution is designed for a 25T axle load railway (open Freight access), resulting in very extensive rework of the trace and all the civil engineering.
- The resultant cost base of the railway, track bed, and its associated control and power system are around £15-20M per mile
- If converted to a road, the 'tarmac' will be laid for a 10T road axle load at around £1-2M per mile (at a guess, after some searching)
- A 52-seat Passenger bus costs £0.25M with road regulation crash worthiness, around 18- 20T

Opportunities from VLR

- Develop a transport system that maximises the railway separated mode USP, whilst utilising the technologies now available
- Actually assists the development of autonomous systems as a separated Route will be quicker and easier to authorise
- Intelligent vehicles
- Dumb infrastructure
- Traffic management
- Which wheels? Which surface?
- We have 2 options

Low cost guided railway

- Designed for low axle weights such as 1 tonne per metre of vehicle (half of today)
- Develop a modular track bed, tarmac based ballast for a 5-7 tonne axle load
- (2-3 metre concrete slabs laid for trams are to support 44 tonne HGVs)
- Automotive autonomous control, no lineside signals
- Traffic Management
- Speed to be 60/80mph
- Motive power not specified, but battery, hybrid, and hydrogen favoured



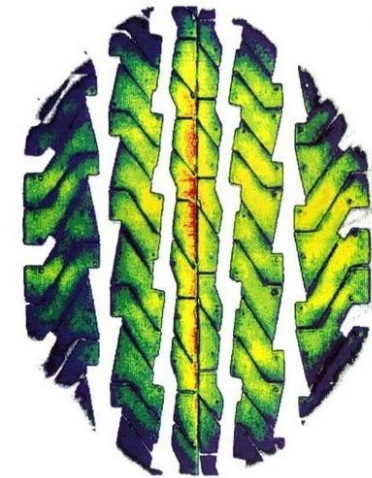
Electronically guided road transport

- All the advantages of a separated transport system
- Extremely low cost infrastructure (a tarmac roadway)
- Autonomous automotive/bus guidance system
- Could utilise disused railway lines where appropriate
- Vehicle design based on a 1 tonne per metre, provide appropriate ambiance, limited size to reduce additional work
- Working assumptions; 60-80?mph, 16Tonne max weight per vehicle, rubber tyres, bus type suspension, and 8T axle loads
- Motive power unspecified



Steel-Steel or Rubber-Tarmac (don't mention Paris metro)

- Steel on steel: 0.1-0.6 μ (but heavy rail assumes <0.15)
- Rubber on tarmac: 0.4-0.9 μ
- Energy consumption for steel is around 20%-50% of rubber (per unit mass)
- It is contentious
- Various cost affecting factors
 - Rubber-Tarmac cheaper to lay
 - Steel-Steel better whole life cost
 - Rubber-Tarmac offers better capacity (braking etc)
 - Steel-steel offers fewer particulates
- But permanence and trust go hand in hand



I can't help but trust rails.

But is there a problem to solve?

Yes

- We want to use and or reopen many disused railways.
- The 'low cost railway sector' has stated many times that there are some 50 plus disused railways and potential routes into 'transport disadvantaged' towns and cities in the UK.
- It has not been possible so far to justify a tram system in smaller cities yet these cities (Cambridge, Coventry*, Oxford) have chronic congestion problems
- Can we utilise the spare space on the side our Routes (old Routes) into a City to enable simple low cost Regional and Tram into town centres.
- Benefit to U.K. Economy is potentially very large

Quite informative, very complementary

- Starting in the Regional/Rural/Reopening railway sector
- Utilise;
 - Automotive sector control technology
 - Alternative power technologies
 - Material science for 'lightweighting'
 - Redesign track and support to a 5-8T axle weight
- Create an electronically guided transport system, Traffic Management
- That combines the best of road and railways?
- Steel wheels to steel rail or rubber tyre to tarmac?
- VLR would not be a traditional railway and heavy rail is here to stay

