

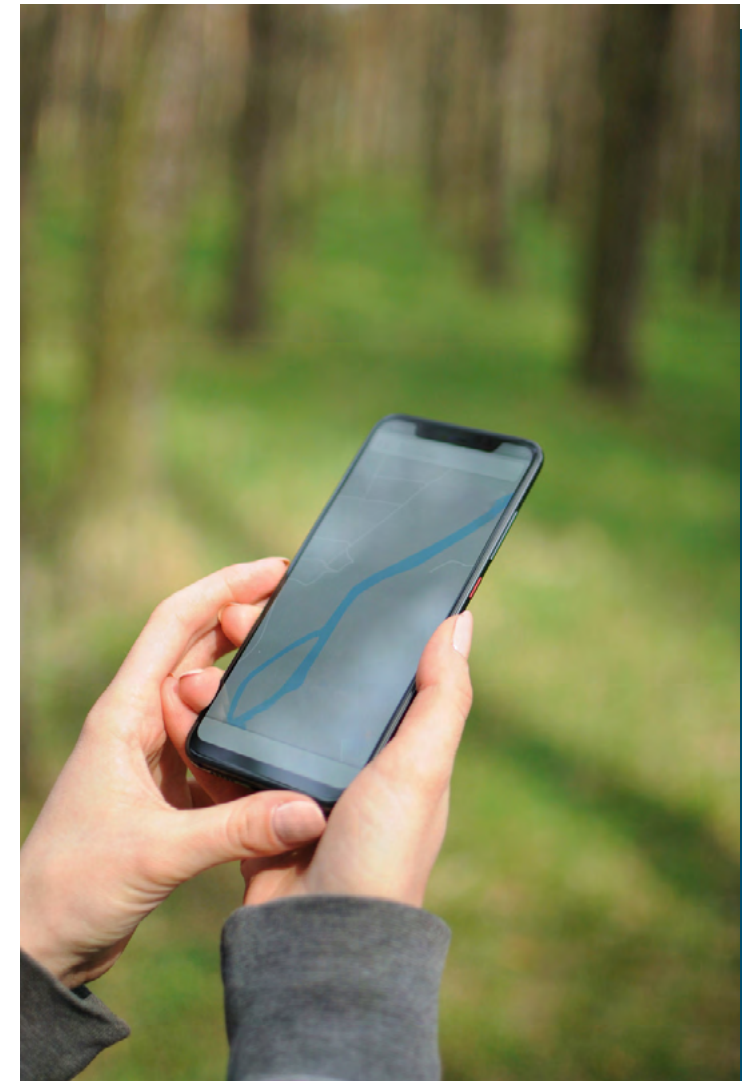
INDEPENDENT REPORT
Rural 4G Connectivity:
Analysing the
community benefits
of mobile investment

June 2024



Contents

Foreword	3
Executive Summary	4
Introduction	5
Methodology	8
Mallaig Assessment	12
Trawsfynydd Assessment	15
Melton Mowbray (North) Assessment	18
Dunseverick Assessment	21
A Comparison of Network Investment and Community Benefits	24
Conclusion	26



Foreword



Dr Andrew Muir

CEO
FARRPOINT

Back in 2023, FarrPoint launched an investigation into the economic, social and environmental benefits that could be delivered from the provision of a new 4G mast in a remote village of Polbain in the Scottish Highlands. This mast, which was taken up by EE, was provided through the Scottish 4G Infill programme to ensure that 4G mobile phone coverage could be delivered in a number of rural areas across Scotland.

The fact this particular site was in my home village added to my personal interest. I know from first-hand experience how important connectivity is to these very remote communities and the significant benefits it can bring. To those used to ubiquitous coverage, the social and economic constraints of having no mobile coverage can sometimes not be truly appreciated.

Our work showed that even in these very remote locations, the socio-economic and environmental benefits can be sufficient to meet the required return on investment of a public intervention with a payback period of around 15 years.

At FarrPoint, we believe there are no real technical restraints when it comes to delivering digital infrastructure to meet the needs of rural communities, and still, approximately 9% of the UK's geography has no mobile coverage from any operator¹. The issue with rural connectivity is almost always the cost of delivering the infrastructure, and more importantly delivering perceived value, or an economic return for this investment.

We were therefore delighted to be commissioned by EE to undertake this further study to look at benefits to communities from the investments they are making in four of the sites that are delivered as part of the Shared Rural Network (SRN).

The SRN programme is having a positive impact on rural connectivity by subsidising mobile coverage extensions to the unconnected. It also demonstrates how the mobile industry can already work together to join forces and help extend services into the most challenging of areas.

Our previous work has shown the range of benefits that communities can obtain from this type of investment. For this report we wanted to further demonstrate this concept and understand how benefits may vary and through what dependencies.

Please read this study to find out the outcomes for four communities across England, Wales, Northern Ireland, and Scotland.

¹ Source: SRN <https://srn.org.uk/faq/what-is-a-partial-and-total-mobile-not-spot>

Executive Summary

In this independent study, connectivity consultancy FarrPoint conducted an economic impact analysis of four EE mobile mast sites across England, Wales, Scotland and Northern Ireland. The primary objective of this research was to understand and evaluate the magnitude of the economic and social benefits that mobile connectivity can bring to different types of rural communities.

All of these sites were 4G improvement projects as part of the Shared Rural Network (SRN) programme, a partnership between mobile operators and the UK Government to improve connectivity in rural and remote regions.





The study used a robust methodology to evaluate the economic and social impact of improved 4G connectivity on rural communities.

The assessment focused on three key benefits, the initial construction impact, the general economic impact, and the social wellbeing impact. The study concludes that all four EE sites demonstrate notable benefits for the local communities.

The benefits of rural mobile connectivity can vary significantly upon local characteristics, although, based on this study, new mobile infrastructure at a single mast site can generate more than £6 million in benefits to the local community over a 15-year period.

Comparing the amount invested in individual mast sites and the impact that that investment has on the local community leads to a mixed picture which is largely driven by the number of local residents covered by the improved 4G signal. In addition to the quantitative benefits, there are also a wide variety of qualitative benefits to consider. For example, improving 4G voice calling has significant positive impacts on the safety and wellbeing of those in the area covered by the mast.

Further details and results per site are summarised in this table.

 <p>MALLAIG IN SCOTLAND</p>	<p>At Mallaig, the 4G site will deliver benefits to society and the local economy in the range of £742,000 and £1,054,000.</p>
 <p>TRAWSFYNYDD IN WALES</p>	<p>The additional 4G spectrum added to the mast in Trawsfynydd could deliver between £249,000 and £383,000 in benefits to the local community.</p>
 <p>MELTON MOWBRAY (NORTH) IN ENGLAND</p>	<p>In the rural communities covered by the Melton Mowbray (North) mast, the benefits could amount to between £5,024,000 and £6,939,000.</p>
 <p>DUNSEVERICK IN NORTHERN IRELAND</p>	<p>The site at Dunseverick in Northern Ireland shows a socio-economic impact of between £353,000 and £518,000 over 15-years.</p>

A photograph of a rural landscape. In the foreground, there is a yellow rectangular overlay with the word "Introduction" in white text. The background shows a grassy hillside with a large green tree in the center. To the right, a tall, dark, cylindrical antenna tower stands next to several green utility boxes. In the distance, several brown cows are grazing on the grass. The sky is blue with some light clouds.

