5G Innovation Regions and Smart Infrastructure Pilots Programme Evaluation

Scoping and baseline report

May 2024

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Glossary

Table 1: Glossary

Key term	Definition
5GIR	5G Innovation Regions
Activities	The material and human resources used to undertake the tasks which underpin an intervention
Attribution	The extent to which measured changes can be attributed to the intervention
Baseline	The baseline provides an understanding of the situation at the start of the intervention. It serves as a reference point against which progress can be measured and evaluated through the implementation of the intervention
Benefits	Positive outputs and outcomes (including economic, social, and environmental) resulting from an intervention
Benefits tracker	The monitoring template filled out by LAs to illustrate progress made on a range of different outputs and/ or outcomes for each intervention
Contribution analysis	A theory-based method to assess the attribution of impacts to an intervention
DSIT	Department for Science, Innovation and Technology
Economic impact	The impact on the economy, primarily measured by economic output (gross value added), productivity and employment, which result from an intervention
GVA	Gross value added
Impact	The changes which result from the intervention over the longer term and that would not have happened otherwise
Indicators	An observable and/or measurable quantity used to determine whether the intended outcome(s) and/or impact(s) have been achieved
Intervention area	Area that received funding from DSIT for either intervention
LA	Local Authority
MNO	Mobile network operator
Network/ tech provider	Organisation providing advanced wireless technology networks or related technologies/ infrastructure
Outcomes	The changes which result from the intervention outputs over the short and medium term
Outputs	The deliverables that directly result from the inputs and activities related to an intervention

PAS	Publicly Available Specification
SIPP	Smart Infrastructure Pilots Programme
Stackable use cases	The provision, or layering, of a number of different use cases on one network without needing to build additional capacity.
Steering Group	The Steering Group for the evaluation has the role of providing advice, guidance, scrutiny and challenge to the evaluation. It consists of DSIT officials and a member of the Cabinet Office's Evaluation Taskforce
Theory of change (ToC)	A theory of change describes and illustrates the changes an intervention is seeking to make, how it is expected to happen, and the measurable outputs, outcomes and impacts associated with the intended change
Use case provider	Organisation that uses advanced wireless technology for a particular purpose (or use case). The use cases can span many sectors and purposes
UKTIN	UK Telecoms Innovation Network

Executive summary

1.1 Introduction

To support the Department for Science, Innovation and Technology's (DSIT) ambition to deliver world-class digital infrastructure across the UK, drive innovation and unlock opportunities for economic growth, and as part of its Wireless Infrastructure Strategy[1], DSIT is currently in the process of delivering two wireless infrastructure programmes: 5G Innovation Regions (5GIR) and the Smart Infrastructure Pilots Programme (SIPP). Details of these programmes can be found in Section 2.1.1 of this report.

In line with the expectation of Government departments to undertake comprehensive, robust and proportionate evaluations of their policy interventions[2], DSIT has commissioned KPMG to undertake programme-level evaluations of 5GIR and SIPP.

The evaluations will consist of process, impact and economic evaluations for each programme:

- The **process evaluations** will examine the application process (running from May to July 2024) and the delivery of the 5GIR and SIPP programmes (running from April to August 2025).
- The **impact evaluations** will seek to identify and measure observed outcomes and impacts and assess the extent to which such outcomes and impacts are caused by/ attributable to the 5GIR and SIPP programmes. This will run from April 2025 to August 2025.
- The **economic evaluations** will seek to assess the value of outcomes realised at the point of the evaluation to determine the extent to which the 5GIR and SIPP programmes have realised benefits in excess of the costs of delivering the programmes. This will run from April 2025 to August 2025.

In delivering the evaluations we will work closely with the DSIT evaluation project team[3] and the Steering Group[4] (hereafter referred to as the DSIT evaluation team and Steering Group respectively) that has been set up as part of the 5GIR and SIPP evaluations.

The purpose of this scoping report is to set out the result of initial scoping and baselining phases of work for the evaluations, including the planned approach to implementing the evaluations. It also establishes the baseline for each programme.

1.2 Approach to scoping the evaluations

The approach taken to scoping and designing the evaluations follows the approach detailed in the HM Treasury Magenta Book[5].

The work undertaken for this report has been informed by a range of activities, including:

[1] See: https://www.gov.uk/government/publications/uk-wireless-infrastructure-strategy/uk-wireless-infrastructure-strategy
[2] See: About us - Evaluation Task Force - GOV.UK (www.gov.uk)
[3] The DSIT evaluation project team has overall responsibility for the evaluations and provides ongoing input and direction in relation to the evaluation such that it meets DSIT's requirements; the team is comprised of DSIT officials.
[4] The Steering Group provides advice, guidance, scrutiny and challenge to the evaluations, with the aim of supporting the evaluations and ensuring the findings are robust and provide useful insights to build the evidence base in relation to digital infrastructure. It consists of DSIT officials covering the areas of policy, analysis, benefits realisation and technical expertise with respect to the 5GIR and SIPP programmes, together with a member of the Cabinet Office's Evaluation Taskforce.
[5] HM Treasury 2020; Magenta Book. See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879438/HMT_Magenta_Book.pdf

- Engagement with DSIT evaluation team and Steering Group to understand the purpose and priorities for the evaluations.
- Review of programme documentation.
- Two familiarisation interviews, one with SIPP policy leads, technical advisors, and officials leading on the collection of benefits information; and one with 5GIR technical advisors and officials leading on the collection of benefits information. These were used to obtain information and understanding of the two programmes.

Based on this consultation and review of existing documentation, a comprehensive theory of change (ToC)[6] for each programme was developed. These provide an overview of how the activities undertaken in both of the programmes are expected to feed through to the intended outcomes and end impacts using causal analysis of available evidence. Details of the ToC developed for each programme is included in Section 3.3.

The understanding gained as to the purpose of the evaluations and the programme ToCs informed the development of evaluation research questions. The research questions were developed in consultation with the DSIT evaluation team and the Steering Group. The final evaluation research questions agreed with these stakeholders are set out in Section 1.3 below.

This initial scoping work provided the basis for the subsequent development of appropriate evaluation methodologies. These methodologies, for each of the process, impact and economic evaluation were then tested and agreed with the DSIT evaluation team and the Steering Group. Detail on the methodologies is presented in Section 4.

1.3 Evaluation research questions

The evaluation research questions presented in Table 2 below reflect the original draft research questions set out in the Invitation to Tender (ITT)[7] and the outcomes/impacts that are expected to be achieved – and that can be measured – within the timescales of the evaluations.

Table 2: Evaluation research questions

Process evaluation	
1)	What went well and what could be improved with regard to the 5GIR/SIPP programmes, specifically:
	a. in relation to the application process (from the point of view of LAs and DSIT)?
	b. in relation to the design and delivery (from both a DSIT and LA/partner organisation perspective)?
Impact evaluation	
1)	To what extent did the 5GIR programme achieve the outcomes it set out to achieve within the timescale of the evaluation and to what extent can these outcomes be attributed to the programme – specifically:
	a. To what extent did the 5GIR interventions provide evidence of the realisable benefits of advanced wireless technologies?
	b. To what extent were the 5GIR interventions sustainable post-Government funding (ie networks continued after funding)?
	c. To what extent were the benefits of advanced wireless technology adoption from the 5GIR programme documented and disseminated?

[6] The ToC identifies the changes an intervention is seeking to make, how it is expected to happen and the measurable outputs, outcomes and impacts associated with the intended change.
[7] UK Shared Business Services Ltd (2023) Mini Competition against an existing Framework Agreement (MC) on behalf of Department for Science, Innovation & Technology Subject: 5G Innovation Regions and Smart Infrastructure Pilots Programme Evaluation. Sourcing Reference Number: PS23394

	d. To what extent has the 5GIR programme fostered an emergent 5G ecosystem by enabling learning by doing?
	e. To what extent is there evidence of the 5GIR programme encouraging and/or increasing long-term adoption of advanced wireless technology?
2)	To what extent did the SIPP programme achieve the outcomes it set out to achieve within the timescale of the evaluation and to what extent can these outcomes be attributed to the programme – specifically:
	a. To what extent has SIPP provided evidence of the benefits of utilising street furniture and other assets for network deployment?
	b. To what extent have lessons learned from SIPP around the procurement and installation of technology been documented and disseminated?
	c. To what extent has SIPP improved the understanding within the intervention LAs of the benefits of utilising street furniture and other assets for network deployment and how this can be delivered?
Economic evaluation	
1)	Is there evidence that the benefits from some of the use cases delivered by the 5GIR and SIPP programmes to date outweigh the costs?
Longer term impact and economic evaluation research questions (not within scope of this evaluation)	
1)	To what extent was the 5GIR programme able to achieve the outcomes it set out to achieve – specifically:
	a. To what extent has the 5GIR programme driven economic growth?
	b. To what extent has the 5GIR programme accelerated commercial investment in 5G and other advanced wireless technologies?
	c. To what extent has the 5GIR programme fostered a 5G ecosystem?
2)	To what extent has the SIPP programme improved the understanding and realisation of the benefits of utilising street furniture and other assets for advanced wireless network deployment?
3)	To what extent do the benefits of the 5GIR and SIPP programmes outweigh the costs?

1.4 Data and evidence collection

The 5GIR and SIPP evaluations will rely on a breadth of data and evidence to inform evaluation analysis and the findings and conclusions in relation to each of the research questions for the evaluations.

A detailed exercise has been undertaken to identify what indicators, information and evidence will be needed, linking back to the ToC developed, and the research methods that will be employed to gather this evidence. More details on the approach that was taken to identifying data and evidence requirements is provided in Section 4.2.1 of this report.

A brief summary of the main research methods that will be used to collect data/information for the evaluations is set out below.

- **Benefits tracker:** All LAs participating in both the 5GIR and SIPP programmes are expected to return information on the activities and outputs delivered by their intervention along with associated outcomes and impacts. This will provide data and information for all aspects of the evaluations and the 6-monthly reporting.

- **Interviews and focus groups:**
  - Representatives from LAs, use case providers and network/tech providers involved in both the 5GIR and SIPP programmes respectively will be invited to participate in focus groups. The focus groups will be used to gather primarily qualitative evidence to inform the process, impact and economic evaluations.

- Interviews with DSIT officials involved in the delivery of the two programmes and UK Telecoms Innovation Network (UKTIN) officials will be undertaken to gather, again primarily qualitative evidence, to support the analysis of each of the process, impact and economic evaluations.

In total, using the above approach, it is expected that around 80 individuals will be invited to participate in focus groups or interviews for the evaluations.

— **Surveys**: A number of surveys will also be run over the course of the evaluations to help answer the evaluation research questions, including surveys of:

- LAs (incl. successful and unsuccessful applicants) regarding the application process; and
- use case providers and network/tech providers to better understand the commercial viability of both use cases and network provision as a result of the 5GIR programme.

— **Review of documentation**: We will review a wide range of documentation to help answer the evaluation research questions. Documentation including official and internal DSIT documentation; existing literature; and, documentation produced as a consequence of the interventions will all be used to support the analysis underlying the delivery of the process, impact and economic evaluations.

Table 3 below summarises the sources of information that will be used to inform each element of the evaluation across both programmes.

Table 3: Main sources of information and evidence for different elements of the evaluation

Elements of evaluation	Source of information/evidence								
	Published data	Benefits tracker	Focus groups/ interviews					Survey	Document -ation
			LAs	Use case providers	Network/ tech providers	DSIT policy	DSIT comms/ UKTIN		
Baseline	✓	✓							✓
6-monthly reporting		✓							✓
Process evaluation									
- Application						✓		✓	✓
- Design and delivery		✓	✓	✓	✓	✓	✓		✓
Impact evaluation – 5GIR									
- Benefits of advanced wireless technology		✓	✓	✓	✓	✓		✓	
- Sustainable post funding		✓	✓	✓	✓	✓		✓	
- Value documented/ disseminated		✓	✓	✓	✓	✓	✓	✓	
- Ecosystem		✓	✓	✓	✓	✓		✓	
Impact evaluation - SIPP									
- Benefits of using LA assets		✓	✓	✓	✓	✓		✓	
- Improved understanding of benefits		✓	✓	✓	✓	✓		✓	
- Lessons learned disseminated		✓	✓	✓	✓	✓	✓	✓	
Economic evaluation									
- Benefits outweigh costs		✓	✓	✓	✓	✓		✓	

Source: KPMG

Further details of the data collection methods which will be used over the course of the evaluations are provided in the main report and Appendix 3.

1.5 Analytical approaches to the evaluations

1.5.1 Process evaluations

The process evaluations will examine how the processes employed in both the application process and the design and delivery of the two programmes contributed to the two programmes' outcomes.

Given the application process has recently concluded and to avoid lessons from this process being lost with the passage of time, the process evaluations will be conducted in two phases. The first phase, to be conducted between May 2024 and July 2024, will consider the application process and include aspects of the design of the programme. Then, following the conclusion of the programme in March 2025, the second phase covering the delivery of the programme will be conducted.

Data and evidence drawn from the range of sources detailed above will be brought together through thematic analysis to identify key themes and insights from the various stakeholders and data sources. Through this process we will assess how the specific processes and approaches adopted for both the 5GIR and SIPP programmes have affected the overall delivery of the programmes.

1.5.2 Impact evaluations

The purpose of impact evaluations is to assess what changes occur as the result of an intervention and the extent to which such changes can be attributed to the intervention, over and above what would have happened had the intervention not taken place.

As part of the scoping, a range of methods for the impact evaluations were considered, including experimental and quasi-experimental methods (QEM) as well as theory-based approaches (as set out in more detail in Section 4.3.2). This concluded that experimental methods would not be suitable and the timing of the evaluations precluded QEM being employed at the programme level (though a programme level QEM might be possible longer term). Moreover, whilst QEM might be possible for individual use cases, these would not be generalisable at the programme level and would carry notable resource requirement and risks around the availability and quality of data collection.

As a result, we propose a theory-based approach to the evaluations, specifically contribution analysis.

To deliver this approach we will combine evidence of the activity, outputs and outcomes reported through the benefits tracker with qualitative and quantitative evidence drawn from focus groups, interviews and surveys of various stakeholders in the programme. This combined evidence base will be used to test the causal links identified in the ToC for both programmes, from the delivery of activities and outputs through to the realisation of outcomes.

Whilst this approach will not allow us to precisely estimate the exact size of impact from the intervention, it will enable us to test the extent to which the pathways identified in the ToC materialised (or not). In this way, the approach will also provide useful contextual information around how and why such outcomes were achieved.

1.5.3 Economic evaluations

To evidence the scale and nature of costs and benefits for 5GIR in a proportionate way, a cost benefit analysis will be undertaken of 3-5 (ideally stackable) use cases as part of the evaluation. These will be selected based on the availability of data required to allow costs and benefits to be monetised robustly, and will seek to obtain coverage across a range of sectors and types of use case.

Following HM Treasury's Green Book guidance[8], the economic evaluations will monetise costs and benefits where possible. They will draw on data from intervention LAs as well as from other alternative information sources to inform the analysis and assumptions, e.g. drawing on existing literature. The analysis will account for additionality and all costs and benefits will be discounted in line with Green Book guidance.

For the SIPP programme, we will investigate the costs of the Publicly Available Specification (PAS) 191 standard multi-purpose poles. These costs will be compared against the potential benefits from the use cases deployed on the poles. The objective will be to produce a robust understanding of the nature and scale of benefits that can be expected by LAs installing PAS 191 poles as compared to their costs.

[8] HM Treasury (2022) The Green Book: Central Government Guidance on Appraisal and Evaluation. Available at: The Green Book (2022) - GOV.UK (www.gov.uk)

2 Introduction

2.1 The context for the evaluations

2.1.1 Background to the evaluations

To support the Department for Science, Innovation and Technology's (DSIT) ambition to deliver world-class digital infrastructure across the UK, drive innovation and unlock opportunities for economic growth, DSIT is currently in the process of delivering two wireless infrastructure programmes: 5G Innovation Regions (5GIR) and the Smart Infrastructure Pilots Programme (SIPP).[9]

These programmes are being delivered as part of DSIT's wider activity to encourage 5G adoption across the UK and support the delivery of the Wireless Infrastructure Strategy.[10] This strategy sets out DSIT's vision for how advanced wireless infrastructure can become an integral part of the UK's economy and society by 2030, and how people, business and public services across the UK can realise the full benefits of 5G and other forms of advanced wireless connectivity.[11]

Government departments are expected to undertake comprehensive, robust and proportionate evaluations of their policy interventions in order to understand how policies and programmes are working and to ensure the best value for public money.[12] To that end, KPMG was commissioned in February 2024 by DSIT to undertake programme-level evaluations of 5GIR and SIPP.

The evaluations will consist of impact, process and economic evaluations for both the 5GIR and SIPP programmes separately. The evaluations will be conducted concurrently due to the synergies between the programmes and their evaluations.

As part of this programme of work, KPMG is required by DSIT to deliver a final report on the process, impact and economic evaluations by the end of August 2025, following the conclusion of the two programmes' delivery in March 2025. During the period the programmes are running, KPMG will deliver two 6-monthly dashboards (covering the two programmes' progress) and an early process evaluation on the application process.

More detail about the two programmes is provided in the sections below.

2.1.2 About the 5GIR programme

As part of DSIT's ambition to drive 5G adoption, 5GIR is a £40 million programme seeking to develop digital ecosystems that leverage local areas' sector-specific expertise and capabilities.[13] Programme delivery commenced in November 2023 and will run until March 2025.

As part of the programme, DSIT invited applications for funding from local authorities (LAs) across the UK to establish themselves as '5G Innovation Regions'. Through this funding, DSIT aims to enable

[9] UK Shared Business Services Ltd (2023) Mini Competition against an existing Framework Agreement (MC) on behalf of Department for Science, Innovation & Technology Subject: 5G Innovation Regions and Smart Infrastructure Pilots Programme Evaluation. Sourcing Reference Number: PS23394
[10] See: https://www.gov.uk/government/publications/uk-wireless-infrastructure-strategy/uk-wireless-infrastructure-strategy
[11] See: https://assets.publishing.service.gov.uk/media/64c3c3177aea5b00126a8e34/5g_innovation_regions_application_guidance.pdf
[12] See: About us - Evaluation Task Force - GOV.UK (www.gov.uk)
[13] DSIT 2024, A guide to the Department for Science, Innovation and Technology's (DSIT) telecoms research, development and innovation current funding and opportunities. See: https://assets.publishing.service.gov.uk/media/65d85a5854f1e700111658db/A_guide_to_DSIT_s_Telecoms_Research__Development___Innovation_Initiatives.pdf

places across the UK to unlock opportunities which utilise advanced wireless connectivity, supporting the following strategic objectives of the programme[14], to:

- drive economic growth in places by supporting places in adopting wireless connectivity for services based around local opportunities for growth;
- accelerate commercial investment in 5G and other advanced wireless technologies by aggregating and demonstrating demand; and
- foster the emergent 5G ecosystem by enabling "learning by doing".

Specifically, ten 5G Innovation Regions will receive DSIT funding through the programme. Regions will deliver interventions with the intention of promoting and demonstrating how the development and scaled adoption of 5G and other advanced wireless technologies (in businesses and in the delivery of public services) can generate benefits at the local level. The intention is for the regions to target key sectors with high potential for local economic growth and productivity gains and to drive innovative applications powered by 5G and other advanced wireless connectivity from proof of concept to widespread adoption.

2.1.3 About the SIPP programme

SIPP is a £1.5 million programme that seeks to enable six LA-led pilots to procure and test smart multipurpose columns for mobile and wireless connectivity services, and other relevant uses. Through this, the aim is for LAs to make efficiency savings as well as increase connectivity for their local communities.[15] The £1.5 million of Government funding allocated to the programme is intended to be matched by smart service providers working with the participating LAs. The main overall objective of the programme is to improve the understanding and realisation of the benefits of utilising street furniture and other assets for network deployment.

The programme aims to support the implementation of DSITs UK Wireless Infrastructure Strategy. Specifically, the strategy highlights that operators will likely need to deploy additional wireless infrastructure to meet the growing demand for mobile access to data, including the installation of small cells rather than more traditional mobile phone masts or poles, to provide services in areas where additional capacity in coverage and speed is required.[16] The use of public sector assets, like lamp posts or other types of street furniture, to house small cells is likely to become increasingly important for the rollout of advanced wireless networks. SIPP aims to fill this gap by enabling successful pilots to procure and test smart multi-purpose columns for mobile and wireless connectivity services, and other relevant uses.[17]

2.2 About the evaluations

2.2.1 Overview of the evaluations

As commissioned, the evaluations of the 5GIR and SIPP programmes will include:

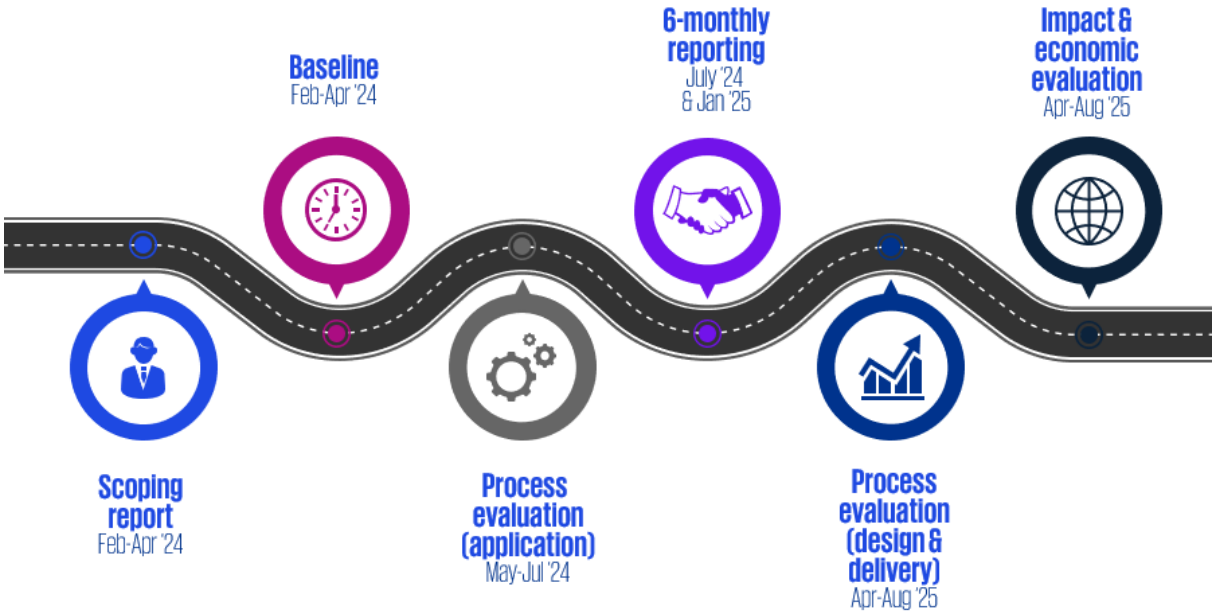
- a scoping and baseline report (this document);
- six-monthly reporting;

[14] See: 5G Innovation Regions (publishing.service.gov.uk)
[15] DSIT Smart Infrastructure Pilots Programme (SIPP) Competition application guidance. See: Smart Infrastructure Pilots Programme competition application guidance (publishing.service.gov.uk)
[16] UK Shared Business Services Ltd (2023) Mini Competition against an existing Framework Agreement (MC) on behalf of Department for Science, Innovation & Technology Subject: 5G Innovation Regions and Smart Infrastructure Pilots Programme Evaluation. Sourcing Reference Number: PS23394
[17] UK Shared Business Services Ltd (2023) Mini Competition against an existing Framework Agreement (MC) on behalf of Department for Science, Innovation & Technology Subject: 5G Innovation Regions and Smart Infrastructure Pilots Programme Evaluation. Sourcing Reference Number: PS23394

— a process evaluation;
— an impact evaluation; and
— an economic evaluation.

The different elements of the evaluations and their respective timings are set out in Figure 1 below.

Figure 1: Elements of the 5GIR/SIPP evaluations and broad timings



A brief summary of each element of the evaluations is set out in the section below.

2.2.2 Scoping and baselining (to which this report relates)

The scoping stage of the evaluations seeks to understand the nature of the interventions, the research questions that need to be answered through the evaluations and then develop a framework for delivering the evaluations.

This includes:

— The development and refinement of the theories of change (ToC) for the two programmes, where the ToC describes the changes the programmes seek to make, how it is expected to happen, and the measurable outputs, outcomes and impacts associated with the intended change.
— The development of evaluation research questions to cover all three evaluation types: process, impact and economic.
— Consideration of the evaluation methodologies that are best suited to answering the evaluation research questions for each element of the evaluations relating to the two programmes, and the development of proposed research and analytical methodologies for the evaluations.

The output of the scoping phase is a scoping report (this report) accompanied by a baseline for the evaluations. The purpose of the baseline is to set out the situation at the start of the programmes,

before any intervention-related activity has taken place, to allow for comparison with observed outcomes and impacts post-intervention.

2.2.3 Six-monthly reporting

Regular updates of the progress of the interventions will be provided to DSIT through 6-monthly updates at end of July 2024 and January 2025. These timings align to the quarterly reporting by LAs and mean updates will be provided ahead of the final reporting in August 2025.

The reporting will be in the form of a simple dashboard and the data which will be reported will be based on information gathered from the DSIT benefits tracker.

2.2.4 Evaluations

The 5GIR and SIPP evaluations will comprise a process evaluation, an impact evaluation, and an economic evaluation. These will be designed and delivered in line with guidance set out in HM Treasury's Magenta Book[18] and Green Book[19].

Table 4: Types of evaluation

PROCESS EVALUATION	IMPACT EVALUATION	ECONOMIC EVALUATION
"What can be learned from how the intervention was delivered?" Process evaluations tend to examine activities involved in an intervention's implementation and the pathways by which the policy was delivered.	**"What difference has an intervention made?"** Impact evaluations focus on the changes caused by an intervention; measurable achievements which either are themselves, or contribute to, the objectives of the intervention	**"Is this intervention a good use of resources?"** Value-for-money evaluation considers such issues, including whether the benefits of the policy are outweighed by the costs, and whether the intervention remains the most effective use of resources

Source: HM Treasury Magenta Book

The **process evaluations** will examine the application process and the delivery of the 5GIR and SIPP programmes, how these contributed to achieving the outcomes and impacts of the programmes, and the lessons that can be learned for future projects/ programmes of a similar nature.

The **impact evaluations** will seek to identify and measure observed outcomes and impacts and assess the extent to which any changes in the measured outcomes and impacts are caused by/ attributable to the 5GIR and SIPP programmes.

The **economic evaluations** will seek to assess (monetising where possible) the value of outcomes (costs and benefits) realised at the point of the evaluations to assess the extent to which the 5GIR and SIPP programmes have delivered benefits in excess of the costs of delivering the programme.

More details on the proposed approach to the six-monthly reporting and process evaluations, impact and economic evaluations of the programmes are set out in Section 4.