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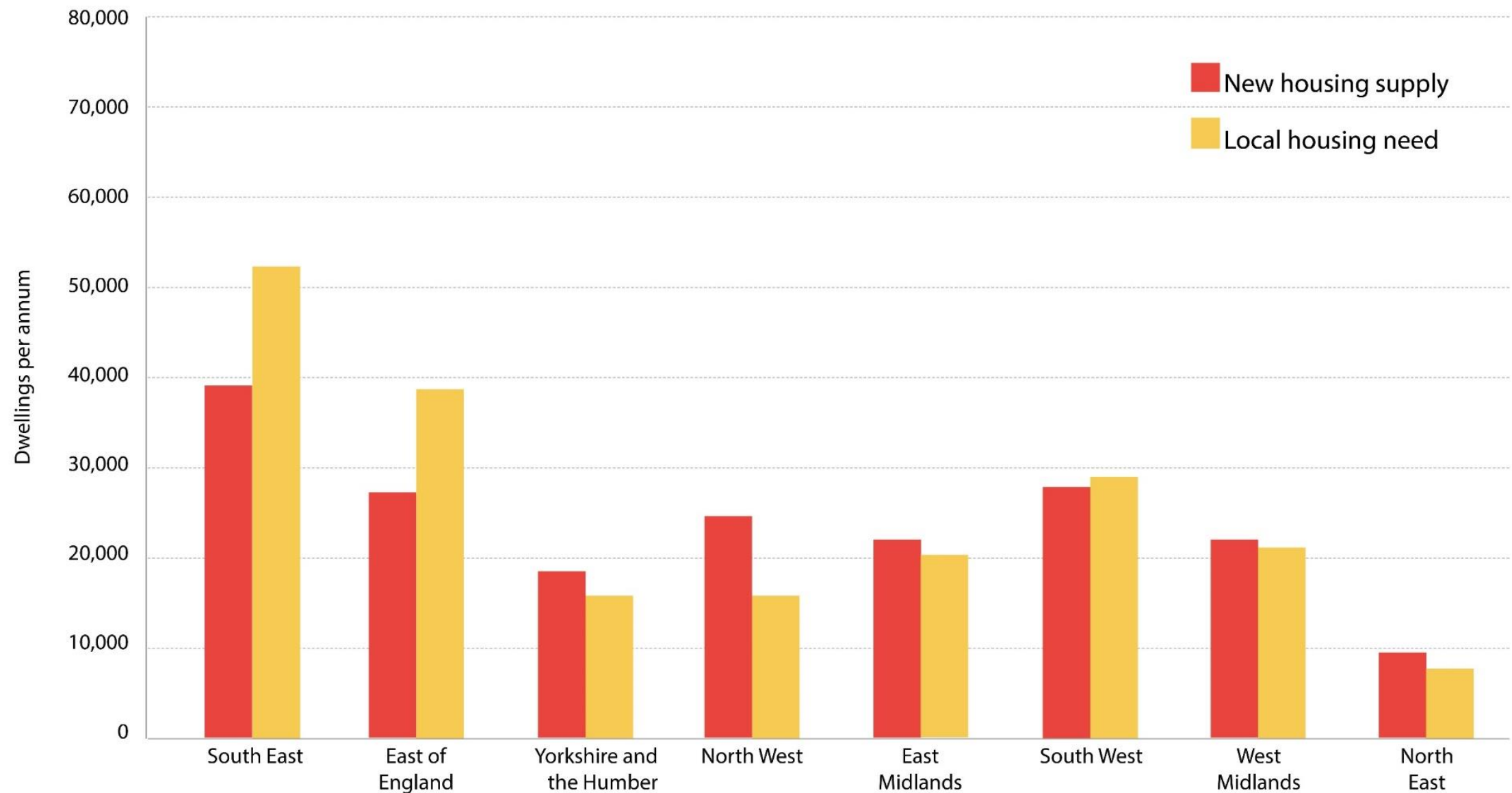
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Accessible urban rail solutions and the UK housing gap

