Supplementary evidence submitted by Network Rail – Net Zero Government inquiry

The written evidence below supplements the oral evidence given by Dr Rossa Donovan to the Environmental Audit Committee on Wednesday 4th September. This includes:

1. Network Rail’s approach to sustainability and the environment
2. The lessons learned from introducing new sustainability standards at Birmingham New Street
3. Introduction of BREEAM methods at London Euston and the impact on Net Zero
4. Upcoming major projects and environmental standards
5. Network Rail and the Greening Government targets
6. Future commitments to the Committee

1. **Network Rail’s approach to sustainability and the environment**

The climate protests earlier this year showed the passion that many people in this country feel for protecting the environment and the rail industry must play its part in responding to that. Rail is already the greenest form of mass passenger transport. Eighty percent of passenger journeys in 2018 (by kilometre) were made in cleaner, greener electrified trains and electrifying our railways results in 50% reduction in carbon emissions per passenger kilometre. In 2018, the total carbon dioxide emissions on passenger trains dropped by 195 kilotonnes, the equivalent of taking 85,000 cars off the road. This comes despite the distance passengers have travelled going up by 200 million kilometres in the same period. Similarly, rail freight takes 7.79 million lorry journeys off the roads every year.

Two of the greatest environmental threats to society are climate change and biodiversity loss. As one of Britain’s biggest land owners and the single largest electricity user in the UK, Network Rail has an important role in supporting Government policy to reverse biodiversity loss and reduce CO2 emissions.

On reversing biodiversity loss, we have set out an ambitious vision for our lineside in response to John Varley’s review of our vegetation management. To deliver our ambitious vision we will look at the way we manage our land differently moving towards more sustainable land management practices. We will begin to manage lineside habitats as an asset resulting in improvements for safety and performance while protecting and enhancing biodiversity at the same time. We will also take opportunities to get the best value from our land through other environmental enhancements and socially beneficial initiatives. This approach will help us to deliver no-net loss in biodiversity by 2024 and move towards net gain by 2040.

On carbon reduction, we continue to develop strategies and design practical solutions to decarbonise rail while working in partnership with the wider rail industry through the Decarbonisation Taskforce to respond to the Government’s rail decarbonisation challenge. Government has challenged industry to phase-out diesel only trains by 2040 and support the Government in achieving its target of a net zero economy by 2050.
At Network Rail, we are committed to reducing our non-traction energy consumption by 18 per cent over the course of the next five years, this complements a separate target to reduce our Scope 1 and 2 carbon emissions 25 per cent over the same timeframe, approved by our regulator the ORR and building on our achieved carbon reduction in CP5 of just under 17%. Combined, this will see a reduction in CO2e of 38% since 2014.

We are also working to embed long-term science-based targets for Network Rail, setting out the pathway and strategy towards Net Zero in 2050, demonstrating our commitment to tackling climate change and our aim to deliver a low-carbon railway. Through the Decarbonisation Taskforce, we have recommended that the wider industry works in collaboration to develop a similar pathway for the totality of GB rail and will continue to encourage Train and Freight Operating companies to work with us towards this aim as Network Rail cannot make this change in isolation.

2. The lessons learned from introducing new sustainability standards at Birmingham New Street

The £750M redevelopment of Birmingham New Street station commenced in 2008 and opened in September 2015. The project funders supported a set of ambitious requirements for environmental and sustainability targets. These were new to the rail environment and needed to be delivered within a complex project that kept the station operational during the works.

The project adhered to a set of requirements set out in a Sustainability Strategy underwritten by achieving a BREEAM rating of ‘Very Good’ for the station while exploring all opportunities to create a low carbon development. This challenge was further complicated by the fact the building is clad in mirror finish stainless steel cladding with very limited scope for additional insulation due to re-use of the façade and 12 sub-surface platforms below the concourse.

Network Rail took the initiative to ensure the requirements were achieved from the outset.

