



WEST MERCIA RURAL  
**5G PROJECT**

# **A partnership testing how 5G transforms rural services**

High Level Summary Report - October 2022

A project of the Department of Digital, Culture, Media, and Sport -  
5G Testbeds and Trials - Rural Connected Communities programme

[www.wmr5g.org.uk](http://www.wmr5g.org.uk)

“West Mercia Rural 5G set out to explore how 5G infrastructure might be delivered differently in rural areas and how the NHS, local councils and businesses could harness the benefits of 5G to help improve services and better manage demand in rural communities. The project has unearthed some interesting challenges and real opportunities for service provision and digital transformation, whilst operating in extraordinary conditions.”



**Mark Stansfeld, Chair of West Mercia Rural 5G project**

“The West Mercia Rural 5G project has opened eyes and changed attitudes and emphatically proven the worth of digital connectivity, particularly in the face of challenges such as on-going infection risk, continuation of and increased demand on services. Our project provides a catalyst to support improved mobile coverage in rural areas and begins to identify the art of the possible for mobile solutions to assist in the levelling up agenda, to support the delivery of health, social care and a range of other public and private services in rural areas.”

**Mike Emery, Director of Data, Digital and Technology for Herefordshire and Worcestershire Integrated Care Board**

West Mercia Rural 5G was **nominated and shortlisted** in three categories at the National Connected Britain 2022 Awards:

- **Improving Digital Skills** through its focus on care workers and care homes
- **Access Innovation** by trialling new approaches to accessing sites with minimal disruption to communities, so 5G technologies are more easily available to communities for trade, health and personal uses
- **Barrier Removal** through the partnership between the Local Authorities and the network providers enabling an accelerated approach to 5G delivery

# What was our challenge?

The West Mercia Rural 5G (WMR5G) project commenced in April 2020, after being funded as one of seven 'Rural Connected Communities' 5G R&D projects within the Department for Digital, Culture, Media and Sport's 5G Testbeds and Trials programme, with an aim to investigate two very distinct challenges:



- To explore a new model to deliver 5G in rural areas
- How can 5G help provide new ways to deliver health and social care in and to rural communities?

The WMR5G project area included geographies in and around Malvern and around Tenbury Wells where the counties of Shropshire and Worcestershire meet.

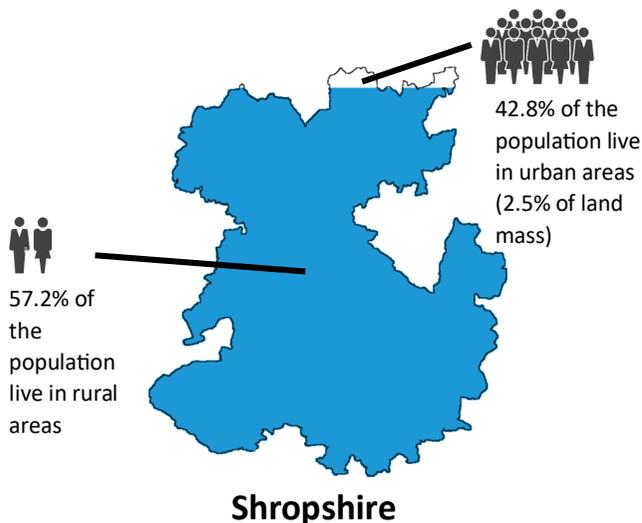


Map showing the area covered by Shropshire County and main towns

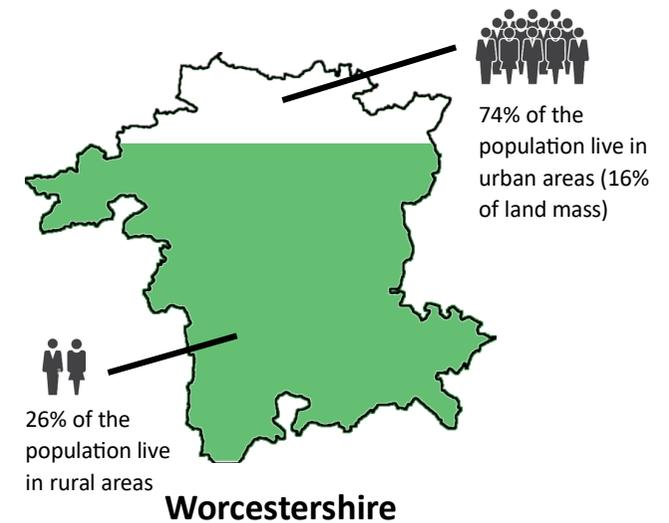


Map showing Worcestershire County area and main towns

Both areas provide a superb location where many of the challenges of rural life and rural connectivity are present.