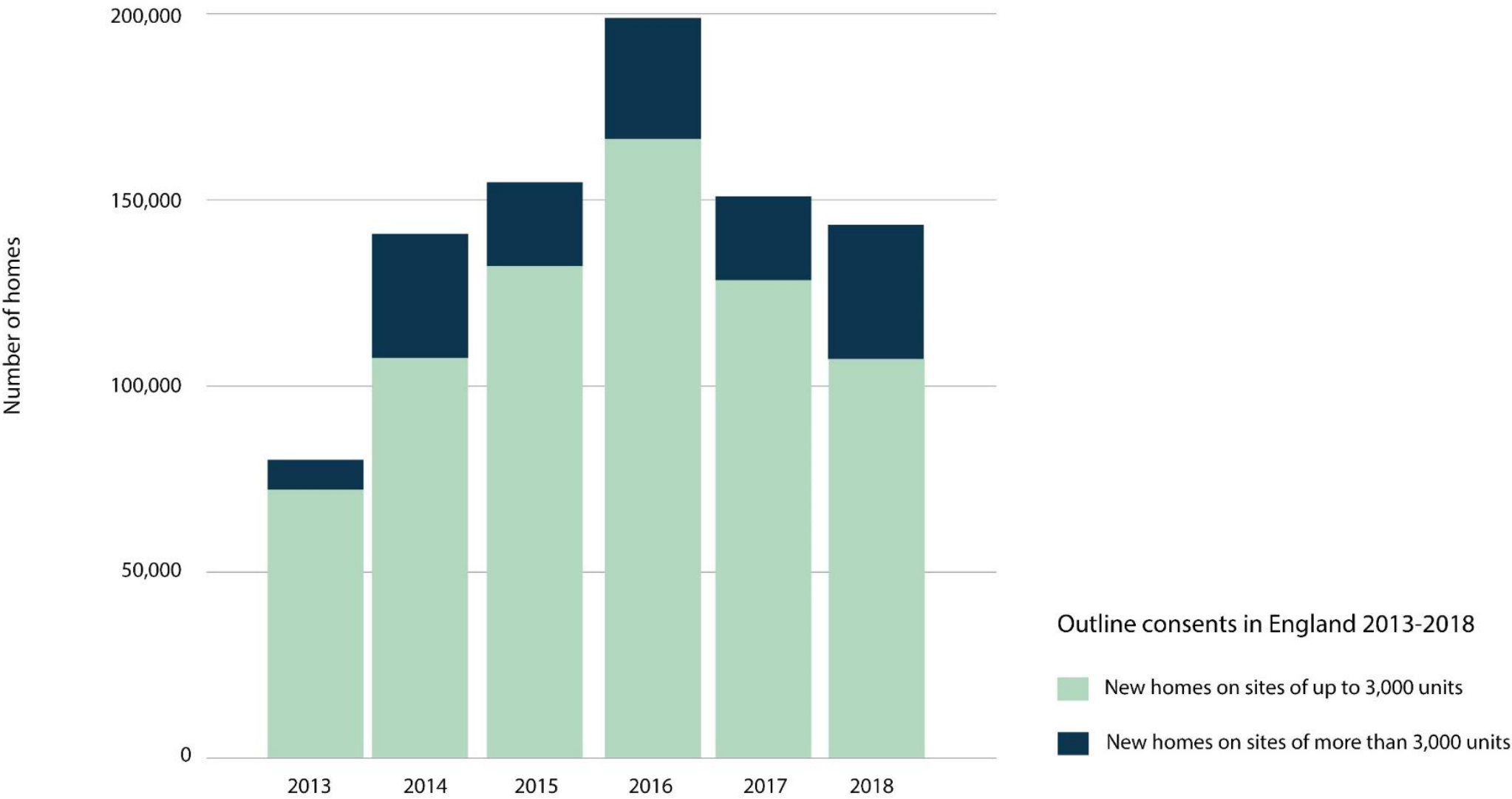


The Housing Gap is regional, but real



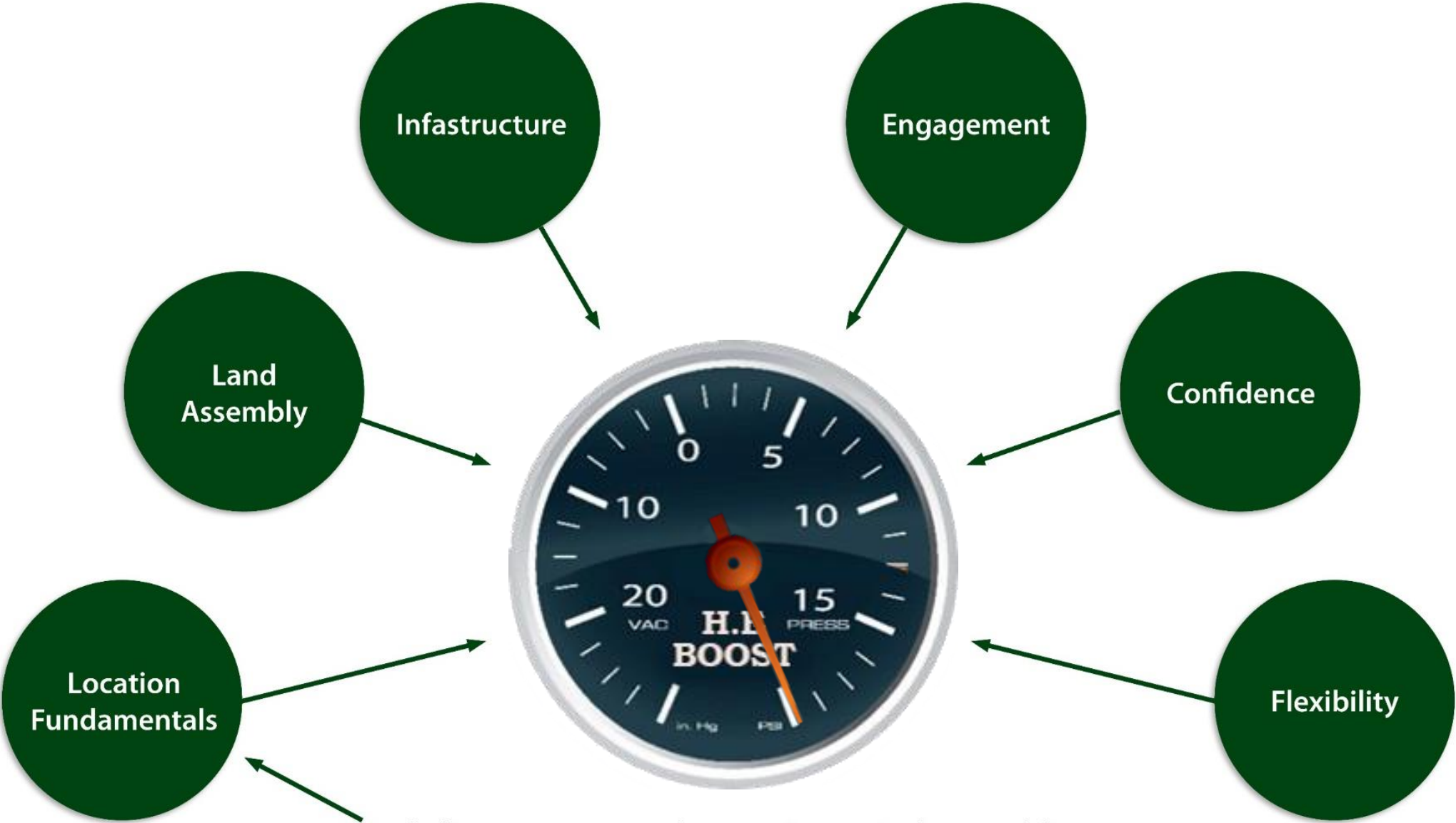
Source: Lichfields Housebuilding Statistics, November 2018 (representation reconfigured)

The planning system has encouraged a move to larger projects, particularly in South East England.