Introduction

Introduction

Introduction

Mobile networks, and the 4G mobile network in particular, are a key component in the UK's communication infrastructure strategy. While much of the current mobile market is concerned with what 5G will deliver to the UK economy, it is the 4G network that is the most widespread mobile connectivity technology used by the majority of the population. Due to its importance, attention remains on the areas across the UK which still have no coverage, known as 'not-spots', or where there is partial coverage referred to as 'partial not-spots'. This lack of, or poor, service is not consistent with the National Infrastructure Commission's view that 'mobile connectivity has become a necessity'².

To improve the coverage of 4G networks, the four mobile network operators (MNOs), EE, Virgin Media O2, Three, and Vodafone, continue to upgrade and develop commercial solutions for improvements in the availability of 4G coverage. The UK and devolved governments have also developed programmes to support network build in rural areas. The Shared Rural Network (SRN) programme was launched as a collaboration between the UK Government and major MNOs to agree a set of binding coverage commitments that address the issue of poor connectivity in rural and remote regions. This addresses both Total Not-Spots (TNS) and Partial Not-Spots (PNS). In Scotland, an earlier initiative, the Scotland 4G Infill (S4GI) programme, is also focused on addressing communities with limited and no 4G mobile coverage.

Purpose of this report

In July 2023, FarrPoint published a report that assessed the social, economic and environmental benefits of a single S4GI site in the small rural community of Polbain in the Scottish Highlands, which is now able to receive a better 4G service³.

The assessment demonstrated that small communities could benefit economically and socially from improvements in 4G coverage, and moreover, the investment required to bring infrastructure to service the growing connectivity needs of rural communities could also pass economic and environmental tests consistent with government spending rules.

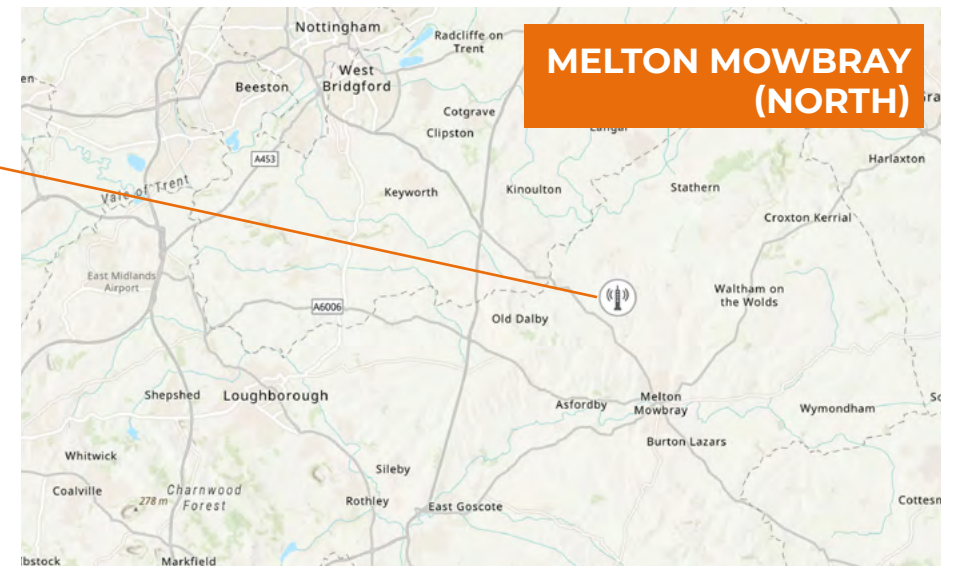
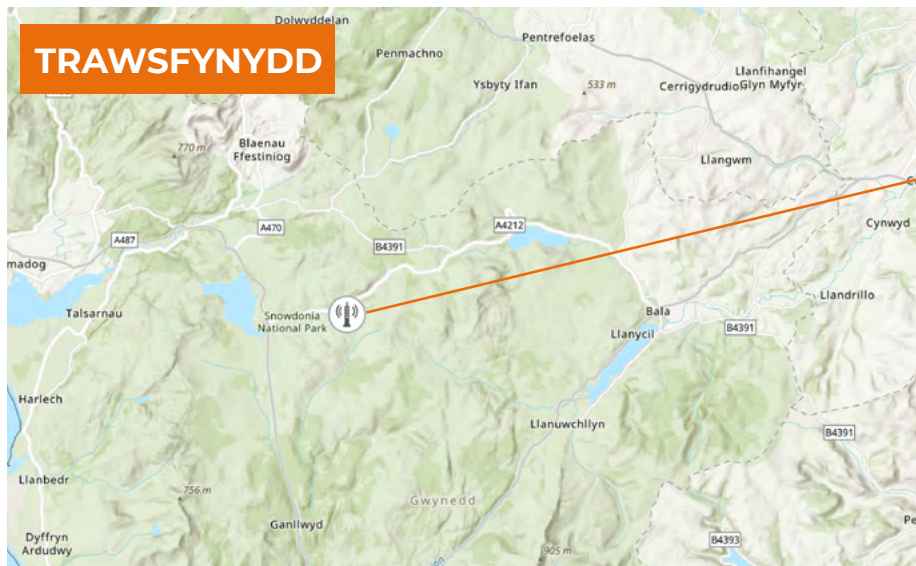
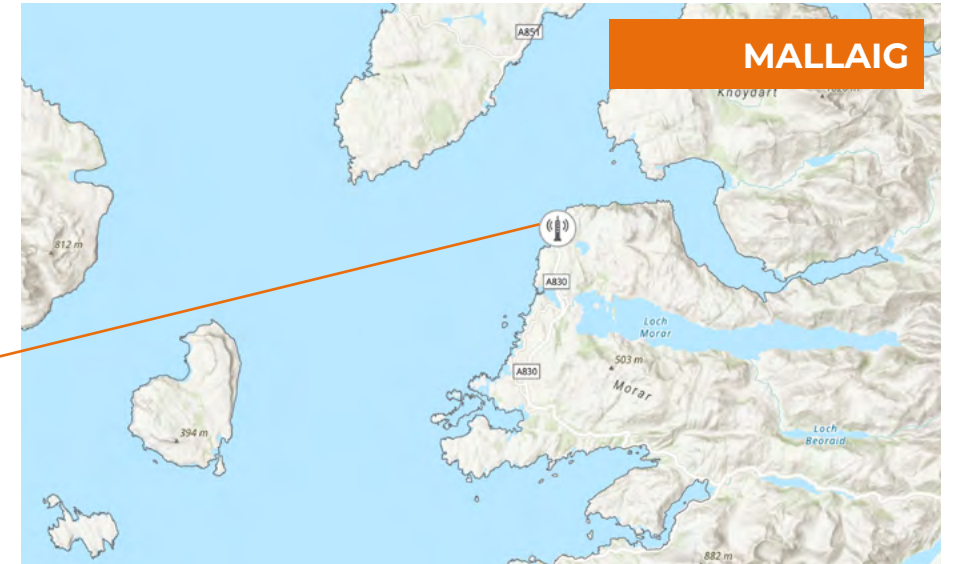
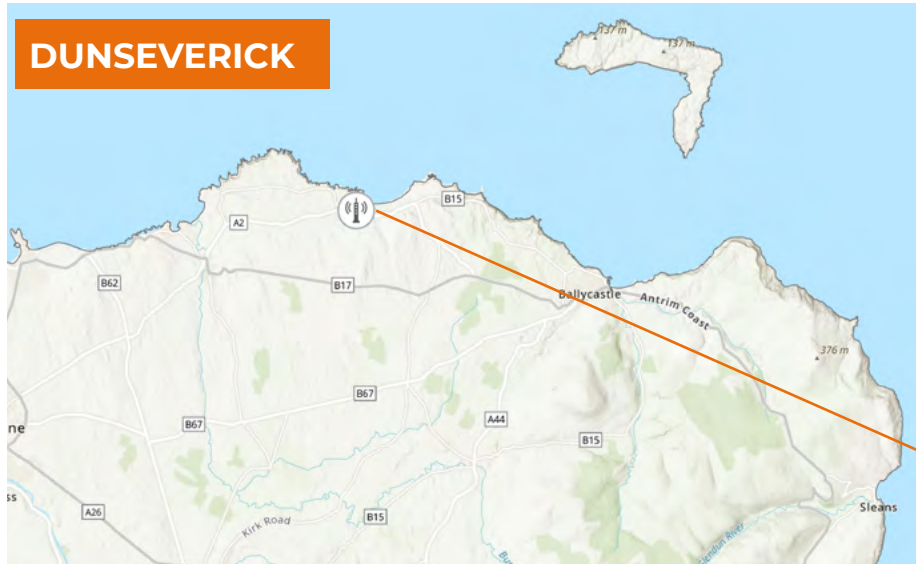
EE commissioned FarrPoint to assess the economic impact of four 4G improvement projects delivered in rural communities across the UK. The mobile mast sites analysed reflect a cross-section of different types of rural communities of varying sizes and demographics that have all received some form of 4G connectivity upgrade in the last three years. The selected sites are:

