

# COVENTRY VERYLIGHTRAIL

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**Director of Innovation**  
**SAPT 22<sup>nd</sup> May 2026**



**Funded by  
UK Government**



# Mission Statement

To create an affordable light rail (tram) system for towns and cities of a similar size to Coventry across the UK and the world

**WHY?**



## **Economic Regeneration & Investment**

**Permanence Breeds  
Prosperity**



## **Superior Environmental Performance**

**True 'Zero-Emission'  
Transit, Unmatched  
Energy Efficiency and  
Longevity**



## **Urban Transformation & Liveability**

**Moving More People,  
reducing congestion,  
creating vibrant city  
centres**

# Why not just electric buses?

When buses are subject to the same segregated/priority corridor required to achieve passenger numbers and reliability necessary for modal shift, the perceived cost advantage largely disappears; steel-on-steel offers the more sustainable solution.



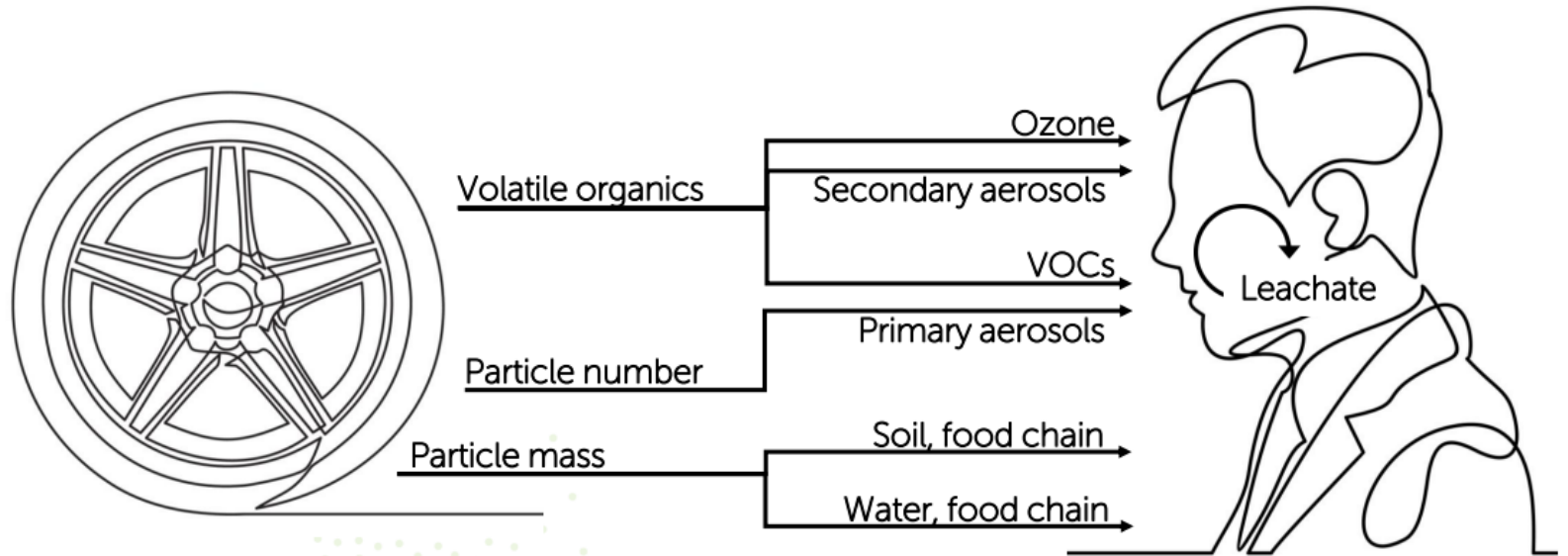
## Car tyres produce vastly more particle pollution than exhausts, tests show

Toxic particles from tyre wear almost 2,000 times worse than from exhausts as weight of cars increases



Emissions from tailpipes in developed countries are much lower in new cars, with those in Europe far below the legal limit. Photograph: Jacob King/PA

## POLLUTION FROM TYRE WEAR 1,000 TIMES WORSE THAN EXHAUST EMISSIONS



CONFIDENTIAL © Emissions Analytics 2024

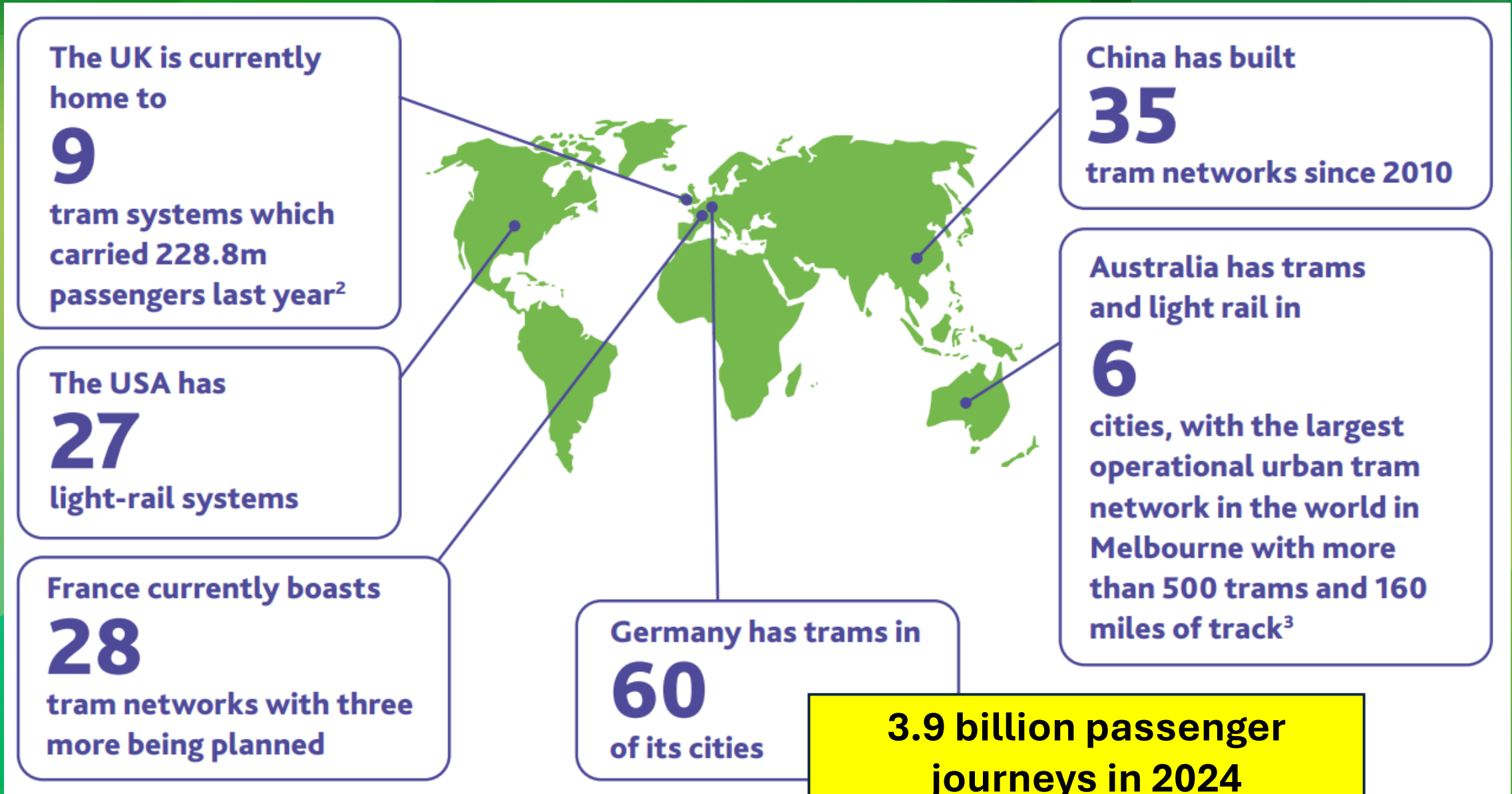
# The Great Retreat: Britain abandons its Trams

An estimated 250,000 people took to the streets to bid farewell to Glasgow's last tram which rolled into the depot for the final time approx. 64 years go





# What is the situation in 2025?

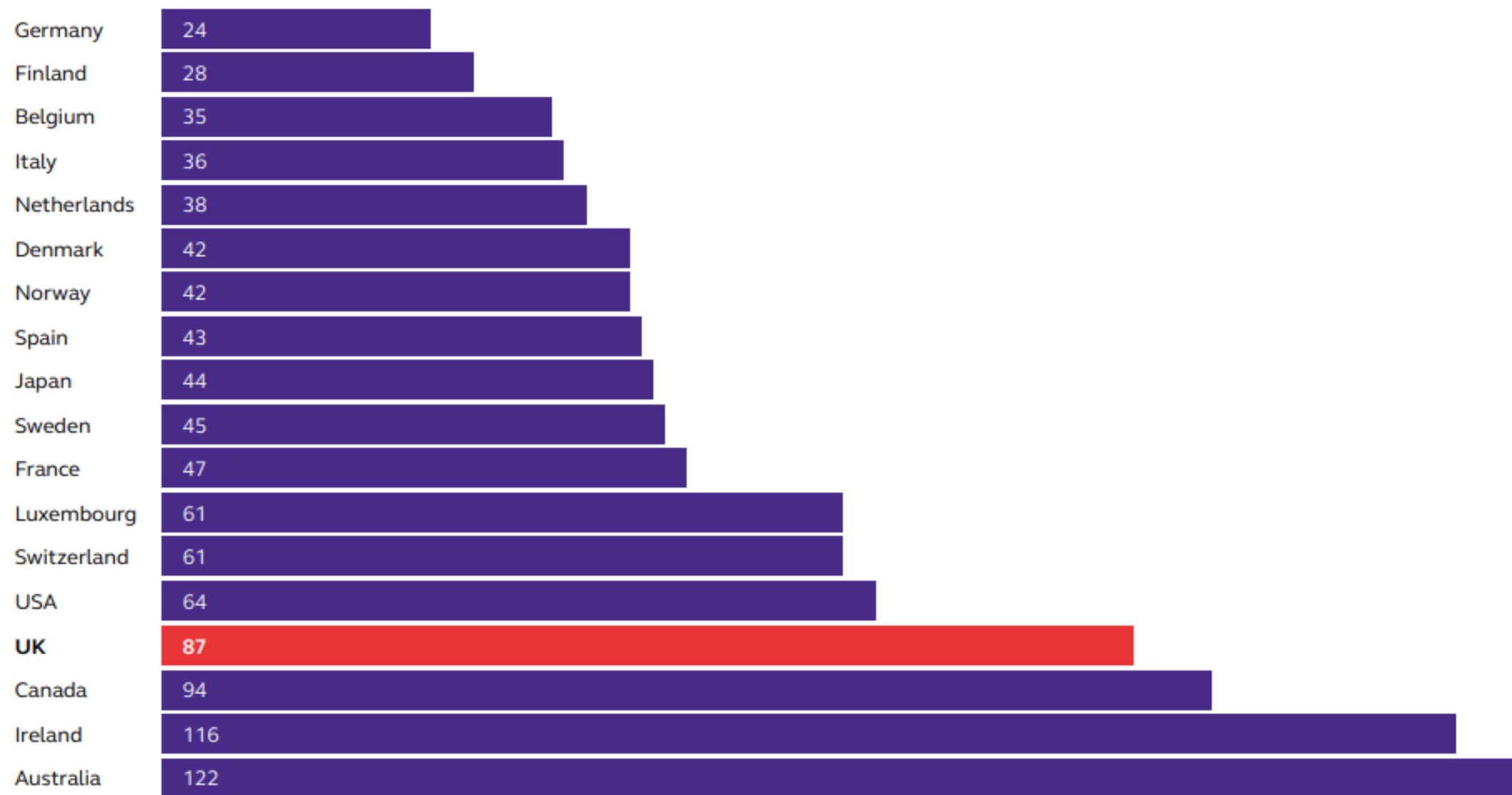


**3.9 billion passenger journeys in 2024**  
**10.7 million passengers /**

**What's the problem?**

### Average Cost of a Mile of New Tramline

Measured in inflation adjusted £



Source: Britain Remade

# UK light rail infrastructure CAPEX

## Midland Metro extension cost rises by £50M

07 MAR, 2019 | 1 COMMENT



The cost of building the 11km long Midland Metro extension from Wednesbury to Brierley Hill to the north-west of Birmingham has risen by £50M to £449.5M.

**Birmingham**  
£ 41 million / km

## True cost of Edinburgh tram line has exceeded £1bn, says report

Public inquiry highlights 'litany of avoidable failures' involving project company Tie, council and ministers



**Edinburgh**  
£ 71 million / km

## Metrolink's Trafford Park £350m tramline opening date revealed

9 March 2020 · 14 Comments



**Manchester**  
£ 63 million / km

Tram extension

**£570m**

Initial budget

- 28 new stations
- 11 miles of new track
- 22 new trams
- 20 million passenger capacity

NET



**Nottingham**  
£ 32.6 million / km

Disclaimer - NOT a scientific comparison of project costs !