A summary of the achievements include:

- Creation of a Low & Zero Carbon Study from the lead consultant at early design stage.
- Low energy and high efficiency LED lighting across all areas of the station with close control for dimming when there is no occupancy and zone controls throughout the station. Infra-red detection on all areas of lighting so nothing stays switched on.
- First BREEAM rated railway station.
- 60% of the rainwater harvested from the stainless steel façade to flush all the station’s toilets.
- Energy efficient lifts and escalators with inverter drive option on escalators to slow when there is no usage.
- Sub-metering for all water, heating and cooling systems to remotely monitor energy consumption linked to a central Building Management System (BMS), managed and monitored by trained personnel.
- Natural daylight for the concourse and natural ventilation designed from complex computer models to avoid use of energy intensive mechanical ventilation.
• Network Rail’s first ever station to incorporate a Combined Heat and Power (CHP) plant with its electricity utilised from the plant for the station power demand and waste heat transferred into a district heating scheme including serving adjacent John Lewis. This could reduce over 3,000 tons of carbon per year.

• Ancillary building and station building have an array of sub-meters to monitor all energy uses from heating / cooling and water and data was benchmarked against design data.

• 98% of waste from construction activity was recycled or re-used to divert waste from landfill.

• Materials and waste for all platform related works were delivered and removed via trains from Bordesley to limit and reduce use of heavy delivery vehicles in the city. This logistics plan reduced around 10,000 lorry trips coming into and out of the city centre over the project lifetime.

• First BREEAM ‘Excellent’ rated rail accommodation building (The Lampblock) for CrossCountry train crew on Platform 1 with use of PVs, solar thermal, high efficiency air source heat pumps to reduce the carbon emissions by greater than 10%.

• 80m long green wall and a green roof to enhance local ecology and biodiversity in an urban environment.

There were many lessons that were learnt from delivering excellent quantifiable sustainable achievements in comparison with the previous station. Principally, working closely with all stakeholders and funders to implement Sustainable Development Principles and values into the project processes and culture. These have helped deliver a more sustainable station that caters for current and future needs of rail passengers.

We embedded sustainable measures that enhanced the credentials of the new station while still focusing on the passenger requirements for connectivity, better amenities and experience. This includes being carbon smart with the use of low carbon technology and supporting the local economy with 100 apprenticeships created on the project through the supply chain and triggering further regeneration around the city.

Other lessons learnt to create low carbon developments that are to be transferred to future redevelopment schemes include:

• Initial project brief to include sustainable targets agreed with all stakeholders from the beginning.

• Undertake low carbon studies early in the design process with clear recommendations on viable technology that provide a clear economic, social and positive environmental impact.

• A dedicated energy and sustainability ‘champion’ for active perusal of the recommended measures and technology innovation.

• Early engagement with key external stakeholders and internal teams from Architects to Asset Managers to ensure full support for the most viable low carbon and renewal propositions.

• Ensure company executive level / senior leadership support of low carbon energy solutions.

• Review of sustainable solutions at each design state review from concept to detail design with commercial and sponsor (Network Rail internal Client) agreement.

• Check of all agreed sustainable and low carbon solutions are implemented as agreed.
3. **Introduction of BREEAM methods at London Euston and the impact on Net Zero**

BREEAM Methodology is being promoted via Network Rail’s Environmental Standard at London Euston. However, while BREEAM provides a robust methodology for creating a sustainable development and the carbon and energy category is weighted higher than the others, carbon reduction does not contribute a significant percentage. The BRE (Building Research Establishment) which created BREEAM, published a briefing paper in 2015 entitled “Assessing carbon emissions in BREEAM” that cites an analysis of assessment data showing BREEAM assessed buildings achieve 22% reduction in CO2 emissions. This does not result in net zero or near to net zero and therefore further measures will be needed at Euston to achieve net zero.

Following the redevelopment of Euston Station, we are looking to achieve a BREEAM (Building Research Establishment’s Environmental Assessment Method) rating of ‘Very Good’ with carbon reduction of at least 10% via low carbon / renewable technology.

4. **Upcoming major projects and environmental standards**

**Network Rail programmes and projects**

A number of projects/programmes have already or will be launched during our current funding period (CP6, 2019-24) to further improve our sustainability performance.

The Levertus Programme contains 14 workstreams which are designed to improve energy management practices, improve energy efficiency, reducing carbon emissions, and assess the feasibility and business case for large-scale renewable energy production and storage. Workstreams include:

- Installing smart meters in tenant’s premises enabling more accurate billing and revenue-recovery.
- Transitioning the road fleet to electric vehicles.
- Feasibility of lineside solar farms and storage facilities.
- Installing energy efficiency measures.