[18] HM Treasury 2020; Magenta Book: Central Government guidance on Evaluation. See: The Magenta Book - GOV.UK (www.gov.uk)
[19] HM Treasury 2020; Green Book: appraisal and evaluation in central government. See: The Green Book (2020) - GOV.UK (www.gov.uk)

2.2.5 Evaluation stakeholders

In delivering the evaluations we will work closely with two key evaluation stakeholder groups:

- The DSIT evaluation team – this team has overall responsibility for the evaluations and is providing ongoing input and direction in relation to the evaluations such that it meets DSIT's requirements.
- The Steering Group for the evaluations – this group has been established with the role of providing advice, guidance, scrutiny and challenge to the evaluations, with the aim of supporting the evaluations and ensuring the findings are robust and provide useful insights to build the evidence base in relation to digital infrastructure. It consists of DSIT officials covering the areas of policy, analysis, benefits realisation and technical expertise with respect to the 5GIR and SIPP programmes, together with a member of the Cabinet Office's Evaluation Taskforce.[20]

2.3 Purpose and structure of this document

The purpose of this scoping report is to report on the outcome of the scoping and baselining phases of work and detail the planned approach to implementing the evaluations and the processes through which the proposed methodologies have been arrived at.

The remainder of this scoping report is structured as follows:

- Section 3 sets out the approach to scoping the evaluations, including:
  - the approach to evaluation scoping and design – detailed in Section 3.2;
  - the programmes' ToC – detailed in Section 3.3; and
  - the research questions for the 5GIR and SIPP programmes – detailed in Section 3.4.
- Section 4 reports the methodologies to be employed for the evaluations, including:
  - the data and evidence collection – detailed in Section 4.2; and,
  - the analytical approaches to the evaluations – detailed in Section 4.3.
- Section 5 provides an overview of the timelines for the evaluations.
- Appendix 1 sets out the baseline for the evaluations, covering:
  - the purpose of the baseline – detailed in Section 6.1;
  - advanced wireless technology in the UK – detailed in Section 6.2;
  - levels of wireless connectivity in the UK – detailed in Section 6.3; and,
  - the baseline context for individual intervention areas – detailed in Section 6.4.
- A series of Appendices then provide more detail to support the report.

[20] See: About us - Evaluation Task Force - GOV.UK (www.gov.uk)

3 Evaluation scoping

3.1 Introduction

This section of the report sets out the approach taken to developing the scope of evaluation for the 5GIR and SIPP programmes, to inform methodology design, including:

— the approach to scoping the evaluations;

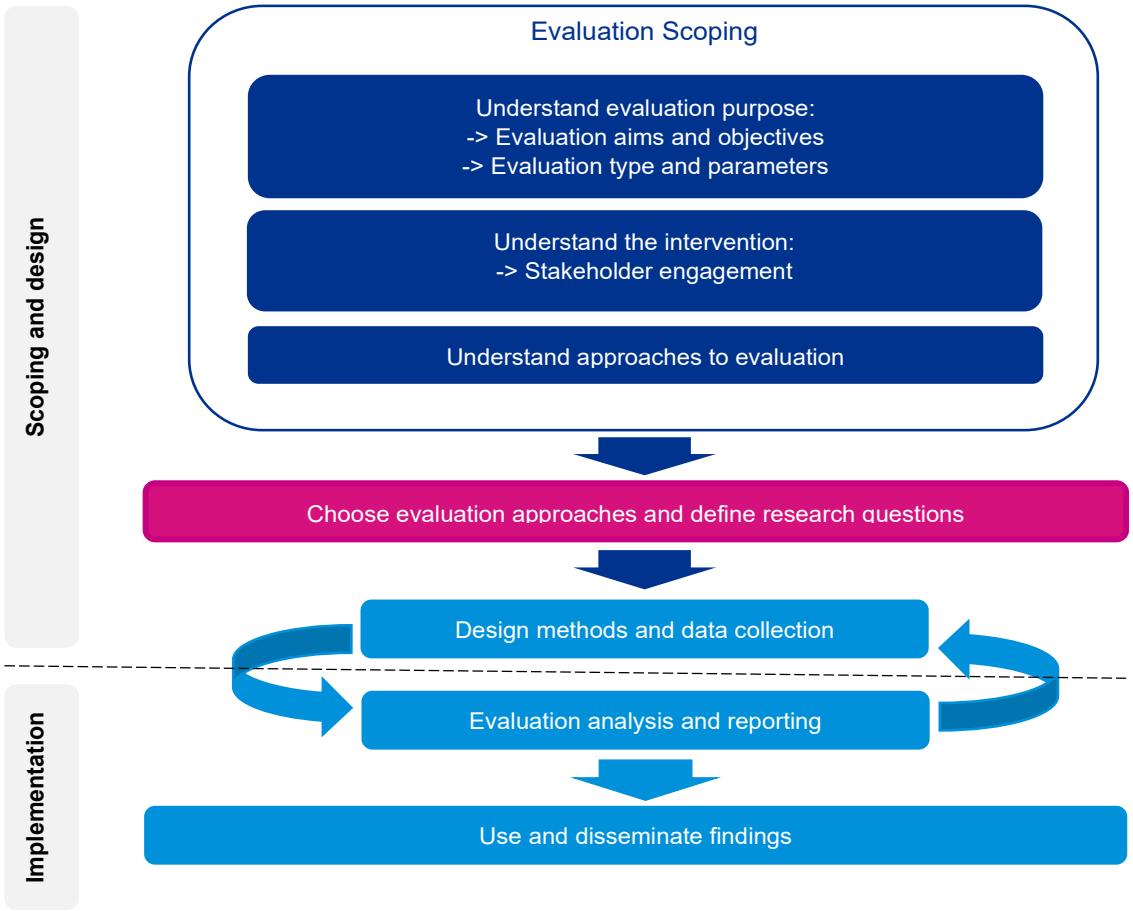
— the programme ToCs; and

— the research questions which will be answered by the evaluations.

3.2 Approach to evaluation scoping and design

The approach taken to scoping and designing the evaluations follows the methodologies detailed in the HM Treasury Magenta Book[21] and is summarised in Figure 2 below.

Figure 2: Overview of the evaluation process



Source: KPMG based on HMT Magenta Book

[21] HM Treasury 2020; Magenta Book. See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879438/HMT_Magenta_Book.pdf

The first stage of work in scoping and designing the evaluations was to understand the purpose of the evaluations and obtain a detailed understanding of the two interventions.

A detailed understanding of the interventions can be gained through the development and refinement of the ToC for the two programmes. A ToC describes the changes the programme is seeking to make, how it is expected to happen, and the measurable outputs, outcomes and impacts associated with the intended change.

This understanding was informed by the following:

- Engagement with DSIT evaluation team and Steering Group to understand the purpose and priorities for the evaluations.
- Review of programme documentation, including:
  - original DSIT business cases for the 5GIR and SIPP programmes, including the original ToC developed by DSIT;
  - DSIT application guidance for the two programmes;
  - application documents submitted by the successful LAs for the two programmes; and
  - benefit templates that have been completed and returned by LAs to date.
- Two familiarisation interviews, one with SIPP policy leads, technical advisors, and officials leading on the collection of benefits information; and one with 5GIR technical advisors and officials leading on the collection of benefits information. These were used to obtain information and understanding of the two programmes.

Based on this understanding, logic models were developed for the 5GIR and SIPP programmes. A logic model is a visual representation of the ToC and is used to illustrate the presumed relationships between programme resources (inputs), activities, outputs and various outcomes and impacts. These are presented in Section 3.3 below.

The logic models and ToC narrative were then tested and refined through:

- Two working sessions, one with the DSIT evaluation team and one with 5GIR policy leads, to test and refine the draft ToC.
- Consultation with KPMG telecoms subject matter experts (including from academia).

This process also highlighted that during the period of the evaluations (through to August 2025) many of the impacts of the programme will not have been realised, which therefore needed to be reflected in the evaluation scope and methodology.

Based on our understanding of the evaluation purpose, the 5GIR and SIPP ToCs and the timing of expected outcomes and impacts, evaluation research questions and specifications for each of the evaluations were developed in consultation with the DSIT evaluation team and the Steering Group. These are presented in Section 3.4.

This initial scoping work provided the basis for the subsequent development of appropriate evaluation methodologies. These methodologies, for each of the process, impact and economic evaluations were then tested and agreed with the DSIT evaluation team and the Steering Group. More detail on the methodologies is presented in Section 4.

3.3 Theory of Change

3.3.1 Introduction

As detailed in Section 3.2, a key part of developing an evaluation methodology is understanding the intervention - in this case 5GIR and SIPP – through mapping the casual chain of expected impacts from activities and outputs and producing a ToC.

The ToC for the 5GIR and SIPP programmes are detailed in Sections 3.3.2 and 3.3.3 below.

3.3.2 5GIR Theory of Change

The sections that follow provide a descriptive explanation of the ToC associated with each of the 5GIR strategic objectives. The 5GIR ToC (included as Figure 3 and Figure 4 below) was developed based on the intended outcomes and impacts of the programme, and builds from the details provided by each of the ten innovation regions in their applications submitted to DSIT for funding.

As detailed in Section 2.1.2, the objectives of the 5GIR programme are to:

- accelerate commercial investment in 5G and other advanced wireless technologies;
- foster the emergent 5G ecosystem; and
- drive economic growth.

Figure 3: 5GIR ToC (1 out of 2)

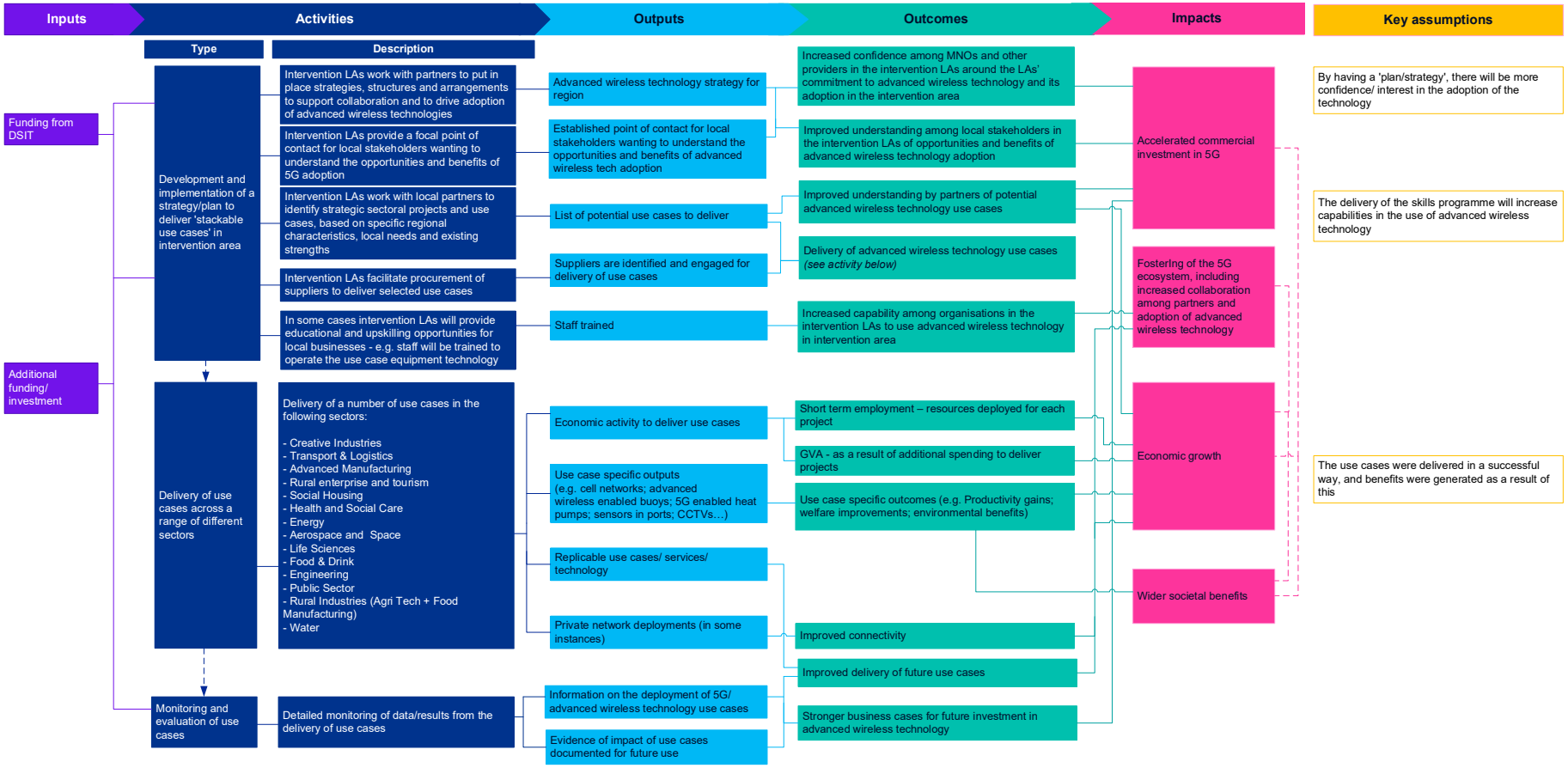


Figure 3: 5GIR ToC (2 out of 2)

Accelerated commercial investment in 5G and other advanced wireless technologies

Commercial investment in 5G and other advanced wireless technology is expected to be supported by the 5GIR programme through different routes, detailed below.

As part of the development and implementation of plans to deliver stackable use cases (i.e. a number of use cases layered on one network) in the intervention areas, it is expected that LAs will publish and publicise an advanced wireless technology strategy for the region. It is expected that these plans will include a central point of contact for local stakeholders who want to understand the opportunities and benefits of advanced wireless technology adoption. This is important because evidence shows that the fragmented approach to network deployment (e.g. through application of planning regulations) and a lack of best practice guidance introduces additional costs to both LAs and network providers in the deployment of advanced wireless technology[22]. The increased clarity provided by the strategy together with a central point of contact is, therefore, assumed to lead, in the short to medium term, to increased confidence among mobile network operators (MNOs) and other network providers in relation to the LA's commitment to supporting advanced wireless technology and its adoption in the intervention area. This increased confidence among network providers will provide the basis for accelerated commercial investment in the intervention areas as compared to other regions.

As part of the programme, a number of stackable use cases will be delivered by the intervention areas. As illustrated in Figure 3, the regions are expected to monitor the delivery of use cases and document the individual and cumulative benefits realised as a result of the use of the advanced wireless technology. Evidence from the 5GTT programme demonstrated the viability of advanced wireless technologies across a wide range of use cases and across a range of industries and geographies[23]. The 5GIR programme seeks to build on the 5GTT programme to illustrate the scalability, replicability, and sustainability of use cases. Assuming the cumulative benefits from stackable use cases are demonstrable, this is expected to illustrate the commercial viability of the provision of advanced wireless technology networks by showing how a range of different use cases can deliver realisable benefits on the same network. The intervention areas are then expected to share the knowledge and lessons learned from the delivery of the use cases across their area, and with the support of UKTIN[24], across areas outside the intervention area.

As a result, the documentation of benefits generated from the use of 5G and other advanced wireless technology is very important. For instance, stakeholders involved in the 5GTT programme noted the positive role of the 5GTT programme in allowing 5G features to be seen in real life, which could encourage increased take-up of advanced wireless technology[25]. Such documentation is, therefore, expected to improve the understanding among organisations that might be interested in adopting advanced wireless technology (for whatever purpose). This is assumed to lead to more demand for access to advanced wireless networks by potential use case providers. In addition, it is expected to improve the understanding of network, or other advanced wireless technology, providers as to the benefits and opportunities that can be derived, or realised, from the adoption of 5G and other wireless technologies. With this increased understanding, it is assumed, that network operators will be more inclined and/or more confident to accelerate commercial investment in advanced wireless technology.

All this activity (both inside and outside the intervention area), in the medium term, is expected to lead to a general increase in interest and demand for 5G and other advanced wireless technology by business, public sector organisations and other bodies that might benefit from its adoption. The stackable nature of the use cases is intended to evidence to network providers the critical mass possible in terms of the number and range of viable use cases. This, in turn, should help evidence the

[22] Analysys Mason (2018) Lowering Barriers to 5G Deployment
[23] Interim evaluation of 5G Testbeds and Trials (2023) A report for the Department for Science, Innovation and Technology. RSM
[24] UK Telecoms Innovation Network
[25] Ensuring future wireless connectivity needs are met (2022) Report for Department for Digital, Culture, Media and Sport (DCMS) Analysys Mason and Oxera

potential return on investment from the provision of 5G and other advanced wireless technology and is expected to lead to an increase in commercial investment by network providers across the country.

Fostering of the 5G ecosystem

The 5GIR programme includes a range of activities that aim to increase collaboration among partners in the delivery of the projects such that a 5G ecosystem is developed. For instance, this collaboration could be between organisations like businesses, public service organisations and other bodies that are interested in using, or adopting, 5G/ wireless technology and those organisations that provide the networks and wireless technology.

One previously identified issue with the adoption of advanced wireless technology by potential users is around not having the internal capability and/or skills needed to integrate advanced wireless technology into existing systems/workstreams[26]. To this end, in some cases the intervention LAs will provide educational and upskilling opportunities for local businesses and their staff to be trained to operate the use case technology, prior to the delivery of the use case. This is expected to lead to an increased capability among organisations in the intervention LAs in the use of advanced wireless technology, and to contribute to enhancing the 5G ecosystem.

The knowledge sharing activities and lessons learned that are disseminated within the intervention areas are also expected to support the fostering of the 5G ecosystem by: building relationships between partners; increasing learning opportunities between partners; and, ultimately increasing capabilities within the ecosystem.

The 5G ecosystem is also expected to be supported and nurtured through the collaboration and relationships developed as a result of the delivery of use cases. For example, the use case providers are likely to become more aware of the benefits of 5G/ advanced wireless technology adoption and network providers more aware of the needs and requirements of those using their networks/ technology as a result of working with one another through the individual projects. Indeed, according to the interim evaluation, one of the main successes of the 5GTT programme was how it encouraged collaboration across organisations that may not have otherwise been inclined to work together[27]. The sustainability plans of the intervention LAs seek to use the development of these relationships in order to expand and increase the resilience of the ecosystem in the longer term.

More generally, the sustainability plans and activities of the ten 5G innovation regions at the end of the programme will further support the 5G ecosystem. As part of their business cases, the intervention LAs have detailed their plans to continue the support offered in their region for future adoption of advanced wireless technologies, as well as the engagement activities that they will undertake to stimulate and continue collaboration between organisations and stakeholders that were brought together thanks to the delivery of the use cases.

Drive economic growth

The accelerated commercial investment which aims to be generated as a result of the 5GIR programme, together with the improved connectivity and further adoption of 5G and advanced wireless technology, is expected to support longer-term economic growth.

The delivery of use cases through the 5GIR programme, as well as the knowledge shared around the benefits of 5G and other advanced wireless technology, is expected to increase the delivery of future use cases and the adoption of wireless connectivity services more generally. Such use cases, as already evidenced through some of the use cases delivered through the 5GTT programme[28], should

[26] Realising the Benefits of 5G (2021) A report for the Department for Digital, Culture, Media and Sport Cambridge Econometrics and Analysys Mason
[27] Interim evaluation of 5G Testbeds and Trials (2023) A report for the Department for Science, Innovation and Technology. RSM
[28] Interim evaluation of 5G Testbeds and Trials (2023) A report for the Department for Science, Innovation and Technology. RSM

generate direct economic benefits (e.g. productivity gains and welfare improvements). The expected increase in the delivery of future use cases across the intervention and non-intervention LAs is therefore expected to lead to larger-scale economic efficiencies.

Specifically, as detailed earlier, existing evidence from the 5GTT programme illustrates that for individual use cases there are positive benefits to be derived from advanced wireless technology adoption[29]. The 5GIR programme intends to build on this by illustrating the scalability, replicability, and sustainability of use cases through the delivery of stackable use cases in intervention areas.

The resulting demand for 5G and advanced wireless technology – or, more simply, the demonstrable evidence that significant benefits can be derived from stackable use cases – is expected to lead to further commercial investment in the deployment of private networks and improved connectivity more generally. The assumption is that the increased awareness of the benefits from advanced wireless technology provision and adoption will overcome the chicken and egg scenario referred to in the literature where both the supply and demand side need each other to demonstrate the business case for advanced wireless technology[30].

This increased connectivity is expected to facilitate more uses of advanced wireless technology (e.g. robotics, IoT, Augmented reality (AR)/ virtual reality (VR)) and catalyse further adoption by businesses and organisations. The increased adoption of advanced wireless technology is expected to unlock new economic opportunities (through increased productivity, new products and services, new markets and new use cases) and significantly contribute to economic growth. Previous research has shown that 5G networks in Asia improved productivity for enterprises[31] and Analysys Mason has estimated that widespread 5G adoption could create a cumulative productivity benefit of £159bn to 2035, reaching an annual GVA benefit of £37bn in 2035[32].

Other impacts

In addition to the three main objectives of the 5GIR programme, the programme is expected to also generate wider societal benefits through the delivery of use cases, for example in terms of environmental benefits and welfare improvements, depending on the specific nature of the use cases delivered. Wider societal benefits are expected to be generated after the programme ends, as a result of the expected increased future use of advanced wireless technology.

Finally, the lessons learned from the delivery of the programme (for example the lessons learned from the method of funding used in the delivery of the programme) are expected to lead to improved efficiency and effectiveness of the delivery of related DSIT and HMG programmes.

This ToC is based on a number of assumptions with the key assumptions being that:

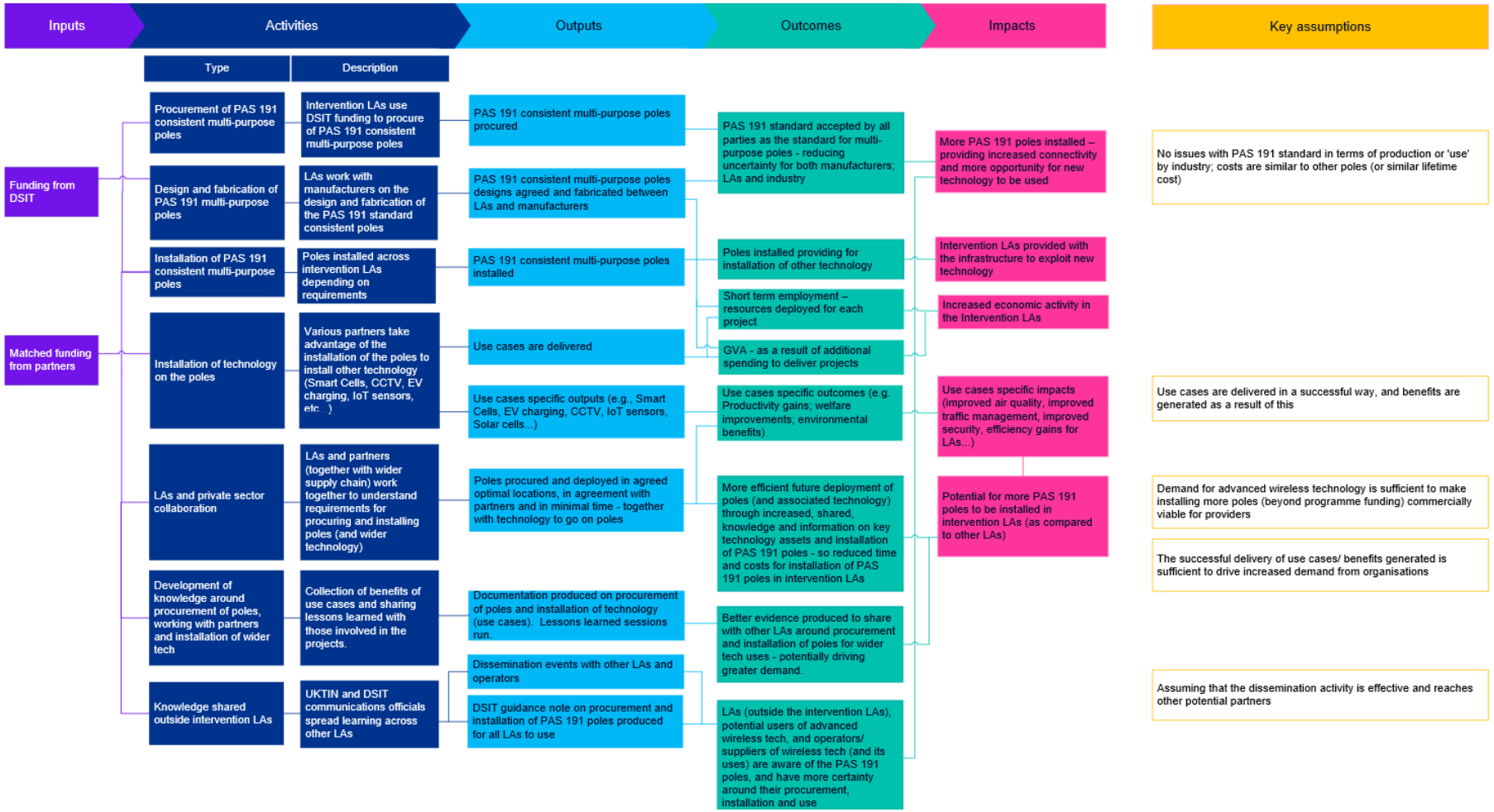
- the use cases delivered generate sufficient realisable benefits for business, public service organisations and/or other bodies and that therefore lead to an increased demand for improved connectivity; and
- the increased demand for improved connectivity is demonstrable and sufficient to make the provision of advanced wireless technology commercially viable for network providers (because the realisable benefits illustrate the commercial viability of such connectivity).

[29] Interim evaluation of 5G Testbeds and Trials (2023) A report for the Department for Science, Innovation and Technology. RSM
[30] Realising the Benefits of 5G (2021) A report for the Department for Digital, Culture, Media and Sport. Cambridge Econometrics and Analysys Mason
[31] Review of the 5G Ecosystem, Adoption, and Industrial use cases in Asia (2023) A report for DSIT. ABI Research
[32] Realising the Benefits of 5G (2021) A report for the Department for Digital, Culture, Media and Sport. Cambridge Econometrics and Analysys Mason

3.3.3 SIPP Theory of Change

The SIPP ToC (included as Figure 4 below) was developed based on the intended outcomes and impacts of the programme and builds on the details provided by each of the six intervention areas in their applications to DSIT for funding.

Figure 4: SIPP ToC



As detailed in Section 2.1.3, the main objective of the SIPP programme is to improve the understanding and realisation of the benefits of utilising street furniture and other assets for network deployment.

In order to achieve this objective, LAs are expected to use DSIT funding to procure, fabricate and install PAS 191 standard multi-purpose poles. Through this procurement and fabrication process both manufacturers and LAs are expected to become more familiar with the PAS 191 specification and resolve any issues with its manufacture. This is expected to improve understanding across LAs and the wider industry of the PAS 191 standard, leading to more wide-spread adoption of this standard and the installation of more PAS 191 compliant poles. This is important because, as highlighted in the literature[33], identifying and accessing suitable publicly owned assets and sites remains one of the primary barriers to the densification of advanced wireless networks through small cell deployments. Therefore, through the activities of the programme, intervention LAs will have more PAS 191 standard poles installed with which to exploit new advanced wireless technology opportunities.

Using their matched funding, it is intended that partners will work with LAs to establish various different use cases (e.g. small cells, electrical vehicle (EV) chargers, internet of things (IoT) applications, CCTV) on the multi-purpose poles. This is expected to require the working together of LAs and the private (or third) sector, improving understanding of the practicalities of realising the benefits of using street furniture and other assets for network and use case deployment. Ultimately, this is expected to enable delivery of various use case specific outcomes and impacts (e.g. increased connectivity to areas; improved air quality; improved security).