Rural areas, largely due to their low population density, often fall towards the end of, or do not fall within, the commercial mobile deployments; this is understandable but not acceptable, particularly to those living or working in these communities.



97.5% of land mass is RURAL (Shropshire Council Area)

84% of land mass is RURAL (county area)

There are 2G, 3G and 4G black spots across all four operators within the focus area of the project and at the outset of the project there was no 5G coverage even within operator delivery plans.

At the same time, providers of public services in rural areas are facing increasing demands from an ageing population, at a time when their funding has been under increasing pressure. Maintaining current approaches to service delivery is not sustainable and alternative models are required.



### Broadband Coverage

Gigabit broadband (1000 Mbps)

44%

19%

67%

### Mobile 4G Coverage

4G indoor premises coverage\*

77%

63%

81%

Worcestershire Shropshire National

Source: Ofcom Connected Nations 2021 \*from all Mobile Network Operators

### Ageing population

Source: Office for National Statistics 2022

1 million

people live across  
Worcestershire and Shropshire

340,000

of those live in  
rural areas

2020-Over 65

23%

25%

19%

2043-Over 65

28%

33%

24%

Worcestershire Shropshire National

Smart connected technology solutions are often seen as an alternative way to deliver these services, to enable efficiencies to deal with increased demand and focus resources on those with highest need.

However, for health and social care services to be delivered in this way a more reliable and more widely available level of connectivity is required in both urban and rural areas.

# How did we do it?

## New model for Rural Delivery

The project set out to explore a proposed new operating model and test how the UK mobile industry could deploy 5G in rural areas at pace, but also at a lower cost.

Five sites were originally identified and progressed through acquisition and planning phases to the point at which infrastructure build activity could commence. Two additional sites were considered but not progressed. The five sites ranged from a 'greenfield plot of land' and 'wooden telecommunications poles' through to 'monopoles' and 'lattice masts'. However, due to a descope within the project only one of these progressed through to site build.

Due to the partners involved, the research focussed on the potential for the utilisation of existing 'fixed wireless' assets and whether this does or does not have an impact on the deployment timeline and costs.

WMR5G explored the infrastructure challenges around planning, building, and operating a rural 5G network. Working with a Mobile Network Operator (MNO) and a wireless broadband asset owner, the project also set out to test the technical and commercial viability of a new operating model through a desktop case study. This focused on an area between Ludlow and Tenbury Wells. Elements considered included:

- using existing infrastructure,
- commercial arrangements,
- technological solutions.

We established a baseline for a typical rural deployment to compare the actual deployment of our 5G network that we had designed and built.



## How did we do it?

How 5G can help provide health and social care

WMR5G also addressed the challenge of how 5G can help provide health and social care in and to rural communities.

Faced with increasing demands for critical care services, organisations responsible for health and social care are looking to **new models for clinical delivery** utilising cutting edge technology requiring enhanced connectivity that 5G brings. The service providers include councils, clinical commissioning groups, and other care providers.

The idea that mobile telemedicine can make the NHS more efficient and can enhance preventative solutions was compelling. Could organisations redesign their services to:

- save transport costs,
- reduce carbon footprint,
- undertake more visits (albeit virtual) per day,
- respond quicker and understand the issues of the patient before attending site,
- prioritise staff resource more effectively by only physically attending those with highest need,
- reduce unnecessary hospital admissions and assist with diagnosis,
- reduce stress and negative impact on patients who would normally be transferred to appointments (especially those suffering from dementia).

## How did we do it?

How 5G can help provide health and social care

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The healthcare industry is having to digitally transform at scale and rapid pace. Subsequently health and care professionals are looking for ways to:

- increase their patients' access to care,
- enable individuals to become self-activated,
- adopt healthy behaviours and action.

WMR5G investigated whether 5G enabled technology could improve health and social care delivery of 5G enabled telemedicine and domiciliary care scenarios for wearable video in a rural context. These two use cases utilised a private 5G network as well as commercial EE 5G and 4G networks.

- **Health XR**
- **Connected Worker**



# How did we do it?

## Health XR



**Supporting the development and evaluating the impact of an extended reality (XR) solution to track improvements in gait and movement for people using hospital Musculoskeletal (MSK) services.**

The Health XR app is designed to provide an extended reality view of the patient's body outline and present this to the clinician as a 3D avatar.