- **Mallaig** in Scotland,
- **Trawsfynydd** in Wales,
- **Melton Mowbray** (North) in England and
- **Dunseverick** in Northern Ireland.

² Connected Future, 2016, National Infrastructure Commission

³ Improving Mobile Connectivity: A Rural Community Study, FarrPoint

Site Locations





Methodology

Methodology

The role of 4G

4G, the technology predominantly used by most mobile customers in the UK, has delivered service for more than 12 years and, as a technology and a market, is considered to be mature. By providing reliable communication on the move, the adoption and reliance of 4G has grown significantly since EE launched the first network in the UK in 2012.

As a technology, it enables digital connectivity and service delivery in a manner that can be more affordable and flexible than, for example, fixed line and satellite connectivity. Mobile subscriber plans often are less costly than standard fixed line broadband, therefore for some consumers, 4G is a more affordable and necessary alternative. 4G offers a good alternative to broadband in many areas, although it does lack the speeds and robustness of full fibre fixed connectivity. Nevertheless, improvements in the ability of 4G to deliver higher bandwidth, as well as traditional voice and messaging services, make it an affordable choice for many⁴. Furthermore, the flexibility of communication on the move that mobile connectivity can provide also leads to the development of new use cases and increased adoption.

It is also an alternative and supplementary technology utilised across a number of commercial and security-based services. For example, two-factor authentication normally requires an alternative to an e-mail method of contact, and for many, password verification and codes are sent to a mobile device. In areas where there is no 4G service, or service is limited, simple activities like internet banking or paying for tickets on the move can become problematic.

The impact of improved 4G in rural communities

Technical barriers are not the main issue when it comes to improving mobile infrastructure to meet the needs of rural communities – the issue is almost always cost. In particular, this is about ensuring that the new or improved digital infrastructure delivers value, either economic or social, for rural communities in the first instance and wherever possible, the operator.

This report seeks to understand the impact that investing in improved 4G mobile connectivity has had at four different sites across the UK.

Methodology

FarrPoint has many years of experience working with rural communities across the UK and understanding the impact and challenges of improving digital infrastructure. We have used this knowledge, alongside our experience in mobile technology and economic impact and evaluation assessments, in our approach to modelling the impact of improved 4G.

Whilst there are a range of benefits driven by improvements in 4G connectivity, this impact assessment focuses on three key benefits that can currently be quantified based on the data available: the initial construction impact, the general economic Gross Value Added (GVA) impact, and the social wellbeing impact. Within the results section there is also an overview discussion of some of the additional qualitative benefits of each site. The average infrastructure build costs, and operation and maintenance costs used in the cost-benefit analysis, were supplied by EE. However, it's important to note that the costs of deploying 4G infrastructure in rural communities can be higher.⁵

The mobile mast sites analysed reflect a cross-section of different types of rural communities, of varying sizes and demographics, that have all received some form of 4G connectivity upgrade in the last three years. Each site has been appraised over a 15-year period, which is consistent with UK and international appraisal guidance for economic infrastructure development projects.

A robust evidence-based approach has been taken to measure the impact of improved 4G connectivity at each of the sites, taking into account the following assumptions:

Assumption 1: Initial Construction Impact – this takes into account the benefits to the local economy from the construction/installation of the infrastructure, for example, from the use of local contractors/suppliers. This has been calculated based upon a proportion of the investment in the infrastructure, ranging from 25-50% of the cost. This is multiplied

⁴ Ofcom - Mobile Matters

⁵ Polbain: Rural Community Study

by UK Government Blue Book Multiplier effects to account for further economic activity (jobs, expenditure or income) associated with additional local income, local supplier purchases and longer-term development effects that need to be added.

Assumption 2: General Economic Impact - This considers a range of medium to long-term economic benefits that impact upon the size of the local economy, from increased innovation, more flexible working and increasing labour force, to opening up a larger market both nationally and internationally. For the purposes of this benefits appraisal, it has been assumed that the rural GVA for those affected by the improved connectivity will increase by 0.5% per annum⁶. For each area, GVA per capita is based on Local Authority GVA per capita⁷. This is grown at the projected rates by the Office for Budget Responsibility for the English, Welsh and Northern Ireland sites and by the Scottish Fiscal Commission for the Scottish site up to 2028 and then in line with long-term economic growth (average 1999-2019 rate), which has been multiplied by the number of people covered by the improved connectivity (Assumption 4). In addition, for the Mallaig and Dunseverick sites, at which there are substantial tourism numbers during the summer months, an adjustment has been made to the population coverage numbers. This is based on the number of tourists in the area⁸ multiplied by an average of 15 minutes spent by each tourist using improved mobile connectivity (to complete activities such as booking tickets to local attractions, researching local restaurants, or navigating the local area).

Assumption 3: Social Wellbeing Impact – Whilst the majority of the impacts of improved connectivity on society are qualitative and therefore difficult to measure, analysis by the former Department of Digital, Culture, Media, and Sport (DCMS) has associated improved digital connectivity with an annual wellbeing uplift equivalent to £93.78 per person⁹. For the purpose of this appraisal, this figure has been inflated from 2019 prices to current prices and a rural uplift has also been applied to the analysis. Given this wellbeing impact is based on national appraisals/evaluations, an adjustment is used to consider regional variations from this average. As all four sites are in rural areas, we know that the costs associated with social wellbeing can be higher due to factors such as longer travel distances. To take this into account, the impact has been adjusted to include an average

of the percentage above UK average of local government spending and of the cost of living for residents. When adjusted, this leads to an uplift of c.10% of the wellbeing impact. However, not all those covered by the improved 4G infrastructure will obtain the same benefit; it is expected that those who are financially worse off are more likely to rely on 4G mobile signal for social connectivity. To take this into account, a proxy of the percentage of workless households¹⁰ within a local authority has been used to calculate those who will maximise the social wellbeing benefit from the improved mobile connectivity. The remaining will receive a benefit in-line with the percentage of people who access the internet using a mobile network¹¹.