**Coventry City Council issues the challenge of £ 10 million / km [dated: 2019]**

# Light rail systems: Why so costly?





## Manchester Metrolink Second City Crossing (2012-2017)

The project involved diverting **over 400 separate utility assets** (gas, water, electricity, telecoms) along a relatively short 1.3km route in the city centre.



## Edinburgh Trams Project (Initial Phase - 2003)

The initial estimate for utility works was around £60-70 million, but the final cost was approximately **£200 million**, representing about **25% of the entire project's final cost**

Average utility diversion costs experienced by the MMA during the delivery of 4 km of tram track in Birmingham city centre

(Birmingham East side (BEE) and Westside (CSQ & EDGE) extensions).

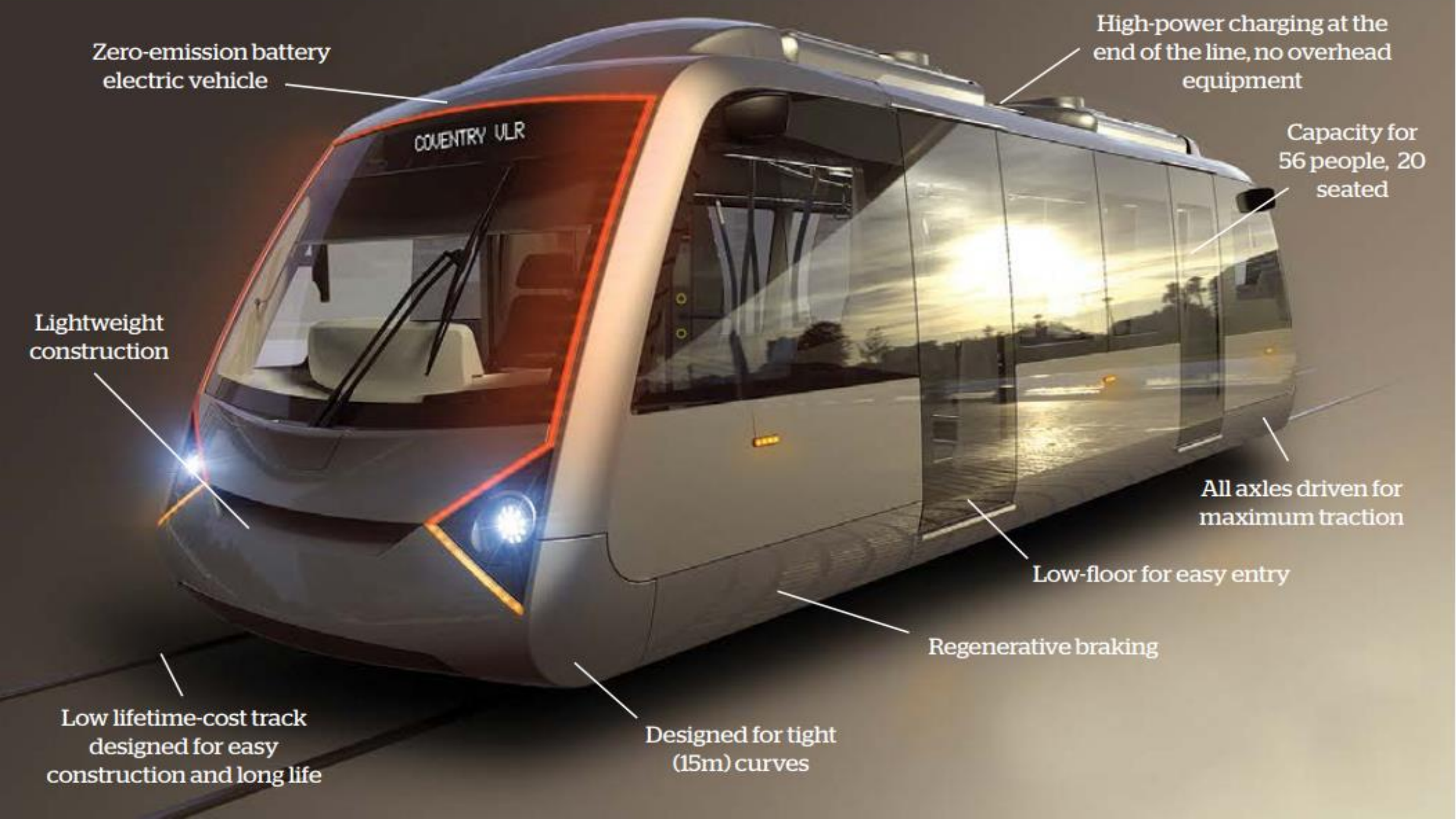
**≈ £ 16 million / km**

# The journey so far.....

- 2017 – secure £14.6m to initiate the R&D Programme and partner with University of Warwick to lead Vehicle and Track development
- 2018 – UoW let vehicle contract to TDI
- 2019 – UoW let track contract to Ingerop
- 2020 – Vehicle assembly at NP Aerospace
- 2021 – First vehicle ride on Test Track at Long Marston
- 2022 – Secured £40.5m CVLR allocation and first installation of CVLR Track installed at UoW
- 2023 – Second and third Test Tracks installed at Whitley Depot and Dudley VLRNIC

## **September 2023 – Vehicle and Track integrated system testing initiated**

- 2024 – preparation for construction of On Road Test
- 2025 – On Road Test 200m installed in Coventry City Centre and Demonstration rides for the public and stakeholders (June25)



Zero-emission battery electric vehicle

High-power charging at the end of the line, no overhead equipment

Capacity for 56 people, 20 seated

Lightweight construction

All axles driven for maximum traction

Low-floor for easy entry

Regenerative braking

Low lifetime-cost track designed for easy construction and long life

Designed for tight (15m) curves

# Vehicle Parts

Front End



Roof



Chassis



Body Side Frame



# THE VEHICLE



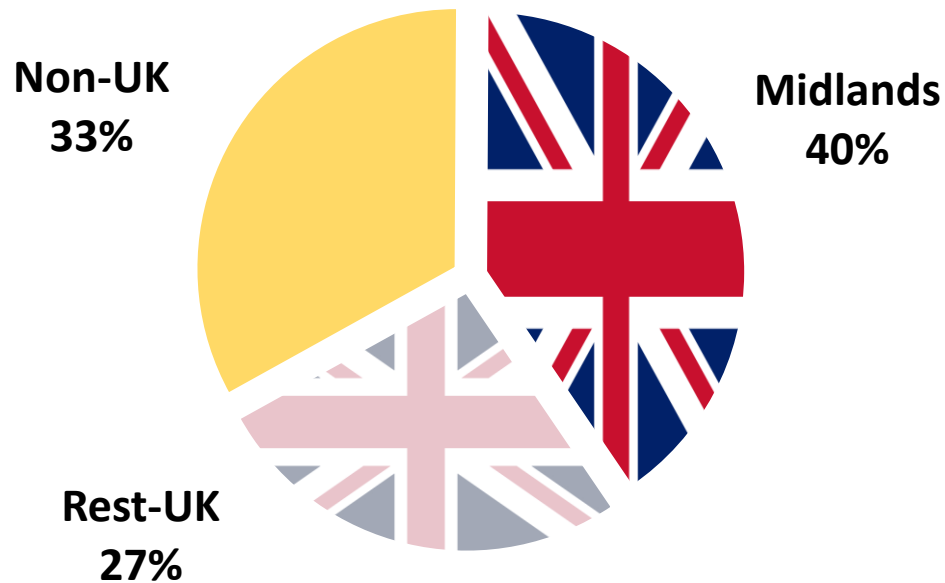
- Working with WMG/ TDI
- Vehicle assembly complete
- Incorporating remote control operation equipment
- Undergoing electrical and factory acceptance testing
- Transfer vehicle to Dudley January 22 for testing vehicle on a standard track



# Not just about a new mode of affordable public transport!

## SUPPORTING UK INDUSTRY

### Material Spend Location



This infographic features logos for TDI (Transport Design International), WMG (The University of Warwick), and MADE IN BRITAIN. It displays a map of the United Kingdom with lines connecting various regional locations to a central hub. Surrounding the map are logos for numerous international and UK-based companies, including:

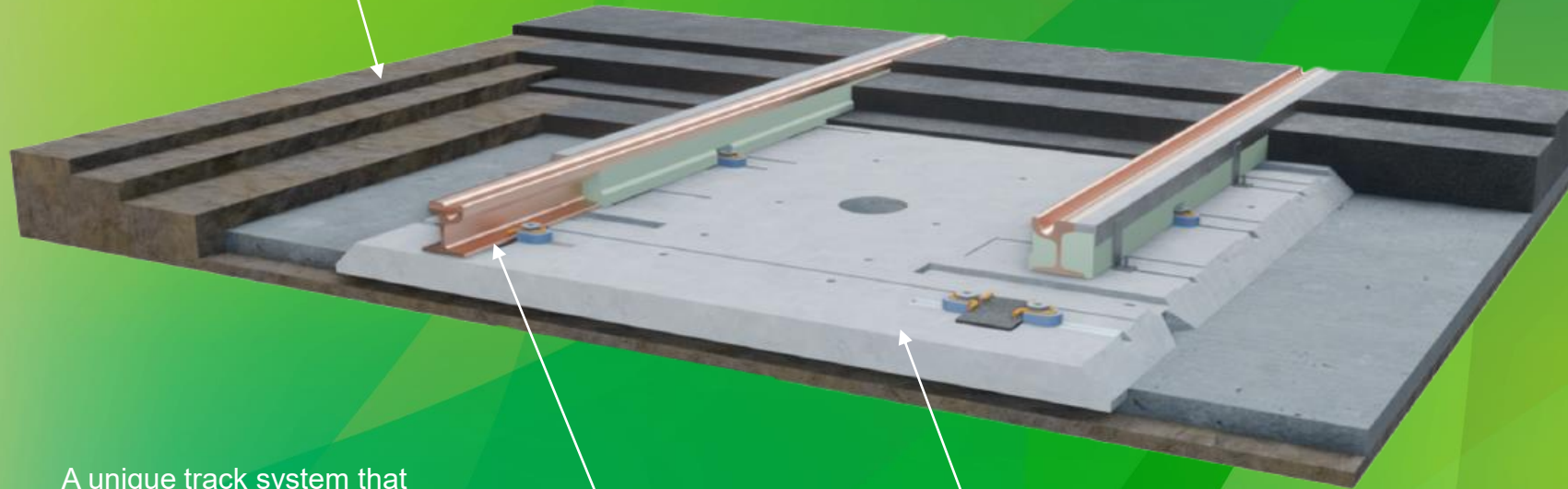
- SWEDEN:** Arogus International AB, ECHANDIA, tikab, BE-GE
- GERMANY:** JOST
- NORWAY:** Alme Solutions
- UK Companies:** DATUM, GARRANDALE LTD, TrainEX, PHOENIX DYNAMICS, XWORKS, SOLO, HEPWORTH GROUP, AVT SYSTEMS, WPARTS, Venture engineering, ValeSpeed, c'cence, CADONIX, AVID technology, ROMAG, SG Technical Systems Ltd, DESIGNANALYSIS, STATFOLD ENGINEERING LTD, NP Aerospace, QUANTUM SEATING, APRACING, bermoic, Furrer+Frey eao, CHINA GUCHEN, SLOVAKIA Stakotra manufacturing...

A legend at the bottom identifies the regions: West Midlands, East Midlands, East of England, London, South East, South West, Republic of Ireland, Northern Ireland, Scotland, Wales, North East and Cumbria, North West, and Yorkshire and the Humber.

**SUPPORTING BRITISH INDUSTRIAL CAPABILITY**

# CVLR track system

Designed to be integrated within existing highways and support HGV loads



A unique track system that eliminates the need for a concrete foundation layer.

