VERY LIGHT RAIL:
TRANSPORT SOLUTIONS
FOR THE FUTURE

Thursday 28th November 2019
9am - 4pm
The Slate, the University of Warwick, CV4 7AL
## Agenda

### Session 1

**Welcome and Opening Remarks**
- Archie MacPherson, CEO WMG HVM Catapult
- Cllr Jim O’Boyle, Cabinet Member for Jobs and Regeneration, Coventry City Council

**Keynote Address – The need for change**
- Steve Berry, Head, Highways Maintenance Branch, Local Transport Funding and Growth Division, Department for Transport

**What is Very Light Rail and what does it offer?**
- Nick Mallinson, Programme Manager VLR, WMG Coventry Very Light Rail project
- Colin Knight, Director of Transportation and Highways, Coventry City Council
- Nicola Small, Programme Manager for VLR, Coventry City Council
- Grant McElvie, Commercial Director, Coventry City Council
- Cost of Urban Very Light Rail, Andrew Stamps, Rider Levett Bucknall

### Session 2

**The Very Light Rail National Innovation Centre**
- Alan Lunt, Strategic Director (Place) & Deputy Chief Executive, Dudley Metropolitan Borough Council

**Very Light Rail Revolution project – the foundations for Coventry VLR**
- Tim Burleigh, Head of External Relations, Eversholt Rail
- Martin Pemberton, Managing Director, TDI

**What standards will apply to VLR systems and how will approval be achieved?**
- Bridget Eickhoff, Principal Infrastructure Engineer, RSSB

### Session 3

**What is best practice for delivery of a safe VLR system?**
- Peter Howarth, Independent Competent Person for the Coventry Very Light Rail project

**How VLR can inform and complement traditional rail**
- Rory Dickerson, Senior Engineer for Traction & Rolling Stock, Network Rail

**Accessible urban rail solutions and the UK housing gap**
- Robin Butler, Managing Director, Urban and Civic plc

**Panel Q&A**

**Closing remarks**
- Nick Mallinson, WMG

**COFFEE AND NETWORKING**
- Tours of WMG and drop in sessions with experts

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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.

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

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

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

**INNOVATION**  
We redefine engineering by thinking boldly, proudly and differently.
**Very Light Rail: Transport Solutions for the Future**

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

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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: 0.1-0.6µ (but heavy rail assumes <0.15)
- Rubber on tarmac: 0.4-0.9µ
- 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
How Very Light Rail can inform and complement traditional rail

Rory Dickerson
Senior Engineer, Traction & Rolling Stock
For Prof. Andy Doherty
**Very Light Rail: Transport Solutions for the Future**

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Accessible urban rail solutions and the UK housing gap
The Housing Gap is regional, but real

- **New housing supply**
- **Local housing need**

Source: Lichfields Housebuilding Statistics, November 2018 (representation reconfigured)
The planning system has encouraged a move to larger projects, particularly in South East England.

Outline consents in England 2013-2018
- Light green: New homes on sites of up to 3,000 units
- Dark blue: New homes on sites of more than 3,000 units

Source: Savills Development Database, Glenigan
The magic ingredients for large scale community building

- Infrastructure
- Engagement
- Confidence
- Flexibility
- Location Fundamentals
- Land Assembly

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

**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.