⁶ Source: Capital Economics

⁷ Source: ONS

⁸ Source: Calmac, and Tourism Northern Ireland

⁹ Source: UK Government

¹⁰ Source: ONS

¹¹ Source: Ofcom

Assumption 4: Connectivity Coverage – the number of people impacted by the improved connectivity is calculated from the total population contained within the site's coverage area¹². These figures are then modelled to grow in line with the relevant Local Authority's projected population growth rates over the 15-year period. This figure has then been adjusted as we have assumed there will not be 100% coverage within the area, so a high and low estimate of 95% and 85% have been factored in for actual coverage. In addition, given not all the people covered by the improved coverage will be EE customers, only a proportion of those covered have been included in the benefit modelling. A high and low figure has been utilised in the modelling; they are 35% (in line with EE's network infrastructure market share) and 43% (in line with FarrPoint research¹³).

Assumption 5: Persistence – To fully understand the longevity of the benefits, it is important to recognise that following a digital connectivity intervention, the impact magnitude decreases over time, so the modelling has taken persistence into account. Given there is currently no value for persistence for 4G interventions, the modelling uses the results of the UK Government's Superfast Broadband Programme Evaluation¹⁴ as a proxy. This suggests that the estimated impact is reduced after two years following the intervention with a rate of decay of 13.2% per annum.

Assumption 6: Discounting and Social Time Preference – An annual discount rate of 3.5% has been applied to the 'Current Value' figures on both the benefits and costs to obtain the 'Present Value'. This is in line with HM Treasury Greenbook guidance¹⁵ to ensure costs and benefits occurring over different periods of time are compared on a consistent basis.



¹² Source: ONS, NISRA, NRS

¹³ Source: FarrPoint

¹⁴ Source: UK Government

¹⁵ Source: Green Book Guidance, HM Treasury



Mallaig Assessment

Mallaig Analysis & Results

The site is based in the village of Mallaig, a port on the west coast of the Scottish Highlands. The 4G mast was activated in February 2021 as part of the SRN PNS upgrades.

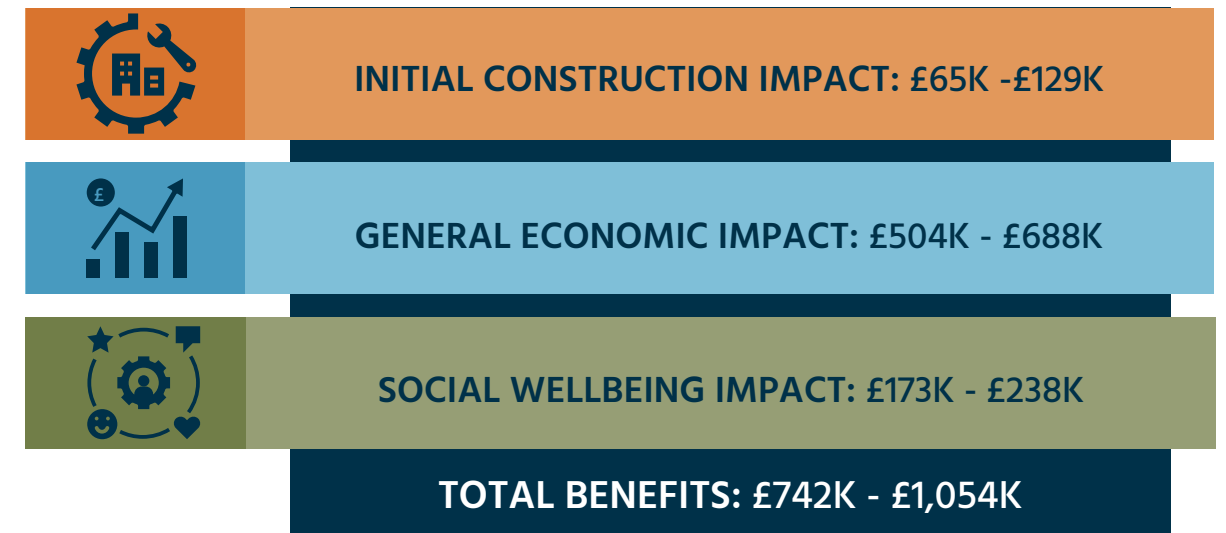
Mallaig is home to the end of the West Highland Line train line and is an important ferry port with regular service to Armadale on the Isle of Skye and to Lochboisdale on South Uist. This transport infrastructure means a significant number of tourists pass through the small port town each year - particularly during the summer months. In addition to serving the rural area surrounding the village, the site also serves a significant part of the Sleat peninsula on Skye (including the small port town of Armadale and the fishing village of Teangue), as well as the sizeable sea area between the two. The better mobile connectivity will have notable qualitative benefits, for example, improving 4G voice calling for those living and visiting the region will have a positive impact on their safety and social wellbeing.

This means that the tourism sector plays a key role in the rural area covered by the Mallaig mast. In addition to this, there are several key use cases for mobile connectivity within the Agriculture and Fisheries industries that will mean that improved 4G signal will lead to innovation and productivity growth within those sectors. The **productivity growth, innovation and growth in employment and the local economy will lead to benefits in the range of £504,000 and £688,000** over 15 years. As with the other sites, the initial mast build and construction activity will lead to economic impact within the area with the use of infrastructure build contractors and supply chain businesses local to the region. This **initial construction impact will be between £65,000 and £129,000**.

Turning to the Social Wellbeing impacts, the evidence suggests that improved mobile connectivity can have a greater impact on those further down the multiple deprivation scale, as they may not be able to afford both fixed and mobile connectivity. Therefore, given the area covered by this mast has a higher than average number of workless households and people on lower incomes, then the 4G connectivity from this mast has the potential to deliver significant benefits to these people. Alongside this, the area has a higher proportion of elderly residents who could benefit from improved delivery of public services (especially health and care) through the improvements in service quality that

access to digital connectivity can have on enabling proactive care to residents. In total, **the improvements in connectivity could deliver social wellbeing benefits in the range of £173,000 to £238,000** over the 15 years.

The results of the socio-economic impact assessment of the improved 4G connectivity in and around Mallaig and on the Sleat Peninsula, demonstrates that this site can deliver significant **total benefits to the local community of between £742,000 and £1,054,000** over a 15-year period. The vast majority of this benefit comes from the uplift in the local economy of well over £0.5m, however, there is also a sizeable social wellbeing benefit for the local residents.



CASE STUDY: 4G at sea presents 'life-changing' opportunity for Isle of Skye fisherman



Fishing is a vitally important industry for Scotland's rural and coastal communities. It feeds into the wider economy and provides employment opportunities for local people. Iain knows this all too well.

As a lifelong commercial fisherman on the Isle of Skye, Iain has lived experience of the struggle to stay connected when out working. Thanks to EE's 4G upgrades, he – alongside his brother who is also his business partner – can run and grow his business from his smartphone, with fast and reliable mobile connectivity.

While out potting (fishing) at sea more than 15 miles from home, Iain exchanges WhatsApp messages with buyers and keeps in touch with friends and family: **"I'm in touch with everything and everyone, just like you are at home. People in the city would take it for granted but what I can now do while working at sea is a game-changer."**

Having been a local resident since birth, Iain has seen the evolution of mobile connectivity throughout the rural area. **"It's been a couple of years now since the upgrade, but it was a massive improvement at the time. Before that, all we had were texts. It would take ages to go through, and sometimes you wouldn't receive them. Ever since 4G came in, we're using WhatsApp now, a text will instantly go through, and the other people will pick it up."**

Having access to high-speed 4G connectivity has transformed how Iain operates his business. Hour long journeys spent travelling out to sea are now spent catching up on emails, liaising with shellfish buyers across Europe and accessing mobile banking.