The learning derived from the fabrication and installation of multi-purpose poles together with the delivery of various use cases on the poles is expected to be documented and disseminated for other LAs. The assumption is that if the PAS 191 standard is to be widely accepted then buy-in will be needed from all different departments within LAs, e.g. highways, planning, procurement, digital, regeneration etc . All these departments would need to collaborate in the budget and procurement process for the purchase of new smart infrastructure poles. The assumption is that the best way to make this happen is to pilot smart infrastructure procurement with a group of LAs, and then share best practice across the rest of the UK. This learning, and accompanying DSIT guidance, is therefore expected to provide more information around the benefits from installing multi-purpose poles and greater certainty around the process for doing so. This should lead to greater demand for the PAS 191 standard pole and consequently their installation in more areas. This is expected to stimulate economic activity and associated employment as well as providing for greater connectivity and the opportunity to exploit technology in more areas.

All of these activities involve LAs and the private sector working together and so improving the understanding and realisation of the benefits of utilising street furniture and other assets for network deployment.

This ToC is based on a number of assumptions with the key assumptions being that:

- the use cases delivered generate sufficient realisable benefits for business, public service organisations and/or other bodies and that therefore leads to increased demand for advanced wireless technology;
- the increased demand is sufficient to make installing more poles commercially viable for LAs/ network and other wireless technology providers; and,
- the lifetime costs of the PAS 191 poles are not dissimilar to other poles (or street furniture) which could be used for to exploit new advanced wireless technology opportunities.

[33] See for instance, Ensuring future wireless connectivity needs are met (2022) Report for Department for Digital, Culture, Media and Sport (DCMS) Analysys Mason and Oxera

3.4 Evaluation research questions

Building on the ToC outlined earlier, and the wider scoping work for the evaluations, a series of evaluation research questions have been developed. The evaluation research questions reflect the original draft research questions set out in the Invitation to Tender (ITT)[34] and the outcomes/ impacts that are expected to be achieved – and that can be measured – within the timescales of the evaluations. The evaluation research questions were developed in collaboration with the DSIT evaluation team and were reviewed by the Steering Group.

The evaluation research questions are presented in Table 5 below:

Table 5: Evaluation research questions

Process evaluation
1) What went well and what could be improved with regard to the 5GIR/SIPP programmes, specifically:
a) in relation to the application process (from the point of view of LAs and DSIT)?
b) in relation to the design and delivery (from both a DSIT and LA/partner organisation perspective)?
Impact evaluation
1) To what extent did the 5GIR programme achieve the outcomes it set out to achieve within the timescale of the evaluation and to what extent can these outcomes be attributed to the programme – specifically:
a) To what extent did the 5GIR interventions provide evidence of the realisable benefits of advanced wireless technologies?
b) To what extent were the 5GIR interventions sustainable post-Government funding (ie networks continued after funding)?
c) To what extent were the benefits of advanced wireless technology adoption from the 5GIR programme documented and disseminated?
d) To what extent has the 5GIR programme fostered an emergent 5G ecosystem by enabling learning by doing?
e) To what extent is there evidence of the 5GIR programme encouraging and/or increasing long-term adoption of advanced wireless technology?
2) To what extent did the SIPP programme achieve the outcomes it set out to achieve within the timescale of the evaluation and to what extent can these outcomes be attributed to the programme – specifically:
a) To what extent has SIPP provided evidence of the benefits of utilising street furniture and other assets for network deployment?
b) To what extent have lessons learned from SIPP around the procurement and installation of technology been documented and disseminated?
c) To what extent has SIPP improved the understanding within the intervention LAs of the benefits of utilising street furniture and other assets for network deployment and how this can be delivered?
Economic evaluation
1) Is there evidence that the benefits from some of the use cases delivered by the 5GIR and SIPP programmes to date outweigh the costs?
Longer term impact and economic evaluation research questions (not within scope of this evaluation)
1) To what extent was the 5GIR programme able to achieve the outcomes it set out to achieve – specifically:
a) To what extent has the 5GIR programme driven economic growth?

[34] UK Shared Business Services Ltd (2023) Mini Competition against an existing Framework Agreement (MC) on behalf of Department for Science, Innovation & Technology Subject: 5G Innovation Regions and Smart Infrastructure Pilots Programme Evaluation. Sourcing Reference Number: PS23394

	b) To what extent has the 5GIR programme accelerated commercial investment in 5G and other advanced wireless technologies?
	c) To what extent has the 5GIR programme fostered a 5G ecosystem?
2)	To what extent has the SIPP programme improved the understanding and realisation of the benefits of utilising street furniture and other assets for advanced wireless network deployment?
3)	To what extent do the benefits of the 5GIR and SIPP programmes respectively outweigh their costs?

4 Evaluation methodology

4.1 Introduction

This section details the proposed approach to the evaluations, including the research and analytical methods that will be employed. It starts by setting out the data and evidence collection methods for both programmes. Following this, the analytical approaches to the process, impact and economic evaluations for both the 5GIR and SIPP programmes are set out.

4.2 Data and evidence collection

This section of the scoping report sets out:

— the data and evidence that will be collected to answer the evaluation research questions as part of the process, impact and economic evaluations; and

— the research methods that will be adopted to collect the data and evidence required.

4.2.1 Approach to identifying the required data and evidence

From the outset of the evaluations it is important to identify what outputs, outcomes and impacts will need to be measured (informed by the ToC) and what wider evidence and data will need to be collected to answer the evaluation research questions.

The ToCs provide the starting point for identifying what will need to be measured as part of the evaluations. The ToCs include the outputs, outcomes and impacts that are expected to be delivered by the 5GIR and SIPP programmes and hence the effects that should be monitored and assessed as part of answering the evaluation research questions (as set out in Section 3.4).

The following criteria were considered when identifying the indicators that will be used to measure outputs, outcomes and impacts. These criteria draw on key principles for monitoring and evaluation as detailed within UK Government[35], and wider industry, guidance[36].

— **Relevance:** indicators should be directly relevant to the output, outcome or impact that they are intended to measure. They should clearly and specifically indicate whether progress is being made in achieving the intended result. This is the most fundamental of the criteria, as the quality of the metric is superfluous if it is not relevant to what it is intended to measure.

— **Clarity of definition:** indicators should be clear and specific. They should be well defined, meaning that they are not open to different interpretations or subject to differences in measurement. This includes clarity on time periods and reference points, particularly where the metric is reporting a change in a value.

— **Robustness of source**: indicators should have a robust and reliable source, to ensure that measurement is consistent. Any limitations of the source of the metric, and consequences of this, should be made clear in reporting.

— **Frequency of reporting**: indicators should be available on a regular basis, and should avoid there being a significant lag time between the intended result being realised and its measurement (depending on the evaluation timelines). For example, many national datasets have significant

[35] HM Treasury (2020). The Magenta Book: Guidance for evaluation. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879438/HMT_Magenta_Book.pdf

[36] International Labour Organisation (2017). Basic principles in monitoring and evaluation. See: https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_546505.pdf

lags in their data, with the latest releases often including data from 6-12 or more months prior. Such sources will therefore be of limited use for these evaluations, and alternative or additional sources have been identified to inform the evaluation.

- **Baseline**: in order for the indicators to provide meaningful insights, there should be a robust baseline in place where possible, that reflects the status before any programme-related activity occurred.
- **Proportionality:** indicators should balance the trade-off between the cost and resource burden of monitoring and reporting the indicator (including primary data collection) and the strength of the indicator based on the above criteria.

The full set of indicators which will be used to measure the identified outputs, outcomes and impacts required to answer the evaluation research questions are presented in Appendix 2, with accompanying details including:

- the indicators which will be used to measure each output and outcome in the ToC;
- the source of each indicator;
- the timing of when the output/outcome is likely to be realised; and,
- the timing of the reporting of the indicator.

These indicators will continue to be reviewed going forward as the programmes develop and may be added to or refined ahead of the evaluations being undertaken. For instance, if Ofcom (or other industry bodies) develop more relevant indicators for some measures, or LAs provide additional data in future benefits tracker submissions, we will look to incorporate them into the evaluations to the extent we can (or advise DSIT on their use for a longer term evaluation).

In addition to indicators seeking to measure outputs, outcomes and impacts, a wider set of data and evidence will be required to answer fully the evaluation research questions.

4.2.2 Proposed approach to data collection

Having identified what data and evidence will need to be collected to inform the evaluations it is important to determine how the information will be collected, i.e. the research methods that will be employed to collect data on these indicators and the wider evidence.

This section of the scoping report sets out the planned approach to collecting the data and evidence required to undertake each of the different evaluations. This includes an overview of the main research methods that will be employed to deliver the evaluations – including:

- project-level monitoring and evaluation (primarily the benefits tracker);
- stakeholder engagement (specifically focus groups and interviews);
- surveys; and,
- review of documentation.

Table 6 below summarises the sources of information that will be used to inform each element of the evaluations across both programmes.

Table 6: Main sources of information and evidence for different elements of the evaluation

Elements of evaluation	Source of information/evidence								
	Published data	Benefits tracker	Focus groups/ interviews					Survey	Documentation
			LAs	Use case providers	Network/ tech providers	DSIT policy	DSIT comms/ UKTIN		
Baseline	✓	✓							✓
6-monthly reporting		✓							✓
Process evaluation									
- Application						✓		✓	✓
- Design and delivery		✓	✓	✓	✓	✓	✓		✓
Impact evaluation – 5GIR									
- Benefits of advanced wireless technology		✓	✓	✓	✓	✓		✓	
- Sustainable post funding		✓	✓	✓	✓	✓		✓	
- Value documented/ disseminated		✓	✓	✓	✓	✓	✓	✓	
- Ecosystem		✓	✓	✓	✓	✓		✓	
Impact evaluation - SIPP									
- Benefits of using LA assets		✓	✓	✓	✓	✓		✓	
- Improved understanding of benefits		✓	✓	✓	✓	✓		✓	
- Lessons learned disseminated		✓	✓	✓	✓	✓	✓	✓	
Economic evaluation		✓	✓	✓	✓	✓		✓	

Source: KPMG

Benefits tracker

All LAs participating in both the 5GIR and SIPP programmes are expected to return information on the activities and outputs delivered by their intervention along with associated outcomes and impacts.

The indicators from the **benefits tracker** (which measure the outputs and outcomes from the programmes as set out in Appendix 2) will be used to support the analysis of the final evaluations as well as to populate two 6-monthly reports. For the 6-monthly reports, a simple dashboard, likely presented in PowerPoint, will be developed which aggregates and summarises the data from the benefits tracker in a visual, easy to understand format. Fitting with the profile of quarterly reporting, two reports will be produced – one at the end of July 2024 and one at the end of January 2025. This timeline will also allow us to monitor the input to the benefits tracker by LAs. This should help make sure the LAs complete the trackers in a way that provides data and information necessary to complete the final evaluations.

Focus groups and interviews

A range of focus groups and interviews will be conducted as part of the evaluations. These will include:

- **LA focus group**: Representatives from all LAs involved in both the 5GIR and SIPP programmes respectively will be invited to participate in a focus group (two groups for the 5GIR programme and one for the SIPP programme).
- **Use case provider focus groups**: Representatives from use case providers for both programmes will be invited to participate in focus groups (3 groups for the 5GIR programme and one group for the SIPP programme). These focus groups will be used to gather primarily qualitative evidence to inform the process, impact and economic evaluations.
    - Use case providers covering similar activities will be grouped together for the 5GIR use case provider focus groups to allow for evidence to be gathered from stakeholders with similar or aligned activities and around common areas of interest, whilst also allowing for a range of different use cases to be covered.
- **Network/ tech provider focus groups**: Representatives from network/ tech providers for both programmes will be invited to participate in focus groups (two groups for the 5GIR programme and one group for the SIPP programme). These focus groups will be used to gather primarily qualitative evidence to inform the process, impact and economic evaluations.
- **Application process interviews with DSIT officials**: An interview with DSIT officials will be run concerning the application process for both programmes. This will consist of two separate interviews – one involving DSIT officials concerned with the delivery of the 5GIR programme and one involving DSIT officials concerned with the delivery of the SIPP programme.
- **Final interviews with DSIT officials**: An interview with DSIT officials involved in the delivery of the two programmes will be held at the end of the programmes. As with the application process interview, this will consist of two separate interviews – one for 5GIR and one for SIPP. The interviews will be used to gather primarily qualitative evidence to inform the process, impact and economic evaluations.
- **Interview with UKTIN officials**: An interview with officials from UKTIN will be held to cover both the 5GIR and SIPP programmes and to gather primarily qualitative evidence to support the evaluation analysis.

A structured approach will be taken to this stakeholder engagement with interview/focus group guides developed before the engagement takes place. The questions and topics in these will be driven by the evaluation research questions, but will allow for flexibility to respond to stakeholders' insights and probe issues raised in more depth where appropriate. **To minimise the burden on stakeholders we will combine questions for the process, impact and economic evaluations into single focus group/interview sessions**.

In total it is expected that around 80 individuals will be invited to participate in focus groups or interviews for the evaluations.

Surveys

We will also run a number of surveys over the course of the evaluations to help answer the evaluation research questions. The surveys will include:

- **LA survey of applicants:** This survey will cover LAs that applied to the 5GIR and SIPP programmes. It will provide information relating to the application process. To maximise response, we will use contact details from LA's applications.

- **Survey of LAs that did not apply:** This survey will cover LAs that did not apply for either the 5GIR or SIPP programme. We will use UKTIN contact details for LAs (who may have been approached about the opportunity) where that is possible and in the absence of contact details from UKTIN, we will contact LA planning departments.
- **Use case providers survey**: For the 5GIR programme, we will run a survey of use case providers. Using contact details derived from the programmes themselves we will survey these providers to better understand the commercial viability of use cases as a result of the 5GIR programme.
- **Network/ tech providers survey**: For the 5GIR programme, we will run a survey of network/ tech providers. Using contact details derived from the programmes themselves we will survey these providers to better understand the commercial viability of network provision as a result of the 5GIR programme.

Further details of the data collection methods including any secondary data collection which will be used over the course of the evaluations are provided in the sections below and Appendix 3.

Review of documentation

We will review relevant documentation to help answer the evaluation research questions. The documentation to be reviewed will range from official DSIT documentation setting out the guidance for LAs to apply to the two programmes through to internal DSIT documentation setting out expectations around delivery and benefits to be derived from the two programmes for example. Other documentation, including documents obtained through a literature review, will also be reviewed to support different aspects of the evaluations – for instance, investigating the monetised benefits derived from advanced technology adoption use cases from previous programmes.

In addition, documentation developed as a part of the programme itself (for example specific use case documentation to evidence, in detail, the benefits derived from a particular use case) will be used to help answer the evaluation research questions.

The following sections provide more detail on the how the sources of evidence will be used as part of each of the elements of the evaluation.

4.2.3 Process evaluation sources of evidence

The process evaluations will be split into two separate exercises: one for the application process (including aspects of the design of the programmes) and one for the delivery of the programmes.

To inform on the application process we will draw, primarily, on the following sources:

- **the LA survey of applicants**;
- **the survey of LAs that did not apply**; and,
- the **application process interviews with DSIT officials**.

As noted earlier, we will survey successful and unsuccessful applicants to both the 5GIR and SIPP programmes – **the LA survey of applicants**. This will provide information on the nature of the application process, for instance how LAs were made aware of the opportunity and whether they had all the information required to make a good application (and what other information could help for future programmes). It will also provide information on whether the method of funding was an attractive aspect of the programme. We expect this survey approach to provide the information required to answer the evaluation research questions relating to the application process. However, should the survey not provide such information, or we require more detail, we will look to interview certain LAs in order to provide more depth to the information gathered.

We will also survey all LAs that did not apply for the 5GIR and SIPP programmes – **the survey of LAs that did not apply** - to understand the extent to which they were aware of the opportunity and any reasons why they didn't apply for either of the programmes.

To understand DSIT's view of the application process (as well as the initial design of the programmes) we will run an **application process interview with DSIT officials** involved in the 5GIR and SIPP programmes separately. These interviews will seek to understand the channels DSIT used to advertise the opportunity and whether good quality applications were received with a geographic spread across the country and anything which officials feel could have made the application process more effective. The interviews will also consider the extent to which the initial design of the two programmes was based on best practice developed from the experience of past programmes.

To inform on the process evaluation of the delivery of the programme we will draw on the following sources:

- DSIT **benefits tracker**;
- **the LA focus group;**
- **the use case provider focus groups**
- **the network/ tech provider focus groups;**
- **the final interviews with DSIT officials;** and,
- **the interview with UKTIN officials.**

The **benefits tracker** will provide information on the extent to which each intervention area delivered what it set out to deliver. This will be tracked quarterly throughout the programme but will provide information on milestones achieved, lessons learned, and any issues experienced with delivery.

To supplement the information provided by the benefits tracker we will undertake a series of focus groups with different stakeholders involved in the programme. The focus groups will investigate any issues with the design and delivery of the different aspects of the programme. For example, the **LA focus group** will consider the extent to which the method of funding the programme contributed (or otherwise) to the successful delivery of the programme. Similarly, the **use case providers focus groups** and the **network/ tech providers focus groups** will consider issues including whether there were any obstacles to delivery and what could be improved with respect to the delivery of the programme.

Outside this we will run **final interviews with DSIT officials** to understand their views on the delivery of each of the programmes separately. These interviews will cover issues looking at what worked and what could be improved in the delivery of the programme and particularly whether the method of funding was effective in delivering the programme.

To understand the extent to which the findings and learnings from the two programmes were spread across the country we will run an **interview with UKTIN officials**. The issues to be considered in this interview will include what the most effective means of transferring learning to other areas were and what could be improved with respect to the effectiveness of sharing findings with the rest of the country.

Appendix 3 sets out the main sources of information/ evidence we will use for the process evaluations and more detail on the information and evidence to be collected.

4.2.4 Impact evaluation sources of evidence

The impact evaluations will be theory-based and focus on testing the strength of causal links within the ToC for both programmes.

Appendix 2 sets out the main indicators aligned with the ToC that we will use to measure each outcome/impact for both programmes. A range of information and evidence will be used to support the impact evaluations as set out in the following sections.

4.2.4.1 Impact evaluation sources of evidence – 5GIR

Most of the information on the outputs and outcomes for the 5GIR impact evaluation will be sourced from the **benefits tracker**. This source is expected to provide information on:

- the benefits derived from the specific use cases delivered;
- any accelerated investment in advanced wireless technology;
- the development of an advanced wireless technology ecosystem (e.g. number of firms engaging with the project; number of collaboration events; and, any partnerships/spin-offs developed); and,
- the documentation produced on the impact of use cases amongst other issues.

The **LA focus group**; **use case providers focus groups**; **network/ tech providers focus groups**; and, **final interviews with DSIT officials** will then be used to collect information and evidence with which to test linkages in the ToC such as:

- the benefits of advanced wireless technology adoption;
- perceptions around the sustainability of advanced wireless technology adoption and associated investment post-funding; and,
- the extent to which an ecosystem within the intervention area has been established and the impacts of that.

The **interview with UKTIN officials** will be used to understand the activities undertaken to spread the learning from the 5GIR programme to areas outside the programme and any emerging impact from that.

The **use case providers survey** and **network/ tech providers survey** will be run to provide further detail on the commercial viability of use cases and network/ tech provision and expectations around future investment. The aim of the surveys is to elicit more detailed commercial information, where possible, to evidence (or otherwise) the commercial viability of use cases and, similarly, based on the experience of use cases – the commercial viability of providing network/advanced wireless technology post-funding.

Appendix 3 sets out the main sources of information/ evidence we will use for the impact evaluation and more detail on the information and evidence to be collected.

4.2.4.2 Impact evaluation sources of evidence - SIPP

As with the 5GIR impact evaluation, for SIPP most of the outputs and outcomes will be sourced from the **benefits tracker**. This source is expected to provide information on:

- the number of PAS 191 poles procured; fabricated; and, installed in the different areas;
- the number of use cases delivered with the poles (and their associated outputs); and,
- the documentation produced on the procurement of poles.

The **LA focus group**; **use case providers focus groups**; **network/ tech providers focus groups**; and, **final interviews with DSIT officials** will then be used to further test issues such as:

- any issues with the procurement and installation of poles;

- the benefits achieved from the PAS 191 poles as compared to existing alternatives; and,
- the extent to which the relationship between LAs and the private sector has improved.

Similarly, the **interview with UKTIN officials** will understand the activities undertaken to spread the learning from the SIPP programme to areas outside the programme and any emerging impact from that.

The table in Appendix 3 sets out the main sources of information/ evidence we will use for the impact evaluation and more detail on the information and evidence to be collected.

4.2.5 Economic evaluation sources of evidence

For both 5GIR and SIPP, the costs and benefits of individual – and, where possible, stackable – use cases will be assessed for a sample of use cases, where such information has been collected by LAs as part of the programme.

A range of information and evidence will be used to support the economic evaluations including:

- DSIT **benefits tracker**;
- the **LA focus group**;
- the **use case provider focus groups**;
- the **network/ tech provider focus groups**;
- the **final interviews with DSIT officials**;
- the **interview with UKTIN officials**;
- the **use case providers survey**;
- the **network/ tech providers survey**;
- use case documentation; and,
- existing literature.

For the 5GIR evaluation, much of the cost information relating to specific use cases will be obtained from the **benefits tracker**. Similarly, the benefits from the use cases – and in particular stackable use cases – are expected to also be documented within the **benefits tracker**.

The **LA focus group**; **use case providers focus groups**; **network/ tech providers focus groups**; and, **final interviews with DSIT officials** will enable further qualitative evidence on the nature of these costs and benefits. The **use case providers survey** and the **network/ tech providers survey** should provide more detailed quantitative evidence on the costs and benefits (covering detail that may not be possible to provide in the focus groups). The information provided from the **benefits tracker**; focus groups; and, the surveys can then be sense-checked with existing literature on the returns from different use cases achieved from other interventions.

For the SIPP evaluation, the cost information relating to specific use cases will also largely be sourced from the **benefits tracker**. Similarly, the benefits from the use cases deployed on the poles should be picked up by the **benefits tracker** and any associated documentation produced by LAs illustrating the benefits of deploying PAS 191 standard poles.

The **LA focus group** will enable further qualitative assessment of the nature of these costs and benefits – particularly as they relate to the costs and benefits of using existing poles.

Appendix 3 sets out the main sources of information/ evidence we will use for the economic evaluations and more detail on the information and evidence to be collected.

4.3 Analytical approaches to the evaluations

4.3.1 Process evaluation

The process evaluations will examine how the processes employed in both the application process and the design and delivery of the two programmes contributed to the two programmes' outcomes. The evaluations will focus on using the information and evidence set out earlier to answer the research question of: '*What went well and what could be improved with regard to the 5GIR/SIPP programmes*', specifically in relation to these two aspects of delivery.

Given the application process has recently concluded, and to avoid lessons from this process being lost with the passage of time, the process evaluations will be conducted in two phases. The first phase, to be conducted between May 2024 and July 2024, will consider the application process (as well as aspects of the design of the programme). Then, following the conclusion of the programme in March 2025, the second phase covering the delivery of the programme will be conducted.

The table below outlines the main issues to be covered by the process evaluations.

Table 7: Main issues covered by the process evaluations

Main issues to be covered by the process evaluation (split by element of process evaluation)		
Date	Element of process evaluation	Issues to be covered
May to July 2024	Application	— channels used to advertise the opportunity; — awareness of the opportunity on the part of LAs; — the quality of the guidance on the application process; — the number of applications received; — the quality of applications received; — the geographic spread of applications received; — whether the alternative method of funding generated more (or less) interest in the opportunity; — whether the scoring of applications was perceived as being consistent and fair; — how applicants found the application process (with any learning for future programmes); and, — whether the design of the programme was clear and based on best practice developed from the experience of past programmes.
April to July 2025	Design and delivery	— whether the delivery of the two programmes went as expected; — whether the spreading of knowledge outside the intervention areas worked as expected; — whether there was anything that could have been improved with respect to the design and/or delivery of the programmes; and, — whether the funding of the programme influenced its delivery and effectiveness.

As set out in Section 4.2.1 a range of research and data collection methods will be employed to obtain the evidence needed to answer the process evaluation research questions. This evidence/ information, drawn from a range of sources, will be brought together and analysed through thematic analysis to identify key themes and insights from the various stakeholders and data sources. Through this process we will assess how the specific processes and approaches adopted for both the 5GIR

and SIPP programmes have affected the overall delivery of the programmes, and any lessons learned in relation to this.

4.3.2 Impact evaluation

4.3.2.1 Potential approaches to the impact evaluation

The purpose of impact evaluation is to assess what changes occur as the result of an intervention. It assesses the extent to which such changes can be attributed to the intervention, over and above what would have happened without the intervention. This assessment is typically not straight forward due to various influences (external to the intervention) that need to be understood in order to claim and evidence that an intervention has had an effect.

There are different types of methodology that can be employed to help with this assessment of attribution and causality. These include experimental methods, quasi-experimental methods (QEM) and theory-based methods[37]. Experimental methods and QEM are designed to achieve a robust quantitative estimate of the impact of a programme by comparing the impact seen in the intervention area, or group, with a 'control' - an area or group (or time period) unaffected by the intervention. The 'control' acts as a proxy for what would have happened in the absence of the policy or programme. Whilst this method, in the right context, provides a robust estimate of the impact of a programme, it does not produce insights about how any measured change comes about, or whether the same outcome would occur if the intervention were tried in another context or at a different scale.

As set out in the HMT Magenta Book, theory-based impact evaluations draw conclusions about an intervention's impact through rigorous testing of whether the causal chains thought to bring about change are supported by sufficiently strong evidence and that alternative explanations can be ruled out. Theory-based evaluation is concerned with both the extent of the change and, importantly, why change occurs; it tries to illustrate the relationships between inputs and outcomes, and how that is affected by wider contexts[38].

DSIT considered the potential for experimental methods at programme design stage and felt that a random control trial was not suitable for the two programmes in this instance. This was due to:

- the relatively low number of areas involved (both in terms of the number of regions awarded funding and the overall number applying for funding) – the low sample size would not have had sufficient statistical power to detect outcomes and impacts that resulted from activities in the intervention areas; and,

- the application guidance for the two programmes set out a range of requirements, with applications scored against these requirements such that DSIT felt it would be unsuitable or unethical to not award funding to those applications that scored highest (in a way that might be required for a random control trial).

As part of the evaluation scoping and design, we have investigated the feasibility of QEM for the impact evaluations, given the benefits of this approach in providing a robust estimate of casual impact. Whilst QEM compares with a control group, the control group is not achieved through randomisation (as is the case with an experimental method). This makes QEM more feasible for these types of evaluations than using experimental methods.

Box 1 sets out our consideration of the potential to use QEM as part of the impact evaluations. This finds that, data constraints and the timing of the evaluations precludes a QEM being employed at the programme level, and whilst QEM may be possible for individual use cases, these would not be

[37] HM Treasury (2020), Magenta Book Annex A: Analytical methods for use within an evaluation (Magenta_Book_Annex_A._Analytical_methods_for_use_within_an_evaluation.pdf (publishing.service.gov.uk))
[38] HM Treasury 2020; Magenta Book: Central Government guidance on Evaluation. See: The Magenta Book - GOV.UK (www.gov.uk)

generalisable at the programme level and would carry notable resource requirement and risks around the availability and quality of data collection.

Given these issues, a theory-based approach to the evaluations is proposed. In line with HMT Magenta Book guidance, attribution of interim outcomes to the programmes will be assessed by drawing on the principles of contribution analysis. In the context of these evaluations, contribution analysis is considered the most appropriate theory-based approach to apply because of the ability to use the range of evidence and information set out in the earlier section to test and, where relevant, attribute causality to linkages in the ToC.