The product went through some iterations in build, with the support of the project team. The key points of note are:

- supporting the product from a Technology Readiness Level (TRL) 3 through to Level 5 that could be trialled on Critical Friends,
- and the progression from an IoT suit being worn by the patient, to IoT sensors attached in specific places, to the finally agreed LiDAR camera that some modern high end mobile phones have.



# How did we do it?

## Connected Worker



**Giving GPs and community nurses access to support workers in care homes equipped with wearable connected cameras and examining how effective the increased connectivity is in providing rapid access and information to assist the resident's welfare.**

Using live video conferencing, clinical staff can see their patients from a remote distance.

Through the use of the HMT-1 device this was further enhanced by moving to a hands-free device, still allowing real-time video and audio capability, meant that the clinical staff member wearing the head mounted device could use both hands for things such as turning the patient safely over.

The use of Connected Worker was also seen to:

- provide usability and resilience to high data demand applications such as high quality video conferencing, enabling the GP or nurse to clearly view specific areas of concern on a patient,
- reduce the risk of infection transfer through wearable technology rather than sharing a handheld device,
- provide real world experience of care home settings and some future opportunities for improvements in the technology to deliver, such as sizing of headband and audio dialogue between patient and GP / nurse.



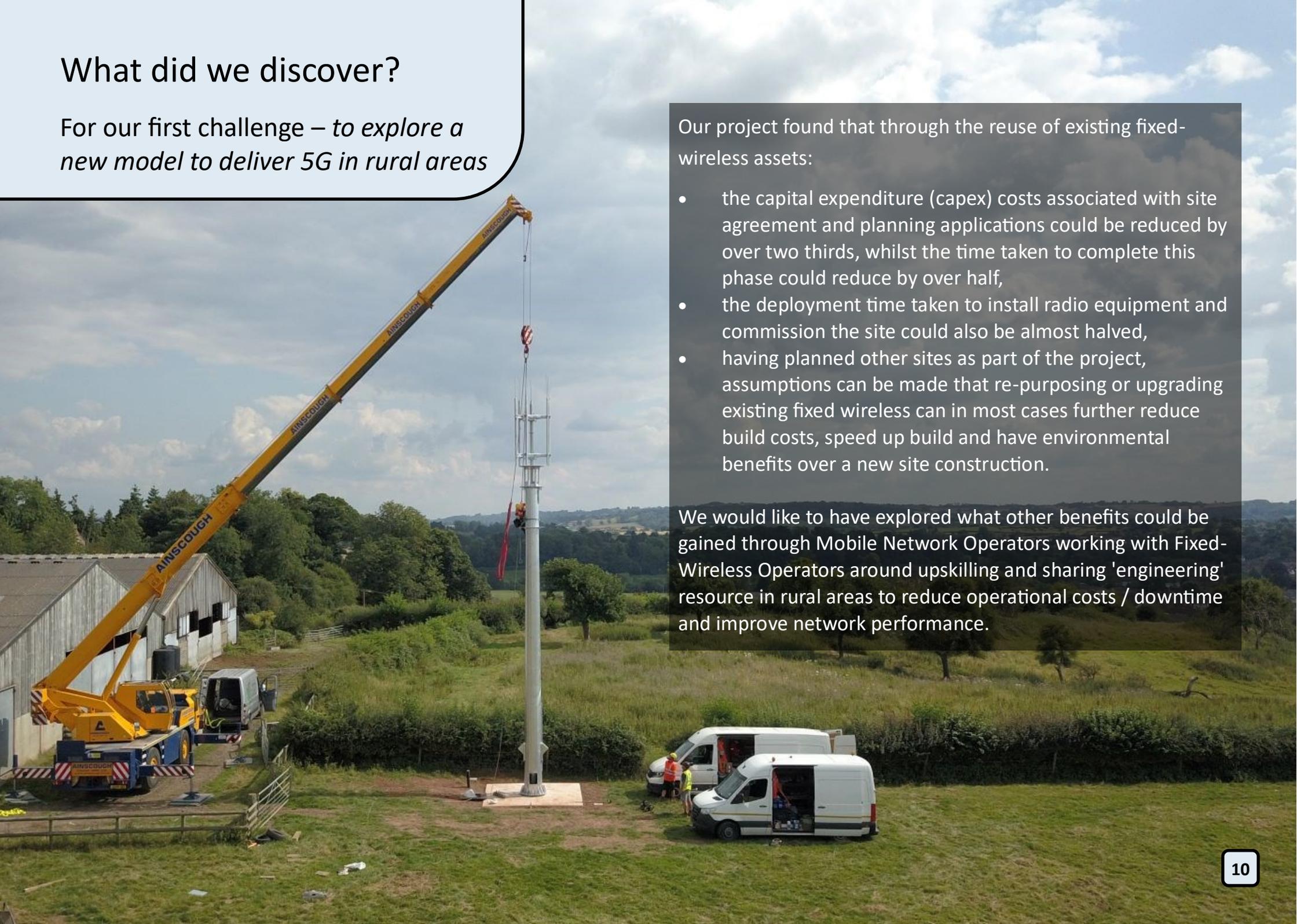
# What did we discover?