"Years ago, we'd have to come home and then go on the PC in the house. Now we've got internet coverage at sea with EE, I can do all my emails and banking and all that while the boat is on autopilot on our way out in the morning or on our way home at night. I can do all my business on my phone using 4G."

The brothers' small boat also means they are restricted to fishing on fair weather days only, and so when a fault arises with their boat, they need to act quickly to minimise downtime. **"Now we've got 4G, if we've had a breakdown, we can just look up the issue online, find out what we need and order the part. We can also access weather forecasts and contact the emergency services. It's a life-changing thing for our work."**





Trawsfynydd Assessment

Trawsfynydd Analysis & Results

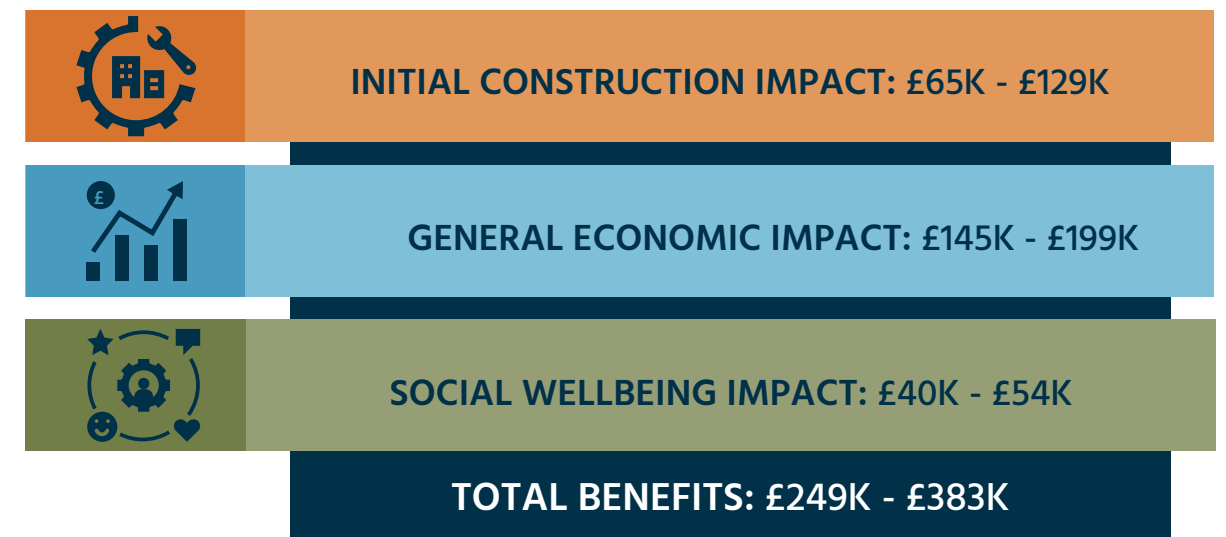
The next site considered is in the Trawsfynydd region in Gwynedd, Wales, near the village of Trawsfynydd and the Llyn Trawsfynydd reservoir. The site was built under the Emergency Services Network contract in May 2018; however, this assessment is focused on the impact of the 4G activation in July 2023, when additional 4G spectrum was added to the mast.

Trawsfynydd is home to approx. 580 people and is primarily an agriculture-based area, with farming being a key centre of the community and culture. Unlike other rural areas of Wales, there are relatively few holiday houses, although there are a few holiday lets. Nevertheless, the village is located within the Eryri National Park, so there are some opportunities for hiking and other rural activities within the area surrounding the village – such as the Pen Dolbelydr and Pen Lyn Hiraethlyn mountains, and a number of water sports activity centres and associated activities. This agriculture and small rural activity economy is where most of the economic activity potential gains are likely to be made from the improved connectivity. Like many smaller villages across the UK, the shops and businesses in the village itself are sparse, and there currently is only one grocery shop, one public house, a chemist, a garage, a petrol station, and a branch of an agricultural merchants. The nuclear power station, which was the area's largest single employer, closed in 1991 although the site still maintains 350 jobs even in 2023 as part of its prolonged decommissioning which is expected to last around 100 years in total. Taking all of this into account, **the total benefits to the local economy over the 15-year period are expected to be between £145,000 and £199,000.** In addition to this, in the short term, whilst the mast site was being built and telecoms technology upgraded, the contractor and supply chain impact of this **initial construction activity was between £129,000 and £65,000.**

Turning to the social impact of the improved mobile connectivity within the region, the available data on areas of multiple deprivation suggests that the area covered by the masts has a higher-than-average number of lower income individuals, which is likely driven by the slowing local economy. In addition to this, there is a high number of elderly people living within the region, who could benefit from improved access to digital public services like telecare or telehealth, enabled by improved connectivity. The social benefits

include the availability of good quality voice connectivity, an important consideration in this popular tourist and hillwalking area for safety reasons. In total the social wellbeing impact of this **improved 4G connectivity is in the range of £40,000 to £54,000.**

Overall, the socio-economic impact assessment of the improved 4G connectivity within the rural area of Trawsfynydd indicates that the improvements in 4G coverage can deliver **total benefits of between £249,000 and £383,000k** over a 15-year period. Given the population covered by the mast is lower than at the other sites, the magnitude of the benefits is smaller in comparison.



CASE STUDY: The future of farming in the heart of Wales



Whether it's submitting VAT returns, monitoring machinery or livestock via GPS, or simply talking to customers or suppliers, strong connectivity is now an essential part of modern farming life. Mobile signal is also critically important for health and safety, in an industry where farm workers often need to work in remote areas on their own.

Sixth generation farmer, Morien, understands the importance of mobile connectivity more than most. Since July 2023, he has benefitted from EE's increased 4G coverage across his 2,500-acre farmland in a remote part of Snowdonia.

Not spots used to be commonplace across the farm, meaning calls would regularly cut out, but not anymore. **"I've got one section of the farm that used to be pretty much non-existent with any type of signal. I'm now going up to that part on the mountain and surprised that I've got a signal on the call."**

Like most modern agricultural businesses, Morien's farm requires near constant supervision and maintenance to adhere to UK Government regulations and environmental protection schemes, which he supports. Digital access across the farm now allows Morien to provide real-time reports of habitat changes, confirm field classifications and check land management rules while on the move.

"It's brilliant because I've got access to the internet for mapping the land. If you're in the middle of mapping for a certain field, I can get straight into the Government

Gateway and look at what production type of field it is, or what management I must do to that field to stick to the rules."