Box 1: Consideration of Quasi-Experimental Methods (QEM)

Exploratory work conducted during this scoping phase has considered the potential to use QEM as part of the evaluation. This work, conducted in consultation with an academic advisor, has identified that QEM at the programme level, using secondary data to compare outcomes among intervention areas and non-intervention areas is unlikely to provide meaningful insights within the timescales for the evaluation. This is because some of the outcomes/ impacts expected from the programmes will not have materialised during this time together with the fact that some of the secondary, published, data will, similarly, not be available during the period of the evaluation. Such an approach may be possible over the longer term, as set out further below.

During the scoping phase consideration was also given to the potential opportunity to apply QEM at the use case level. This suggested QEM may be feasible for some use cases proposed in the 5GIR programme. For example, one use case involves equipping a social housing heating system with advanced wireless technology in order to enable real-time adjustments to the heating system. Another use case example is aimed at improving the productivity of growers in the Agri-food sector through more detailed monitoring of growing conditions (through the use of advanced wireless technology).

In both examples it would be possible, theoretically, to monitor the impact of advanced wireless technology on the use case by comparing the heating costs (in the case of the social housing provider) and productivity (in the case of the agri-food growers) with a similar sample of bodies not party to the programme.

The application of QEM at the use case level would rely on a lot of primary research and data collection from both programme beneficiaries and a large enough sample of non-beneficiary organisations (to provide for a robust comparison). For the social housing example, information on the cost of heating (e.g. monthly heating bills for different social housing estates) could be sourced from both the social housing provider taking advantage of the programme and a number of other social housing providers. There would, however, be risks around the quality of data received from the different parties and their response rates. Such risks would likely vary with different use cases. For example, whilst one might be reasonably confident about receiving data in a similar form from social housing providers, it may be more difficult to source productivity information from agri-food producers (who might consider such information to be commercially sensitive). As a result, the collection of data for each use case would be resource intensive and would carry risks.

Whilst we might be able to illustrate an impact for a specific use case using QEMs, it would evidence the impact for that single use case only. Whilst there are some similar use cases in some of the 5GIR intervention areas, a facet of the 5GIR programme is the variety of use cases across the intervention areas. As a result, we would not be able to generalise from the single use case to the programme as a whole.

Ideally, all of the use cases would be included in this analysis (or at least all of the types of use cases undertaken in the programme) to be able to scale results to the programme as a whole. However, use of QEM would not be feasible for all use cases. For many use cases (e.g. innovation hubs; tourism applications; and some creative industry applications) it would be difficult to identify a robust control group from which to gather information and data to compare against. As a result, it is unlikely that this approach would be able to cover all use cases in the 5GIR programme.

Ultimately, given the level of resource requirements around primary data collection; the risks to the quality of data collection; and, the limitations around the applicability of this method to the programme as a whole, it was felt that to reprioritise resource from other elements of the evaluation (or provide additional funding for this aspect of the evaluation) to enable this approach would not be proportionate.

In terms of a longer term evaluation, QEM at the programme level may be more feasible. Whilst not within the scope of this evaluation, an evaluation conducted around 3-5 years after the conclusion of the programme would allow for:

- more of the expected outcomes and impacts within intervention areas to be realised;
- potential outcomes and impacts to be realised outside the intervention areas (as other areas are able to absorb and act on the findings from the two programmes); and,
- secondary data to become available to measure some of the expected outcomes/impacts.

With such secondary data a QEM which looks at the impact on some variables over time in the aggregated intervention areas as compared to non-intervention areas, may be possible.

The table below sets out the main QEMs together with an assessment of their applicability to a longer term evaluation.

Table 8: Consideration of quasi-experimental methods for impact evaluation

Method	Viability for impact evaluation
Randomised Control Trial	DSIT considered unsuitable at programme design stage due to low sample size and the nature of the application process.
Propensity Score Matching (PSM)	Potential to match intervention areas to non-intervention areas to consider difference in outcomes. However, given the low number of intervention areas the results will not be conclusive. Moreover, there is a question around practically being able to effectively match regions (given the likely data requirements).
Timing of events	Whilst interventions will spend and so deliver at slightly different times; the difference in delivery times is not sufficiently distinct for this approach to be relevant.
Interrupted time series analysis (ITSA) coupled with Difference in Difference (DiD) approach	Arguably the most plausible and practicable approach. This method could be used to look at the impact on variables impacted by the programme over time. Intervention areas could be aggregated to programme level – to look at the change in all intervention areas combined as compared to the rest of the country. Following the intervention both a break in the trend for these variables could be investigated as well as a difference to non-intervention areas. The most plausible variables to use for this are likely to be variables that are related to advanced wireless technology usage. If the programme is successful there is likely to be a short period of out-performance in the intervention areas (after which the rest of the country catches-up or at least changes trend when the learnings from the 5GIR are spread across the country). Whilst, it is unlikely that this approach will provide conclusive, robust, evidence (given number of intervention areas) on impact – it should be a useful supplement to a theory-based evaluation.
Instrumental variables	Whilst an IV approach has some attractions (e.g. potentially overcoming a self-selection bias in areas that bid for funds) it is not clear what would be used as an instrument and it is not clear it would be practicable given the data requirements.
Synthetic Control Methods	For this evaluation, this method is similar to the interrupted time series combined with a difference in difference approach highlighted above. However, it is arguably more demanding in terms of data requirements and/or econometrics (in terms of establishing a historical relationship between intervention areas and the rest of the country).
Regression Discontinuity	Not practicable given significant data demands.

Source: KPMG

As set out in Table 8, the most promising and practicable QEM for this programme (in the longer term) is likely to be the interrupted time series analysis (ITSA) approach coupled with the Difference in Difference (DiD) approach.

Through this approach a change in the trend of variables that are impacted by the programme over time in intervention areas could be investigated – particularly as compared to the non-intervention areas. The implication is that after the intervention there is a change in the trend of the variable concerned and this change in trend is not seen in non-intervention areas.

Given the scale of the 5GIR programme, it may be difficult to identify an impact at the programme level on GVA; employment; and/or, industrial structure – although an impact could be looked for in those variables using secondary data. However, other variables like Ofcom connectivity variables (for instance premises with gigabit capable broadband and 5G coverage - to the extent they act as a proxy for demand) and/or industry usage statistics (where available) would be more viable variables to test for an impact. Whist such an approach is unlikely to provide conclusive, robust, evidence of impact in and of itself (given the relatively low number of intervention areas), it should provide useful contextual information in which to frame the theory-based evaluation.

4.3.2.2 Proposed approach: Contribution analysis

Contribution analysis aims to assess attribution by exploring the range of evidence to understand the strength of the cause-effect links identified within the ToC, including through analysis of observed changes in outcomes (relative to baseline), evidence on activities and outputs, and analysis of other influencing factors that could affect programme related outcomes.

Data and evidence gathered as part of the evaluations will be used to validate the ToC for both programmes. This assessment will include consideration of the following three areas:

- Achievement of programme outcomes – assessment of the evidence to confirm whether the programmes were implemented as planned and whether the expected outputs and outcomes were observed.
- Evidence to support the assumptions within the ToC and the logical links at each stage – assessment of the evidence to confirm, disconfirm, or call into question the causal assumptions.
- Analysis of other influencing factors – examination of the evidence in relation to whether other factors, non-programme related, might have an influence on the outcomes observed.

We will combine evidence of the activity, outputs and outcomes reported through the benefits tracker with qualitative and quantitative evidence drawn from focus groups, interviews and surveys of various stakeholders in the programme. This combined evidence base will be used to test the causal links identified in the ToC for both programmes, from the delivery of activities and outputs through to the realisation of outcomes.

Whilst this approach will not allow us to precisely estimate the exact size of impact from the intervention, it will enable us to test the extent to which the pathways identified in the ToC materialised (or not). In this way, the approach will also provide useful contextual information around how and why such outcomes were achieved.

4.3.3 Economic evaluation

Given that many of the longer-term, and wider, benefits from the programmes will not have materialised during the period of the evaluations, the economic evaluations will focus on evidence of costs and benefits realised at the time of the evaluations. To evidence and illustrate the scale and nature of the costs and benefits delivered at the time of the evaluations in a proportionate way, a cost benefit analysis will be undertaken of a sample of 5GIR use cases. These will be selected based on the availability of data required to allow costs and benefits to be monetised robustly, and will seek to obtain coverage across a range of sectors and types of use case.

HM Treasury's Green Book[39] sets out that a cost benefit analysis should consider 'public value', including all significant costs and benefits that affect the welfare and wellbeing of the population, and should include non-market effects as well as market effects. All significant costs and benefits should be monetised to the extent that it is possible and proportionate to do so. Where it is not possible to monetise certain costs or benefits, they should be assessed and reported, ideally in a way that provides an understanding of their magnitude.

Following Green Book guidance, the 5GIR economic evaluation will monetise, where possible, all the significant benefits derived from a sample of use cases, ideally enabling analysis of stackable use cases (subject to data availability). This will likely be easier for some use cases (e.g. cost savings achieved through reduced heating bills through real-time control of heating) where data/information from LAs can be used when compared to others (e.g. increased security derived from CCTV cameras). For those use cases for which LAs are unable to provide data to enable direct monetisation

39 HM Treasury (2022) The Green Book: Central Government Guidance on Appraisal and Evaluation. Available at: The Green Book (2022) - GOV.UK (www.gov.uk)

of benefits, we will investigate opportunities to draw on other alternative information sources to inform the analysis and assumptions. For instance, we will investigate existing literature on the returns, or monetised benefits, to different use cases derived from previous interventions. Where this evidence exists we will use it for this evaluation (where the use cases are sufficiently similar). This approach will be supplemented by quantitative and qualitative analysis of the scale of benefits based on impact evaluation analysis where monetisation is not possible.

Depending on the use case examples, where the costs and benefits can be effectively monetised and set against one another we may be able to scale these benefits (for instance where other use cases are sufficiently similar). However, given the variety of use cases undertaken in the programmes, this approach is unlikely to be robust at the programme level.

To the extent possible, the cost benefit analysis will also include adjustments for additionality in order to capture only costs and benefits that would not have occurred in the absence of the 5GIR and SIPP interventions respectively. This will be based on the evidence developed as part of the impact evaluation.

Monetised costs and benefits will be converted into present value by discounting them over the period in which the costs and benefits are being assessed at the HM Treasury Green Book social time preference rate of 3.5%. This will allow for the present values of all use case costs and benefits realised and calculated at the time of the evaluations to be aggregated to provide for a Net Present Value (NPV) figure.

For the SIPP programme we will investigate the costs of the PAS 191 standard multi-purpose poles and assess how those costs compare against the potential benefits from the use cases deployed on the poles. The objective will be to use information from the benefits tracker as well as the interviews and surveys of use case providers to produce a robust understanding of the nature and scale of benefits that can be expected by LAs installing PAS 191 poles as compared to their costs.

The method set out in this section relies heavily on the data and evidence collected by LAs in relation to specific use cases. Given this, the method will continue to be developed and refined as the programme progresses. It will be developed as more details on use case benefits and data availability is known, in collaboration with DSIT officials leading on benefits realisation.

5 Evaluation timelines

This scoping report provides the planned scope and methodology for the two programmes' evaluation and how they will be undertaken.

The two project plans in this section set out how this will be implemented over the next approximately 16 months.

Figure 5 below sets out the timeline for the delivery of the process evaluations and the initial development of the 6-monthly report dashboard.

Figure 6 sets out the timeline for the second 6-monthly dashboard together with the process, impact and economic evaluations.

Figure 5: Evaluations timeline (1 of 2)

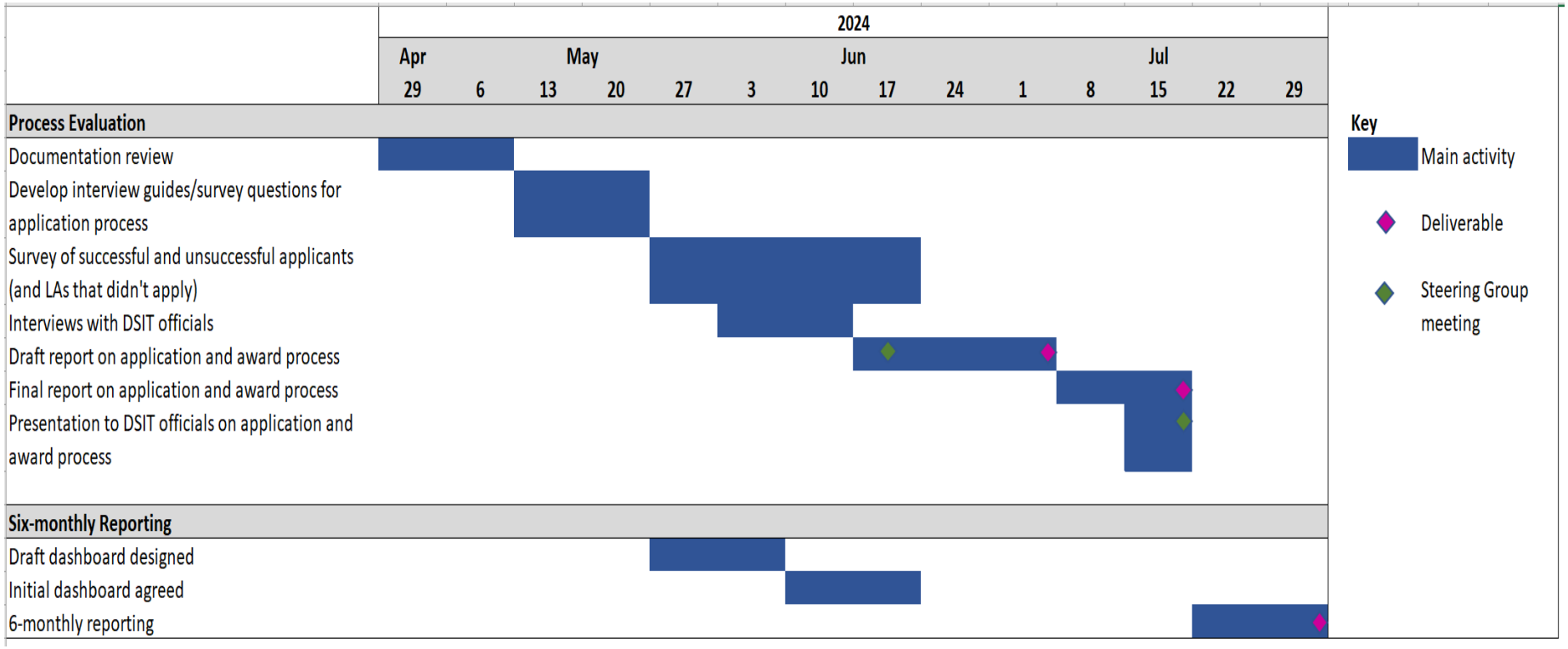
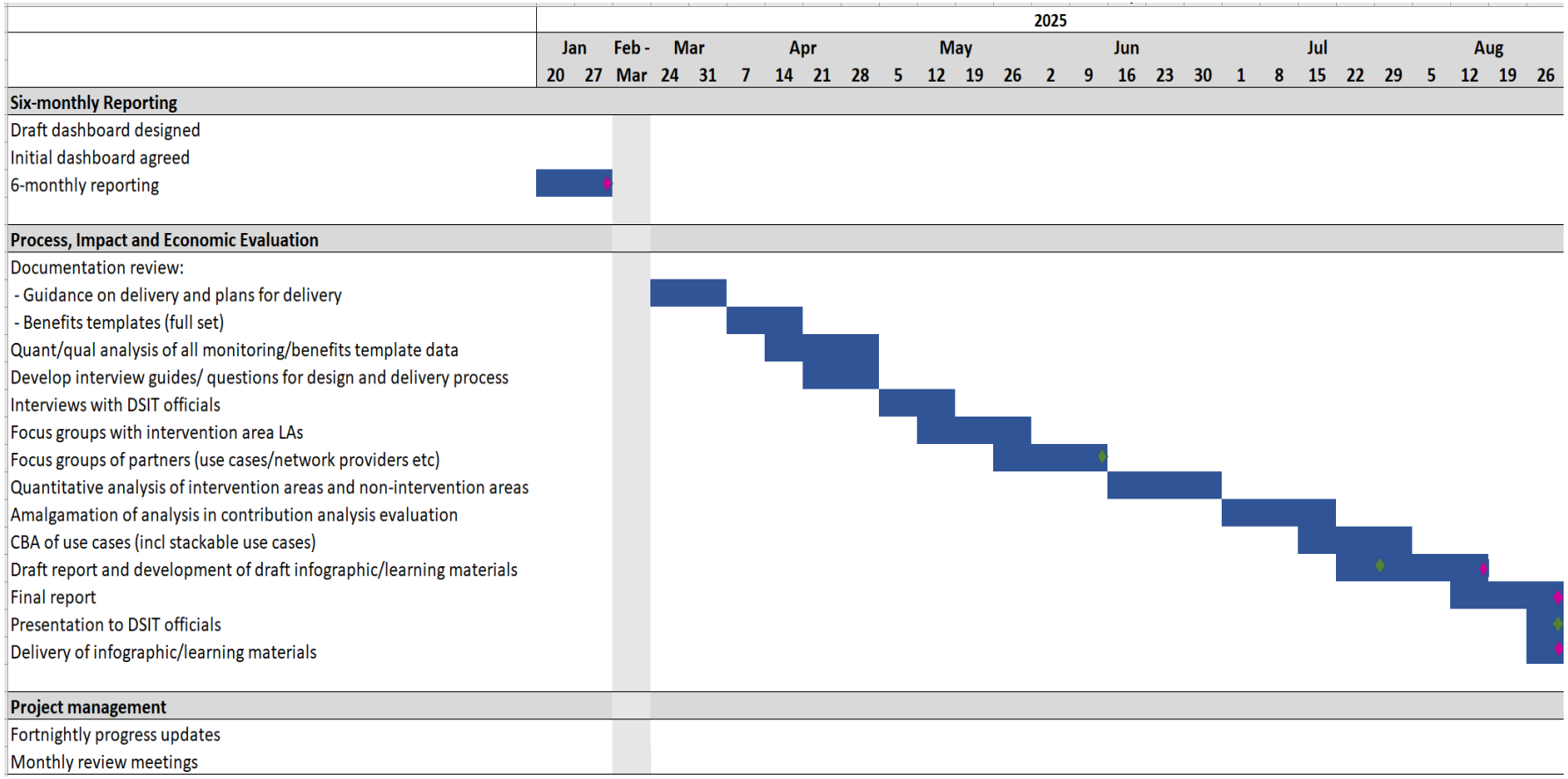


Figure 6: Evaluations timeline (2 out of 2)



6 Appendix 1: Baseline

6.1 Purpose of the baseline

As set out in the main body of the scoping report, the purpose of this baseline is to establish a clear understanding of the situation at the start of the 5GIR and SIPP programmes. It provides an initial point of comparison for monitoring and evaluation purposes and, as such, serves as a reference point against which progress can be measured and evaluated through the implementation of both programmes.

The baseline report is structured as follows:

- Section 6.2 provides a brief overview of the nature of advanced wireless technology provision and its adoption in the UK to date.
- Section 6.3 then reports relevant published data; it presents data for the intervention areas for the two programmes together with data for non-intervention areas. This provides a comparison of the levels of public connectivity in the intervention areas and non-intervention areas at the start of the two programmes, and provides a baseline that could be used as part of a longer term evaluation to analyse the impact of the 5GIR and SIPP interventions.
- Finally, Section 6.4 presents data and information on the individual intervention areas drawing on the content of the initial applications made by the intervention areas together with the initial benefits tracker returns to set out the baseline position in each intervention area as at the start of both programmes.

6.2 Advanced wireless technology in the UK

This section provides some brief background and policy context concerning the nature of advanced wireless technology availability and its adoption at the start of the two programmes.

6.2.1 Policy context for 5GIR

The provision and adoption of 5G and other advanced wireless technologies in the UK is in its infancy. Indeed, the purpose of the 5GIR programme is to promote the use and adoption of 5G and other advanced wireless technologies in businesses and in the delivery of public services.

To date in the UK, as in most other countries, operators have begun rolling out 5G by deploying non-standalone (NSA) 5G. NSA 5G offers consumers increased speeds and bandwidth to improve experiences such as streaming and video calls. However, as set out in the Wireless Infrastructure Strategy, many of the economic benefits associated with advanced wireless technology will require significantly higher quality 'advanced' or standalone (SA) 5G, which offers higher bandwidth, lower latency and greater reliability[40].

A number of recent reports highlight the relatively new nature of 5G SA roll-out:

- "The 5G coverage footprint does not yet match those of earlier generations and is still being rolled out … In the context of further 5G roll-out, a key evolution will be migration to 5G standalone networks" [41].

[40] UK Wireless Infrastructure Strategy (2023), Department for Science, Innovation and Technology (UK Wireless Infrastructure Strategy (publishing.service.gov.uk))
[41] Analsys Mason and Oxera 2022; Ensuring future wireless connectivity needs are met (Ensuring future wireless connectivity needs are met - final report for DCMS (publishing.service.gov.uk)

- "5G in the UK has been commercially rolled out in non-standalone (NSA) mode … We are now beginning to see the transition to mobile 5G standalone (SA) rollouts, moving from a trial phase reported last year to around 2,000 mobile 5G SA sites commercially deployed this year [2023]. We, however, note that we are still at an early stage in the rollout of mobile 5G SA, and we will continue to monitor progress in the years ahead" [42].
- "As 5G NSA infrastructure is upgraded to 5G SA, starting in 2023, more 5G use cases will be developed and become available for consumers and enterprise customers" and, "5G technology is still very new to the market (the latest advanced features have only been adopted by standards bodies in 2022 and therefore will not come to market at scale until later this decade) and therefore adoption by businesses is still nascent but growing" [43].

In conclusion, the rollout of advanced wireless networks remains limited and the adoption of 5G services by businesses and the public sector in the UK is nascent. Following the 5G Testbed and Trials programme, the 5GIR programme aims to stimulate the adoption of advanced wireless technology and demand for it and thereby also stimulate investment in advanced wireless technology. Qualitative and quantitative evidence provided by the intervention LAs (set out in Section 6.4.1) shows that, there are some, limited, examples of 5G adoption or capability in some of the intervention areas including 5G hubs, though these tend to be the exception rather than the rule.

6.2.2 Policy context for SIPP

SIPP has been implemented to build on the Digital Connectivity Infrastructure Accelerator (DCIA) programme, launched in 2021, which explored the challenges of using publicly owned land, buildings and street furniture to support digital infrastructure and roll out of advanced wireless connectivity.

The demand for greater wireless capacity and coverage is expected to require increased network densification. To that end, MNOs and other providers are increasingly looking to deploy 5G small cells on infrastructure owned or overseen by LAs - including lamp posts, traffic lights, signposts, CCTV columns etc. The SIPP programme aims to fill this gap by enabling successful pilots to procure and test smart multi-purpose columns for mobile and wireless connectivity services, and other relevant uses. The programme is aimed at primarily applying new publicly available specifications (PAS) to the design and procurement of new smart street infrastructure for LAs.

Part of the DCIA programme involved developing standards for smart infrastructure – specifically developing PAS for smart lamp posts. This was to provide LAs with the specifications required for smart multi-purpose poles to then enable the more effective accommodation of mobile and wireless connectivity services and other relevant uses.

The baseline position for the programme is therefore that no PAS 191 standard poles currently exist; SIPP will test the specification in order to establish such a standard. Qualitative and quantitative evidence provided by the intervention LAs (set out in Section 6.4.2) shows that, whilst no PAS 191 standard poles currently exist, some SIPP areas do have experience of deploying wireless technology on existing street furniture. Where such experience exists it particularly relates to the deployment of small cells, CCTV and IoT.

[42] Ofcom 2023; Connected Nations 2023 (https://www.ofcom.org.uk/research-and-data/multi-sector-research/infrastructure-research/connected-nations-2023)
[43] DSIT 2023; UK Wireless Infrastructure Strategy; (https://assets.publishing.service.gov.uk/media/64357c81877741001368d7fd/uk_wireless_infrastructure_strategy.pdf)

6.3 Levels of wireless connectivity in the UK and SIPP and 5GIR intervention areas

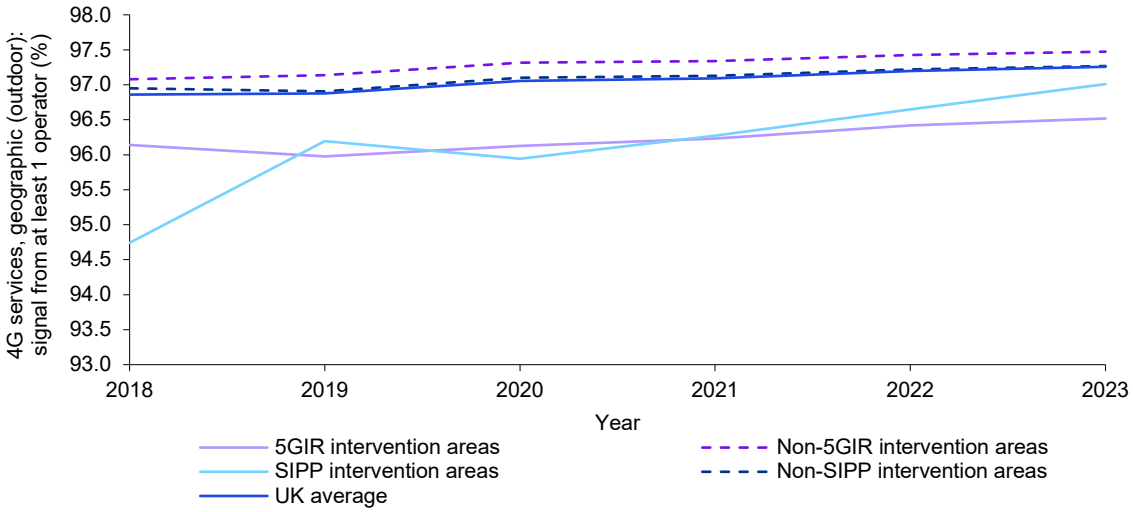
This section provides detail on the levels of connectivity in the UK using published statistics. It compares Ofcom published statistics on connectivity (and related issues) at the aggregated 5GIR and SIPP intervention area level with the position nationwide. While the Ofcom statistics reported here might not be expected to be directly impacted by the programmes, they are used as broad proxies for how connected the different areas are and to assess the extent to which there are any inherent differences between the intervention areas and the rest of the country. As set out in Box 1 in Section 4.3.2.1, whilst it is unlikely that these statistics can provide meaningful insights within the timescales for the evaluation (because some of the outcomes/ impacts expected from the programmes will not have materialised during this time and some of the statistics will, similarly, not be available during the period of the evaluation) these and/or related variables could be analysed as part of a longer-term evaluation of the programmes.