Source: Savills Development Database, Glenigan

The magic ingredients for large scale community building



Including access to employment increasingly via public transports

The 100 mile rule




42,000+
consented and
submitted homes

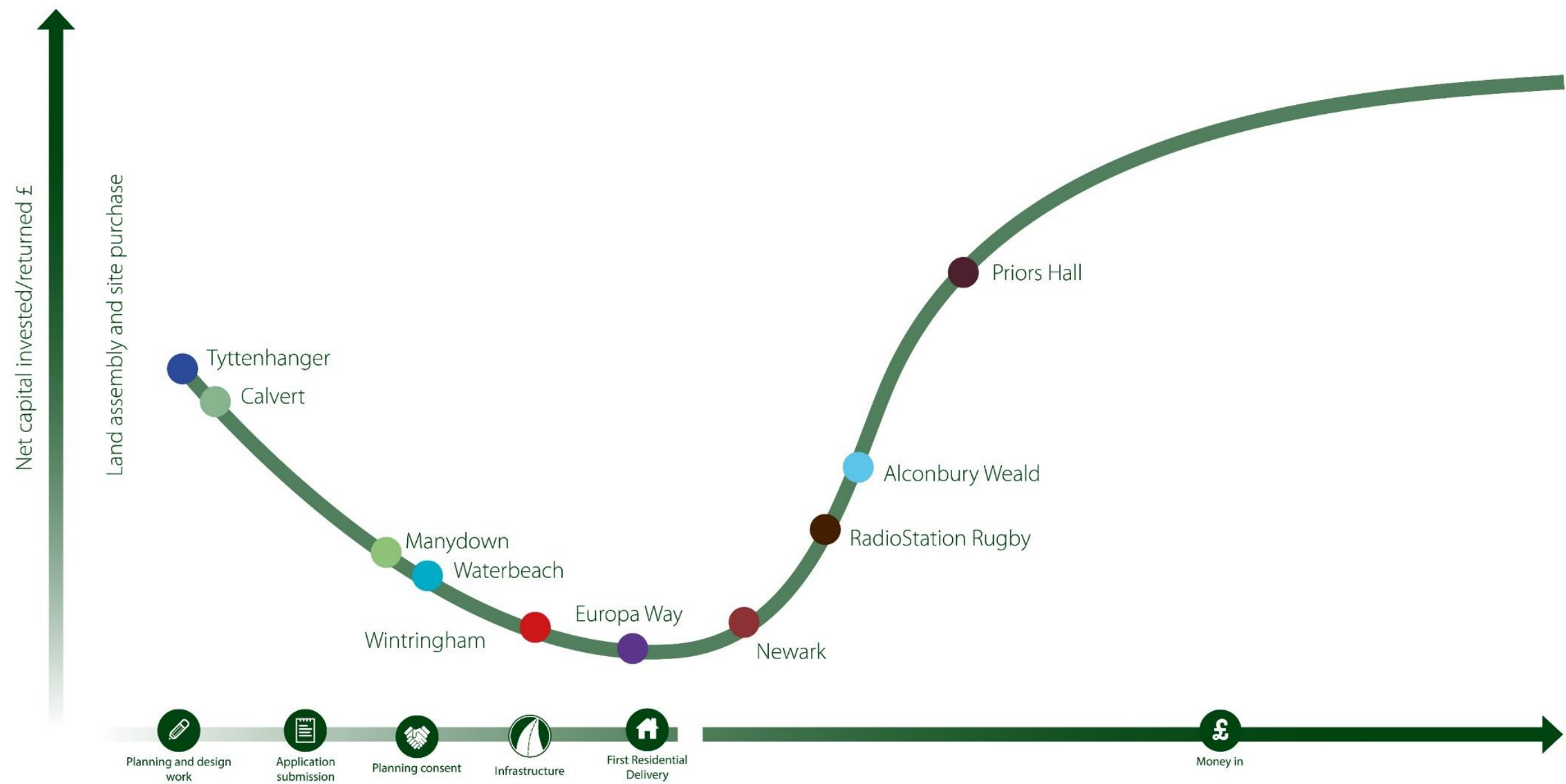

9,045
acres of
strategic land


8m ft²
employment
floorspace


23 schools
18 primary
5 secondary


53 km
of roads

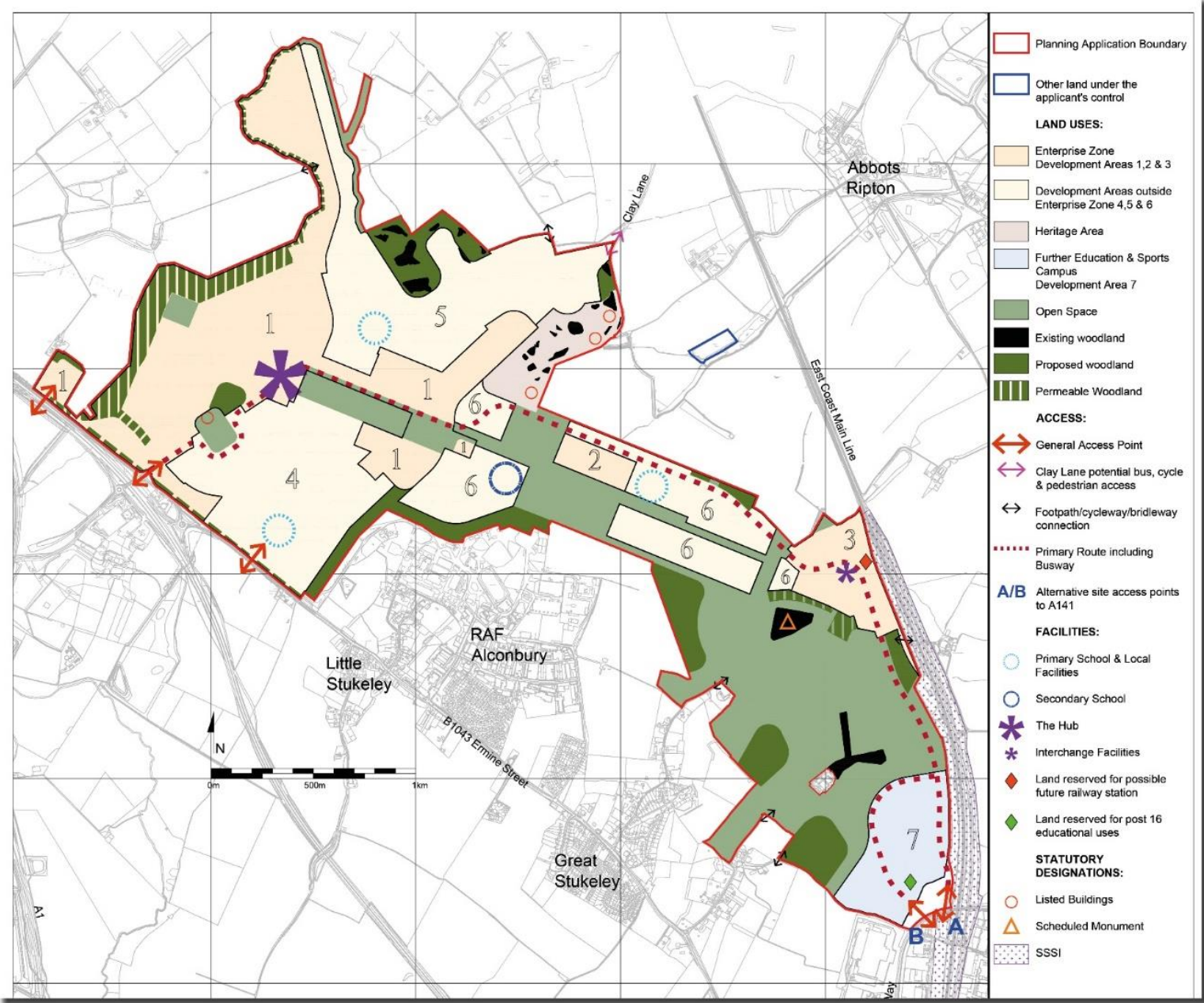
Speed of build out is crucial to us (and the Government)