The Sustainable Land Use Programme is our response to John Varley’s review of the way NR manages its lineside vegetation. The review called for NR to create an ambitious vision for its lineside, one which improves our vegetation management practices while maintaining and enhancing biodiversity. We have responded with a vision which surpasses what John Varley had in mind, a vision which not only considers sustainable vegetation management and biodiversity enhancement, but also seeks to use our estate for a wider range of sustainability gains such as:

- Managing our lineside in such a way that keeps it safe for our trackworkers and passengers, and improves performance.
- Generating and storing renewable energy.
- Improving waste and pollution remediation processes.
• Using under-utilised non-operational land for community-led environmental and social initiatives.
• Working in partnership with local companies and land-owners to achieve sustainability objectives.

In addition, the programme will improve communication practices with our lineside neighbours and local communities so that they are better informed when we plan to carry out works. Training will be given to lineside staff to raise awareness of our improved vegetation management practices and to reinforce the importance of protecting and enhancing biodiversity.

Both the Levertus and Sustainable Land Use Programmes contain cultural change workstreams. These will include a combination of training, communications and behavioural coaching of relevant staff to change business as usual behaviours and reinforce the message to act and work more sustainably. The cultural change workstream will be delivered by the same team that transformed the safety culture of the business in recent years.

Current R&D projects in progress focus on the how to improve the resilience of the railway to extreme and adverse weather days, and what adaptations do we need to design into our asset renewals and upgrades to ensure the railway is resilient to weather conditions in the future as a result of climate change. Combined our Weather Resilience and Climate Change Adaptation activities are abbreviated to WRCCA. The projects are as follows:

• The real cost of WRCCA – this project aims to quantify the amount of investment required to meet weather-related performance targets in the future.
• Mapping WRCCA criticality – this project aims to identify the assets most vulnerable to poor weather both now and in the future and identify which parts of the network will be vulnerable to future climate change conditions.

Further R&D projects are being planned to look at:

• Alternatives to, or ways of reducing, herbicide use.
• Moving Network Rail to a circular economy approach.

Future major development projects

Network Rail are looking to achieve a high standard of low carbon sustainable future developments that incorporate the lessons learnt from New Street in projects such as:

• Liverpool St Station renewal project: Target of a Solar Panel installation (design to be confirmed).
• London Waterloo Station: Target of Solar Panel installation (design to be confirmed).
• London Euston Station redevelopment: A BREEAM (Building Research Establishment’s Environmental Assessment Method) rating of ‘Very Good’ with carbon reduction of at least 10% via low carbon / renewable technology.
• Northern Programmes – Transpennine Route Upgrade: Target BREEAM Infrastructure (Pilot). Target to be confirmed but estimate 10 – 20% reduction in carbon.
• Snow Hill Station redevelopment (Birmingham). Potential BREEAM rating of ‘Very Good’ with 10% reduction in carbon.

• Cottam Parkway Station (Preston) – New Build. Potential BREEAM ‘Excellent’ with a target for a carbon neutral development.

These projects will follow industry standards, in particular the Environment & Social Minimum Requirements standard, and the BREEAM assessment methodology (where appropriate) to minimise environmental impact and maximise environmental and social gain during the redevelopment. Options that will be considered include:

• Improving energy efficiency and reducing carbon emissions.

• Avoiding unnecessary waste, maximising the re-use of materials, and recycling or energy recovery of waste to minimise waste being sent to landfill.

• Preventing/minimising pollution to air, water and land.

• Reduction in potable water use e.g. by reuse of rain/grey water etc.

• Renewable energy generation and storage, combined heat and power plant, district heating schemes etc.

• Ecological protection/mitigation/enhancement.

• Designs that maximise the use of natural daylight and natural ventilation.

• Early engagement with stakeholders to understand their views, address any concerns and to identify potential win-wins.

**Strategy to improve air quality at stations**

Station air quality is managed via the monthly Air Quality Focus groups and Air Quality Action Plans that commenced with New Street Station and now cover other stations such as Euston. The station Safety, Health and Environment specialists are also carrying out risk assessments across our managed stations and we have informed train operating companies to do the same for their managed stations.