Wireless connectivity (mobile networks, Wi-Fi and a range of other solutions) can be used to connect data via wireless sensor networks in order to track objects and to transmit videos/images. 5G is the latest cellular wireless technology available in UK, offering higher speed and lower latency which can support the adoption of a range of advanced wireless applications and thus transform the way of doing business as well as the provision of public services in the UK.[44]

According to the latest Ofcom data on the percentage of premises in the UK with a 4G signal from at least one network operator[45], MNOs collectively provide close to 100% coverage for mobile data services using 4G cellular technology, as shown in Figure 7. This shows that the difference in coverage between 5GIR and SIPP intervention areas and non-intervention at an aggregate level is small, with the intervention areas (both for the SIPP and 5GIR programmes), lagging, on average, up to one percentage point behind non-intervention areas by 2023.[46]

[44] Wireless connectivity is essential for the delivery of many public services, especially those related to transport and health care.
[45] Ofcom 2023, Connected Nations 2023 (Connected Nations 2023 - UK report (ofcom.org.uk))
[46] SIPP and 5GIR interventions areas are defined at the International Territorial Level (ITL) 3, as shown in Appendix 4.

Figure 7: Percentage of geographic areas with 4G signal outdoors from at least one operator (signal threshold: 105dBm)[47]

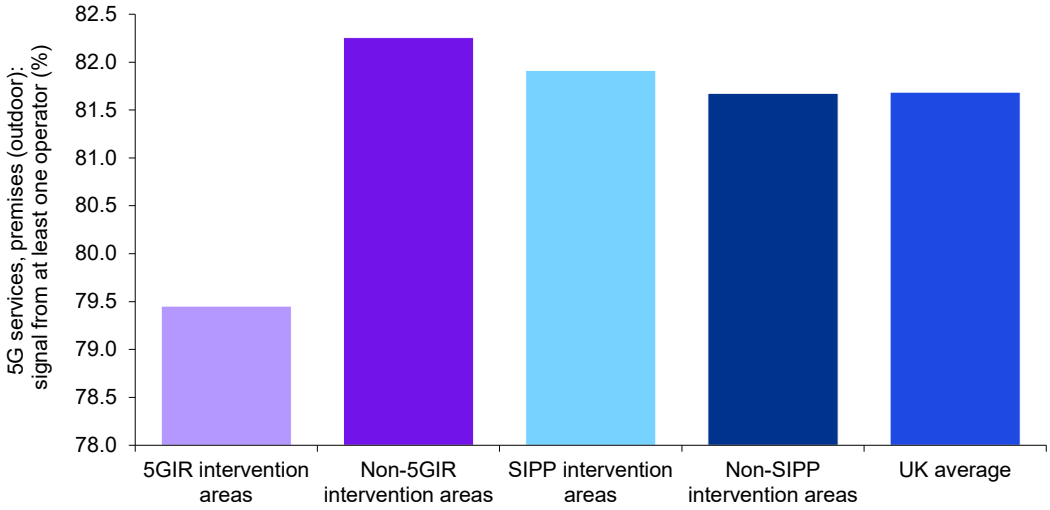


Source: Ofcom – Connected Nations data

At present, 4G continues to carry the majority of data traffic and provides the primary support to consumers' mobile experience as the roll-out of 5G is still in progress.[48] In 2023, the percentage of outdoor premises where at least one MNO provides 5G coverage was on average 82% in the UK (see Figure 8). In 5GIR intervention areas a slightly lower proportion of premises (79.5%) received a 5G signal from at least one MNO, compared to non-intervention areas (82.3%).

[47] Ofcom data on 4G signals contains missing values for some local authority districts, this have been removed from the analysis. As a results, data on Westminster and Kingston are not included.
[48] Ofcom 2023, Connected Nations 2023 (Connected Nations 2023 - UK report (ofcom.org.uk))

Figure 8: Outdoor premises with 5G coverage from at least one MNO (very high confidence level)[49]



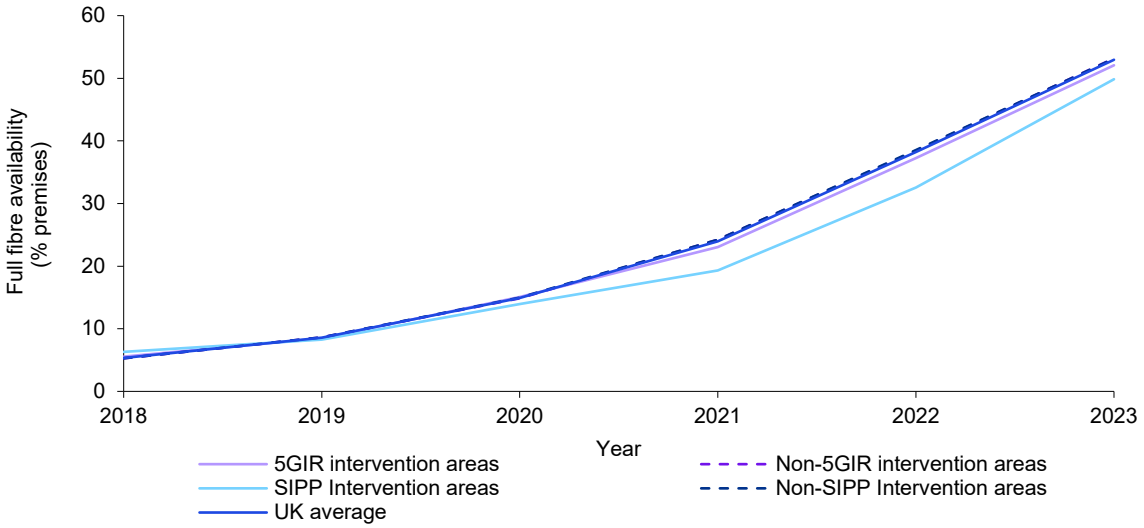
Source: Ofcom – Connected Nations data

Whilst fibre networks are usually associated with fixed technologies, 5G and fibre investment can be viewed as complementary in that 5G infrastructure will utilise fibre networks for backhaul purposes where available. Moreover, full-fibre Wi-Fi, which provides the primary form of wireless connectivity for many connected devices in homes, offices and industrial settings, may be seen as an indicator of an area's openness to wireless connectivity in its widest sense.

The percentage of UK premises with full fibre availability has increased significantly over the period 2018 to 2023 (see Figure 9), with an average annual increase of 60%. The rate in the 5GIR intervention area follows a broadly similar trajectory to that of non-intervention areas and the average in the UK. The rate in SIPP intervention areas, however, has not increased quite as fast as in other areas since 2020.

[49] A "Very high confidence level" indicates that a signal strength of -100 dBm or better is predicted, with around a 95% probability (Connected Nations 2023 - UK report (ofcom.org.uk))

Figure 9: Percentage of premises with full fibre availability



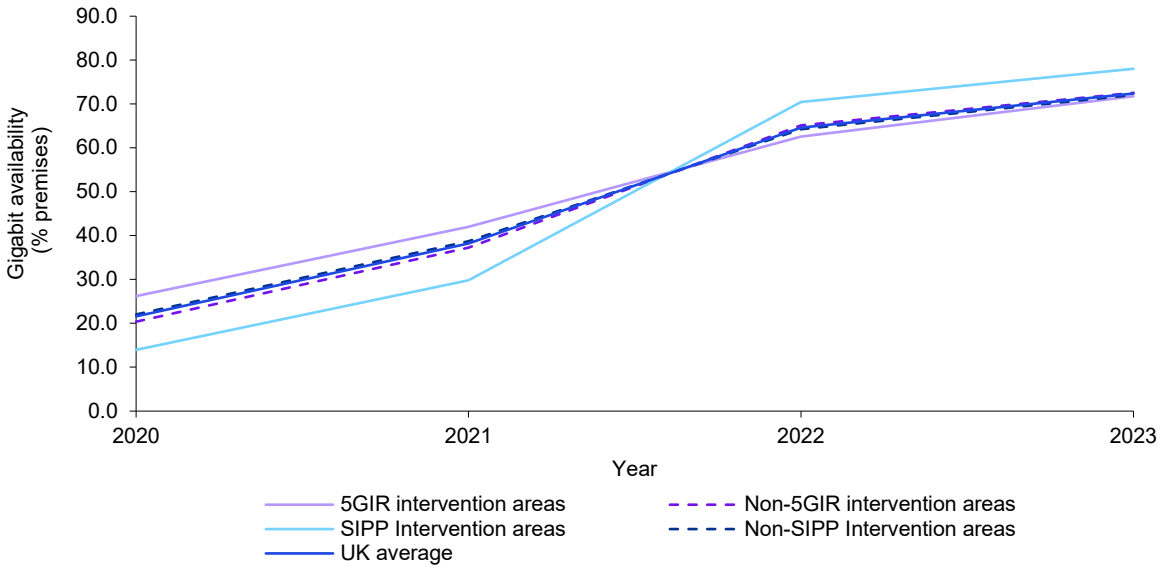
Source: Ofcom – Connected Nations data, KPMG analysis

Whilst there is still some uncertainty around the exact speed required to support future wireless applications, a recent report[50] suggests that required speeds could range from around 20–30Mbit/s (similar to those delivered by the cellular networks in the UK today) up to 100Mbit/s and above.

Gigabit capable services, which offer download speeds of 1 Gbit/s and above, can be delivered by HFC cable or full fibre. Thus, the growth in full-fibre coverage has also contributed to an increase in the number of premises able to access gigabit-capable services. The growth in the percentage of premises with access to gigabit capable services could act as a proxy for demand for advanced wireless technologies. The UK gigabit-capable broadband network has increased rapidly in recent years: the percentage of premises with coverage from gigabit-capable service grew from approximately 20% in 2020 to 72% in 2023 on average in the UK.

[50] Oxera & Analysys Mason 2022, Ensuring Future Wireless Connectivity Needs Are Met;*Ensuring future wireless connectivity needs are met - final report for DCMS (publishing.service.gov.uk).

Figure 10: Percentage of premises that have coverage from a Gigabit capable service from fixed broadband



Source: Ofcom – Connected Nations data, KPMG analysis

The coverage of gigabit capable services in 5GIR intervention areas has mirrored the average trend in the UK. In SIPP intervention areas, growth has been slightly more rapid than the average, rising from 14% in 2020 to approximately 78% in 2023 (compared to 69% for the average across the UK in 2023).

In conclusion, Ofcom data suggest that the 5GIR and SIPP intervention areas are not hugely dissimilar from the rest of the country at the start of the two programmes in terms of their levels of connectivity.

6.3.1 Economic performance of 5GIR and SIPP intervention areas

In addition to looking at connectivity data, as the objectives of the 5GIR programme include increased commercial investment and economic growth, this section also considers published statistics relating to gross value added per hour (GVA per hour)[51] and employment. This is provided to assess the extent to which, at the start of the two programmes, the intervention areas are different to the rest of the country in terms of these measures.

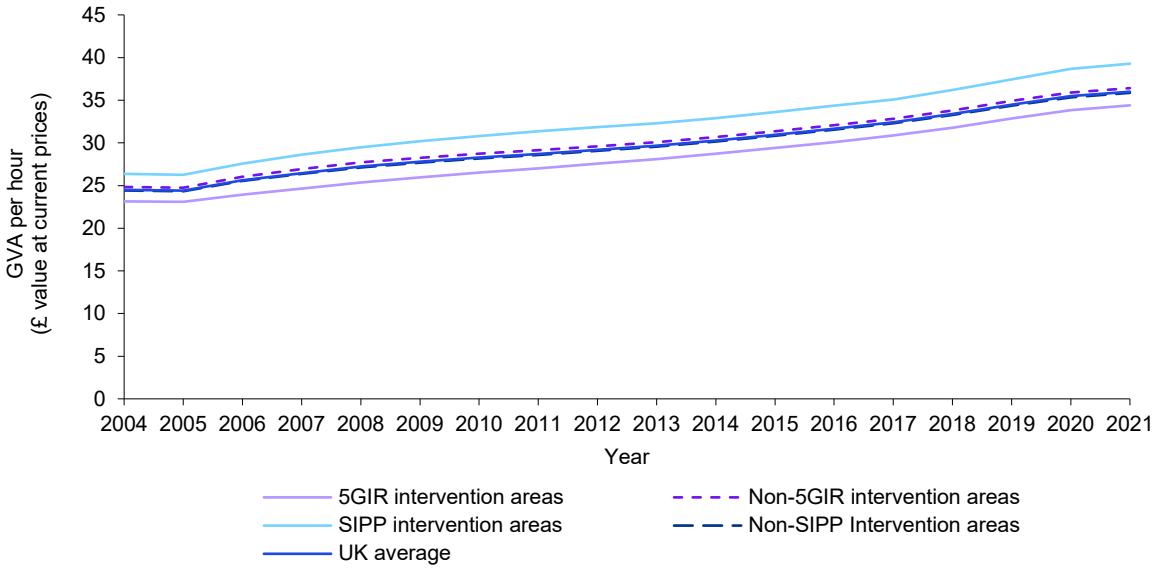
The latest available data on GVA per hour worked at the LA level[52] sourced from ONS shows that the evolution of productivity and employment in 5GIR and SIPP intervention areas has generally followed similar trends to non-intervention areas between 2004 and 2021, as shown in Figure 11.

However, SIPP intervention areas have consistently reported higher GVA per hour compared to the UK average between 2004 and 2021. In contrast, 5GIR intervention areas have reported a slightly lower average GVA per hour between 2004 and 2021.

GVA per hour is used here to enable comparisons of the levels of productivity across areas in the lead up to, and at the start of, the programmes. Productivity is a key driver of economic growth and one of the aims of the Wireless Infrastructure Strategy is to realise the substantial productivity benefits of advanced wireless networks.

[51] GVA is a standard measure of the economic activity taking place in an area. It reflects the value of goods and services produced, less the cost of any inputs used up in that production process.
[52] 5GIR and SIPP interventions areas are defined at the International Territorial Level (ITL) 3, as shown in Appendix 4

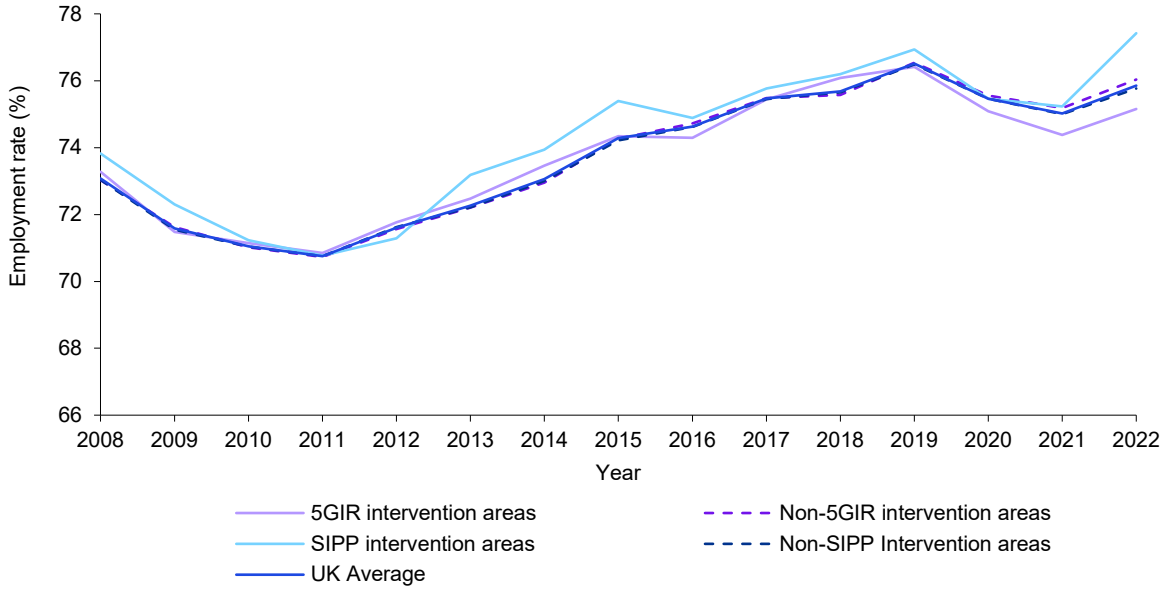
Figure 11: Gross Value Added per hour (at current prices) in 5GIR and SIPP intervention areas compared to non-intervention areas



Source: ONS – GVA per hour worked data, KPMG analysis

Turning to employment[53], the data shows that between 2008 and 2022, 5GIR and SIPP intervention areas have generally experienced similar employment rates to the UK average, with differences of less than a percentage point throughout most of the period. However, the employment rate in SIPP intervention areas increased between 2021 and 2022 to a greater extent than in other areas.

Figure 12: Employment rate in 5GIR and SIPP intervention areas compared to the UK average and non-intervention areas



Source: ONS employment rate data, KPMG analysis

[53] ONS employment rate data – showing the percentage of people aged 16 to 64 in employment (from the Annual Population Survey).

6.4 Baseline context for individual intervention areas

This section provides detail on the status of the intervention areas and planned programme activity for both 5GIR and SIPP at the start of the programmes, using information drawn from the applications and initial benefit tracker returns.

It should be noted that we also considered running a baseline survey of LAs in intervention and non-intervention areas to understand the nature of advanced wireless technology provision and adoption in those areas at the start of the two programmes. However, as set out in Section 6.2, the provision and adoption of advanced wireless technology is in its infancy and so it is questionable whether a survey of LAs would elicit much useful information beyond what is available from other sources (such as Ofcom data for example) on the existence and adoption of advanced wireless technology at this stage. As a result of this, and our wider work in scoping the evaluation, it was agreed with the DSIT evaluation team that the evaluation would reprioritise resource to allow more focus groups and surveys with use case providers and network providers as part of the final impact evaluation. It was considered these focus groups and survey would provide more robust and comprehensive information on the change in the provision and adoption of wireless technology over the period of the programme than the inclusion of a baseline survey of LAs conducted at the start of the two programmes.

Section 6.4.1 sets out summary tables for each 5GIR intervention area, including high level details on the nature of the planned interventions and any pre-existing capabilities with regard to advanced wireless technology based on the application forms submitted to DSIT. This is followed by a summary of the baseline position and target objectives as reported by each intervention area through the benefits tracker as at Q1 2024 in the programmes' delivery, presented in Table 9.

The same is presented for SIPP intervention areas in Section 6.4.2.

6.4.1 5GIR intervention areas

Belfast

Total budget	Areas of intervention	Relevant sector(s)
£3.8 million	Belfast City Council	— Creative Industries — Transport & Logistics — Advanced Manufacturing

Key activities

The programme will deliver selected key projects:

— **5G Film Anywhere**
'5G-in-a-box' real-time high-capacity location to studio uplinks

— **5G Transport & Logistics**
- Real-time information capture from the Translink Glider bus network
- Port operations digitalisation and automated bulk freight handling

— **5G Construction of Advanced Manufacturing flagship**
5G enabled smart design including AR and Digital Twin to manage whole-life cycle construction and fit-out of advanced manufacturing factory of the future.

— A **Regional 5G Centre of Excellence** to work across sectors and identify opportunities and attract additional investment to drive 5G-enabled change across the region. A Grant Fund will be a flexible funding vehicle to drive adoption.

Main objectives and outcomes

— Using 5G to exploit new/emerging technologies
— Sector productivity gains - saving money/increasing profitability
— Use cases can be commercialised and extended
— Learning applied to other sectors

Pre-existing capabilities

The programme's anchor projects will make use of existing network infrastructure resources, including:

— Belfast Harbour's existing 5G public/private network
— Studio Ulster Virtual Studio and AMIC Factory of the Future testbeds
— Translink's data hub resources and Weavers Cross Innovation Hub
— Openreach, Virgin, Eir and Fibrus backhaul infrastructure previously procured by partners under BDUK LFFN and Stratum projects

Expected sustainability post-intervention

Operation of Project Structures and Assets/ Infrastructure and Sustainability & Scalability:

Project	Sustainability & Scalability
5G Film Anywhere	Licensing 5G remote production products using the use case IP. Studios purchase product for remote filming. 5G Film Anywhere network workflow licensed to media production companies. Pop-up 5G connection model commercialisation by operators globally.
5G Port Hoppers	Automation of hoppers and the manufacturing for new hoppers enabling 5G automation by ports UK globally to optimise bulk cargo handling.
5G Port West Bank Rd	5G Port use case stacking commercial model extendable to most ports.
5G Transport Data	Capturing and commercialising data delivers revenue stream covering the cost of installation. Further routes will adopt the technology in Northern Ireland with UK-wide scalability. Model for high-volume data usage replicable globally.

Cumberland

Total budget	Areas of intervention	Relevant sector(s)
£3.8 million	Cumbria, Dumfries & Galloway, Northumberland and Scottish Borders	— Rural enterprise — Tourism

Key activities

Delivery of five use cases, aligned with the Destination Borderlands Programme, which will use advanced wireless technologies:

— Windermere 5G Ferry
— Kielder Castle & Forest
— Stranraer Marina
— Sill @ Hadrian's Wall
— Destination Tweed

Utilising similar technology for all use cases will allow efficient procurement, rapid mobilisation, prove commercial value of the technology in different environments at scale and stimulate further commercial or public deployment in each of the partner LA areas. Using replicable formulas will inform the LA strategy and provide opportunities for stakeholders to experience the value of this technology.

Main objectives and outcomes

– Enhanced visitor experience though improved public connectivity, content delivery, user content creation and real-time information
– Improved service demand management and real time sharing of capacity information
– Increased revenue through prevention of revenue loss from currently poor connectivity
– Improved customer safeguarding
– Real time data to inform destination management and empower local businesses
– Environmental monitoring – air quality, water quality, flood prevention, environmental research and habitat restoration

Pre-existing capabilities

The LAs that make up the Borderlands Partnership have extensive experience in delivering large scale, complex projects and working with a unified cross border approach. Key strengths of the Borderlands Partnership are in knowledge sharing, stakeholder engagement and senior oversight of the programme.

Expected sustainability post-intervention

The LAs will seek to leverage deal, private and LA partner funding as part of a renewal of the Borderlands Digital Infrastructure Strategy.

Borderlands Partners will develop options for further investment, such as a challenge fund to bring together a range of innovation partners in transforming the region. Information from Borderlands use cases, wider 5GIR programme and stakeholder engagement will inform the development of business case options.

To further support both public and commercial development of advanced wireless all Borderlands Partners will seek to develop and agree region wide processes to support access to public sector assets. The programme team will work with a range of stakeholders in developing processes and incorporating best practice.

Moreover, through the stakeholder engagement programme, the LA will identify anchor tenants to support long-term sustainability of projects.

Glasgow

Total budget	Areas of intervention	Relevant sector(s)
£3.23 million	Across land boundaries of Glasgow City Region, including: — East Dunbartonshire Council — East Renfrewshire Council — Glasgow City Council — Inverclyde Council — North Lanarkshire Council — Renfrewshire Council — South Lanarkshire Council — West Dunbartonshire Council	— Social Housing — Health and Social Care

Key activities

Primary activities across workstreams include:

— Cross-sector stakeholder engagement.
— Market engagement with members of the digital connectivity ecosystem: LAs, social landlords, connectivity and IoT providers, and equipment/application developers.
— Connectivity, technology and process change testing.
— Data analysis and validation.
— Market sizing and commercial model validation.
— Business case development.
— Knowledge exchange and dissemination.

Main objectives and outcomes

Drive economic growth:

— Significant, realisable cost savings and productivity gains through increased technology adoption to support proactive operations and maintenance of social housing assets.
— Improved welfare through better housing conditions and enhanced health and social care to drive inclusive economic growth.
— Energy optimisation, saving money for residents and providers, easing the cost-of-living crisis, and generating economic growth.

Accelerate commercial investment:

— Collaborating with IoT product and service suppliers on data aggregation; supporting infrastructure requirements for their established and emerging deployments and linking them with wider customer bases to create sustainable business cases for scaling operations.

Foster the 5G ecosystem:

— Building upon the Glasgow City Region (GCR) LAs history of public, private and academic collaboration in deploying advanced wireless technology and services, the GCR LAs will expand their outreach activities to facilitate 'learning by doing' through impactful cross-sectoral collaboration and knowledge exchange.
— Establishing a robust governance structure and 5GIR Delivery Taskforce to disseminate information and provide a focal point of contact.

Pre-existing capabilities

The project builds on existing expertise and activities fostered within an established ecosystem of public, private, and academic partners.

— Glasgow City Council (GCC) Telecoms Unit: the driving force behind the project, poised to leverage its expertise in industry engagement and liaison with LAs.
— Three globally recognised universities: leading-edge 5G innovation research at University of Glasgow, University of Strathclyde, and University of the West of Scotland.
— CENSIS: Scotland's Innovation Centre for IoT, Sensing and Imaging, with a strong track record of working with the public and private sectors, and industry.

- Innovation Accelerator Region: GCR is one of three pilot areas funded by the UK Government's Levelling Up programme, further strengthening our innovation ecosystem.
- Existing deployments and pilots**:** Building on existing initiatives provides a strategic advantage to capture and catalyse the momentum created by prior efforts.

GCR will leverage existing influence to convene stakeholders, coordinate regional and national communications, and propose, lobby and institute policy to create an attractive investment environment for 5G application use cases.

Expected sustainability post-intervention

The 5GIR will deliver individual business cases and a regional blueprint for aggregated use case investment. The project activities will enhance the ecosystem to create a sustainable pipeline of opportunities for further investment and deployment at the end of the grant funding period.

Market engagement activities planned throughout delivery will test market appetite for investing and seek to match investors with beneficiaries. This process will inform commercial model refinement and prepare the market for further investment and expansion of the use cases.

These activities will involve LAs, asset owners, and connectivity, equipment and solutions providers across the Region. The relationships and support from these entities provide the opportunity to shape and align their plans to complement workstreams in our 5GIR project.

Manchester

Total budget	Areas of intervention	Relevant sector(s)
£3.1 million	Greater Manchester	— Energy — Housing — Transport

Key activities

The Greater Manchester (GM) 5G SMART Decarbonisation Network's (GM 5G SDN) vision is to demonstrate how to tackle the drivers of climate breakdown at a city region level using 5G by creating a:

1 – **Smart Energy Grid** that will capture and analyse data from 1,800 heat pumps in three areas of GM social housing for real-time demand optimisation. In time, this could link a vast number of units together to enable the development of a Local Energy Market, matching regional energy supply and demand.

2 – **Digital Road Network** that will enable smart signals in two areas of GM, enabling Transport for Greater Manchester (TfGM) to coordinate movements and prioritise traffic flows to improve the efficiency of our road network reducing congestion and carbon emissions.

The project focuses on social housing areas in Wigan and Manchester plus the surrounding road networks, using vendor neutral 5G small cell capabilities back-hauling against the GM Local Full Fibre Network (LFFN) which spans the city region.

Main objectives and outcomes

Intended outcomes include:

— Developing frontier energy and technology industries across GM and UK
— Improving public sector services provision (efficiency/Innovation)
— Reducing the digital connectivity gap providing public connectivity
— Specialist employment, knowledge dissemination and skills development
— Providing a national focus for use of advanced wireless in community based decarbonisation.

Pre-existing capabilities

GM 5G SDN has the support of the Chief Executives of the lead public organisations (GMCA, TfGM, Manchester City Council, and Wigan Council) plus the support of the GMCA Digital Portfolio Holder, and the relevant housing organisations and industry bodies.

This project will be sponsored through existing city-region wide governance arrangements for Digital and wider GMCA & TfGM activities. GM's mature governance and track record in delivering digital initiatives provides assurance and confidence that over 15 months they will co-design, test, implement and evaluate, and disseminate shared learnings in line with DSIT requirements.

In this field they have already trailblazed policy areas such as dig-once strategies, open access small cell agreements, standardised wayleaves and collaboration agreements with across GM. Moreover, GM5GSDN will benefit from existing and planned complementary investment from private and public sector.

Expected sustainability post-intervention

Smart Energy
Enabling 5G connectivity and the financial benefits from demand-side response, time of use tariffs, grid balancing, and specialist heat pump tariffs will sustain further roll out.