Total dig depth of 30cm avoids physical clashes with most buried utilities and easy to remove in the event emergency access is required

Standard grooved rail and fastening system exploiting existing supply chain efficiencies

Patent-pending embedded Slab Track system enables any track alignment to be achieved using just one slab shape



# CVLR Track System: the strategic Dig-Depth Advantage

## Traditional Track System

DIG DEPTH from Top of Rail

≈ 600 – 900mm

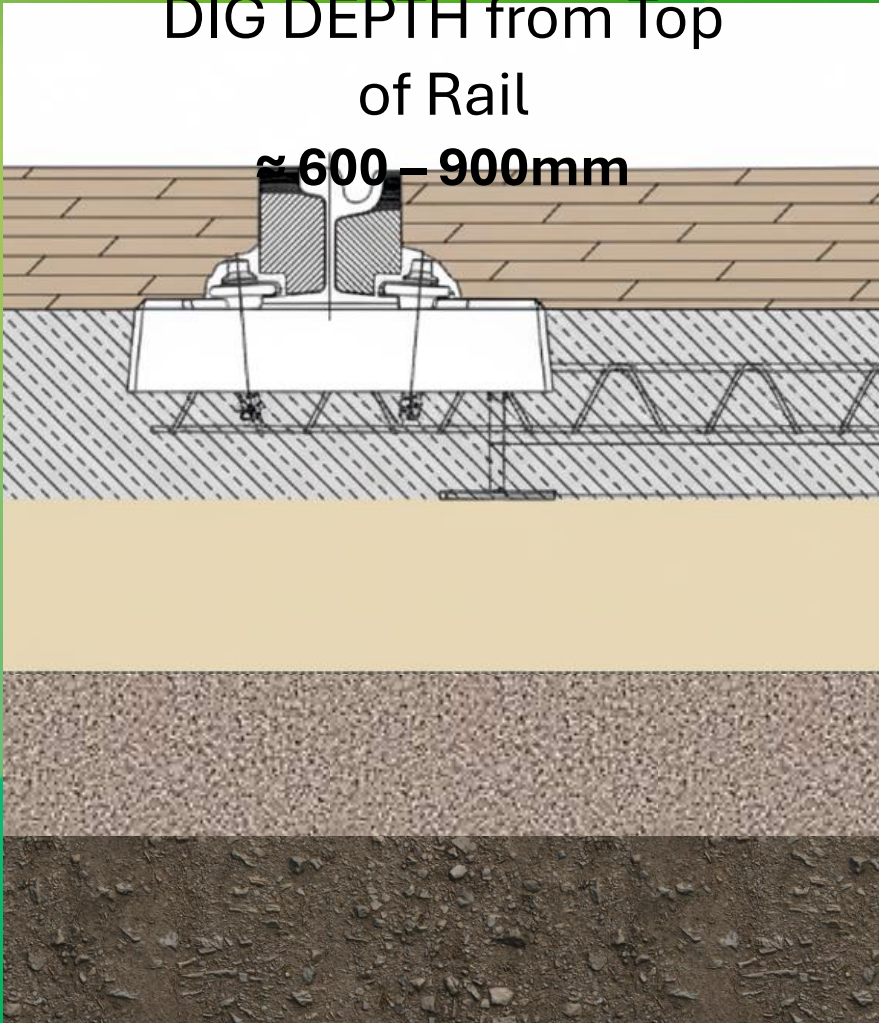
Rail and pavement

Sleeper and in-situ-cast concrete (≈ C35)

Hydraulically Bound Layer (HBL)

Unbound sub-base

Subgrade



## CVLR Track System

DIG DEPTH from Top of Rail

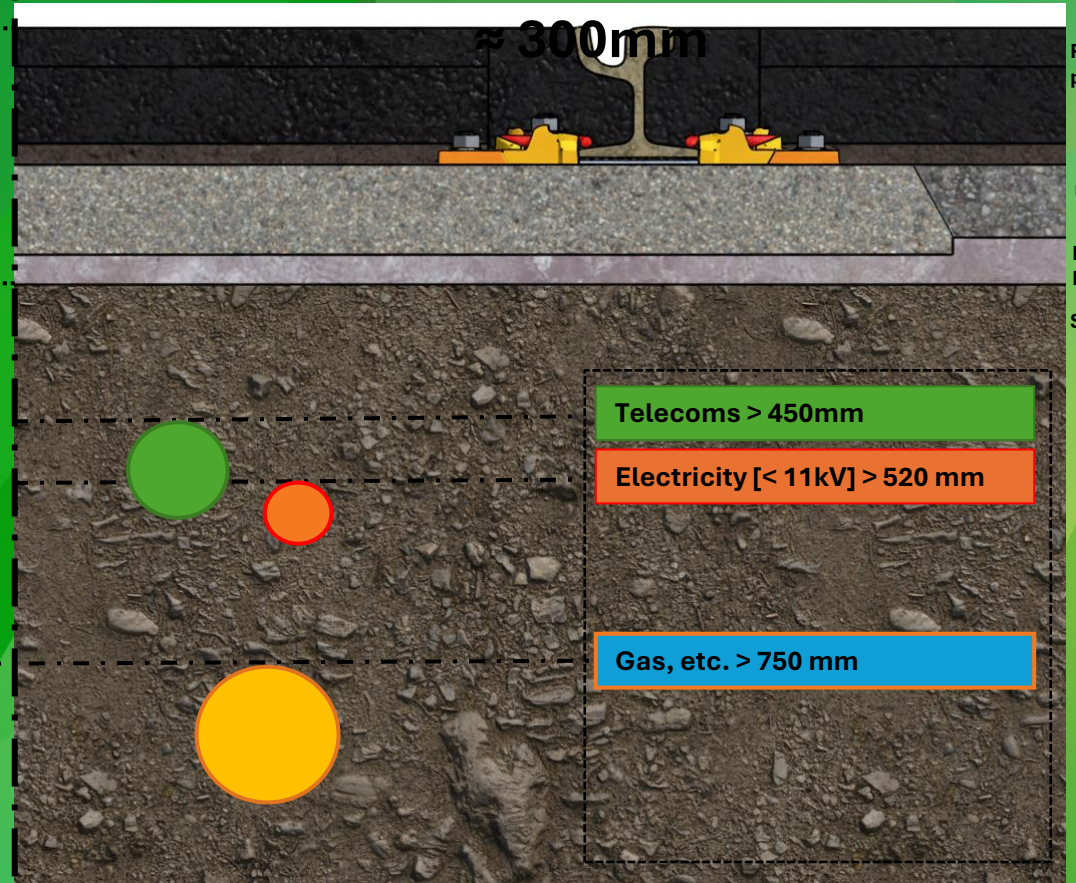
≈ 300mm

Rail and pavement

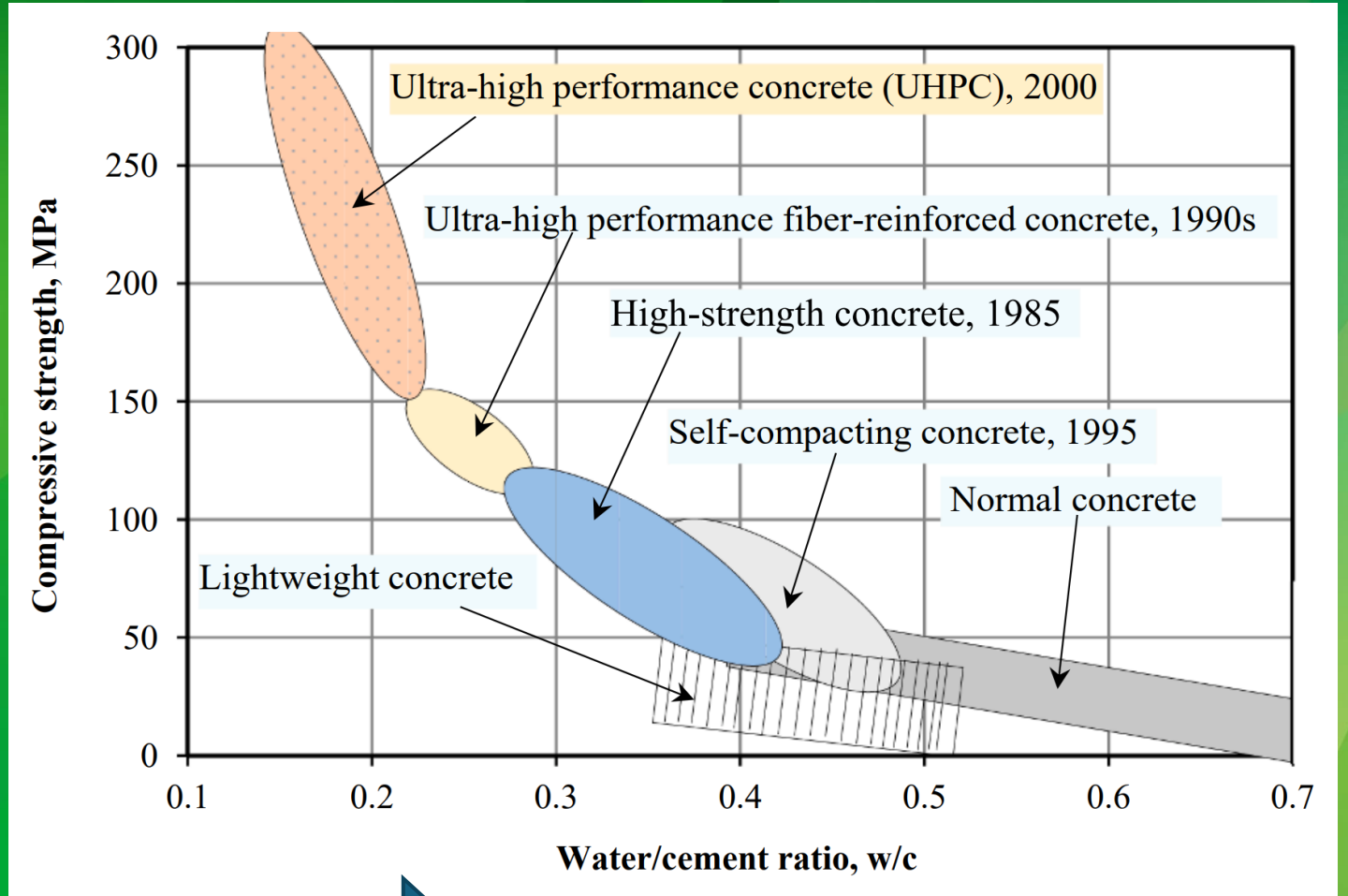
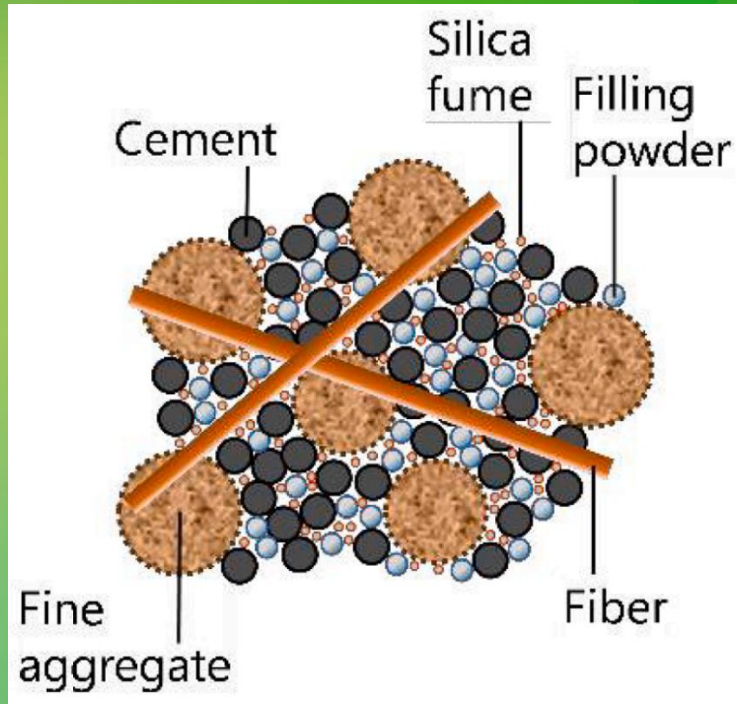
UHPC Slab

Bedding Layer

Subgrade



# What is UHPC [Ultra-high-performance-concrete]



## Typical LRT Trackform

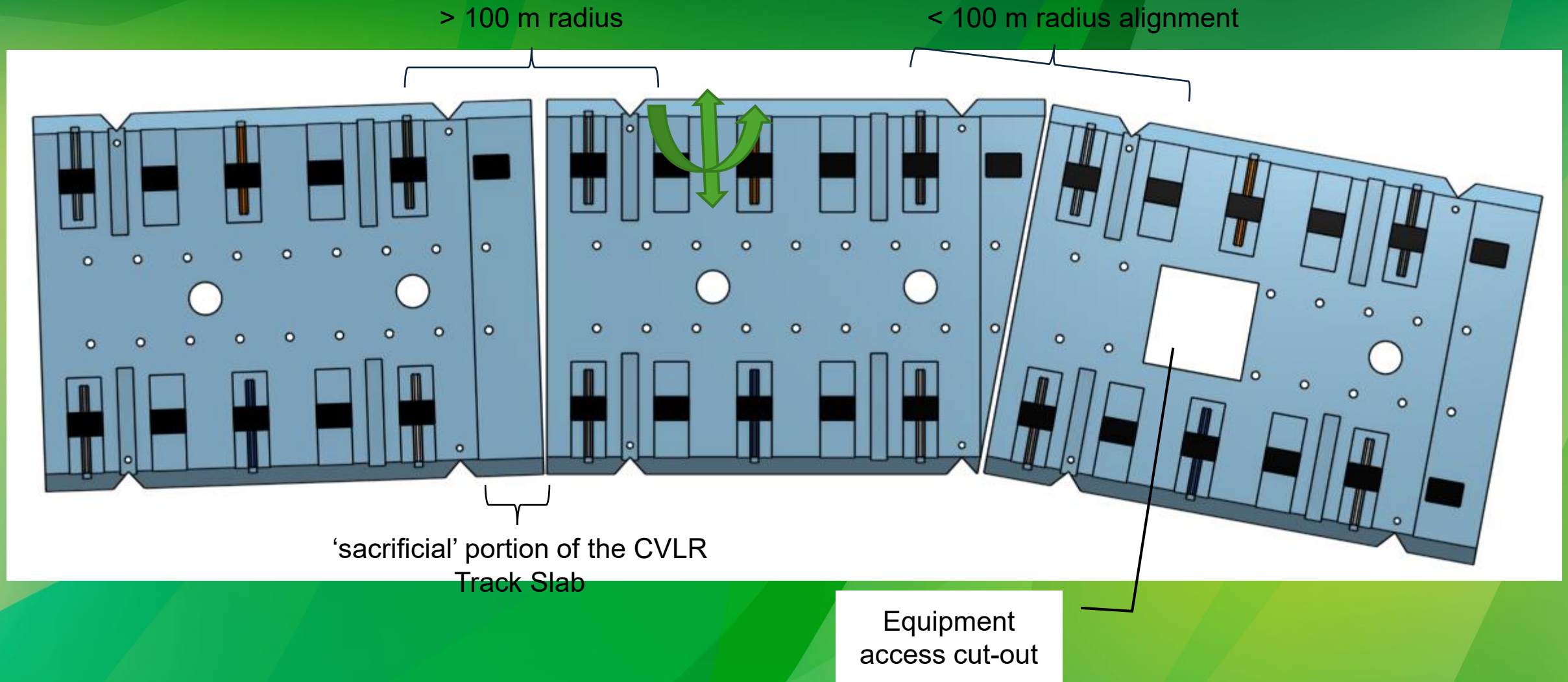
≈ 1.4m<sup>3</sup> / 1mst (3.5m x 0.4m ) of Concrete