The Action Plan formulated for New Street has been accepted by our regulator, the ORR, and has helped to reduce the emission levels and frequency of complaints. A guidance note for stations is being devised based upon the following sub-headings:

• Train Idling reduction / behavioural change with train operators

• Station risk assessments

• Air Quality / DEEE Monitoring

• Legislation applicable

• Enhancements / Introduction to the fume / Ventilation System

• Occupational Health checks of staff

• Stakeholder engagement
Network Rail has committed to being included in the next round (i.e. 2020-2025) of the Greening Government Commitments (GGCs). During the past year we have met with DfT, BEIS and DEFRA to discuss our current sustainability initiatives, performance and targets for CP6 and beyond. We are accelerating our work in a number of sustainability areas, particularly decarbonisation, waste and biodiversity. There is growing ambition within Network Rail to improve our sustainability performance even further and work with the rail industry to make the greenest form of mass transport become even greener still. While the exact scope and magnitude of the Greening Government Commitments have yet to be finalised, we feel we are in a good position to meet any targets set through the GGCs.

Examples of some of the work we are doing to reduce our environmental impact are given below:

In August 2019 a pioneering trial started using solar energy to partly power a railway line. Social enterprise, Riding Sunbeams, switched on the first ever solar panels to directly supply a railway line with electricity, paving the way for the world’s first solar-powered trains.

HydroFLEX, the UK’s first hydrogen train was tested on the UK mainline in June 2019. Unlike diesel trains, which the UK wants to ban by 2040, hydrogen-powered trains do not emit harmful gases, instead using hydrogen and oxygen to produce electricity, water and heat. Currently, 36% of the UK’s rail network is electrified and because the busiest routes are electrified this means that 70% of all trains in the UK are electric. Twenty-four percent of trains are diesel and 6% are bi-mode.

At the end of April 2019, nine out of 10 rail journeys were available via smartphone tickets, spelling the end for orange paper tickets. Between 6 January 2019 and 3 March 2019 alone, 14.1 million smart tickets were sold - the equivalent of almost 1,200 km (or the distance from London to Edinburgh and back) in traditional orange paper tickets.

At the 20 biggest stations in the UK managed by Network Rail:

- Plastic cutlery and cups will be banned by end of 2020.
- All coffee grounds will be recycled by the end of 2020.
- Free water fountains are reducing the impact of single use plastic water bottles.
- Marylebone station has launched SimplyCups, which has seen more than 63,000 paper cups recycled.

Redeveloped as part of the Thameslink programme, Blackfriars Station has the world’s largest solar bridge with over 4,400 photovoltaic panels, enough to cover 23 tennis courts. The roof provides up to 50% of the station’s energy, reducing the station’s CO2 emissions by an estimated 511 tonnes per year – equivalent approximately to 89,000 (average) car journeys.
6. Future commitments to the Committee

Network Rail engagement with the Committee on Climate Change on baselines

Baselining carbon emissions for the whole of the rail industry has been a challenge. During our work to establish Science Based Targets for Network Rail scope 3 (upstream and downstream) emissions, datasets from various sources were examined – in particular data from the Committee on Climate Change, the Office of Rail and Road and RSSB. We found that none of the datasets matched, so we were not able to base our Scope 3 baseline on any existing established dataset with any level of confidence. For this reason, we have worked to collate the necessary underlying data to establish our own Scope 3 baseline to supplement what we already know for Scopes 1 and 2.

Air quality strategy

There is a significant amount of ongoing work in relation to improving air quality, particularly in stations. The next step in this work is to undertake a gap analysis to identify where monitoring is (and isn’t) taking place, what is (and isn’t) being measured, and whether the measurements are continuous or episodic. This gap analysis will help us define the scope of any subsequent monitoring campaign, which in turn will help us formalise a company-wide strategy for air quality.

In the meantime, we will continue to manage air pollution at our enclosed, sub-surface and city centre stations through initiatives such as air quality management plans, train idling restrictions and pollutant threshold triggered forced air ventilation. At Marylebone Station, in London, Chiltern Railways has partnered to bring nanocarbon filters designed by Clean Air Labs to make the air 95% cleaner.