For our first challenge – *to explore a new model to deliver 5G in rural areas*

Our project found that through the reuse of existing fixed-wireless assets:

- the capital expenditure (capex) costs associated with site agreement and planning applications could be reduced by over two thirds, whilst the time taken to complete this phase could reduce by over half,
- the deployment time taken to install radio equipment and commission the site could also be almost halved,
- having planned other sites as part of the project, assumptions can be made that re-purposing or upgrading existing fixed wireless can in most cases further reduce build costs, speed up build and have environmental benefits over a new site construction.

We would like to have explored what other benefits could be gained through Mobile Network Operators working with Fixed-Wireless Operators around upskilling and sharing 'engineering' resource in rural areas to reduce operational costs / downtime and improve network performance.



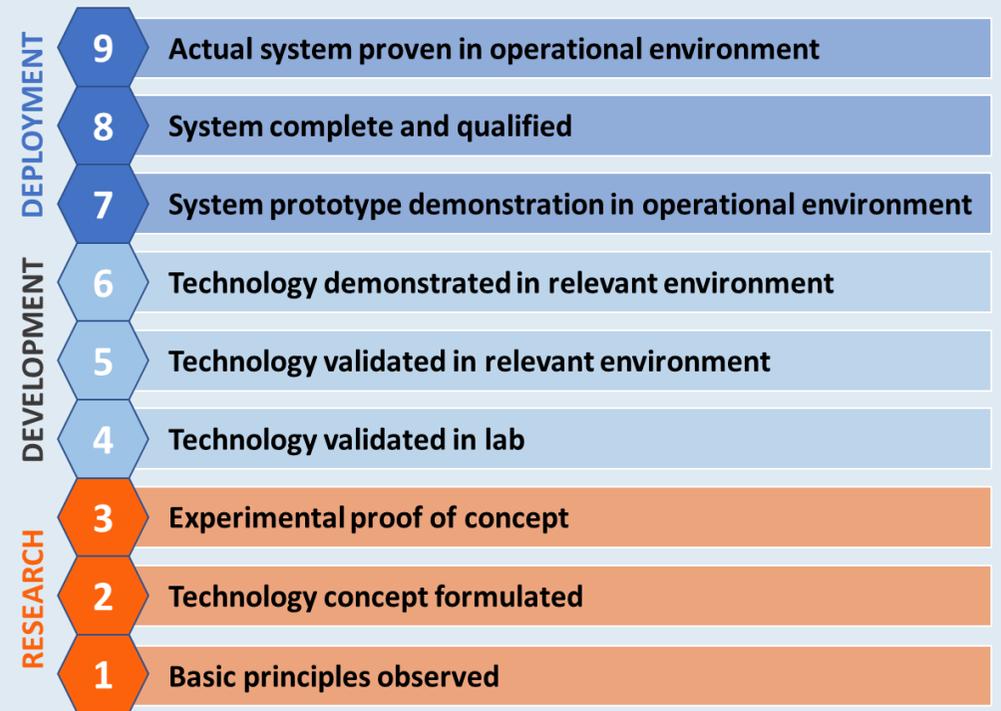
## What did we discover?

Our second challenge was – *to explore how 5G can help provide new ways to deliver health and social care in and to rural communities*

Our project found that through the Health XR Use Case:

- a testbed environment can support innovative connectivity products advance its Technology Readiness Level - a method for understanding the technical maturity of a technology during its acquisition phase,
- using a private 5G network enabled the SME to test the app in a supportive 5G environment before being trialled on patients.

### Technology Readiness Level (TRL)



We also found that connecting clinicians, care workers and patients using Connected Worker was also seen to:

- benefit patients - stay in familiar setting of their care home especially important with dementia patients and also allows GPs to see the patient's environment,
- save patient travel to and from clinical settings which might expose them to additional health risks,
- reduce carbon footprint of those involved in remote consultations,
- reduce GP or nurse travel time to visit the patient, freeing up more time to see more patients.