Digital Road Network
Working with industry, GM will explore further leverage of the Digital Road Network, attracting investment and creating centres of excellence for adoption in advance wireless use cases.

Developing the use case stack
As part of the legacy, the aim is to create social housing focussed place-based model where multiple 5G use cases can be stacked including building management, education, mould detection, and health-at-home, whilst results are scaled across GM.
Our stackable use cases create the environment to replicate this model across GM, funded by industry partners, through lower energy costs, charging options, and re-purposing funding grants.

North Ayrshire

Total budget	Areas of intervention	Relevant sector(s)
£3.8 million	Ayrshire	— Advanced Manufacturing, — Aerospace and Space, — Life Sciences, — Food & Drink, — Engineering, — Tourism, — Creative Industries and — Public Sector

Key activities

- Establish three sector-focused 'Regional Strategic Wireless Innovation Hubs' anchored to Ayrshire Growth Deal 'Innovation Hubs,' creating a robust innovation ecosystem that fully leverages 5G and other advanced wireless technologies, to accelerate adoption.
- This project will enable real-time environmental monitoring, the establishment of digital factories for the future, smart vision inspection, immersive training experiences, and more.

Main objectives and outcomes

- Establish Ayrshire as a hub of innovation, integrating cutting-edge wireless technologies and collaborative ecosystems to drive economic prosperity, sustainable growth, and community well-being.
- Improve efficiency, reduce costs, and enhance quality standards

Pre-existing capabilities

- Strong leadership of the Ayrshire Regional Economic Joint Committee (AEJC), uniting LAs, anchor institutions, and community representatives
- The commitment to the 5GIR is amplified through the LA's involvement in established initiatives, such the S5GC HALO hub, and the existing network and collaborations with key players such as Scottish Enterprise, Skills Development Scotland, and Net-Zero Accelerators.

Expected sustainability post-intervention

The Ayrshire 5GIR Project is strategically designed for long-term sustainability. A Commercial Sustainability Report, generated at the project's conclusion, will inform the approach to securing additional funding if necessary. Sustainability will also be achieved by:

- Diversifying funding sources
- Collaboration and Partnerships
- Sustainability and Scalability of Products and Services

Oxford

Total budget	Areas of intervention	Relevant sector(s)
£3.8 million	— Oxfordshire — Berkshire — Buckinghamshire — Cambridgeshire — Central Bedfordshire	— Rail Transport (5G Railway) — Advanced Engineering (5G Science Park)

Key activities

Delivery of two large scale real-world 5G projects, in the world-leading Harwell Campus on the East West Rail line, using them to develop a methodology that enables their success to be repeated across the region, UK-wide and beyond.

— **Transport – 5G Railway**
Use new existing trackside fibre to drive 5G in a rural setting

— **Advanced Engineering - 5G Science Parks**
Deliver Public/Private 5G network on the world leading Harwell campus to support 5G Quantum, Space, Health and Energy Clusters and the Diamond Light Source Synchrotron

Main objectives and outcomes

— Demonstrating large-scale and highly scalable 5G adoption in key sectors;
— Focus on developing the models for aggregating demand;
— Creating a critical mass scale to make combined existing ecosystems more viable

Pre-existing capabilities

ECH brings together digital champions and existing resourced programmes to create a sustainable programme that builds on those strengths.

The programme draws on regional expertise:

— Contract with Neos;
— ESA Harwell 5GHub: leading anchor customer for Harwell site, facilitating access to potential 5G users
— STFC: deep experience of working with tech companies, facilitating huge network of potential 5G users.
— Westcott 5G Future Network Development Centre: facilitator of potential customers
— Cambridge Wireless: facilitating access to its significant member network
— JISC: Members access, massive scale use case application in UK education

Expected sustainability post-intervention

The programme's sustainability is supported by a gainshare approach that incentivises replication. The region's high level of broadband gainshare evidences likely success.

The 5G Science Park contract will be funded for 7 years. Partners, STFC and the Supplier will work to drive uptake, with income from tenant services replacing the initial public sector investment. Gainshare and other funding will be invested in similar projects at other science parks in the region.

Shropshire

Total budget	Areas of intervention	Relevant sector(s)
£3.8 million	— Shropshire Council (LEAD) — Gloucestershire County Council — Herefordshire Council — Monmouthshire County Council — Powys County Council — Telford and Wrekin Council	— Rural Industries (Agri Tech + Food Manufacturing) — Water — Public Sector

Key activities

— Implement mobilisation plan.
— Implement an active stakeholder engagement and communication plan.
— Appoint partners and collaborators through commercial frameworks/contracts/streamlined routes to support case study development and regional demonstrator stand-up.
— Finalise and scale up regional testbed / demonstrator locations and identify scope of gaps to demonstrate sector case studies.
— Establish industry sector interfaces to consolidate lessons learned and case study reviews with UKTIN.
— Implement Digital Champions and coordinator network.
— Launch 'learn by doing' pilot.

Main objectives and outcomes

Demonstrate, prove, and drive implementation and adoption of new digital products and services that support public service delivery, whilst enabling key enterprise in water management and rural industries to explore and exploit digital innovation.

Pre-existing capabilities

The River Severn Partnership (RSP) is an established, structured collaboration with an accountable body (Shropshire Council), governance structure and agreed MOU. It brings together strategic leaders across public and private partners representing the multi sector leadership across the Severn system.
RSP intends to collaborate with national and regional partners who are centres of excellence in supporting 5G/AWC and innovation in our key specialist sectors. These partners will provide transferrable and scalable skills, insight and support to stimulate interest and adoption in proven case studies for our sectors.

Expected sustainability post-intervention

The integration within the RSP structure, leverages a unique sustainability strength with governance and sector-based relationships already established, and a commitment to work collaboratively as a river-based growth region. A sustainability plan will be developed through 2024, ensuring sustainability and scalability are central to all product and service development.

Sunderland

Total budget	Areas of intervention	Relevant sector(s)
£3.8 million	North East Region	— Transport & Logistics — Creative Industries — Rural Industries: Agritech

Key activities

Delivery of the following projects:

- 5G-enabled port operations to improve port competitiveness and safety and reduce environmental impact
- Connected Intelligent Transport Systems to improve road transport efficiency in our cities and between strategically important industrial locations (such as Nissan and the Port of Tyne)
- 5G-Enabled event production and 360º live broadcasting to keep our flourishing creative sector at the forefront of innovations, and as an attractor of tourism and inward investment
- Advanced wireless sensor technology on farms to drive automation, increase efficiency, and improve environmental sustainability of farming by empowering farmers to make informed decisions and optimise output using real data collected from a network of on-farm crop, soil, livestock and environmental sensors

Main objectives and outcomes

- Improving efficiency/competitiveness through transport and logistics
- Developing leading-edge creative industries in the North East region
- Improving competitiveness and reducing emissions in the agriculture sector

Pre-existing capabilities

The North East is already a nationally recognised hot spot for digital growth, a strategic node in international connectivity, bridging the region and the UK to Europe and USA.

In addition to a nationally significant automotive sector, the region is building an offshore wind, automotive and energy cluster with ground-breaking renewable energy projects underway and a Gigafactory being built at the International Advanced Manufacturing Park.

The region hosts four renowned universities and works with national accelerators such as Connected Places Catapult, Satellite Applications Catapult, Digital Catapult, Marine Innovation Hub, Offshore Renewables Catapult and National Centre for Rural Enterprise. We are home to Nissan and three ports including Port of Tyne, one of UK's most innovative and efficient deep-sea ports handling cargoes across five continents.

Expected sustainability post-intervention

This project is being led by LA7 – the authorities coming together to form a North East Mayoral Combined Authority (NEMCA). It is part of the development of the Digital Strategy for the region and will ultimately come under the Devolution Deal. This relationship with NEMCA will ensure the firm foundations for the future in significant local economic sectors.

West Midlands

Total budget	Areas of intervention	Relevant sector(s)
£3.8 million	West Midlands	— Advanced Manufacturing — Smart Communities (Social Care, Social Housing & related local public services)

Key activities

The region will accelerate the deployment of live 5G solutions in Jaguar Land Rover Group (JLR)'s Solihull plant and the councils social housing. Activities in adoption hubs will centre on iterating the business case and design to deliver a compelling ROI, launching a device ecosystem acceleration project and pioneering IT upskilling to reduce deployment costs/complexity.

The region will also launch adoption programmes to raise awareness of benefits (with 'hubs' acting as live demonstrators) to organisations and deliver tailored support to accelerate adoption and investment.

Programmes will be structured to cover awareness, problem analysis, design, sourcing, deployment, and operations.

Main objectives and outcomes

- Cost savings
- Productivity improvements
- Quality improvements
- Compelling ROI
- Reduced deployment costs and complexity
- Improved awareness of benefits of adoption of 5G to organisations
- Accelerated adoption of technology by other organisations

Pre-existing capabilities

- For innovation ecosystems, 5GIR will draw extensively on the West Midlands tech ecosystem convened by TechWM.
- For manufacturing 5GIR will also draw upon the innovation ecosystem established by the High Value Manufacturing Catapult.
- For smart communities, 5GIR will also work with the West Midlands Health Technology Cluster and the Levelling Up Innovation Accelerator. Finally, we will also collaborate extensively with UK Telecoms Lab, which is based in Solihull, to leverage its cyber security ecosystem.
- For manufacturing, 5GIR will build upon the Made Smarter adoption programme – which provides a basic foundation for digital adoption, the West Midlands advanced manufacturing Levelling Up zone and JLR's investment in its transformation programme.

Expected sustainability post-intervention

The adoption hubs will be self-sustainable by design as part of existing facilities and deployment programmes. Jaguar Land Rover Group (JLR) are committed to fund rollout to the rest of their sites, which includes plants outside of the West Midlands. All four sponsors are committed to continue to accelerate and roll out the technology across the region for the benefit of the wider ecosystem given their leadership roles.

5GIR will continue to be led by WM5G, and the hubs operated by the sponsors. 5GIR will collaborate further with other partners to extend 5GIR nationally, and will work closely with DSIT and UKTIN to provide further comms, coordinate support with other 5GIRs and encourage foreign direct investment.

Products and services will be sustainable, ensuring that they deliver critical business benefits that are affordable and feasible to implement.

West Sussex

Total budget	Areas of intervention	Relevant sector(s)
£3.8 million	West and East counties of Sussex	Agritech and food production (rural industries)

Key activities

Key funded activities will be:

- installation of advanced wireless technology at college and commercial sites;
- use case creation incentivising the adoption of AI and other foundational technologies;
- assimilation within curriculums and delivery to students in 24/25 academic year;
- showcasing, networking and adoption events for businesses; marketing to stimulate demand and take-up;
- hosting of test beds for private sector trials and innovation;
- establishing Framework to support further adoption by growers.

Main objectives and outcomes

- Co-develop foundational technology use cases with telecoms and technology partners, education centres and commercial producers to develop future farming and growing practices that increase sustainable productivity;
- Provide a qualified, digitally skilled workforce;
- Develop sector-supporting products and services;
- Foster a 5G ecosystem through innovation and data sharing in Education with suppliers and adopters;
- Create demand for scalable expansion of 5G/wireless infrastructure and develop a commercial model enabling more investment in wireless technologies.

Pre-existing capabilities

West Sussex County Council (WSCC) is experienced in delivering pilot projects and sharing learning directly with other authorities, Local Economic Partnerships (LEP) and business communities through dissemination events, frameworks, toolkits, and technical support to fast followers.

Expected sustainability post-intervention

WSCC is committed to supporting the project over a 5-year period. WSCC Digital Infrastructure Team will provide support by:

- Use existing resources to support ongoing project delivery through match funding
- Access external funding sources such as Coast to Capital, community grants and working with academic partners
- Provide non-financial resources such as time, skills or facilities
- Explore commercial models to secure revenue from investments to offset costs

WSCC will utilise the global list of ecosystem partners VMO2 has connections with, to seek out innovation partners to utilise the 5G network alongside the space at the colleges and growers with an aim to commercialise the networks.

Table 9: Summary of baseline results and target objectives from the Benefit Realisation templates of the 5GIR Programme as reported in Q1 (1 out of 2) [54]

Benefit ID	Benefit name	Belfast		Cumberland		Glasgow		Manchester		North Ayrshire	
		Baseline	Target	Baseline	Target	Baseline	Target	Baseline	Target	Baseline	Target
5GIR 1	Alternative funding generated by the project	0	£2.5m	-	-	TBC	TBC	TBC	TBC	0	-
5GIR 2	Firms from key sectors in the region who engage with the project	0	150	-	-	8 LAs, HSCP, 3 Private companies	8 LAs, HSCP, 6 Private companies	9	9	0	-
5GIR 3a	Number of use cases deployed per region	0	2 per region	-	2 per region	4 workstreams	4 per region	1	1	0	-
5GIR 3b	Number, type and impact of individual use cases and impact	-	-	-	-	4 workstreams	4 per region	-	-	0	-
5GIR 4	Number of new private networks deployed	0	4 networks	-	-	1	1 per region	-	-	0	-
5GIR 5	Number of new jobs per use case deployed from each project	0	TBC	-	-	1	4	-	-	0	-
5GIR 6	Number of dissemination events (e.g. workshops, presenting at conferences)	0	12 events	-	-	2 events	5 events	4 events	n/a	0	-
5GIR 7	Number of networks continuing operation at the end of the programme (To only be reported on in last BR collection)	0	90% of networks	-	90% of networks	TBC at end of project	90% of networks	TBA	90% of networks	0	-

[54]Data presented in this table comes from the Benefit Realisation Template reported to DSIT in Q1. Cells containing a dash indicates that further information will be provided in Q2 (~ July 2024).

Summary of baseline results and target objectives from the Benefit Realisation templates of the 5GIR Programme as reported in Q1 (2 out of 2) [55]

Benefit ID	Benefit name	Oxford		Shropshire		Sunderland		West Midlands		West Sussex	
		Baseline	Target	Baseline	Target	Baseline	Target	Baseline	Target	Baseline	Target
5GIR 1	Alternative funding generated by the project	0	TBD	0	0	0	£50000 (a guess at this stage)	-	-	0	-
5GIR 2	Firms from key sectors in the region who engage with the project	0	10% of potential organisations	0	132	0	10	-	-	0	20
5GIR 3a	Number of use cases deployed per region	0	Min of 2	2	11	0	4 per region	-	-	0	Trial of 7 Use Cases across 4 Growing Partners
5GIR 3b	Number, type and impact of individual use cases and impact	0	Min of 2	2	11	Existing situation & context	-	-	-	Drones = 2 IoT Sensors = 4 AI = 2	3 per region
5GIR 4	Number of new private networks deployed	TBD	TBD	2	5	0	1	-	-	0	Increasing the provision of fibre and mobile connectivity to 50 businesses and 800 residents
5GIR 5	Number of new jobs per use case deployed from each project	-	-	0	TBC	0	4	-	-	Supplier will measure the level of connectivity before the deployment of the network	7
5GIR 6	Number of dissemination events (e.g. workshops, presenting at conferences)	0	TBD	0	23	0	3	-	-	-	-
5GIR 7	Number of networks continuing operation at the end of the programme (To only be reported on in last BR collection)	0%	100%	0	90% of networks	0	100% of networks	-	-	5	8

[55] Ibid.

6.4.2 SIPP intervention areas

Cambridgeshire

Principal partners	Total budget
— Cambridgeshire County Council (CCC) — Cambridgeshire & Peterborough Combined Authority (CPCA) — Greater Cambridge Partnership (GCP) — Ontix — Kerb	— Matching funding: £260k — DSIT funding: £220k

Key activities

- The project covers the supply and the installation of 7 poles with a fibre connection point within 20m and a power supply point within 5m. Additionally, the project will cover the installation and 1-year maintenance costs of the equipment to be installed on the poles, including:
  - 7 Small cells, designed and produced by Ontix;
  - 4 EV charging sockets, developed and manufactured by Kerb;
  - 1 CCTV camera, funded by CCC;
  - 4 Traffic sensors, Gigabit capable Wireless Backhaul funded in partnership by CCC, CPA and GCP.
- The CCC/CPCA/GCP partnership will also cover the 1-year cost of the small cells, the management and staffing costs and the cost of designing 5 of the 7 PAS 191 poles.

Main objectives

- Reduced cost and time to deploy smart poles as standard specifications for use cases are developed.
- Increased LA knowledge through the dissemination of information for areas with similar overarching connectivity and smart city ambitions.
- Increased engagement with businesses that provide smart and connectivity products.
- Increased confidence in PAS191 as use cases are successfully completed and lessons are learned.
- Improved understanding of coverage and capacity demand by engaging with the market to identify locations best served by a smart pole.
- Improved digital connectivity: The deployment of advanced connectivity will provide immediate benefits to residents and businesses in areas with known capacity issues.

Pre-existing capabilities

- CCC is responsible for approximately 53k street lighting access across the regions and has already engage with neutral host providers and drafted an agreement for the commercial use of smart cells.
- In the region, Connecting Cambridgeshire (ConCamb), the Digital Infrastructure Acceleration Programme hosted by CCC and lead by CPCA, delivers the region's Digital Connectivity Strategy as well as other smart projects on behalf of GCP and has significant experience with the production and deployment of smart technologies (such as CCTV and EV charging) in the region.
- Ontix can deploy and maintain wireless networks on street furniture, having successfully deployed several hundred small cells and Wi-Fi access points on lampposts in towns and cities across the UK.

Kingston

Principal partners	Total budget
— The Royal Borough of Kingston (RBK) — Boldyn Networks' — Volker Highways	— Matching funding: £1.06m — DSIT funding: £246k

Key activities

- The project consists in the installation of 20 PAS 19 standard poles and technical equipment in selected target locations across the RBK, including:
  - the construction of a full fibre network and connection to the poles;
  - the installation, testing and validation of smart cells to be installed onto the poles; and
  - the installation and testing of IoT sensors and camera to monitor road usage, footfall, air quality and CCTVs.

Main objectives

- Improving mobile and fixed connectivity in the areas of intervention.
- Developing the supply chain and building a partner network for the future roll-out of additional PAS 191 standard poles.
- Reducing the deployment time and costs of the PAS 191 poles.
- Sharing lessons learned and use case specific information with relevant stakeholders to facilitate future deployment of smart infrastructure and promote best practices.

Pre-existing capabilities

- RBK has experience in the deployment of smart infrastructure. It has been awarded a wireless concession to Cellnex to deliver small cell and public Wi-Fi across the borough. Additionally, RBK was recently involved as one of the leading boroughs in a £4million Internet of Things (IoT) programme, the "InnOvaTe Project", which implemented 47 IoT use cases across the 5 boroughs of the South London Partnership. Finally, RBK is also currently upgrading and redesigning the existing CCTV network with help from specialist consultants Cognetix and is undertaking EV charging initiatives and is working with charge point operators to increase the availability of public charge points in the borough.
- Boldyn Networks has also existing relationships with potential manufacturers for the production of the smart multi-purpose columns in line with the PAS 191 specifications and with the MNOs which can leverage to facilitate the deployment of Small cells.

Oxford

Principal partners	Total budget
— Oxfordshire County Council (OCC) — Zeta Specialist Lighting (Zeta) — Virgin Media/O2 (VMO2)	— DSIT funding: £250k — Matching funding: £249,079

Key activities

- The project costs will cover:
  - the procurement, installation and deployment of 10 PAS 19 standard poles;
  - 10 CCTV cameras;
  - 10 EV charging units; and
  - 5 LoRA CMS comms units.
- The budget will also cover to staffing and management costs and a small funding to cover intellectual property searches and advice.

Main objectives

- Improved connectivity: Anticipating at least a 25% increase in the average network speed and significant improvements in network coverage in identified areas.
- Energy efficiency: Smart poles will feature solar power, promoting sustainable energy use.
- Enhanced safety: CCTV cameras will improve community safety, aiming for a measurable improvement in community safety indexes.
- IoT integration: Facilitating data collection for various community benefits.
- Improved knowledge of the benefits of use cases: Dissemination of findings and lessons learned among stakeholders, including the DSIT, project partners, and other LAs.

Pre-existing capabilities

- OCC has experience planning, deploying and monitoring smart infrastructure projects like Freshwave 4G/5G small cell deployment, Street Lighting Column & LED Replacement Scheme, Deployment of +150 Viva City IoT sensors.
- Zeta and VMO2 have extensive experience in infrastructure deployment and digital services, particularly in Oxfordshire. In particular, VMO2 has an extensive range of licensed spectrum, which will be utilised optimally for the deployment of 5G and other wireless connectivity services on the smart poles.

North Ayrshire

Principal partners	Total budget
— North Ayrshire Council — BT	— DSIT funding: £242,765 — Matching funding: £350,000

Key activities

— The project consists of the installation of 5 PAS191 poles and additional technology along Great Harbour area in North Ayrshire, including the installation of a LoRaWAN solutions on the columns with 3 IoT sensors.

— BT has partnered with NAC and agreed to cover costs for the fibre deployment (1 Gbit/s Backhaul) and installation of 5G small cells on the poles.

Main objectives

— Enhanced connectivity: Improved access to high-speed internet and reliable communication networks for residents, businesses, and visitors.

— Improved quality of life: Increased access to smart city applications, improved efficiency in services like street lighting and waste management, and enhanced convenience and accessibility for the community.

— Contribution to the local economy: Job creation, increased economic activity, and cost savings achieved through efficient resource management.

— Positive social impact: Measured through indicators like community engagement, citizen satisfaction, and improved public services.

— Improved knowledge of the benefits of use cases: Dissemination of findings and lessons learned among stakeholders, including the DSIT, project partners, and other LAs.

Pre-existing capabilities

— The installation of the PAS 191 poles is part of an existing large infrastructure improvement programme, whose first phase consist of creating a Costal Hub for a total initial investment of £4m.

— The NAC is investing in Connectivity Assessment and SMART Connected Place Strategy in order to encourage IoT and 5G adoption.

Tees Valley

Principal partners	Total budget
— Tees Valley Combined Authority (TCVA) — Dense Air — Latos Data Centre Ltd	— DSIT funding: £202,500 — Matching funding: £391,982

Key activities

- TCVA proposed project consists of the installation and testing of 9 PAS 191 poles. Of these:
  - 2 PAS 191 poles will be installed at the Teesside International Airport (TIA), taking advantage of the existing Dense Air 5G network and testing connectivity of the PAS 191 poles to Dense Air's 5G cells. One poles will provide smart lighting, CCTV and a smart screen for use of passengers and visitors to the airport; and
  - 7 PAS 191 poles will be installed from the route from Hartlepool Railway Station to Hartlepool Marina, replacing 7 existing standard lampposts. These poles include the following equipment:
    - Smart information screens displaying a range of up-to-date information, primarily aimed at those walking between the station and Marina;
    - CCTV;
    - Traffic counters monitoring motor traffic, cyclists and pedestrians, linking to the existing UTMC system;
    - Smart lighting - providing an efficiency saving to Hartlepool Council; and
    - Environmental monitors – monitoring PM2,5,PM10, noise pollution, temperature, humidity and vibration.

Main objectives

- Energy savings – potential for TIA and Hartlepool Council to reduce power consumption based upon evidence showing that motion-sensor smart street lighting can deliver up to 80% energy savings.
- Improved monitoring of environmental benefits, through environmental monitors installed in the poles
- Reduction in anti-social behaviour through CCTV which has proved to have a transformative effect.
- Satisfaction of users who utilise the services of the columns such as smart screen and charging.
- Reduced deployment time/costs of the PAS 191 columns
- Raise awareness of smart infrastructure and the benefits to businesses, residents and visitors.

Pre-existing capabilities

- TVCA has experience in the deployment and maintenance of wireless infrastructure, has highlighted by:
- The partnership with Dense Air at Teesside International Airport (TIA) to install 5G small cells onto a mixture of existing and new lampposts, providing a neutral host, end-to-end secure, highly reliable and low latency 5G Network;
- TVCA has managed over £3m of procurement and installation of digital assets for the Urban Traffic Management Control (UTMC), including Traffic Signal Connectivity, CCTV cameras, Automatic Number Plate Recognition cameras, Variable Message Signs, Control Room monitors and Traffic Counters with speed and accident near miss technology.
- Latos Data Centre Ltd has already in the process of installing a neutral host fibre ring around the Tees Valley.

Westminster

Principal partners	Total budget
— Westminster City Council (WCC) — FM Conway — Ontix — Breathe London — NSL — Siemens	— DSIT funding: £202,500 — Matching funding: £391,982

Key activities

- The project includes the development and installation of 15 multi-purpose columns, as defined by the PAS 191 specification, including the installation and testing of:
  - 3 CCTV Enforcement provided by NSL
  - 15 Typical Lamp Column cost and 15 Enhanced Foundation provided by FM Conway
  - 15 Small Cells, 4 Fibre Backhaul and 15 Signify Luminaire provided by Ontix
  - 10 Air Quality Monitors provided by Breathe London (based on costs for 2 years)
  - 15 EV Chargers provided by Siemens

Main objectives

- A 20% increase in mobile phone capacity in areas surrounding the PAS 191 column, as measured by the average download speed based on speed tests conducted by the waste truck capacity monitoring project.
- Increased fixed wireless access points capable of receiving gigabit-capable broadband.
- Reduction in the deployment time and costs of a small cell on a PAS 191 column.
- Capturing and sharing the benefits of smart use cases.

Pre-existing capabilities

- WCC has experience in procuring and installing smart infrastructure within the city and has a concession agreement with Ontix, who have exclusive rights to deploy wireless infrastructure on lamp columns in Westminster. Ontix and WCC partnership has helped create the conditions for investment in small cells, Wi-Fi and fixed wireless access within Westminster. For example, as a result of the concession Ontix has in the area, 157 small cells, 98 Wi-Fi 6 access points, 2 Fixed Wireless Access nodes to address an urban not-spot in Soho have been installed.

Table 10: Summary of baseline results and target objectives from the Benefit Realisation templates of the SIPP Programme as reported in Q1[56,57]

Benefit ID	Benefit Name	Cambridge		North Ayrshire		Oxford		Tess Valley		Westminster	
		Baseline	Target	Baseline	Target	Baseline	Target	Baseline	Target	Baseline	Target
1a	Large smart multi-purpose columns installed	0	5	No existing infrastructure of this type	6	0	15	0	2	0	15
1b	Small smart multi-purpose columns installed	0	4	-	-	0	0	0	7	0	0
2a	Small cells deployed	0	7	Baseline 5G network performance to be gathered	1	0	1	0	6	0	15
2b	Mobile capacity increase	TBD - Improvement in mobile signal in vicinity of deployment (based on 2022 data)	TBD - Improvement in mobile signal in vicinity of deployment (Expected May 24)	No Wi-Fi at Present	6 access points	-	-	- Number of small cells deployed and linked to COMPORAN private 5G network: 0	- Number of small cells deployed and linked to COMPORAN private 5G network: 2	- Average download speed in areas surrounding the PAS 191 column: Not identified	- 20% increase in the average download speed in areas surrounding the PAS 191 column

[56] Data presented in this table comes from the Benefit Realisation Template reported to DSIT in Q1. Cells containing a dash indicates that further information will be provided in Q2 (~ July 2024).
[57] The Royal Borough of Kingston has yet to report the Benefit Realisation Templated to DSIT at the time in which this report is written, therefore it has been excluded from this table.