Alconbury Weald



One consented plan for 5,000 units (9 million square feet)



2014



2019



2014

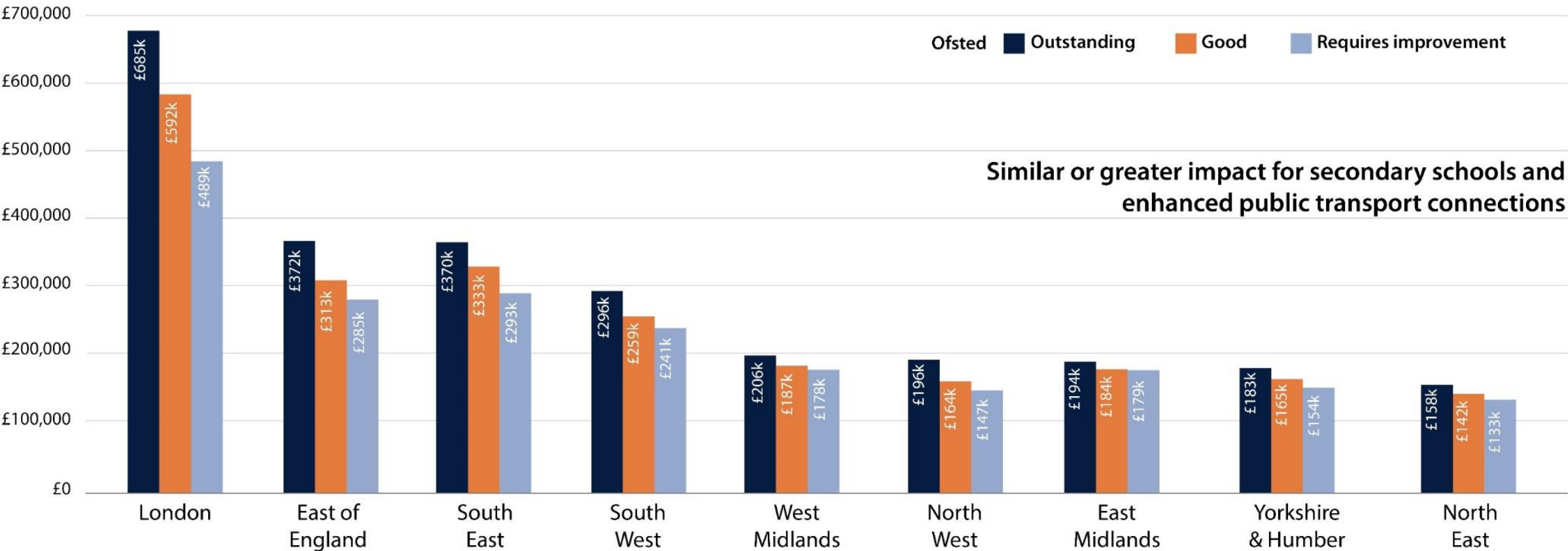


2019



Facilities improve viability

Property prices near primary schools



Average second-hand sale prices for homes near Ofsted-rated primary schools in England

Source: Savills Research, Land Registry

Illustrative costs for a 6-7,000 unit settlement (C1500 acres)

Transport

Local improvements	£10m	
Contribution to Highways Authority	£35m	
Bus improvements / other	£5m	
		£50m