His farm operations are reliant upon a range of smart devices and mobile applications – all of which benefit from 4G connectivity: **"We have a laptop; I have a Samsung Galaxy S21 smartphone and one of the workers has an iPad. We each share the same apps and it's all connected. So, I could be at the north side of the farm and the lad that works with me could be on the south side, and we can just message or pinpoint each other instantly."**

Livestock is a main source of income for the farm, and so keeping track of the health of their herd of pedigree Welsh black cattle and sheep is a top priority. **"I can now use apps to record if a certain cow hasn't been well if she's had certain injections and we can register where they've been grazing. Everything that's done is through the phone. If I'm out in the middle of the mountain and I've got a cow and she's had a calf, I simply put a tag in it and I can go online where I am and register it straight away."**

Morien no longer needs to manage his operations at home after a hard day's work. **"And with the coverage I've got with EE, I can do it anywhere I want on this farm. It's fantastic."**

Comparing his experience to that of other friends or employees not with EE, Morien says: **"When you're on the phone, they say 'Oh, I'm just going through this patch here, I'll be losing signal' and I'm thinking, why? What network have you got? I've got signal all the way through."**





Melton Mowbray (North) Assessment

Melton Mowbray (North) Analysis & Results

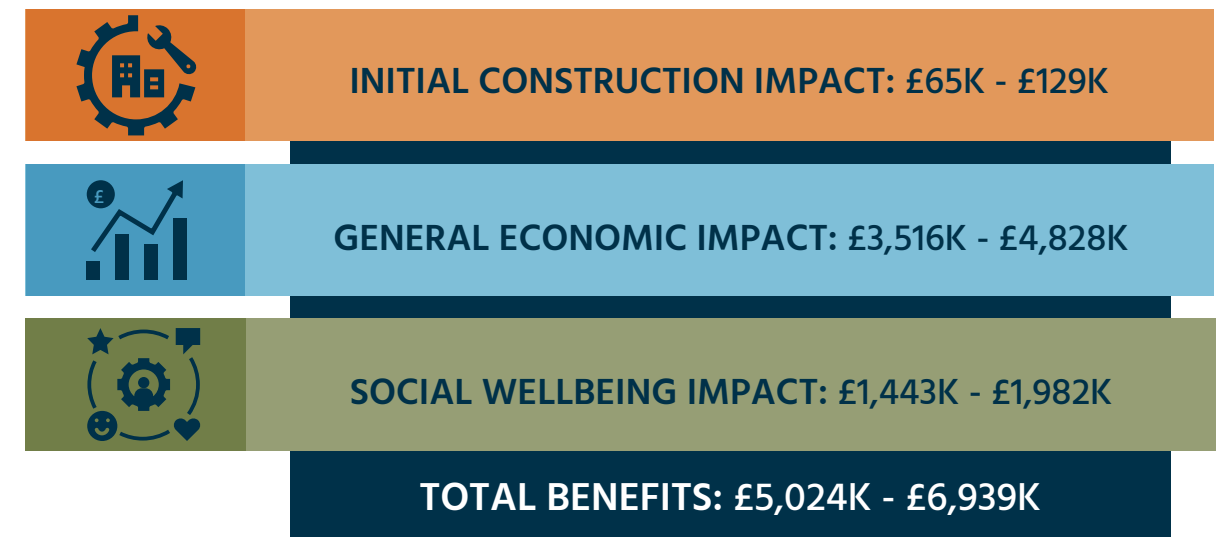
The site covers a sizeable rural area north of Melton Mowbray, including the villages of Long Clawson, Hose, Harby, Old Dalby and Nether Broughton. The new 4G coverage was activated June 2023 as part of the SRN PNS upgrades.

The initial build activity, including the telecoms construction work, has the potential to lead to economic growth within the region, via the use of local build and technology contractors, in addition to any knock-on impact this has on the local economy. **This initial construction impact will be in the range of £65,000 and £129,000.**

Subsequently, home to some c.13,000 residents, the vast majority of whom are of working age, the area covered by this mast has the potential to have the largest impact of all four sites. Many people living and working in the region work in rural sectors of the economy, such as farming and local food manufacturing (most notably, it's dairy and cheese businesses are world-renowned). All of these sectors can benefit from the improvements to mobile connectivity, both in terms of driving innovation as well as improving worker safety. In addition to this, in the age of increased home working, the improvements to 4G connectivity can offer those working from home within these commuter belts improved digital connectivity resilience. In total, the impact of the improved connectivity– through innovation, widening markets, increasing employment, etc. – **has the potential to add between £3,516,000 and £4,828,000 to the local economy.**

Relative to the other sites analysed within this report, the households covered by this mast are less deprived and on average are on higher incomes and have better access to public services. However, despite this, given this mast has the potential to cover such a significant number of households and residents, even a small impact on wellbeing could lead to **between £1,443,000 and £1,982,000 in social wellbeing impact.** As with the other areas, the improved 4G voice calling coverage will lead to important qualitative safety benefits, such as enabling both EE and non-EE customers greater access to 999 and other emergency services.

The results of the socio-economic impact assessment of the improved 4G connectivity within the rural area to the north of Melton Mowbray demonstrates that this site can deliver the **most significant total benefits of all the sites assessed, of between £5,024,000 and £6,939,000** over a 15-year period. Whilst there is the initial benefit of construction, the sizeable economic and social wellbeing uplift seen across the region is driving these significant benefits, driven largely by the sheer number of people that the improved network could cover.



CASE STUDY: 4G connectivity provides leap forward for equestrian coach



Libby is a self-employed equestrian coach, teaching people of all ages and abilities to ride horses, while also managing a busy livery stable. She also spent more than five years teaching at the Brooksby Campus in Leicestershire - a specialist land-based and sports college.

As someone who travels around the local area a lot for work, she has seen firsthand how EE's 4G connectivity has developed, with download speeds and signal reliability improving in the last year: **"I'm getting signal now at a lot more places, whereas before you'd be looking for it as such. I don't seem to be doing that whole walking around with your hand in the air thing."**

Most of Libby's working week is now spent either at the stable yard or out schooling horses, often in remote fields or countryside locations. As someone who works with children and young adults, as well as on occasions people with additional learning needs, she is entirely dependent on having reliable mobile connectivity when out riding. With strong 4G coverage, she is also able to maintain and check the emergency contact details for all her clients using a Google Form on her smartphone.

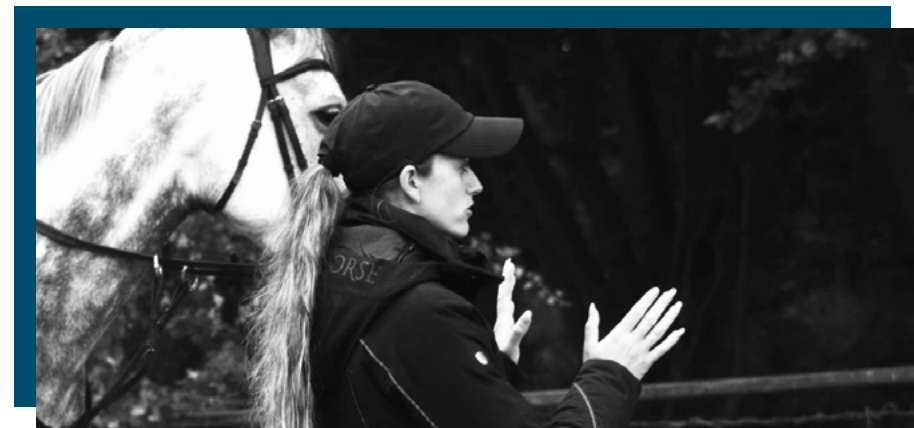
"In all my roles my mobile phone is so important, but especially when needing to get signal in the middle of a field when we're out cross-country schooling should we need first aid or an ambulance. Sometimes I am the sole coach in charge of a horse

and rider and the only person able to contact not only the emergency services, but also their emergency contact."

Now a self-employed coach, Libby organises and coaches at a variety of venues within the Nottinghamshire and Leicestershire area (including Melton Mowbray and surrounding villages), alongside being a competitive rider herself. Post-pandemic riding competitions rely much more on digital technology, with competitors like Libby, and those she teaches, now using their smartphones to register and take part in competitions. **"The arenas are often in the sticks on the windiest of hills, so having 4G coverage means you can be sat in the lorry and get instant updates on your start time, whether you're delayed or not, and can see your live results updated."**

Social media is Libby's primary advertising channel to grow her business, and access to fast 4G mobile internet is helping her raise awareness of her events, keep in touch with her clients, and generate sales for the equine yard by promoting its facilities online.