3	Use cases tested	- Sensor equipment: 0 -CCTV: 0 -EV Charging: 0	- Sensor equipment: 4 -CCTV: 2 -EV Charging: 3	- CCTV: 0 - Gigabit Backhaul: 0 - Lighting: Limited lighting - IoT Sensors: 0	- CCTV:0 - Gigabit Backhaul: 1 - Lighting: 6 - IoT Sensors: 2	0	9	- Audio Speaker: 0 - Environmental Monitors: 0 - Traffic Sensors: 0 - Electronic Display Screens: 0 - CCTV: 0	- Audio Speaker: 9 - Environmental Monitors: 3 - Traffic Sensors: 4 - Electronic Display Screens: 7 - CCTV: 2	0	4
4	Dissemination events	0	5	-	-	0	3	0	-	0	4
5	Industry applications	0	2	-	-	-	-	0	-	0	1

7 Appendix 2: Indicators

Table 11: Output indicators – 5GIR

Activities		Outputs	Output metrics	Source	Expected timing of data collection and realisation of the outputs
Type	Description				
Development and implementation of a strategy/plan to deliver 'stackable use cases' in intervention area	- Intervention areas work with partners to put in place strategies, structures and arrangements to support collaboration and to drive adoption of advanced wireless technologies	- Advanced wireless technology strategy for region	- Publication of advance wireless technology strategy for the region	- Focus groups with 5GIR areas	- Information collected towards the end of the programme (~ April/May 2025) - Output to be realised during the life of programme
	- Intervention LAs provide a focal point of contact for local stakeholders wanting to understand the opportunities and benefits of 5G adoption	- Established point of contact for local stakeholders wanting to understand the opportunities and benefits of adv wireless tech adoption	- Number of firms from key sectors in the region which engage in with the project. - Number of collaboration events attended - Established point of contact	-Benefit Template: Benefit Tracker section - Benefit Template: Knowledge Dissemination section - Focus groups/interviews with use cases providers and DSIT officials	- Information collected each quarter through Benefit Template, and towards the end of the programme through focus groups/interviews (~ April/May 2025) - Output to be realised during the life of programme
	- Intervention LAs work with local partners to identify strategic sectoral projects and use cases, based on specific regional characteristics, local needs and existing strengths	- List of potential use cases to deliver	- Total use cases deployed per region	- Benefit Template: Benefits Tracker section	- Information collected each quarter through Benefit Template - Output to be realised during the life of programme

	- In some cases, intervention LAs will provide educational and upskilling opportunities for local businesses - e.g. staff will be trained to operate the use case equipment technology	- Staff trained	- Number of staff trained/training spend - Number of new Master/PHD graduates in the specialised fields	- Benefit Template: Knowledge Dissemination section - Benefit Template: Knowledge Dissemination section	- Information collected each quarter through Benefit Template - Output to be realised during the life of programme
	- Intervention LAs facilitate procurement of suppliers to deliver selected use cases	- Procurement process for establishing use cases	- Established procurement process	- Focus groups/interviews with 5GIR areas and DISIT officials	- Information collected towards the end of the programme (~ April/May 2025) - Output to be realised during the life of programme
Delivery of use cases across a range of different sectors	Delivery of a number of use cases in the following sectors: - Creative Industries - Transport & Logistics - Advanced Manufacturing - Rural enterprise and tourism - Social Housing - Health and Social Care - Energy - Aerospace and Space - Life Sciences - Food & Drink - Engineering - Public Sector - Rural Industries (Agri Tech + Food Manufacturing) - Water	- Use cases are delivered - Use cases specific outputs (e.g. cell networks; advanced wireless enabled buoys; 5G enabled heat pumps; sensors in ports; CCTVs etc.) - Replicable use cases/ services/ technology - Private network deployments (in some instances)	- Total use cases deployed per region - Private network deployments	- Benefit Template: Benefits Tracker section - Survey of MNOs and network providers (questions possibly incorporated into Benefits Tracker)	- Information collected each quarter through Benefit Template, and towards the end of the programme through focus groups/interviews (~ April/May 2025) - Output to be realised during the life of programme
Monitoring and evaluation of use cases	- Detailed monitoring of data/results from the delivery of use cases	- Information on the deployment of 5G/advanced wireless technology use cases - Evidence of impact of use cases documented for future use	- Number of individual use cases information - Data collection process	- Benefit Template: Benefit Tracker section - Focus groups with 5GIR areas	- Information collected each quarter through Benefit Template, and towards the end of the programme through focus groups/interviews (~ April/May 2025) -Output to be realised during the life of programme

Knowledge sharing / lessons learned for organisations within intervention area	- Delivery of workshops, publication of documents etc. by the intervention LAs detailing key lessons learned from the delivery of use cases.	-Workshops/ Communication campaigns/Dissemination events etc. - Public documents detailing benefits of use cases- Standards/ best practices developed	- Number of dissemination events (e.g. workshops, presenting at conferences, with detail on the number of each type of event and who attended/engaged in the events) - Standard developed - Publications and dissemination events organised	- Benefit Template: Knowledge Dissemination section - Survey/focus groups with MNOs and other network providers (questions possibly incorporated into Benefits Tracker)	- Information collected each quarter through Benefit Template, and towards the end of the programme through surveys (~ April/May 2025) - Output to be realised during the life of programme
Knowledge sharing / lessons learned for organisations outside intervention area	- Knowledge shared outside the intervention area through UKTIN and other communication/dissemination activities	- Evidence uploaded to UKTIN website - Workshops/ Communication campaigns/Dissemination events - Public documents detailing benefits of use cases - Standards/ best practices developed	- Number of disseminations events (e.g. workshops, conferences, documents) and publications by UKTIN	- Interviews with the UKTIN Comms team/DIST officials	- Information collected towards the end of the programme (~ April/May 2025) - Output to be realised during the life of programme
Knowledge sharing / lessons learned for the delivery of the programme for DSIT	DSIT will review lessons learned through the course of, and at the end of, the 5GIR programme and assess the efficiency of the delivery of the programme	- Public documents (evaluation)	- Documentation of lessons learned each quarter	- Benefit Template: Lessons (quarterly) section	- Information collected each quarter through Benefit Template, and towards the end of the programme through focus groups/interviews (~ April/May 2025) - Output to be realised during the life of programme

Ecosystem development within intervention area	- Establishment of a 'structure' (e.g. stakeholder engagement programme/ framework/ working groups/ market engagement activities/ set-up of a task force / grant scheme) to develop an advanced wireless technology ecosystem within the intervention area and take forward current and future opportunities in the advanced wireless space	- Frameworks to support future adoption of advanced wireless networks and opportunities for sustainability	- Established working groups/task force/ grant schemes/ market activity engagement to develop wireless technology ecosystem in advance wireless technology	- Focus groups with 5GIR areas	- Information collected towards the end of the programme (~ April/May 2025) - Output to be realised during the life of programme
	- Promote the generation of privately funded projects within the community, for example, by hosting meetups, Workshops and helping to link demand with the relevant sector	- Workshops and various engagement activities - Pipeline for future investment	- Number of engagement activities held with the private sector stakeholders - Number of attendees	- Benefit Template: Knowledge Dissemination section	- Information collected each quarter through Benefit Template - Output to be realised during the life of programme

Table 12: Outcome indicators – 5GIR

Outcomes	Outcome metrics	Source	Expected timing of data collection and realisation of the outcomes
- Increased confidence among MNOs and other providers in the intervention LAs around the LAs commitment to advanced wireless technology certainty and its adoption in the intervention area	- Additional private funding generated by the project in advance wireless technology	- Benefit Template: Investment Stimulation section	- Information collected towards the end of the programme (~ April/May 2025) - Outcome to be realised during the life of the programme
- Improved understanding among local stakeholders in the intervention LAs of opportunities and benefits of advanced wireless technology adoption	- Data and evidence collected illustrating the benefit of use cases - Improved understanding of opportunities and benefits	- Benefit Template: Benefit Tracker section - Survey of use cases providers	- Information collected each quarter through Benefit Template, and towards the end of the programme through focus groups/interviews (~ April/May 2025) - Outcome to be realised during the life of the programme
- Set of stackable use cases to illustrate value of advanced wireless tech adoption	- Total use cases deployed per region	- Benefit Template: Benefits Tracker section	- Information collected each quarter through Benefit Template, and towards the end of the programme through focus groups/interviews (~ April/May 2025)

			- Outcome to be realised during the life of the programme
- Increased capability among organisations in the intervention LAs to use of advance wireless technology in intervention area - Improved connectivity	- Staff trained - Increased connectivity	- Benefit Template: Benefits Tracker section; Ofcom Connected Nations dataset - Benefit Template: Knowledge Dissemination section	- Information collected each quarter through Benefit Template; Ofcom data collected each September and released in December/January - Outcome to be realised during the life of the programme
- Short-terms employment - resources deployed for each project - GVA - as a result of additional spending to deliver projects - Use cases specific outcomes (e.g. productivity gains, welfare improvements, environmental benefits)	- Additional employment per use case deployed from each project - Spend associated with each use cases to deliver the project (including any alternative funding generated by the project). - Individual use cases impact	- Benefit Template: Benefits Tracker section - Benefit Template: Benefits Tracker section and applications/survey to use case and the providers	- Information collected each quarter through Benefit Template -Outcome to be realised during the life of the programme
- Stronger business cases for future investment in advanced wireless technology - Improved delivery of future use cases	- Individual use cases information	-Benefit Template: Benefit Tracker section/survey of use cases providers	- Information collected each quarter through Benefit Template, and towards the end of the programme through focus groups/interviews (~ April/May 2025) - Outcome to be realised during the life of the programme
- Increased awareness by organisations of benefits of adoption of 5G to organisations - Improved understanding of challenges and opportunities for further programmes across the region and sector - Stronger business cases for investment as a result of 'successful' delivery of use cases - Reduction in market barriers to entry/adopt 5G/advanced wireless technologies as a result of the improved awareness of opportunities/challenges - Increased commercial investment by MNOs and other operators in set-up/deployment of	- Survey of MNOs, other network providers, and use cases providers - Alternative funding generated by the project - Number of networks continuing operation at the end of the programme (to be reported at the Last Benefit Template collection)	- Survey of use cases providers - Benefit Template: Investment stimulation section - Benefit Template: Benefit Tracker section	- Information collected each quarter through Benefit Template, and towards the end of the programme through focus groups/interviews (~ April/May 2025) - Outcome to be part-realised during the life of the programme

networks/technology as a result of the successful delivery of use cases and increased interest/demand by organisations in adoption of advanced wireless technology - Increased market demand (and subsequent commercial investment) by organisations/businesses for adoption of 5G/advanced wireless technology as a result of 'successful' delivery of use cases within and outside intervention area			
- Outcomes identified for the intervention LAs realised more widely, among non-intervention areas	- Adoption of use cases in LAs outside of the intervention areas - Additional commercial investment in LAs outside of the intervention areas	- Interviews with UKTIN Comms team/DSIT officials - Primary research/subject matter experts/industry press	- Information towards the end of the programme (~ April/May 2025) - Outcome to be part-realised during the life of the programme
- Improved understanding of advantages/disadvantages of delivering programmes in the way 5GIR was delivered - Improved outcomes for LAs in delivery of programme - Improved efficiency in delivery of DSIT programmes	- Decentralised delivery is more effective and efficient to deliver DSIT programmes by LAs and DSIT officials	- Interview with 5GIR areas and DSIT officials	- Information collected at the end of the programme - Outcome to be realised during the life of the programme
- Continuation of services/ connectivity/ networks after funding ends - Further collaboration between organisations and stakeholders that were brought together thanks to the delivery of the use cases - Lasting commercial relationships developed - Industry innovation as a result of collaboration/knowledge sharing between organisations/stakeholders - Commercial investment in advanced wireless technologies	- Number of spin-offs generated - Number of patent application granted - Number of networks continuing operation at the end of the programme. (To only be reported on in Last Benefit Template collection) - Additional commercial investment	- Benefit Template: Knowledge Dissemination section - Benefit Template Benefit: Tracker section - Benefit Template: Investment Stimulation section	- Information collected each quarter through Benefit Template - Outcome to be part-realised during the life of the programme

Table 13: Impacts indicators – 5GIR

Impacts	Impact metrics	source	Expected timing of data collection and realisation of the indicators
- Foster 5G ecosystem, including increased collaboration among partners and adoption of advanced wireless technology - Economic growth - Accelerate 5G commercial investment	- Additional GVA generated in the 5GIR related sectors - Additional inward investment in the regions in related sectors	- ONS Subregional productivity: labour productivity indices by UK ITL2 and ITL3 subregions[58]	- ONS Subregional productivity: labour productivity indices by UK ITL2 and ITL3 subregions dataset is released annually, as described in Table 17 - Expected initial impact realised after the end of the programme
- Wider societal benefits	- Use case specific impacts (e.g. welfare impacts, environmental externalities etc.)	- ONS Subnational indicators dataset[59]	- Relevant variables of this ONS dataset are released as described in Table 17 - Expected initial impact realised after the end of the programme
- More efficient delivery of HMG programmes	- Improved delivery of HMG programmes	- Focus groups/interviews with DSIT officials and 5 GIR areas	- Information collected towards the end of the programme (April/May 2025) - Expected initial impact realised by the end of programme

Table 14: Output indicators – SIPP

Activities		Outputs	Output indicators	Source	Expected timing of data collection and realisation of the outputs
Type	Description				
Procurement of PAS 191 consistent multi-purpose poles	Intervention LAs use DSIT funding to procure of PAS 191 consistent multi-purpose poles	PAS 191 consistent multi-purpose poles procured	- Number of PAS 191 multi-purpose poles procured	- Benefit Template: Milestones and Deliverables section	- Information collected each quarter through Benefit Template - Output to be realised during the life of programme (~ up to April/May 2025)

[58] ONS (2023), Subregional productivity: labour productivity indices by UK ITL2 and ITL3 subregions (Subregional productivity: labour productivity indices by UK ITL2 and ITL3 subregions - Office for National Statistics).
[59] ONS (2023), Subnational indicator dataset (Subnational indicators dataset - Office for National Statistics (ons.gov.uk)).

Design and fabrication of PAS 191 multi-purpose poles	LAs work with manufacturers on the design and fabrication of the PAS 191 standard consistent poles	PAS 191 consistent multi-purpose poles designs agreed and fabricated between LAs and manufacturers	- Number of PAS 191 multi-purpose poles designed and fabricated	- Benefit Template: Milestones and Deliverables section	- Information collected each quarter through Benefit Template - Output to be realised during the life of programme (~ up to April/May 2025)
Installation of PAS 191 consistent multi-purpose poles	Poles installed across intervention LAs depending on requirements	PAS 191 consistent multi-purpose poles installed	- Number of large and small smart multi-purpose columns installed	- Benefit Template: Benefit Tracker section	- Information collected each quarter through Benefit Template - Output to be realised during the life of programme (~ by Summer 2025)
Installation of technology on the poles	Various partners take advantage of the installation of the poles to install other technology (Smart Cells, CCTV, EV charging, IoT sensors, etc...)	Use cases are delivered	- Number of small cells deployed	- Benefit Template: Benefit Tracker section	- Information collected each quarter through Benefit Template - Output to be realised during the life of programme (~ by Summer 2025)
		Use cases specific outputs (e.g., Smart Cells, EV charging, CCTV, IoT sensors, Solar cells...)	- Number of use case tested (CCTV, etc.)	- Benefit Template: Benefit Tracker section	- Information collected each quarter through Benefit Template - Output to be realised during the life of programme (~ by Summer 2025)
LAs and private sector collaboration	LAs and partners (together with wider supply chain) work together to understand requirements for procuring and installing poles (and wider technology)	Poles procured and deployed in agreed optimal locations, in agreement with partners and in minimal time - together with technology to go on poles	- Effective collaboration throughout the project lifetime	- Interviews with UKTIN comms team/DSIT officials	- Information collected towards the end of the programme (~ April/May 2025) - Output to be realised during the life of programme
Development of knowledge around procurement of poles, working with partners and installation of wider technology	Collection of benefits of use cases and sharing lessons learned with those involved in the projects.	Documentation produced on procurement of poles and installation of technology (use cases).	- Number of dissemination events (e.g. workshops, presenting at conferences) - Number or reports published on the use cases	- Benefit Template: Benefit Tracker section	- Information collected each quarter through Benefit Template, - Output to be realised during the life of programme (~ especially in the final phases of the programme from January to March 2025)
Knowledge shared outside intervention LAs	UKTIN and DSIT communications officials spread learning across other LAs	-Dissemination events with other LAs and operators - DSIT guidance note on procurement and installation of PAS 191 poles produced for all LAs to use	- Number of dissemination events (e.g. workshops, presenting at conferences) by DSIT/UKTIN - Number of report/document published on the poles and use cases	- Interviews with UKTIN comms team/DSIT officials	- Information collected towards the end of the programme (April/May 2025) - Output to be realised during the life of programme (~ especially in the final months of the programme from January to March 2025)

Table 15: Outcome indicators – SIPP

Outcomes	Outcome indicators	Source	Expected timing of data collection and realisation of the outcomes
PAS 191 standard accepted by all parties as the standard for multi-purpose poles - reducing uncertainty for both manufacturers; LAs and industry	- Standard developed	- Benefit Template: Impact Tracker section	- Information collected each quarter through Benefit Template - Outcome to be realised during the life of the programme (~ Spring 2025)
Poles installed providing for installation of other technology	- Additional investment stimulated by the project - Number of industry application to use smart multi-purpose columns	- Benefit Template: Investment stimulation section - Benefit Template: Impact Tracker section	- Information collected each quarter through Benefit Template - Outcome to be realised during the life of the programme (~ Spring 2025)
Improved mobile and 5G connectivity in area	- Mobile capacity increased - Fixed Wireless Access improvement	- Benefit Template: Benefit Tracker section; Ofcom connect nations dataset	- Information collected each quarter through Benefit Template; Ofcom Connected Nations data collected each September and released in December/January - Outcome to be part-realised during the life of the programme;
Short term employment – resources deployed for each project	- Additional employment involved in the project	- Estimated based on spend/survey of network providers	- Information collected each quarter through Benefit Template - Outcome to be part-realised during the life of the programme
GVA – as a result of additional spending to deliver projects	- Additional GVA generated as a result of spending to deliver the project	- SIPP applications and Benefit Template: Costs section	- Information collected each quarter through Benefit Template - Outcome to be part-realised during the life of the programme
Use cases specific outcomes (e.g. Productivity gains; welfare improvements; environmental benefits)	- Use cases specific outcomes, as detailed in the applications	- Survey of use case providers	- Information collected towards the end of the programme (~ April/May 2025), - Outcome to be part-realised during the life of the programme (~ from Summer 2024 to March 2025)

More efficient future deployment of poles (and associated technology) through increased, shared, knowledge and information on key technology assets and installation of PAS 191 poles - so reduced time and costs for installation of PAS 191 poles in intervention LAs	- Reduction deployment time	- Benefit Template: Benefit Tracker section	- Information collected each quarter through Benefit Template - Outcome to be realised during the life of the programme (~ from Summer 2024 to March 2025)
Better evidence produced to share with other LAs around procurement and installation of poles for wider tech uses - potentially driving greater demand.	- Number of spin-offs generated - Number of patents granted	- Benefit Template: Impact Tracker section	- Information collected each quarter through Benefit Template - Outcome to be part-realised during the life of the programme
LAs (outside the intervention LAs), potential users of advanced wireless technology, and operators/suppliers of wireless tech (and its uses) are aware of the PAS 191 poles, and have more certainty around their procurement, installation and use	- Perceived impact of communications activities organised	- Benefit Template: Impact Tracker section - Interviews with UKTIN Comms team/DSIT officials	- Information collected each quarter through Benefit Template and towards the end of the programme through focus groups/interviews (~ April/May 2025) - Outcome to be part-realised during the life of the programme

Table 16: Impacts indicators – SIPP

Impacts	Impact indicators	Source	Expected timing of data collection and realisation of the indicators
More PAS 191 poles installed – providing increased connectivity and more opportunity for new technology to be used	- Increased level of connectivity in intervention areas	- Benefit Template: Benefit Tracker section; Ofcom connect nations dataset (2018-2023)[60]	- Information collected each quarter through Benefit Template; Ofcom data collected each September and released in December/January, - Expected initial impact realised during the course of the programme (~Summer 2025)

[60] Ofcom (20018-2023), Connected Nations (Connected Nations and infrastructure reports - Ofcom).

Intervention LAs provided with the infrastructure to exploit new technology	- Perceived preparedness of LAs to exploit the new technology - Perceived impact of relevant stakeholders on the benefits of PAS 191 poles and their commercial viability	– LA/ use case providers/ network providers focus groups	- Information collected towards the end of the programme (~ April/May 2025) - Expected impact realised by the end of programme
Increased economic activity in the Intervention LAs	- Additional GVA generated in the region associated to the project.	- ONS Subregional productivity: labour productivity indices by UK ITL2 and ITL3 subregions[61]	- ONS Subregional productivity: labour productivity indices by UK ITL2 and ITL3 subregions dataset is released yearly, - Expected impact to be realised after the end of the programme
Use cases specific impacts (improved air quality, improved traffic management, improved security, efficiency gains for LAs...)	- Use case specific impacts (e.g. welfare impacts, environmental externalities etc.)	- ONS Subnational indicators dataset[62]	- Relevant variables of this ONS dataset are released as described in Table 17 - Expected initial impact to be realised after the end of the programme
Potential for more PAS 191 poles to be installed in intervention LAs (as compared to other LAs)	- Perceived potential impact of installing additional PAS 191 poles and their commercial viability	- Focus groups/interviews with DSIT officials and SIPP areas	- Information collected towards the end of the programme (~ April/May 2025) - Expected impact to be realised after the end of the programme

[61] ONS (2023), Subregional productivity: labour productivity indices by UK ITL2 and ITL3 subregions (Subregional productivity: labour productivity indices by UK ITL2 and ITL3 subregions - Office for National Statistics).
[62] ONS (2023), Subnational indicator dataset (Subnational indicators dataset - Office for National Statistics (ons.gov.uk)).

Table 17: Secondary data

Metric	Indicator	Description	Unit of Measure	Period	Data frequency	Frequency of updates	Last update	Next update	Nations covered	Source
Gross value added per hour worked	Gross value added per hour worked	Measure of business productivity (estimate of the volume of goods and services produced) in £ per hour worked (experimental statistics)	Pounds Sterling	2004-2021	Annual	LAD: Biannually ITL: Quarterly	LAD: December 2023 IT: June 2023	TBA	UK	ONS
Gross value added	Gross value added per industry	Measure of gross value added by LA and industry, £millions at current prices	Pounds Sterling (million)	1998-2021	Annual	Annual	Apr-23	Mar-24	UK	ONS
Gross median weekly pay	Gross median weekly pay	Average (median) weekly pay, based on where people live	Pounds Sterling	UK: 2002 - 2023 NI: 2016 - 2023	Annual	Annual	ASHE ONS: April 2023 ASHE NISRA: November 2023	30 Nov 24 (provisional)	UK	ONS, NISRA
Employment rate aged 16 to 64 years (Great Britain)	Aged 16 to 64 years employment rate (Great Britain)	Proportion of people aged between 16 and 64 years in paid work or who had a job that they were temporarily away from	Percentage	Dec. 2004 - Sept. 2023	Quarterly	Quarterly	Annual Population Survey: 16/01/2024	Apr-24	GB (England, Wales and Scotland). Northern Ireland national figure included	ONS
Employment rate aged 16 to 64 years (Northern Ireland)	Aged 16 to 64 years employment rate (Northern Ireland)	Proportion of people aged between 16 and 64 years in paid work or who had a job that they were temporarily away from	Percentage	2009-2022	Annually	1 year	Oct-23	TBA	Northern Ireland	NISRA
Modelled unemployment rate aged 16 years and over	Aged 16 years and over modelled unemployment	Proportion of economically active people aged 16 years and over without a job who have been actively seeking work within the last four weeks and are available to start work within the next two weeks (model-based estimates)	Percentage	1997-2021	Annually	Annually	Oct-23	Oct-24	GB (England, Wales and Scotland)	ONS
Gross disposable household income, per head	Gross disposable household income per head	Estimate of the amount of money each individual within a household has available for spending or saving after they have	Pounds Sterling	2004-2022	Quarterly	Quarterly		Apr-24	UK	ONS

		paid taxes and received any direct benefits								
Inward foreign direct investment (FDI)	Inward foreign direct investment (FDI)	Total foreign FDI international investment position in the UK at end period (experimental statistics)	Pounds Sterling (million)	2015 - 2021	Annually	Annually	Apr-23	TBA	GB (England, Wales and Scotland). Northern Ireland national figure included.	ONS
Public-funded gross regional capital and non-capital expenditure on research and development	Public-funded gross regional capital and non-capital expenditure on research and development	Total UK public-funded gross regional capital and non-capital expenditure on research and development (experimental statistics)	Pounds Sterling (million)	2021	Experimental statistics	TBA	Apr-23	TBA	UK	ONS
Premises with gigabit capable broadband	Gigabit capable broadband	Percentage of premises with 125 megabytes (MB) or greater	Percentage	2018-2023	Annually	Annually	Dec-23	TBA	UK	Ofcom
4G coverage provided by at least one mobile network provider	4G coverage	Percentage of geographic areas with 4G signal outdoors from at least 1 operator (signal threshold: 105dBm)	Percentage	2018-2023	Annually	Annually	Jan-24	TBA	UK	Ofcom
19+ further education and skills learner achievements (qualifications) excluding community learning, non-qualification parts of the Multiply programme and bootcamps	Aged 19 years and over further education and skills learner achievements	Count of learners achieving a funded further education and skills learning aim, with the exception of community learning	Achievements gained	2018-2024	Annual	Quarterly	Jan-24	TBA	England	DfE
Proportion of the population aged 16 – 64 with level 3+ qualifications	Aged 16 to 64 years level 3 or above qualifications	Percentage of the population aged 16 – 64 with National Vocational Qualification (NVQ) level 3+ qualifications	Percentage	2004-2023	Annually	Annually	Jan-24	TBA	GB (England, Wales and Scotland). Northern Ireland national figure included	NOMIS
Average life satisfaction rating	Life satisfaction	The average rating of those that feel satisfied about their lives for adults aged 16 years and over	Mean (Where 0 is 'not at all satisfied' and 10 is 'completely satisfied').	2011/12 - 2022/23	Annually	Annual	Nov-23	TBA	UK	ONS

Average feeling that things done in life are worthwhile rating	Feeling life is worthwhile	The average rating of those that feel the things they do in life are worthwhile for adults aged 16 years and over	Mean (Where 0 is 'not at all worthwhile' and 10 is 'completely worthwhile')	2011/12 - 2022/23	Annually	Annual	Nov-23	TBA	UK	ONS
Average happiness rating	Happiness	The average rating of those that felt happy yesterday for adults aged 16 years and over	Mean (Where 0 is 'not at all happy' and 10 is 'completely happy')	2011/12 - 2022/23	Annually	Annual	Nov-23	TBA	UK	ONS
Average anxiety rating	Anxiety	The average rating of those that felt anxious yesterday for adults aged 16 years and over	Mean (Where 0 is 'not at all anxious' and 10 is 'completely anxious')	2011/12 - 2022/23	Annually	Annual	Nov-23	TBA	UK	ONS

8 Appendix 3: Data and evidence collection methods for the evaluations

8.1 Process evaluation sources of evidence

The process evaluation will be split into two separate phases of work: one covering the application process and one covering the design and delivery of the programme. The table below sets out the methods we will use to elicit information and evidence from stakeholders involved in both programmes relating to the application process.