Education (3 primary, 1 secondary) £80m

On site Roads, Utilities, Parks etc. £150m

CIL £35m

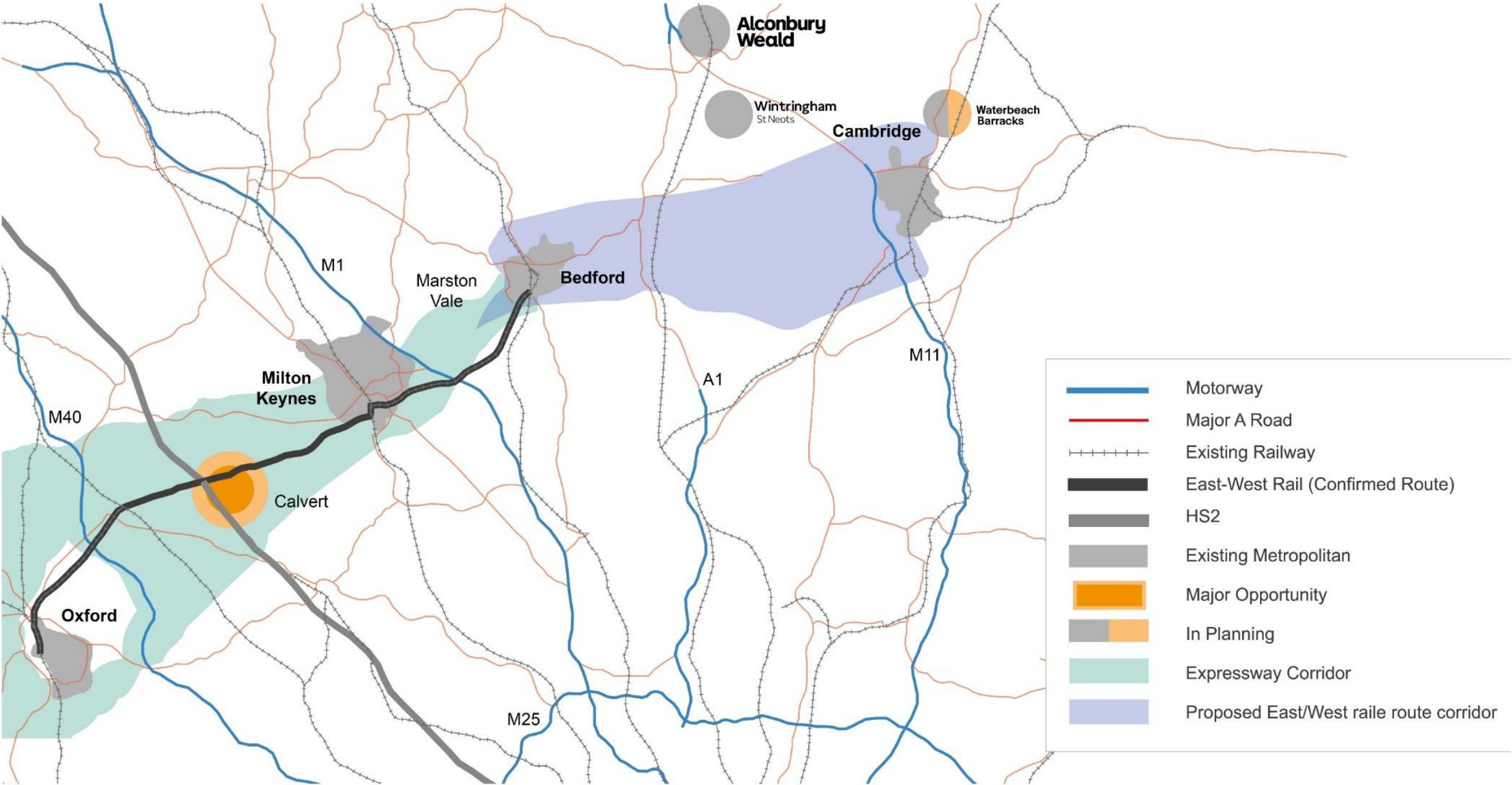
Total £315m

The unaffordable past





Real growth needs affordable rail solutions



Was always thus... A view of railway expansion from the 1840s

How do transport improvements impact the growth and spatial structure of population and employment?

Results show that population growth and secondary and tertiary employment growth were significantly higher near railway stations.