"It's important that we have access to a signal and can talk to people when we need to. With social media growing, all our advertising is now done online so when I'm out in the yard I'm reliant on my 4G to put my posts on Facebook. Rural areas are usually a little bit behind those in the city in terms of technology, but we've got to keep up with the times and stay modern."





Dunseverick Assessment

Dunseverick Analysis & Results

The site at Dunseverick serves the community in and around this small hamlet, mostly known for being near the Giant's Causeway in County Antrim, Northern Ireland. 4G mobile connectivity was activated in January 2022 as part of EE's SRN PNS upgrades.

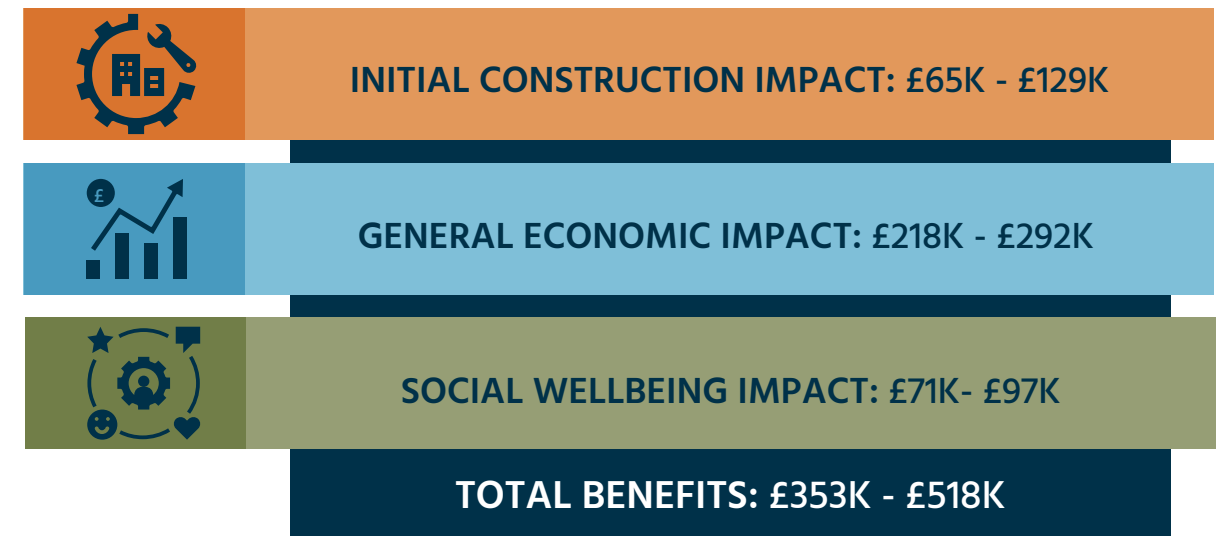
In addition to covering the properties and area surrounding the hamlet and its c.700 residents, the site covers Dunseverick Pool, Harbour and Castle as well as White Bay Beach. This means the improved mobile connectivity will deliver notable qualitative benefits, such as improved safety for both residents and visitors. It also covers a section of the A2, a major tourist route along the coastline, and the Causeway Road – both of which are home to a range of hotels and B&Bs. An adjustment has been made to take into account the sizeable numbers of tourists that flock to the region during the summer months, in particular. These visitors use the available mobile connectivity to complete activities such as booking tickets to the historical and environmental local attractions, as well as researching local restaurants, and/or navigating the local area. The additional capacity of 4G connectivity also increases the reliability and accessibility of voice calls in crowded areas, such as beaches and major roads. This is not just of benefit for EE customers, the improvement in voice services can offer additional benefits of emergency roaming for non-EE customers.

The initial construction impacts are largely focused on those infrastructure build contractors and supply services firms local to the region and will deliver between **£65,000 and £129,000 in initial construction benefit to the local area**. In addition to this, given the characteristics of those working within the area, the general economic improvements to the region will be largely driven by the tourism sector businesses, alongside those working from home and in more mobile occupations for example agriculture and fishing. In total, the **wider innovation, productivity and growth impacts of the improved 4G connectivity will deliver between £218,000 and £292,000 to the local economy**.

As the region has reasonably good, fixed digital connectivity – in particular through the roll out of full fibre across Northern Ireland - both the social and economic benefits are likely to be attributed to the more flexible on the go uses of mobile technology. However, given the region also does not perform well on levels of deprivation, in particular driven

by lower incomes levels and poor access to services, it can be assumed that there is a relatively large number of people using the mobile signal as their single digital connectivity within the household. The **impact on social wellbeing within the area will be in the range of £71,000 to £97,000**.

The results of the socio-economic impact assessment of the improved 4G connectivity in the area indicate that this site can deliver **total benefits to the community of between £353,000 and £518,000 over 15 years**. The vast majority of this benefit comes from the general medium-long term GVA benefits that 4G can have in a rural economy, from improved productivity, innovation, more flexible working, increasing the labour force, and attracting investment – particularly around the tourism economy.



CASE STUDY: Reliable mobile connectivity is becoming essential for the film industry



Northern Ireland has seen a huge growth in film and television production in the country in recent years. Game of Thrones and its current prequel, House of the Dragon, have taken advantage of some of the visually arresting locations the country has to offer. From the 'Dark Hedges' and Giant's Causeway in County Antrim, to ancient castles like Dunseverick, rural Northern Ireland is meeting the imaginative asks of filmmakers. Mobile coverage needs to do the same.

Filmmaking involves intricate coordination among cast, crew, and various support teams. Mobile networks facilitate real-time communication, allowing for seamless coordination despite geographical challenges. Crew members can share updates, scripts, and schedules through messaging apps and email, reducing delays and miscommunications.

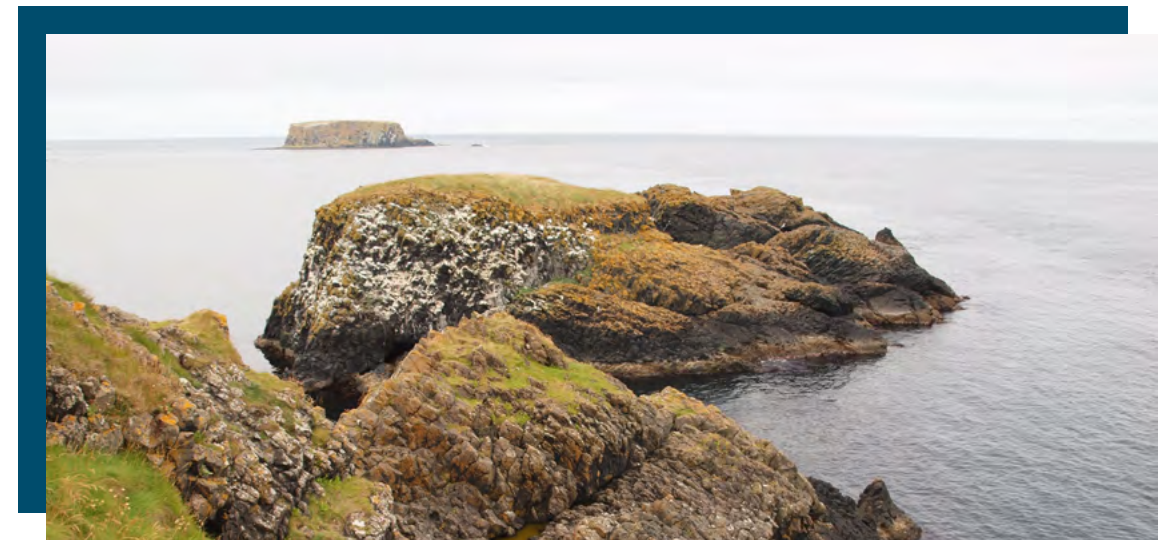
Alana works in film production as a set decorator and relies hugely on her phone to sort logistics while on the move. **"A film production is never set in stone. Scripts, locations and timings are always evolving and it's vital that I can respond in real time to meet changing and challenging deadlines. Being able to hold phone calls – especially in remote areas – allows me to work when travelling between locations, freeing up time at the other end."**

It's not just handling important logistics that mobile connectivity is supporting. Alana says the use of cloud-based production tools are also making a difference. **"Dailies (daily raw**

footage) can be uploaded to cloud platforms, allowing directors and producers, who might not be on location, to review and provide feedback promptly. This real-time collaboration is essential for maintaining the pace and quality of production."