≈ - 85%  
Reduction  
in Structural material  
volume

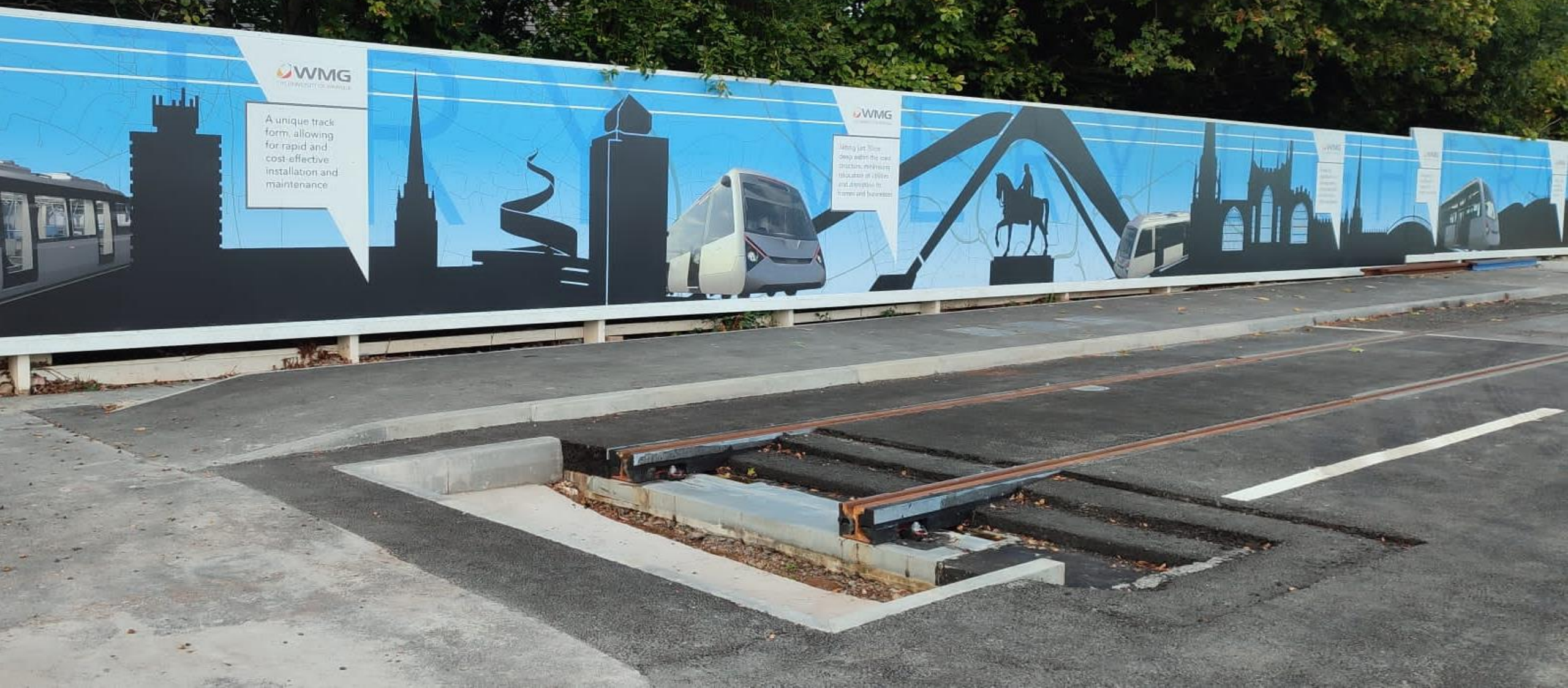
## CVLR Trackform

≈ 0.2m<sup>3</sup> / 1mst (2m x 0.1m ) of UHPFRC

# CVLR Track system



One singular CVLR Track slab can be utilized for any route alignment, which is especially advantageous in urban environments where significant portions of curvature and surface utility access chambers are typically encountered.



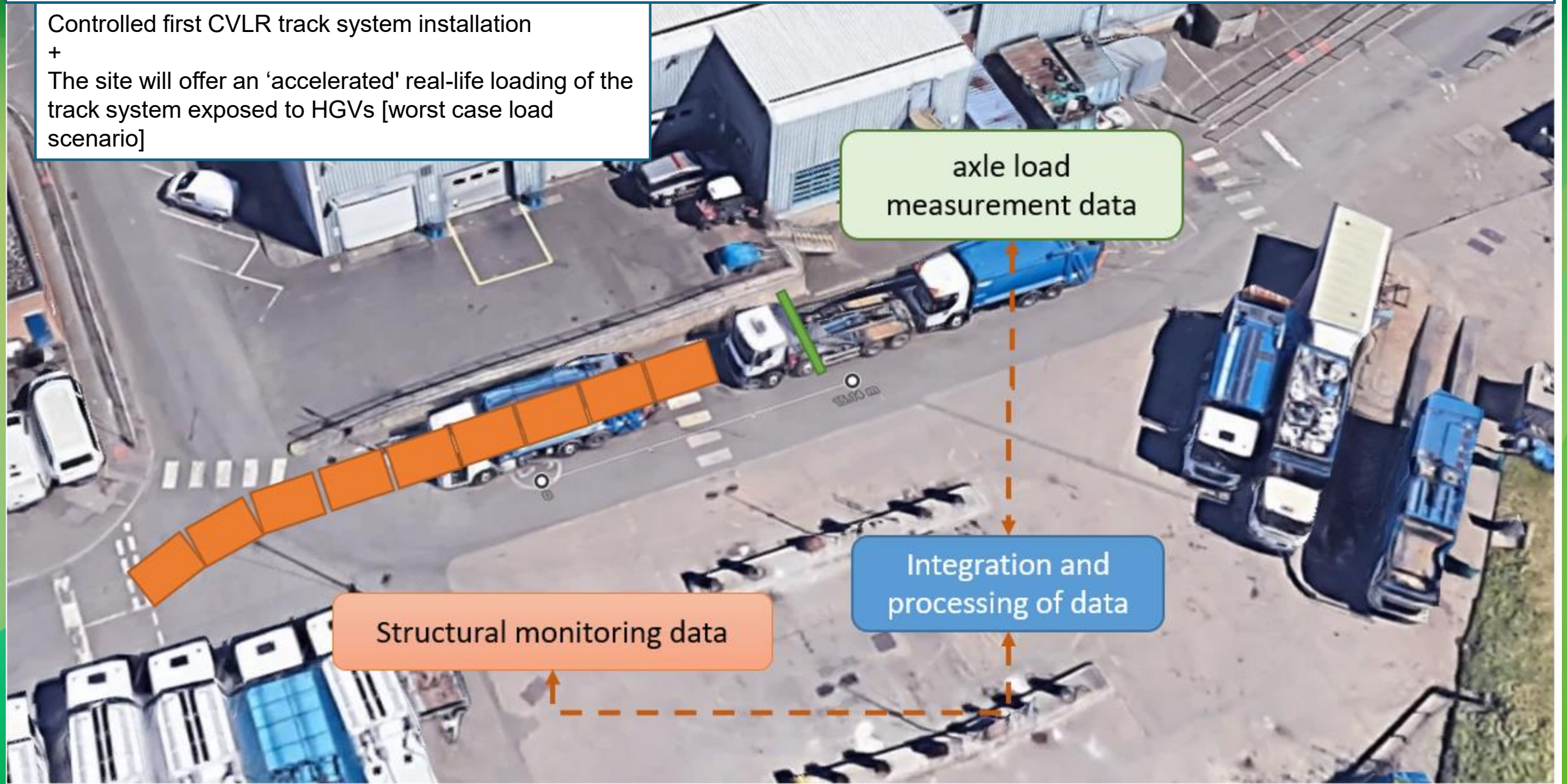
Coventry Very Light Rail Track test site at the University of Warwick since September 2022



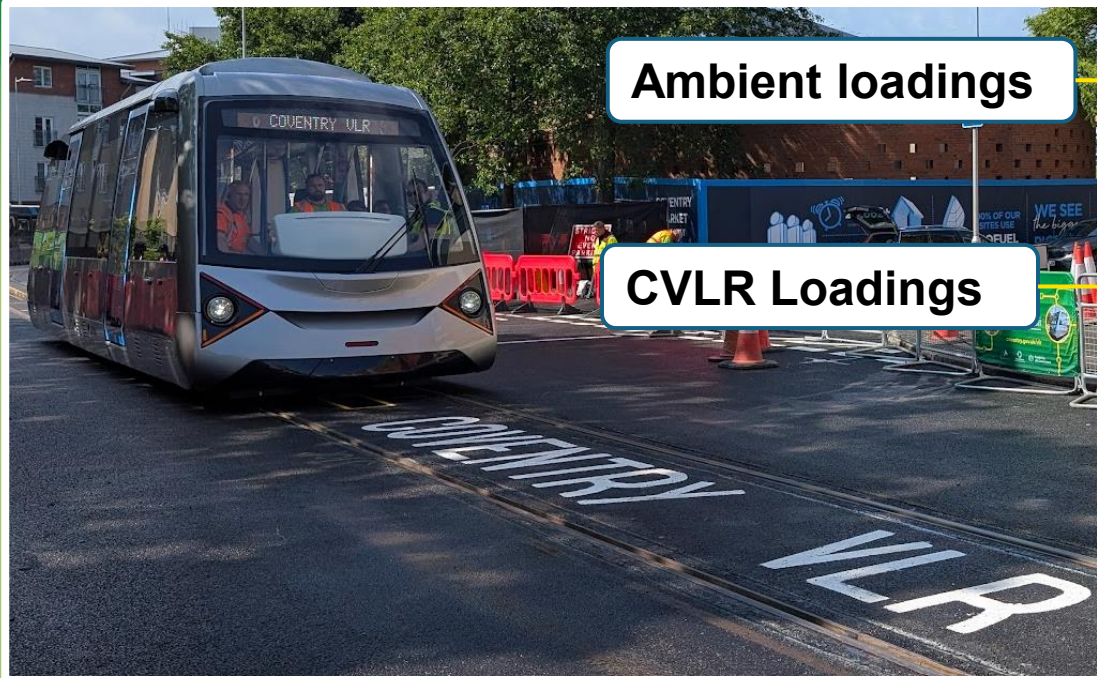
**Coventry Very Light Rail Track test site at Whitley Depot since February 2023**

# Whitley Depot – Track Testing with Road Vehicle loading

Controlled first CVLR track system installation  
+  
The site will offer an 'accelerated' real-life loading of the track system exposed to HGVs [worst case load scenario]