## So what?

We have shown that the specific reuse of fixed-wireless assets may be an effective part of the solution in improving 5G and wider mobile connectivity in rural areas. But it is important to realise that shared asset utilisation should not be limited in anyway.

There is huge potential to be realised through agreements with a variety of land and facility owners to allow cellular coverage to be distributed through existing infrastructure – such as railways, local authorities, and other public sector locations.

The exploration of wider ‘neutral host’ models, private networks, alternative technologies, more mature business cases and additional public funding beyond the current Shared Rural Network (SRN) proposals are required to support the levels of connectivity truly required in rural areas.

WMR5G’s partners recognise that the project has created opportunities to test and collaborate and that this has established a strong foundation to build a longer-term sustainable operating model for 5G.



## So what?

We are seeing that innovations in digital technology are making it easier for health and care professionals to communicate with their patients.

Digital technology and improved connectivity are breaking down the traditional barriers that can hinder a patient's access to medical care, allowing them to receive relevant information, advice, and guidance remotely.

With the help of live video, audio and remote monitoring, patients can now interface with healthcare providers from the comfort of their own home, care home or any other convenient location. This is especially beneficial for those who live in rural communities, who would otherwise need to drive long distances to their local doctor's surgery or to see a specialist and brings the patient's service experience in line with those in many urban areas.





## So what?

Our work should not be viewed as static or in isolation

The experience of Covid-19 brought a nationwide focus to the issues often found in other, more localised, situations where there are restrictions on movement, for example flooding and severe weather.

It has opened eyes and changed attitudes and emphatically proven the worth of digital connectivity, particularly in the face of challenges such as on-going infection risk, continuation of and increased demand on services.

Our project provides a catalyst to support improved mobile coverage in rural areas and begins to identify the art of the possible for mobile solutions to assist in the levelling up agenda to support the delivery of health, social care and a range of other public and private services in rural areas.

## Looking for further information?

The full report provides further details behind the findings highlighted in this Summary Report, please contact [westmercia5g@worcestershire.gov.uk](mailto:westmercia5g@worcestershire.gov.uk) or Worcestershire County Council's Digital Infrastructure and Connectivity team on 01905 763763 if you are interested in discussing any elements of the report or project in more detail.

# Recognition

“It can often be difficult to deliver a connected network solution whether that is a mobile or broadband service into rural areas. In this project, WMR5G looked specifically at the 5G challenge, how services might be delivered differently, how staff in the field can be connected and how connectivity can be improved for all.”

**Ste Ashton, Digital Infrastructure and Connectivity Lead, Worcestershire County Council**

“There is great potential for GPs to be able to review patients in urgent settings, even conduct routine ward rounds from the surgery, and through 5G be able to access patient notes making us better informed when we are out in the community. I think Connected Worker can be a real success, but there are still some hurdles to overcome in terms of getting staff engaged and trained, and the connection to be stable.”

**Dr Edward Conquest, Tenbury Surgery**

“Moving our patients with dementia for a hospital visit can be particularly upsetting for them due to the time it takes and the unfamiliar environment. This technology has great potential to allow my residents with dementia to remain in their familiar surroundings and remove unnecessary stress.”

**Helen Whitehouse, Manager, Haresbrook Care Home**

“One of the advantages of Connected Worker is that we have the ability to observe our patients in their living environment, potentially spotting risks that could be avoided, or conditions they may not have told us about. Seeing people like this, without having to unnecessarily enter the homes could avoid a situation worsening. Also, when I am physically with a patient, it will also give me the ability to speak to the doctors at a surgery if I need the backup from a fellow medical practitioner.”

**Rachel Desogus, Advanced Nurse Practitioner, Tenbury Wells**

## The consortium partners

West Mercia Rural 5G is a consortium with a shared interest in improving connectivity in rural areas. In 2020 the following partners came together, with Worcestershire County Council as the lead partner.



Herefordshire and  
Worcestershire  
Clinical Commissioning Group



University of  
Chester



worcestershire  
county council



west midlands  
ACADEMIC HEALTH SCIENCE NETWORK



University  
of Worcester



**NOTE:** Three UK were partners April 2020 to August 2020. nexGworx were not a project partner but were a key subcontractor providing technical support, network, and guidance.

For further information on the project visit:

[www.wmr5g.org.uk](http://www.wmr5g.org.uk)

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