Northern Ireland Film suggests production in the country is worth £43m to the local economy, but it also opens up opportunities for talent discovery in underserved regions. **"With the industry increasingly looking to film in more regional locations, it means casting calls and location scouting can be conducted more efficiently. Filmmakers can use social media and dedicated apps to reach out to local communities, discovering actors and crew members who might not have access to traditional casting networks. This not only enriches the film's authenticity but also provides valuable opportunities for rural talents to break into the industry."**

The economic impact of connectivity on rural film industries is growing. By facilitating more efficient productions and broader distribution channels, mobile networks can lead to an increase in local employment opportunities and economic activity. The influx of film projects into rural areas can boost local businesses, from hospitality to transportation to tourism, creating a positive ripple effect on the rural economy.



A scenic landscape featuring rolling green hills, lush trees, and a group of people sitting on a grassy field. In the foreground, there are vibrant pink and white tulips. A semi-transparent orange box is overlaid on the lower-left portion of the image, containing the title text.

A Comparison of Network Investment and Community Benefits

A Comparison of Network Investment and Community Benefits

Comparing the amount invested in individual mast sites and the impact that that investment has on the local community leads to some interesting findings. For this analysis an average infrastructure cost of £207,000 and average operation & management costs of £32,000 pa have been used to give an overall present value of investment in each mast site over the 15-year period of £553,000.

At two of the sites, the magnitude of the social and economic benefits to the local community considerably outweighs the cost of this investment:

- In the area covered by the **Melton Mowbray (North)** site in England, the benefits could amount to between £5.0 and £6.9 million, which is between 9.1 and 12.5 times its cost.
- At **Mallaig**, in Scotland, the new site will deliver benefits in the range of £0.7 million and £1.0 million, which is between 1.3 and 1.9 times the investment made.

At the other two sites, whilst the benefits to the local community are considerable, they are not as large as the investment made in the improvements:

- At **Dunseverick** in Northern Ireland, the socio-economic impact of between £353k and £518k is between £201k and £35k lower than the investment made.
- The additional 4G spectrum added to the mast in **Trawsfynydd** in Wales could deliver between £383k – £249k in socio-economic benefit, however this is nearly half the investment made in the improvements.

The challenges of delivering improved digital connectivity to remote communities with low population densities is well known. Therefore, programmes like SRN are important in helping to close the digital gap and ensure that the benefits of connectivity are more widely realised.

This quantitative benefits analysis does not take into account the wide variety of qualitative benefits of enhanced reliability of mobile connectivity – such as improved safety in emergency situations and ageing populations, both of which can be more prevalent in these remote communities. Furthermore, when considered as part of EE’s larger coverage picture across the whole of the UK, the investment in improving rural connectivity to remove ‘not-spots’ increases the network’s overall coverage available to all users.



*Figures show net benefits after the cost of network investment has been accounted for.



Conclusion

Conclusion

SRN is a £1 billion partnership between the UK Government and the four main mobile network operators to extend 4G connectivity to rural communities, with the aim to cover 95% of the UK's landmass by the end of 2025.

This study focuses on understanding the social and economic impact that improved 4G mobile connectivity delivers at four different sites across the UK. These sites have all been delivered as part of the SRN programme.

Ultimately, the programme's aim is to ensure that the rural communities across the UK have 4G mobile connectivity that matches the national average and is not solely determined by commercial drivers. Our robust evidence-based analysis shows that all four sites demonstrate significant positive economic benefits for the communities covered.

- At **Mallaig** in Scotland, the new site will deliver benefits to society and the local economy in the range of £742,000 and £1,054,000.
- The additional 4G spectrum added to the mast in **Trawsfynydd** in Wales could deliver between £249,000 to £383,000 in benefits to the local community.
- In the rural communities covered by the **Melton Mowbray (North)** site in England, the benefits could amount to between £5,024,000 and £6,939,000.
- The site at **Dunseverick** in Northern Ireland shows a socio-economic impact of between £353,000 and £518,000 over 15-years.

Comparing the amount invested in individual mast sites and the impact the investment has on the local community leads to a mixed picture which is driven by the number of local residents covered by the improved 4G signal – the more people use it, the more cost-effective the solution is. In addition to the quantitative benefits there are also a wide variety of qualitative benefits like improved safety, wellbeing, and reliable access to critical digital services such as banking and healthcare. Furthermore, the investment in improving rural connectivity increases the network's overall coverage available to

all users. Given the significant benefits that we have found for local communities from improvements in 4G, it demonstrates the importance of the private and public sectors continuing to work together to invest in rural connectivity, despite the higher costs of delivering mobile technology in some locations.

	MALLAIG	TRAWSFYNYDD	MELTON MOWBRAY (NORTH)	DUNSEVERICK
BENEFITS				
Initial Construction Impact	£65k to £129k	£65k to £129k	£65k to £129k	£65k to £129k
General Economic Impact	£504k to £688k	£145k to £199k	£3,516k to £4,828k	£218k to £292k
Social Wellbeing Impact	£173k to £238k	£40k to £54k	£1,443k to £1,982k	£71k to £97k
Total Benefits	£742k to £1,054k	£249k to £383k	£5,024k to £6,939k	£353k to £518k
INVESTMENT				
Infrastructure	£207k	£207k	£207k	£207k
Operation & Maintenance over 15 years	£346k	£346k	£346k	£346k
Total Investment	£553k	£553k	£553k	£553k
COST-BENEFIT ANALYSIS				
Cost-Benefit Ratio	1.3 – 1.9	0.5 - 0.7	9.1 – 12.5	0.6 – 0.9
Net Present Value	+£189k to +£501k	-£304k to -£171k	+£4,470k to +£6,385k	-£201k to -£35k
* Note: Numbers may not sum due to rounding				

About FarrPoint

FarrPoint is an independent technology consultancy that specialises in digital connectivity. We understand the importance of connectivity as the underlying mechanism for driving economic and social benefits and we have deep personal convictions about the importance and impact of our connectivity work. This work matters to us, and we get professional reward from being part of the change that improved connectivity can bring to societies and communities.

To achieve this, we provide independent advice on the commercial and technical considerations of connectivity strategies, technical planning and modelling, procurement support and implementation assurance. Our work ranges from connectivity infrastructure programmes to use cases covering public service delivery, health and social care and environmental issues.

Our team comprises a mix of consulting technologists, economists and data analysts who work together to provide experience, expertise, and complementary resource to clients in the public and private sectors.

More details on our approach and services are found at www.farrpoint.com



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