# CVLR Track: Proving long-term performance



**Ambient loadings**

**CVLR Loadings**



**HGVs Loadings**

## Track Structural Health Monitoring

64 x high-frequency sensors embedded in the CVLR Track

**Strains within the UHPC Slabs**

**Strains within the Rails**

**Movement Slabs vs Foundation**

**Movement of Slab vs Slab**

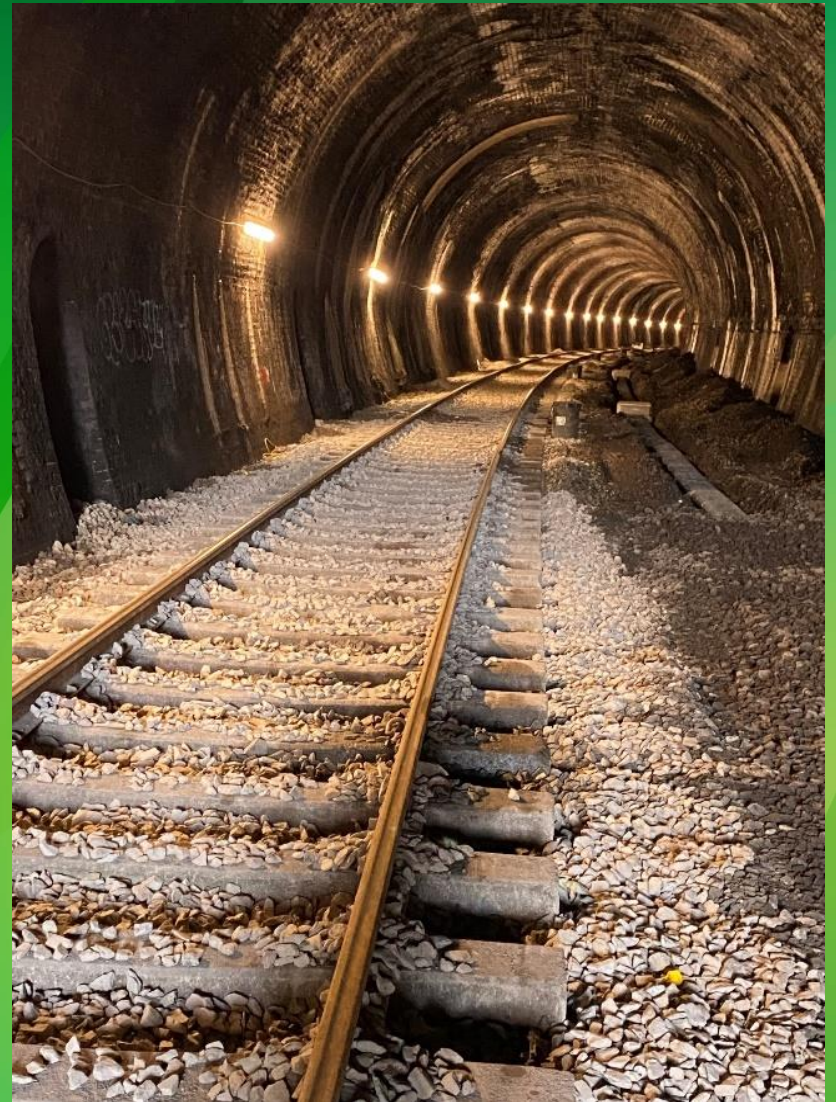
**Movement of Slab vs Rail**

**Pressure transmitted into Foundation**

**Asphalt pavement strain**



# **Very Light Rail National Innovation Centre (VLRNIC)**



## On Road Test Site

- 220m single track installation
- Prove track installation and removal methodology in a live environment (time and cost)
- Demonstrate that the slab track does not compromise stats equipment
- Operate the prototype vehicle in controlled conditions
- Provide public rides and gather feedback



How we did it...

# CVLR track – Installation Methodology



## Step #1

Milling to a controlled surface profile as per design spec; nominal at -300 mm

# CVLR track – Installation Methodology



**Step #2**  
Surface bearing capacity quality control, rebuilding of top section of access chambers and preparation of rail water drain connections

# CVLR track – Installation Methodology



**Step #3**

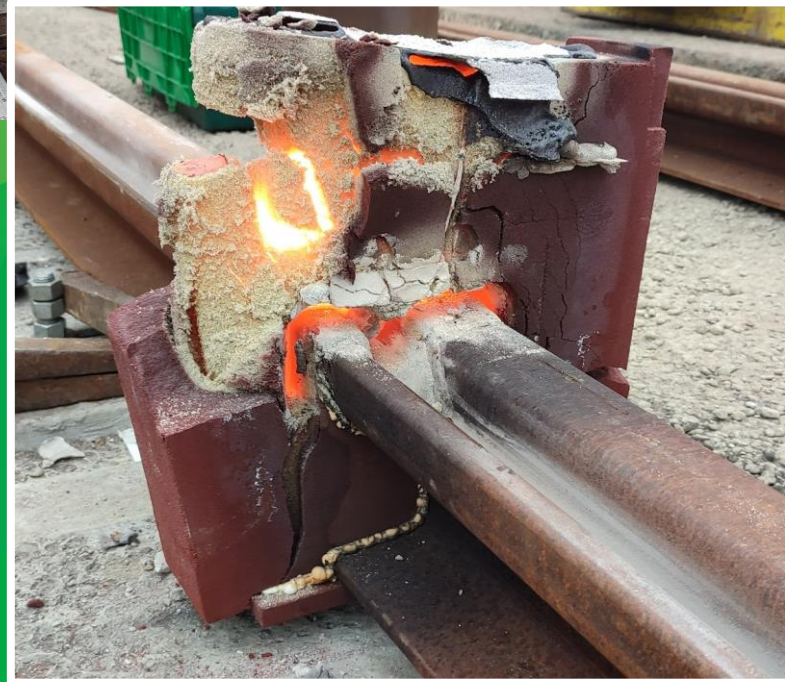
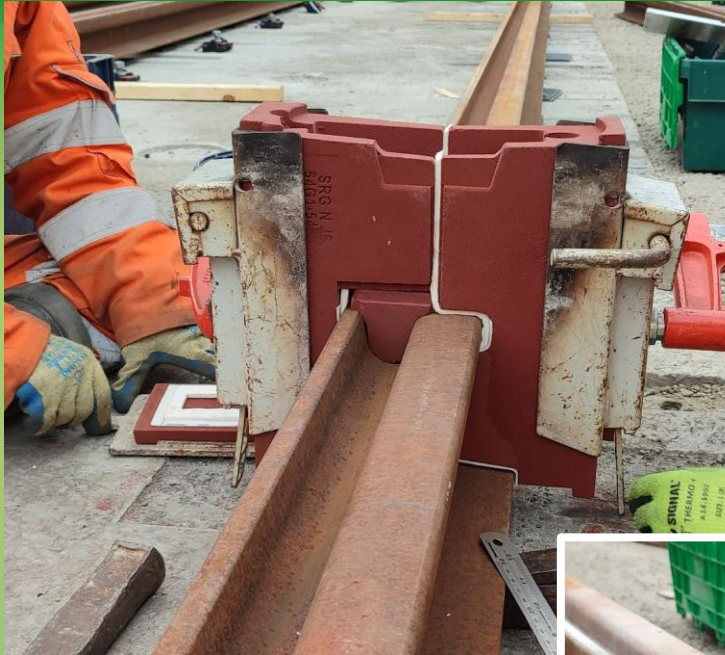
**Slab positioning and setting-out**

# CVLR track – Installation Methodology



**Step #4**  
Rail delivery, cutting and setting out

# CVLR track – Installation Methodology



**Step #5**  
**Rail Welding**

# CVLR track – Installation Methodology



**Step #6**  
**Rail fastening and installation of water drainage boxes**

# CVLR track – Installation Methodology



**Step #7**  
Bedding of CVLR slabs

# CVLR track – Installation Methodology



**Step #8**  
Rail Encapsulation installation

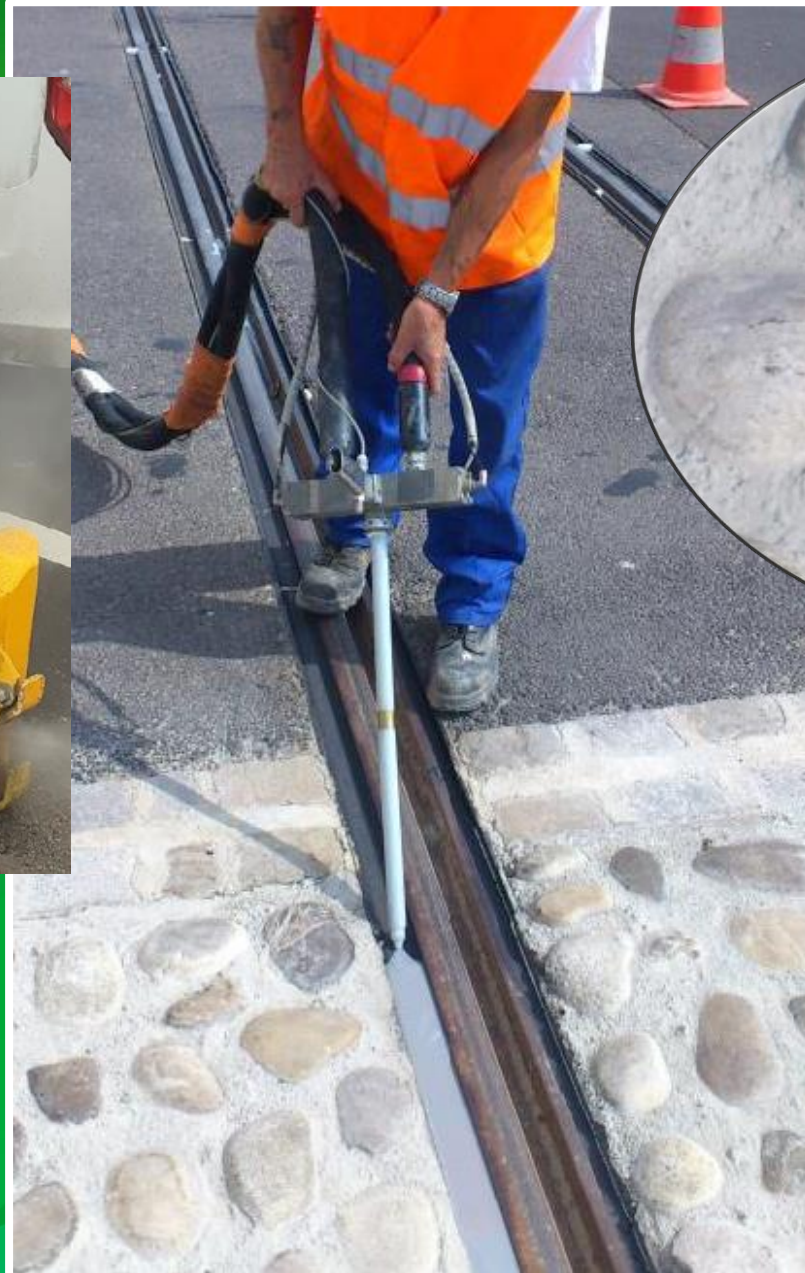
# CVLR track – Installation Methodology



**Step #9**

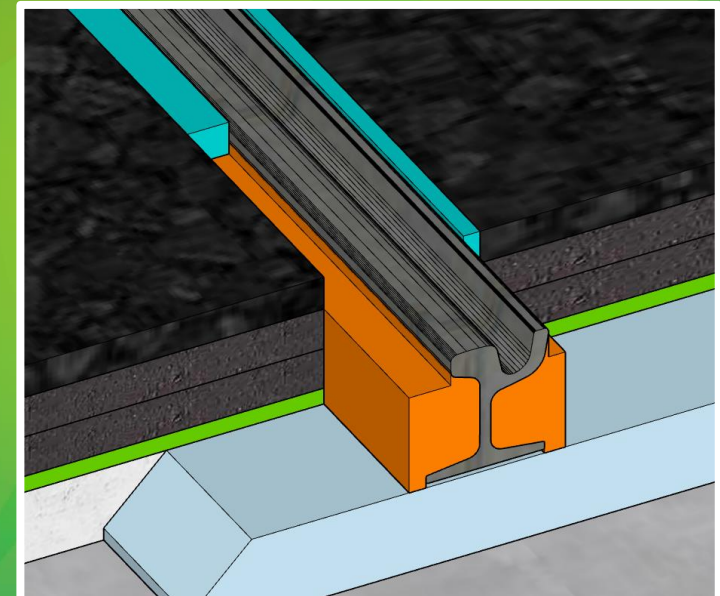
**Building up of the pavement system**

# CVLR track – Installation Methodology



## Step #10

Cutting of joint void and pouring of an elastic liquid rail-to-pavement joint





# COVENTRY

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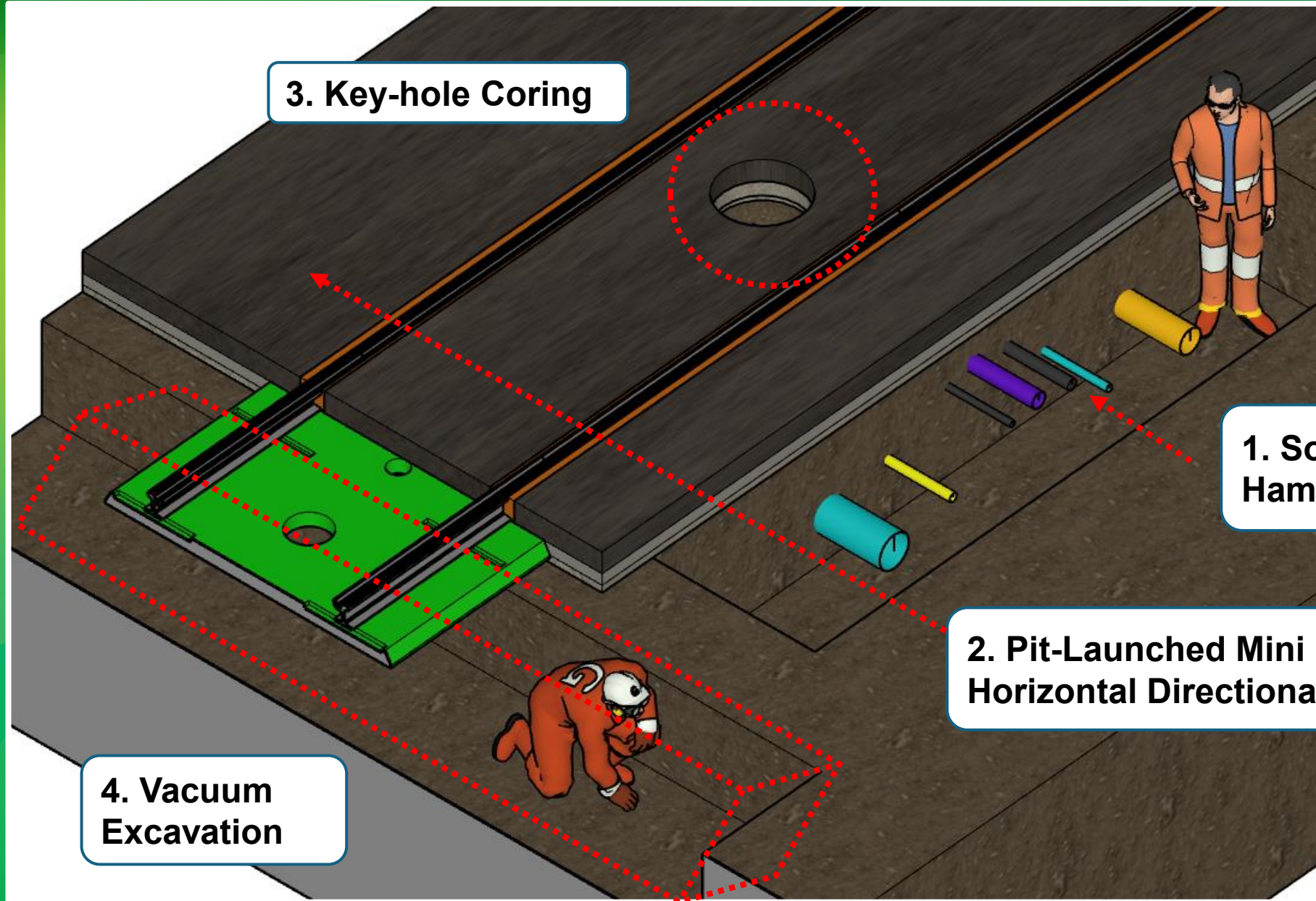
# VERY LIGHT RAIL

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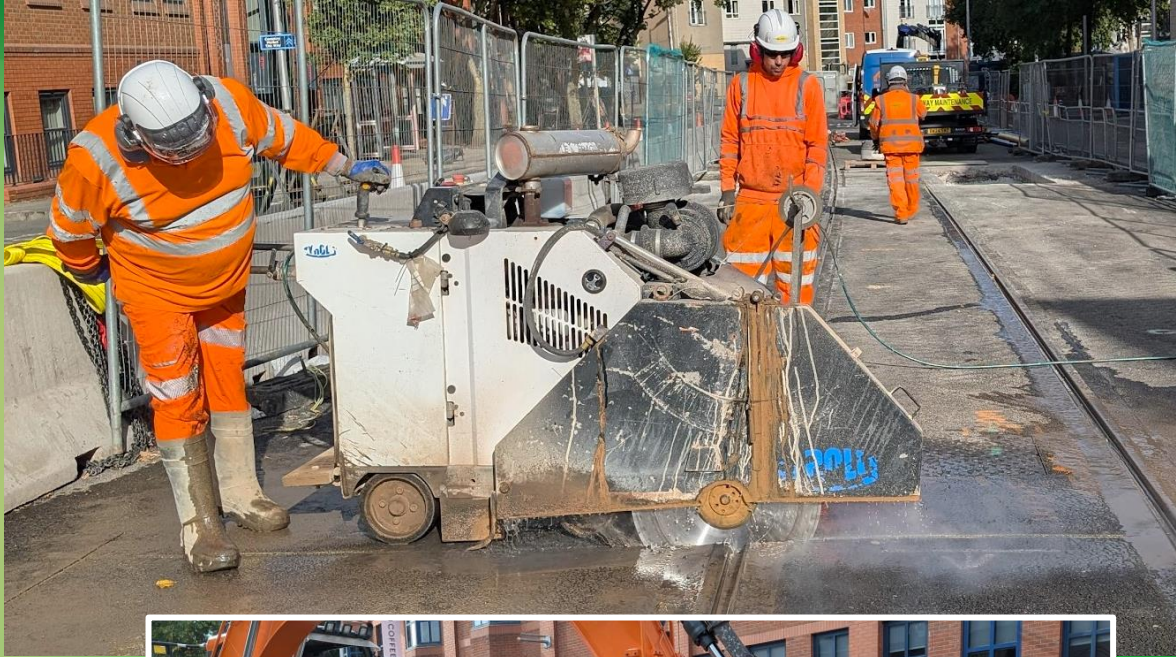
## Coventry "On-Road Test"



# Utilities access strategy



# CVLR track: Rapid access to buried utility in case of emergency



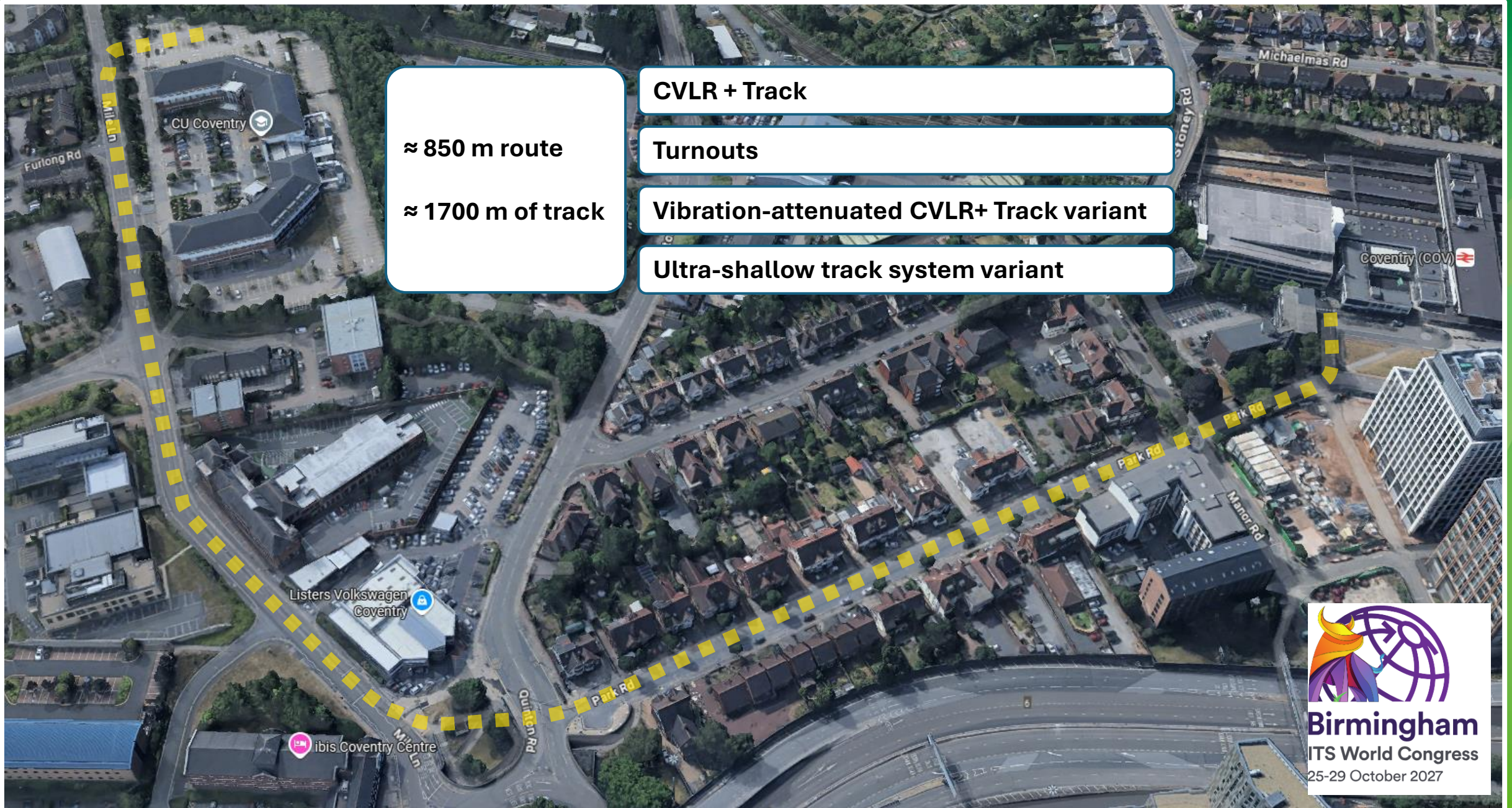
In emergency scenarios, access to any buried utilities under the track can be granted very quickly. Trial successfully delivered in < 1hr

# Rail Replacement Demonstrator

Demonstrated rapid rail replacement validates a trackform designed not only to reduce CAPEX, but to minimise whole-life cost.



What's Next?.....



**≈ 850 m route**  
**≈ 1700 m of track**

**CVLR + Track**

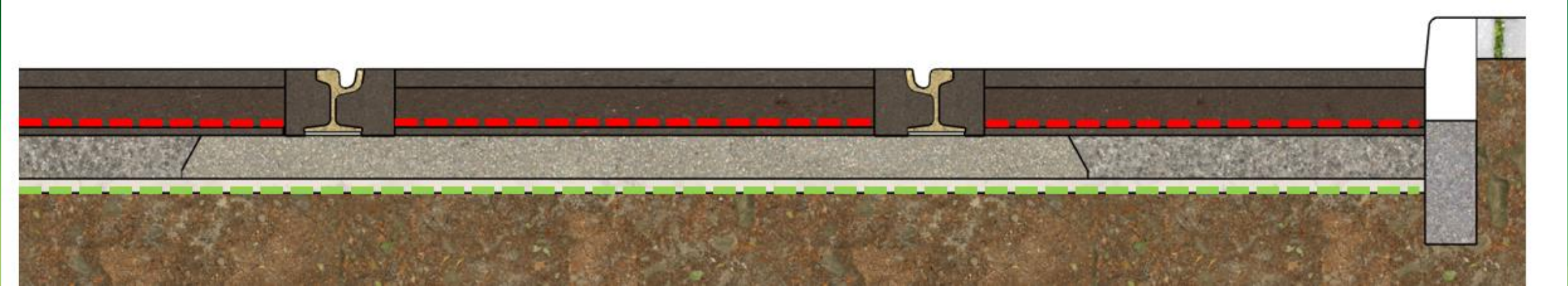
**Turnouts**

**Vibration-attenuated CVLR+ Track variant**

**Ultra-shallow track system variant**

# ITS Route





45 mm SMA PMB

90 mm HRA

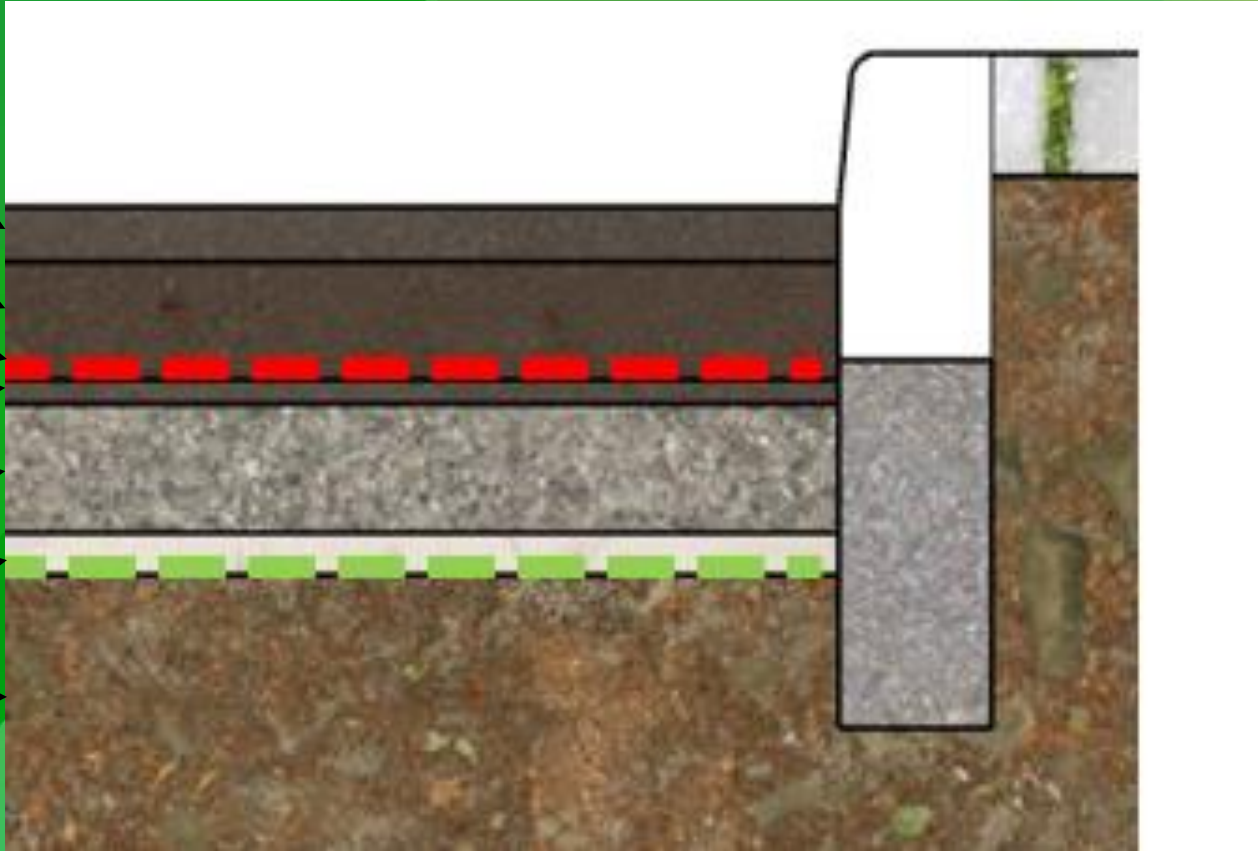
---- SAMIGRID Reinforcement

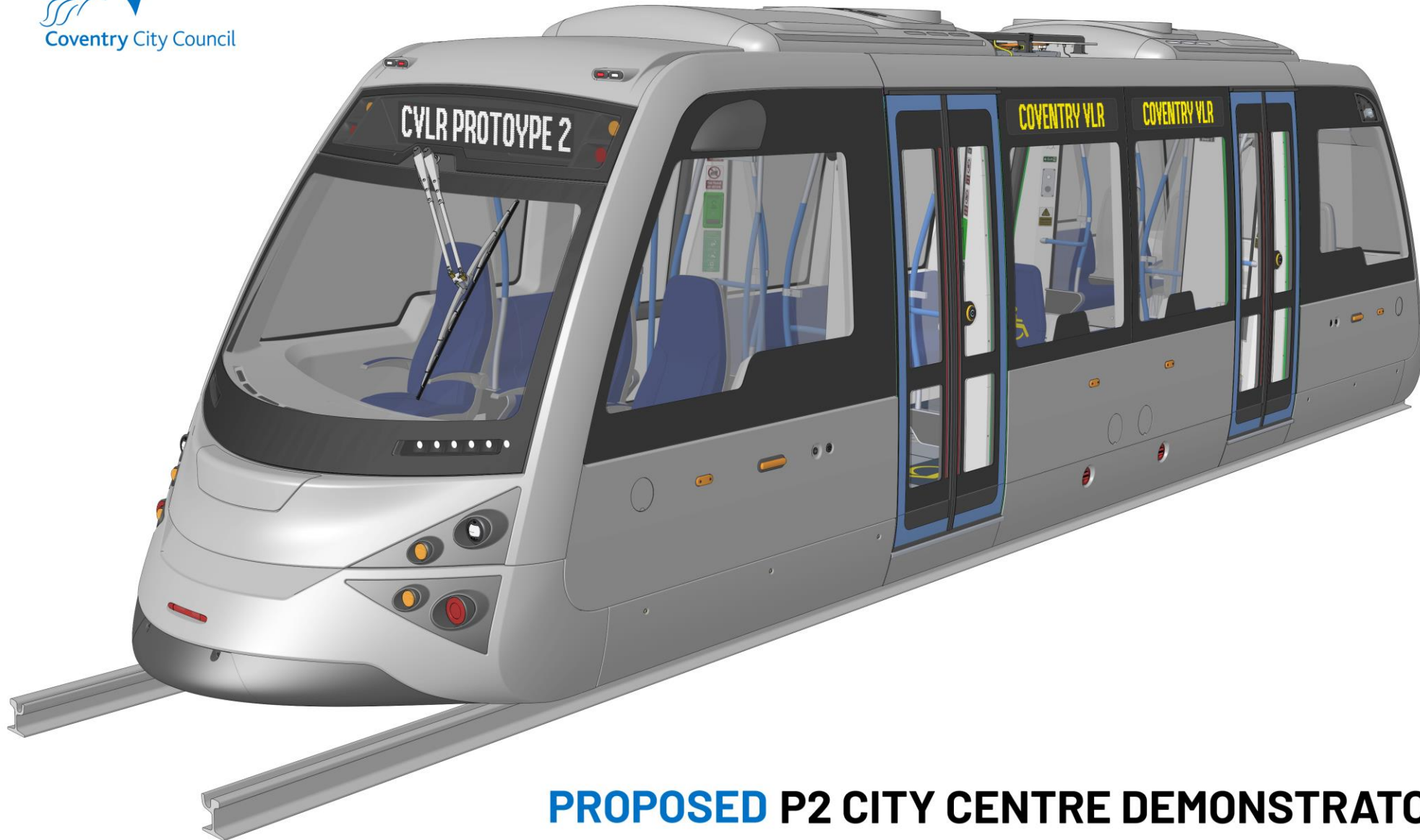
25 mm SAMI Layer

150 mm C8 wetmix

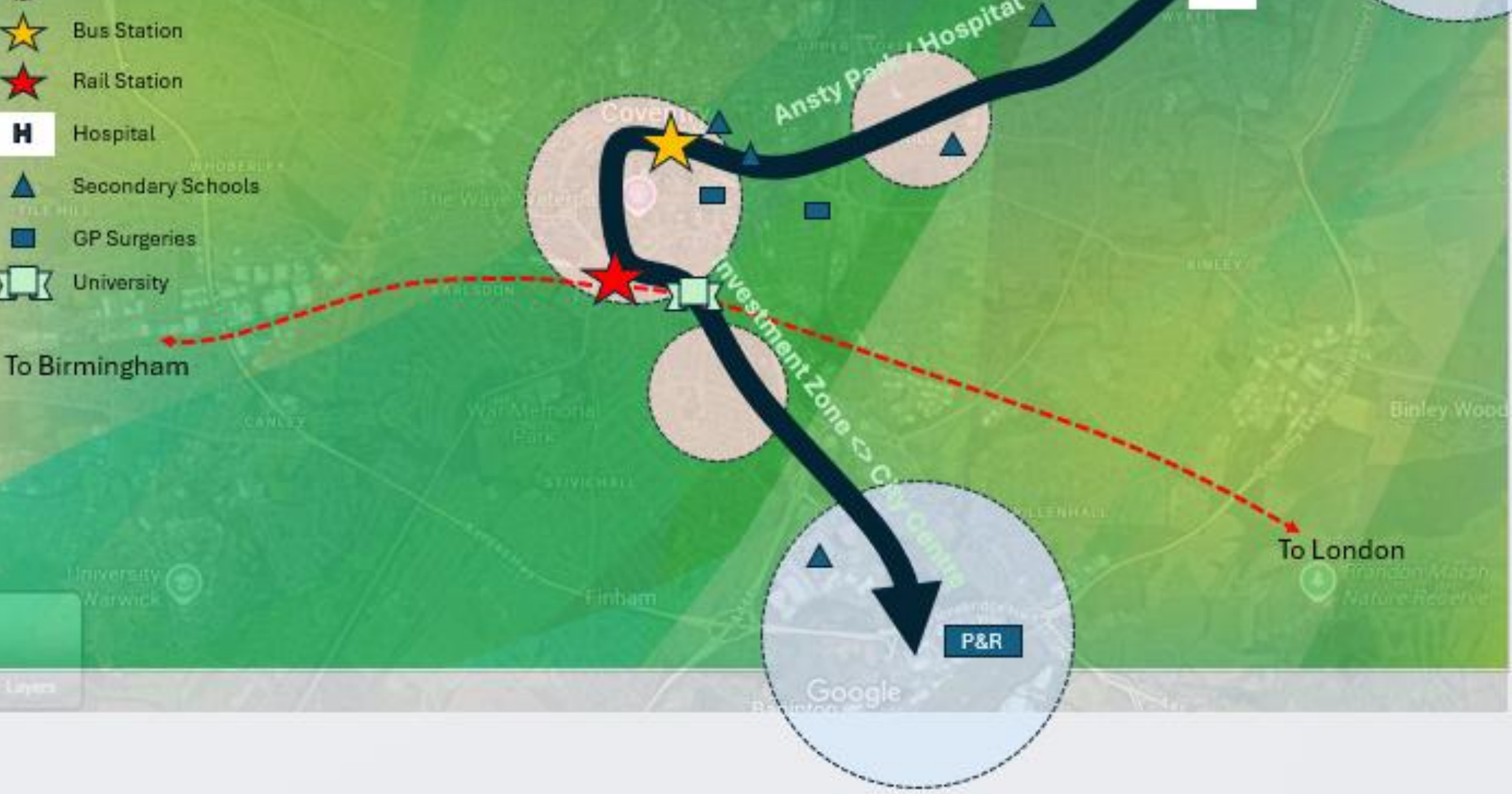
---- Geogrid Reinforcement

Existing 'foundation' @ - 300 mm



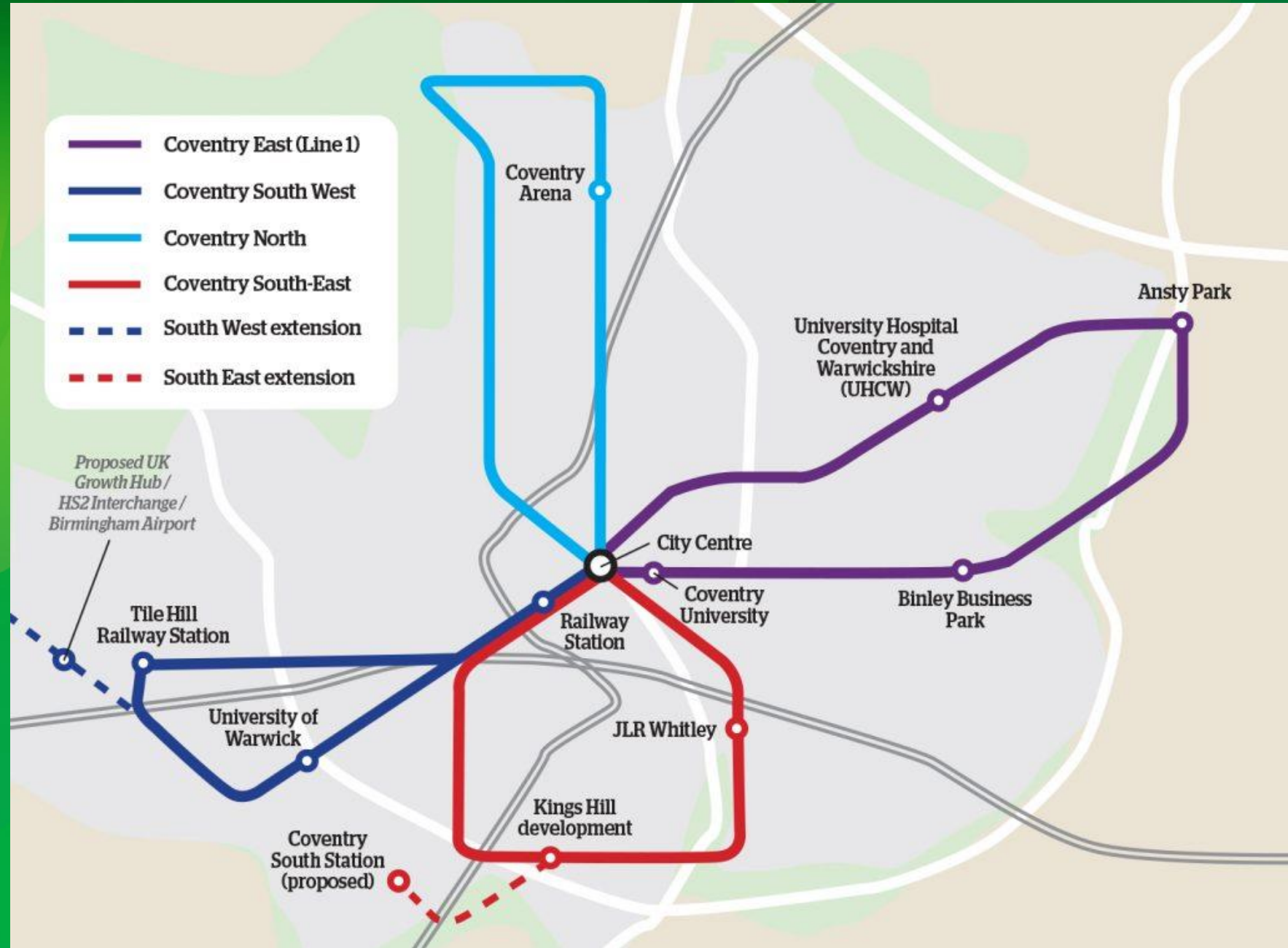


**PROPOSED P2 CITY CENTRE DEMONSTRATOR**



# THE ROUTE

1. Rail Station to City Centre - Demonstrator (2023/24)
2. City Centre to UHCW (2026/27)
3. Network to connect city centre to strategic locations
4. Link to HS2

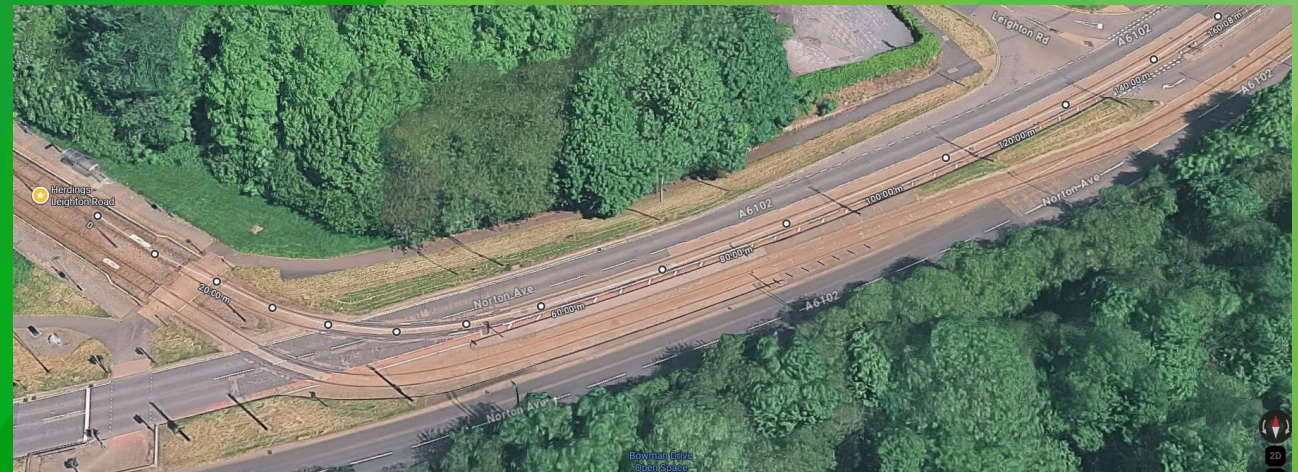
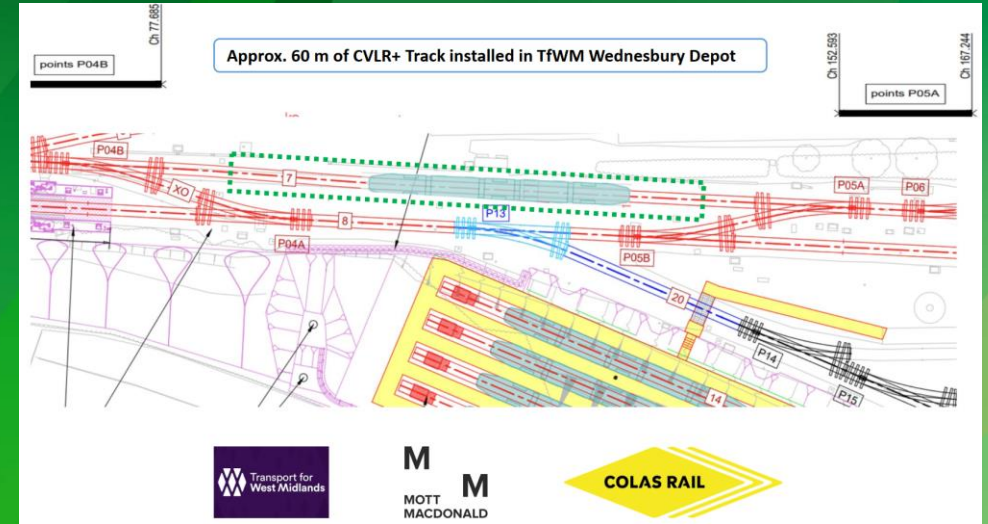


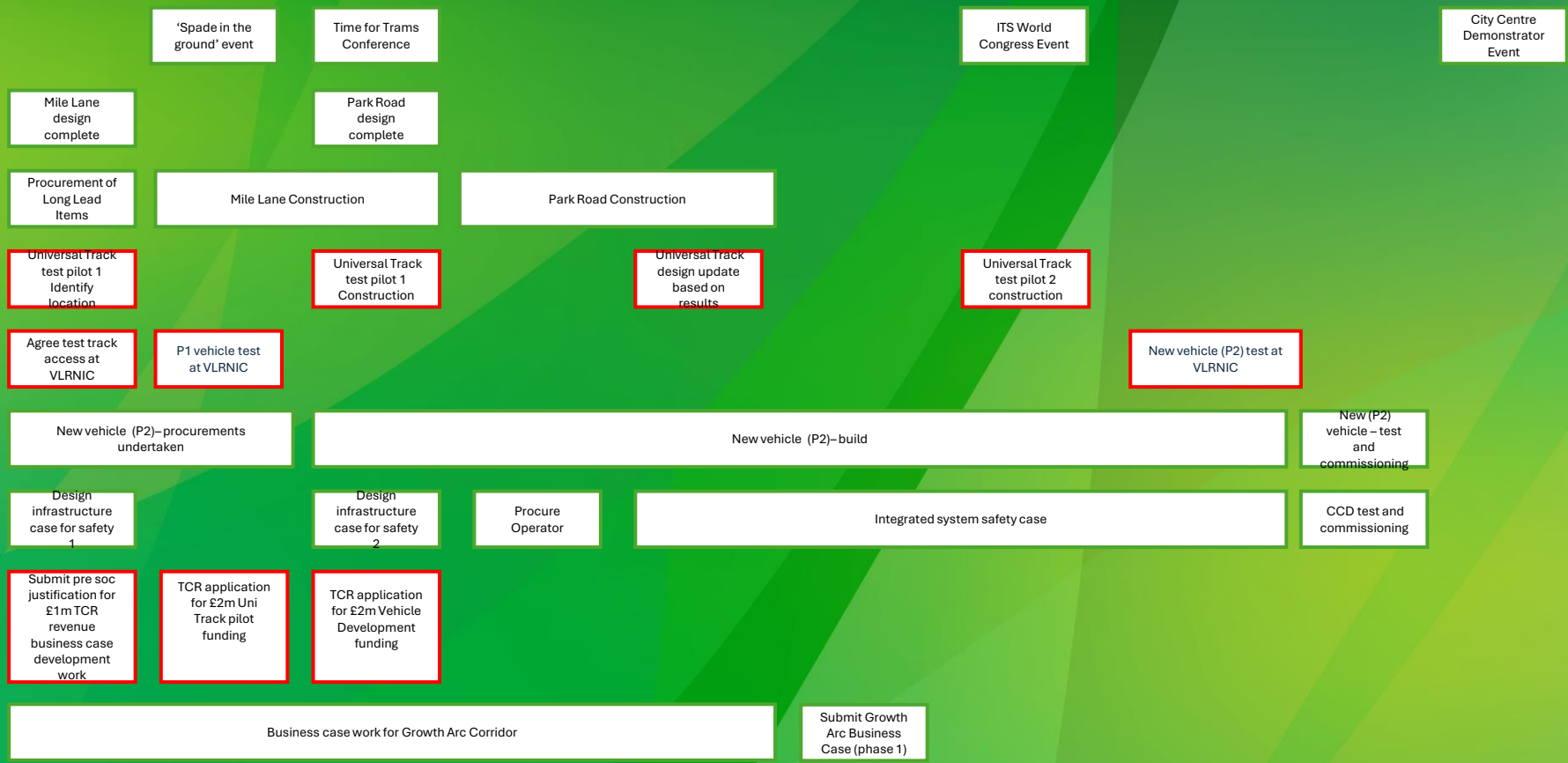
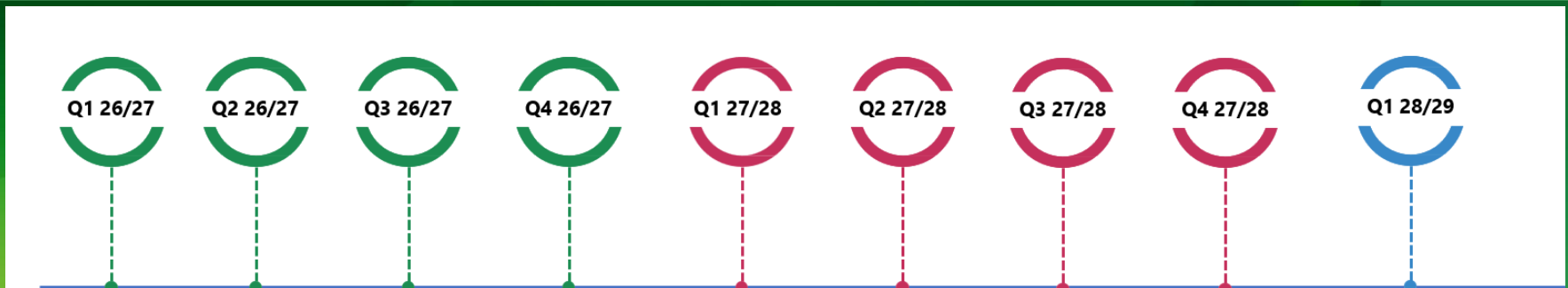
# VLR Vehicle – Ongoing Innovation

- **Remote Control/ Autonomy** – to enable higher frequencies and reduce operating costs
- **Slab Optimization** – composition, shape, reinforcement...
- **Air circulation** – optimal ventilation to minimise spread of viruses/ bacteria
- **Materials to reduce infection spread**- e.g. coating grab handles with a suitable material to render viruses inactive
- **Contactless** – passenger information and ticketing
- **Automated robotic cleaners** – to enable vehicles and platforms to be cleaned frequently at low cost.
- **Dynamic Wireless Power Transfer** – charging on the move

# Universal Track planned test sites

1. Wednesbury Depot – replacement of 60m of standard track with universal track
2. Sheffield – replacement of up to 200m of track (on and off road) – 2027
3. Other opportunities being explored





P1 - Original prototype vehicle, used at the on-road test  
 P2 - New prototype vehicle  
 Universal Track – Advanced track for use with conventional trams  
 Red outlined boxes – Key decision points

# Commercialization

- City Council has successfully obtained 7 patents – with a further 7 pending
- Opportunities to exploit the IP – especially for the trackform
- Many interested towns and cities...

# Interested Organisations

- TFWM is working with us to develop universal slab track which could be used to extend the West Midlands Metro network
- And many other organisations are either interested in the system or the universal slab track opportunity and have asked to be updated on our progress:

Liverpool City Council

Derby City Council

Leeds City Council

Peterborough CC

Cirencester Town Council

Isle of Wight

Warwick District Council

Midlothian Council

HS2 Architects for Toton

Birmingham Airport

Halifax

Perth

Black Country Consortium

Arcus Infrastructure Partners

Urban and Civic

Arnold White Estates

Eversholt Rail

Network Rail

Arriva and Northern Rail

UHCW

Segro

South Yorkshire Combined  
Authority

West of England Combined  
Authority

West Midlands Combined  
Authority

West Yorkshire Combined  
Authority

Warrington Borough Council

Herefordshire Council

Galloway, Ireland

Rosario, Argentina

Delhi Airport, India

New York City

Wakefield Council

Wirral Waters – Peel Holdings



Transport for  
West Midlands

# CVLR partners

Anteo  
Arogus  
Arup  
Atkins  
AVA Consulting  
BCIMO  
Bloom  
Cemex  
Colas Rail  
Construction Fixing Systems  
Coventry University  
Design and Analysis  
Edilon )( Sedra  
Egis  
Elkington & Fife  
Galliford Try  
Hall Engineering

Hatch  
Huddersfield University  
IKO UK  
Ingerop (Rendel)  
ITP  
GCP  
KPMG  
Mainspring  
Mott Macdonald  
Murphy Geospatial  
Pandrol  
Penmark  
Pinsent Masons  
Rail Adventure  
Rendel Thorpe  
RLB  
Sika

Severn Partnership  
Statfold Engineering  
Tarmac  
Techjoint  
TDI  
TfWM  
The MTC  
Valuation Consulting  
Vertex  
Waterman Aspen  
Wildlife Trust  
WMG/ University of Warwick  
WSP  
WSP Rendel

# How can we make this all happen?

- **Utilities** – changing codes of practice and rebalancing costs
- **TWAO** – devolution to mayors? Streamlining the process
- **Funding/Business Case** – not just focusing on the bottom line!
- **Environmental Regulation** – need for proportionality: CVLR is designed to run primarily in existing roads or urban environments
- **Vision!**



# TIME FOR TRAMS

Fast-tracking affordable tram and light rail networks across Britain

landor LINKS  LIVE

24 September 2026



09:00-17:00

## Time for Trams 2026

Fast-tracking affordable tram and light rail networks across Britain

Conference and Exhibition  
Coventry Technology Centre, Coventry

Time for Trams is a bold new annual gathering for the people shaping the future of urban transport in the UK.

Time for Trams is not just another conference. It is a rallying point for political leaders, policy makers, investors and delivery experts who recognise that Britain needs to move faster – and think bigger – when it comes to mass transit.

[Visit website](#)

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Thank you !



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