Evidence and data to be collected relating to the application process for the 5GIR and SIPP programmes			
Date	**Method**	**Stakeholder**	**Evidence to be collected**
June 2024	Survey	LAs that applied for the programme [Aim to contact all LAs that applied and achieve a response rate of 30-50%]	Quantitative and qualitative information to inform on the application process including: — how LAs became aware of the opportunity; — whether the guidance on the application process was clear and easy to follow (and any ways this can be improved); — whether LAs had all the information they required to make a good application (and what other information could help for future programmes); — whether the amount of time provided for the application was sufficient; — whether the funding method was an attractive aspect of this programme; — whether the LAs felt the scoring of applications was clear and fair (with reasoning to support their answer); and, — how applicants found the application process (with any learning for future programmes).
June 2024	Survey	LAs that did not apply [Aim to contact all LAs that did not apply and achieve a response rate of over 20%]	Quantitative and qualitative information to inform on the application process including: — whether they were aware of the opportunity; — the main reasons why they didn't apply for either of the programmes; and, — any lessons for future programmes.
June 2024	Interviews	DSIT policy and delivery team [Speaking with 5GIR policy/delivery team and SIPP policy/delivery team separately]	Qualitative information to inform on the application process including: — the channels DSIT used to advertise the opportunity; — whether a good number of applications were received; — whether the applications received were of a good quality; — whether a good geographic spread of applications was achieved; — whether the scoring of applications was consistent, efficient and fair;

			— whether the method of funding generated more (or less) interest in the opportunity; — anything which officials feel could have made the application process more effective; and, — whether the process of designing the programme was based on best practice developed from the experience of past programmes;

The table below sets out the methods we will use to elicit information and evidence from stakeholders involved in the 5GIR and SIPP programmes separately relating to the design and delivery process.

Evidence and data to be collected relating to the design and delivery of the 5GIR and SIPP programmes			
Date	**Method**	**Stakeholder**	**Evidence to be collected**
5GIR			
May 2025	DSIT benefits tracker	Intervention LAs	Qualitative and quantitative evidence on the extent to which each intervention area delivered what it set out to deliver – including: — alternative funding generated by the project (commercial investment); — firms engaged with the project; — use cases deployed; — improved connectivity; — additional employment; — dissemination events; — networks continuing operation; — lessons learned; and, — any issues experienced with delivery.
May 2025	Interview	DSIT 5GIR policy and delivery team	Qualitative information on the design and delivery of the programme including: — what worked and what could be improved in the design of the programme; — whether the delivery of the overall programme was as expected; — what could have been improved with respect to the delivery of the programme; and, — whether the method of funding was effective in delivering the programme.
May 2025	Focus groups	Intervention LAs [Aim to have 2 groups of 5 areas each]	Qualitative information on the design and delivery of the programme including: — the extent to which the method of funding the programme contributed (or otherwise) to the successful delivery of the programme; — whether the use cases were delivered to time and with the level of effectiveness expected; — what obstacles to delivery were encountered; — whether the support from DSIT was sufficient for the effective delivery of the programme; and, — what could be improved with respect to the delivery of the programme.
May 2025	Focus groups	Use case providers [Aim to have 3 focus groups split by type of use case: commercial; social; and, other]	Qualitative information on the design and delivery of the programme including: — whether the use cases were delivered to time; — what obstacles to delivery were encountered; and, — what could be improved with respect to the delivery of the programme.
May 2025	Focus groups	Network/tech providers [Aim to have 2 groups covering 5 areas each]	Qualitative information on the design and delivery of the programme including: — whether the use cases were delivered to time; — what obstacles to delivery were encountered; and, — what could be improved with respect to the delivery of the programme.

May 2025	Interview	DSIT communications and UKTIN officials	Qualitative information on the design and delivery of the programme including: — whether the delivery of the overall programme to areas outside the intervention areas (e.g. the spread of knowledge) was as expected; — what were the most effective means of transferring learning to other areas; and, — what could be improved with respect to the effectiveness of sharing findings with the rest of the country.
SIPP			
May 2025	DSIT benefits tracker	Intervention LAs	Qualitative and quantitative evidence on the extent to which each intervention area delivered what it set out to deliver – including: — number of poles installed; — number of small cells deployed; — improved connectivity; — use cases tested; — dissemination events; — lessons learned, and, — any issues experienced with delivery.
May 2025	Interview	DSIT SIPP policy and delivery team	Qualitative information on the design and delivery of the programme including: — what worked and what could be improved in the design of the programme; — whether the delivery of the overall programme was as expected; — what could have been improved with respect to the delivery of the programme; and, — whether the method of funding was effective in delivering the programme.
May 2025	Focus groups	Intervention LAs [Aim to have 1 group covering the programme]	Qualitative information on the design and delivery of the programme including: — the extent to which the method of funding the programme contributed (or otherwise) to the successful delivery of the programme; — whether the procurement, fabrication and installation of poles went as expected; — whether the use cases were installed on poles to time and with the level of effectiveness expected; — what obstacles to delivery were encountered; — whether the support from DSIT was sufficient for the effective delivery of the programme; and, — what could be improved with respect to the delivery of the programme.
May 2025	Focus groups	Use case providers [Aim to have 1 focus group covering the range of use cases covered by the programme]	Qualitative information on the design and delivery of the programme including: — whether the use cases were delivered to time; — whether there were any issues with deploying use cases on the poles; and, — any other obstacles to delivery encountered; what could be improved with the delivery of the programme.
May 2025	Interview	DSIT communications and UKTIN officials	Qualitative information on the design and delivery of the programme including: — whether the delivery of the overall programme to areas outside the intervention areas (e.g. the spread of knowledge) was as expected; — what were the most effective means of transferring learning to other areas; and, — what could be improved with respect to the effectiveness of sharing findings with the rest of the country.

8.1.1 Impact evaluation sources of evidence

As illustrated in Section 4.3.2, the impact evaluation will be theory-based and focus on testing the strength of causal links within the ToC for both programmes. The set of indicators which will be used to measure the identified outputs, outcomes and impacts from the two programmes' ToC are set out in Appendix 2. In addition to this, a range of other information and evidence will be used to support the impact evaluation.

The table below sets out the methods we will use to elicit information and evidence from stakeholders involved in **the 5GIR and SIPP** programmes **separately** to support the impact evaluation.

Evidence and data to be collected relating to the impact evaluation for the 5GIR and SIPP programmes			
Date	**Method**	**Stakeholder**	**Evidence to be collected**
5GIR			
May 2025	DSIT benefits tracker	Intervention LAs	Data and information on the outputs and outcomes from projects – including: — outputs/ outcomes delivered from use cases; — benefits derived from the outputs/ outcomes from the use cases; — amount of extra commercial investment generated by the project; — the development of an advanced wireless technology ecosystem; — extra economic activity/employment generated by the project; — improved connectivity delivered by the project; and, — extent to which networks continuing operation.
May 2025	Interview	DSIT 5GIR policy and delivery team (run at same time as process evaluation to minimise burden)	Qualitative information on the outputs and outcomes from the programme – including: — whether the benefits derived from the stackable use cases change DSITs perspective on the adoption of 5G/advanced wireless tech going forward; — extent to which the programme has better evidenced the business case for advanced wireless technology adoption and investment; — whether any extra commercial investment was generated by the project and how/why; — the extent to which an ecosystem within the intervention areas was established and the impacts of that; — whether any extra economic activity/ employment was generated by the programme and how/why; — whether any improved connectivity was delivered by the programme and how/why; and, — perceptions around the sustainability of advanced wireless technology adoption and associated investment post-funding.
May 2025	Focus groups	Intervention LAs	Qualitative information on the outputs and outcomes from the programme – including: — how the outputs/ outcomes were delivered from use cases; — whether the benefits derived from the use cases change the LAs perspective on the adoption of 5G/advanced wireless tech going forward;

		[Aim to have 2 groups of 5 areas each – run at the same time as process evaluation to minimise burden]	— extent to which the programme has better evidenced the business case for advanced wireless technology adoption and investment; — whether any extra commercial investment was generated by the project and how/why; — the extent to which an ecosystem within the intervention area has been established and the impacts of that. — whether any extra economic activity/ employment was generated by the project and how/why; — whether any improved connectivity was delivered by the project and how/why; and, — perceptions around the sustainability of advanced wireless technology adoption and associated investment post-funding.
May 2025	Focus groups	Use case providers [Aim to have 3 focus groups split by type of use case: commercial; social; and, other – to be run at same time as process evaluation to minimise burden]	Qualitative information on the outputs and outcomes from the programme – including: — whether the outputs/ outcomes delivered from use cases were as expected; — whether the benefits from the use cases are likely to outweigh the costs of adopting 5G/ advanced wireless tech after the project; — whether the benefits illustrated by the use cases changes the provider's perspective on the adoption of 5G/ advanced wireless tech going forward; — extent to which the programme has better evidenced the business case for advanced wireless technology adoption and investment; — whether the provider felt part of an ecosystem and what, if anything, they learnt/ gained from it; — whether any extra commercial investment was generated by the experience and how/ why; — whether any extra economic activity/employment was generated by the experience in the project/ ecosystem and how/ why; and, — whether the experience from the project will make future 5G/ advanced wireless tech adoption more likely in this and/or other areas.
May 2025	Focus groups	Network/tech providers [Aim to have 2 groups covering 5 areas each – run at the same time as the process evaluation to minimise burden]	Qualitative information on the outputs and outcomes from the programme – including: — whether the outputs/ outcomes delivered from use cases were as expected; — whether the benefits from the use cases are likely to provide sufficient encouragement to provide 5G/ advanced wireless tech after the project; — whether the benefits illustrated by the use cases change the provider's perspective on the adoption of 5G/ advanced wireless tech going forward (and so the provision of networks/ tech to allow for that); — extent to which the programme has better evidenced the business case for advanced wireless technology adoption and investment; — whether the provider felt part of an ecosystem and what, if anything, they learnt/ gained from it;

			— whether any extra commercial investment was generated by the experience and how/ why; — whether any extra economic activity/ employment was generated by the experience in the project/ ecosystem and how/ why; and, — whether the experience from the project will make future 5G/ advanced wireless tech provision by the provider more likely in this and/or other areas.
May 2025	Survey	Use case providers [Aim to survey use case providers from all intervention areas and achieve a response rate of over 25%]	To provide more detailed quantitative information (not possible with focus groups) – including: — commercial viability of use cases (i.e. more detailed cost and benefit information to assess commercial viability of use cases post-funding); and, — providers' expectations around future continuation of use cases (post-funding).
May 2025	Survey	Network/tech providers [Aim to survey network/ tech providers from all intervention areas and achieve a response rate of over 25%]	To provide more detailed quantitative information (not possible with focus groups) – including: — commercial viability of network/ tech provision (i.e. more detailed understanding of number and type of use cases required to prove commercial viability of network/ tech provision post-funding); and, — providers' expectations around future continuation of network/ tech provision (post-funding).
May 2025	Interview	DSIT communications and UKTIN officials (run at same time as process evaluation to minimise burden)	Qualitative information on the outputs and outcomes from the programme – including: — whether the spread of information to areas outside the intervention areas has had an impact (and in what ways); — whether there is evidence of more use cases being deployed outside the intervention areas (or intentions to that end) as a result of the programme; and, — whether the evidence from stackable use cases deployed in 5GIR has generated the provision of networks/tech in other areas (or any evidence around this).
SIPP			
May 2025	DSIT benefits tracker	Intervention LAs	Qualitative and quantitative evidence on the outputs and outcomes from the programme – including: — number of PAS 191 poles: - procured; - fabricated; and, - installed in the different areas; — number of use cases deployed together with associated outputs; — improved connectivity; — documentation produced on the procurement and installation of poles; and, — dissemination events delivered.
May 2025	Interview	DSIT SIPP policy and delivery team (run at same time as process evaluation to minimise burden)	Qualitative information on the outputs and outcomes from the programme – including: — whether the benefits derived from the procurement, fabrication and installation of PAS 191 poles was as expected (and how this compares with alternatives);

			— extent to which the programme has better evidenced the business case for advanced wireless technology adoption and investment by LAs through use of street furniture/assets; — whether any extra commercial investment was generated by the programme and how/why; and, — perceptions around the viability of PAS 191 poles and their adoption and associated investment post-funding.
May 2025	Focus groups	Intervention LAs [Aim to have 1 group covering the programme – run at same time as process evaluation to minimise burden]	Qualitative information on the outputs/ outcomes achieved including: — benefits achieved from the PAS 191 poles as compared to existing (public assets) alternatives; — any issues with the procurement and installation of poles; — extent to which the relationship between LAs and the private sector has improved; and, — perceptions around the sustainability of the PAS 191 poles in the longer term.
May 2025	Focus groups	Use case providers [Aim to have 1 focus group covering the range of use cases covered by the programme – run at same time as process evaluation to minimise burden]	Qualitative information on the outputs/ outcomes achieved including: — benefits achieved from use cases installed on PAS 191 poles; — any extra benefits from the use of PAS 191 poles (as compared to existing street furniture/public assets); — extent to which the relationship between LAs and use case providers has improved; and, — perceptions around the sustainability of use cases on PAS 191 poles in the longer term.
May 2025	Interview	DSIT communications and UKTIN officials (run at same time as process evaluation to minimise burden)	Qualitative information on the outputs/ outcomes achieved including: — whether the spread of information to areas outside the intervention areas has had an impact; — number of poles fabricated/being fabricated outside the intervention areas (or intentions to that end); and, — whether the evidence from use cases deployed in SIPP has generated the adoption of similar use cases in other areas.

8.1.2 Economic evaluation sources of evidence

The table below sets out the methods we will use to elicit information and evidence from stakeholders involved in **the 5GIR and SIPP** programmes **separately** to support the economic evaluation.

Evidence and data to be collected relating to the economic evaluation of the 5GIR and SIPP programmes			
Date	**Method**	**Stakeholder**	**Evidence to be collected**
5GIR			
May 2025	DSIT benefits tracker	Intervention LAs	Qualitative and quantitative evidence on the costs and benefits from projects – including: — costs of delivering use cases; — benefits delivered from use cases; — amount of extra commercial investment generated by the project; and, — extra economic activity/employment generated by the project.
May 2025	Interview	DSIT 5GIR policy and delivery team (run at same time as process evaluation to minimise burden)	Qualitative information on the costs and benefits from the programme – including: — internal DSIT costs for delivering the programme (to cover DSIT and UKTIN); — evidence around the benefits derived from stackable use cases; — evidence of extra commercial investment generation; and, — evidence around extra economic activity/ employment generation.
May 2025	Focus groups	Intervention LAs [Aim to have 2 groups of 5 areas each – run at the same time as process evaluation to minimise burden]	Qualitative information on the costs and benefits from the projects – including: — any costs not covered in benefits tracker; — any benefits not covered in benefits tracker; and, — overall perception of balance of costs and benefits from stackable use cases.
May 2025	Focus groups	Use case providers [Aim to have 3 focus groups split by type of use case: commercial; social; and, other – to be run at same time as process evaluation to minimise burden]	Qualitative information on the costs and benefits from the use cases – including: — whether the benefits from the use cases are likely to outweigh the costs of adopting 5G/ advanced wireless tech after the project in other areas; — extent to which the programme has better evidenced the business case for advanced wireless technology adoption and investment; — whether the experience from the project will make future 5G/ advanced wireless tech adoption more likely in this and/or other areas; and, — intentions around future investment in use cases following the programme.
May 2025	Focus groups	Network/tech providers [Aim to have 2 groups covering 5 areas each – run at the same time as the process evaluation to minimise burden]	Qualitative information on the costs and benefits from network/ tech provision – including: — whether the benefits from the stackable use cases are likely to provide sufficient encouragement to provide 5G/ advanced wireless tech after the project; — extent to which the programme has better evidenced the business case for advanced wireless technology adoption and investment;

			— whether the experience from the project will make future 5G/ advanced wireless tech provision by the provider more likely in this and/or other areas; and, — intentions around future investment in network/ tech provision following the programme.
May 2025	Survey	Use case providers [Aim to survey use case providers from all intervention areas and achieve a response rate of over 25% - run with impact evaluation survey to minimise burden]	To provide more detailed quantitative information (not possible with focus groups) – including: — commercial viability of use cases (i.e. more detailed cost and benefit information to assess commercial viability of use cases post-funding); and, — providers' expectations around future continuation of use cases (post-funding).
May 2025	Survey	Network/tech providers [Aim to survey network/ tech providers from all intervention areas and achieve a response rate of over 25% - run with impact evaluation survey to minimise burden]	To provide more detailed quantitative information (not possible with focus groups) – including: — commercial viability of network/ tech provision (i.e. more detailed understanding of number and type of use cases required to prove commercial viability of network/ tech provision post-funding); and, — providers' expectations around future continuation of network/ tech provision (post-funding).
May 2025	Documentation/ literature review	Past use case providers	Qualitative and quantitative evidence on the costs and benefits from the use cases – including: — Using past information from previous studies on the benefits derived from use cases (e.g. 5GTT and DCIA where relevant).
May 2025	Interview	DSIT communications and UKTIN officials (run at same time as process evaluation to minimise burden)	Qualitative information on the costs and benefits from network/ tech provision – including: — any benefits (and estimate of associated costs) from use cases delivered outside intervention areas that is attributable to the programme; and, — any benefits (and estimate of associated costs) from networks/ tech provided outside intervention areas that is attributable to the programme.
SIPP			
May 2025	DSIT benefits tracker	Intervention LAs	Qualitative and quantitative evidence on the costs and benefits from projects – including: — benefits derived from the installation of PAS 191 poles; and, — costs of procuring, fabricating and installing PAS 191 poles.
May 2025	Interview	DSIT SIPP policy and delivery team (run at same time as process evaluation to minimise burden)	Qualitative information on the costs and benefits from the programme – including: — internal DSIT costs for delivering the programme (to cover DSIT and UKTIN); — evidence around the benefits derived from the installation of poles and associated use cases; and, — understanding of the costs and benefits to PAS 191 procurement by LAs as compared to using other furniture/assets.
May 2025	Focus groups	Intervention LAs	Qualitative information on the costs and benefits from the projects – including: — benefits achieved from the PAS 191 poles as compared to existing (public assets) alternatives;

		[Aim to have 1 group covering the programme – run at same time as process evaluation to minimise burden]	— understanding of the costs and benefits to PAS 191 procurement by LAs as compared to using other furniture/assets; and, — perceptions around the sustainability of the PAS 191 poles in the longer term.
May 2025	Focus groups	Use case providers [Aim to have 1 focus group covering the range of use cases covered by the programme – run at same time as process evaluation to minimise burden]	Qualitative information on the costs and benefits from the projects – including: — benefits achieved from use cases installed on PAS 191 poles; — any extra benefits from the use of PAS 191 poles (as compared to existing street furniture/public assets); and, — perceptions around the sustainability of use cases on PAS 191 poles in the longer term.
May 2025	Interview	DSIT communications and UKTIN officials (run at same time as process evaluation to minimise burden)	Qualitative information on the costs and benefits from the programme – including: — any benefits (and estimate of associated costs) from the fabrication and installation of PAS 191 poles outside intervention areas that is attributable to the programme; and, — any benefits (and estimate of associated costs) from use cases delivered outside intervention areas that is attributable to the programme.

9 Appendix 4: 5GIR and SIPP intervention areas

5GIR intervention areas have been identified through the information provided in the original application made to the 5GIR programme. The list of intervention areas and the respective International Territorial Level[63] (ITL) 3 code and name are presented in Table 18 below. ITL areas are the geocode standard for referencing the subdivisions of the United Kingdom for statistical purposes, used by the Office for National Statistics (ONS). The ITL 3 refers to the UK counties and groups of unitary authorities.

Table 18: 5GIR intervention areas and corresponding ITL classification

Local Authority (5GIR applications)	ITL3 Code	ITL3 Name	ITL2 Code	ITL2 Name	ITL1 Code	ITL1 Name
Belfast	TLN06	Belfast	TLN0	Northern Ireland	TLN	Northern Ireland
	TLN0C	Causeway Coast and Glens	TLN0	Northern Ireland	TLN	Northern Ireland
	TLN0A	Derry City and Strabane	TLN0	Northern Ireland	TLN	Northern Ireland
	TLN0G	Fermanagh and Omagh	TLN0	Northern Ireland	TLN	Northern Ireland
	TLN0D	Antrim and Newtownabbey	TLN0	Northern Ireland	TLN	Northern Ireland
Cumberland	TLD11	West Cumbria	TLD1	Cumbria	TLD	North West (England)
	TLM92	Dumfries and Galloway	TLM9	Southern Scotland	TLM	Scotland
	TLM92	Dumfries and Galloway	TLM9	Southern Scotland	TLM	Scotland
	TLC21	Northumberland	TLC2	Northumberland, and Tyne and Wear	TLC	North East (England)
	TLM91	Scottish Borders	TLM9	Southern Scotland	TLM	Scotland
Glasgow	TLM81	East Dunbartonshire, West Dunbartonshire, and Helensburgh and Lomond	TLM8	West Central Scotland	TLM	Scotland
	TLM82	Glasgow City	TLM8	West Central Scotland	TLM	Scotland
	TLM84	North Lanarkshire	TLM8	West Central Scotland	TLM	Scotland
	TLM83	Inverclyde, East Renfrewshire, and Renfrewshire	TLM8	West Central Scotland	TLM	Scotland
Manchester	TLD33	Manchester	TLD3	Greater Manchester	TLD	North West (England)
North Ayrshire	TLM63	Lochaber, Skye and Lochalsh, Arran and Cumbrae, and Argyll and Bute	TLM6	Highlands and Islands	TLM	Scotland
Oxfordshire	TLJ14	Oxfordshire CC	TLJ1	Berkshire, Buckinghamshire and Oxfordshire	TLJ	South East (England)
	TLJ13	Buckinghamshire	TLJ1	Berkshire, Buckinghamshire and Oxfordshire	TLJ	South East (England)
	TLF25	North Northamptonshire	TLF2	Leicestershire, Rutland and Northamptonshire	TLF	East Midlands (England)

[63] International Territorial Level is a geocode standard for referencing the subdivisions of the United Kingdom for statistical purposes, used by the Office for National Statistics (ONS).

	TLH12	Cambridgeshire CC	TLH1	East Anglia	TLH	East
	TLH25	Central Bedfordshire	TLH2	Bedfordshire and Hertfordshire	TLH	East
Shropshire	TLK13	Gloucestershire CC	TLK1	Gloucestershire, Wiltshire and Bath/Bristol area	TLK	South West (England)
	TLG11	Herefordshire, County of	TLG1	Herefordshire, Worcestershire and Warwickshire	TLG	West Midlands (England)
	TLL21	Monmouthshire and Newport	TLL2	East Wales	TLL	Wales
	TLL24	Powys	TLL2	East Wales	TLL	Wales
	TLG21	Telford and Wrekin	TLG2	Shropshire and Staffordshire	TLG	West Midlands (England)
	TLG13	Warwickshire CC	TLG1	Herefordshire, Worcestershire and Warwickshire	TLG	West Midlands (England)
	TLG22	Shropshire	TLG2	Shropshire and Staffordshire	TLG	West Midlands (England)
	TLG31	Birmingham	TLG3	West Midlands	TLG	West Midlands (England)
Sunderland	TLC23	Sunderland	TLC2	Northumberland, and Tyne and Wear	TLC	North East (England)
	TLC22	Tyneside	TLC2	Northumberland, and Tyne and Wear	TLC	North East (England)
	TLC21	Northumberland	TLC2	Northumberland, and Tyne and Wear	TLC	North East (England)
	TLK24	Bournemouth, Christchurch and Poole	TLK2	Dorset and Somerset	TLK	South West (England)
	TLC22	Tyneside	TLC2	Northumberland, and Tyne and Wear	TLC	North East (England)
West Midlands	TLG32	Solihull	TLG3	West Midlands	TLG	West Midlands (England)
	TLG31	Birmingham	TLG3	West Midlands	TLG	West Midlands (England)
	TLG33	Coventry	TLG3	West Midlands	TLG	West Midlands (England)
	TLG39	Wolverhampton	TLG3	West Midlands	TLG	West Midlands (England)
West Sussex	TLJ28	West Sussex (North East)	TLJ2	Surrey, East and West Sussex	TLJ	South East (England)
	TLJ27	West Sussex (South West)	TLJ2	Surrey, East and West Sussex	TLJ	South East (England)

Source: 5GIR applications, ONS data

Similarly, SIPP intervention areas have been identified through the information provided in the original application made to the SIPP programme.[64] The list of intervention areas and the respective ITL 3 code and name are presented in Table 19. As mentioned at the beginning of the section, ITL areas are the geocode standard for referencing the subdivisions of the United Kingdom for statistical purposes, used by the Office for National Statistics (ONS). The ITL 3 refers to the UK counties and groups of unitary authorities.

[64] Not all the applications provided information on the location of the poles at the postcode level, therefore, the intervention areas were identified using a ITL level 3 code.

Table 19: SIPP intervention areas and corresponding ITL classification

Lead Local Authority	ITL3 Code	ITL3 Name	ITL2 Code	ITL2 Name	ITL1 Code	ITL1 Name
Cambridgeshire	TLH12	Cambridgeshire CC	TLH1	East Anglia	TLH	East
Oxfordshire	TLJ14	Oxfordshire CC	TLJ1	Berkshire, Buckinghamshire and Oxfordshire	TLJ	South East (England)
North Ayrshire	TLM63	Lochaber, Skye and Lochalsh, Arran and Cumbrae, and Argyll and Bute	TLM6	Highlands and Islands	TLM	Scotland
Tees Valley	TLC11	Hartlepool and Stockton-on-Tees	TLC1	Tees Valley and Durham	TLC	North East (England)
	TLC12	South Teesside	TLC1	Tees Valley and Durham	TLC	North East (England)
Westminster	TLI32	Westminster	TLI3	Inner London - West	TLI	London
Kingston	TLI63	Merton, Kingston upon Thames and Sutton	TLI6	Outer London - South	TLI	London

Source: SIPP applications, ONS data

10 Appendix 5: List of use case and network/ tech provider stakeholders involved in 5GIR and SIPP

This appendix provides details of the main stakeholders involved in the delivery of the 5GIR and SIPP interventions.

10.1 5GIR

Application	List of potential partner organisation
Belfast	— Belfast City Council (BCC) — Queen's University Belfast (QUB) — Ulster University (UU) — Studio Ulster — Advanced Manufacturing Innovation Centre (AMIC) — Belfast Harbour Commissioners — Translink — Institute of Electronics Communications and Information Technology (ECIT) — Centre for Secure Information Technologies (CSIT) — Department for the Economy (DfE) — Department for Infrastructure (DfI) — Department of Finance (DoF) – responsible for NI Public Sector Shared — Network framework (NIPSSN) — Invest NI — Innovation City Belfast (ICB) — Mid & East Antrim Borough Council — Antrim & Newtownabbey Borough Council — Lisburn & Castlereagh City Council — Ards & North Down Borough Council — Newry Mourne & Down District Council — Full Fibre Northern Ireland (FFNI) — Digital Catapult UK — BT/EE — Ontix — AWTG — Eir — Fibrus — Cornerstone — Manfreight — Stena — BBC NI — ICG Containers — Boom Clap Plya — Yellow Moon — McAdam Design — Picture House — Sound House — Future Screens — Armagh City Banbridge — Craigavon Borough Council — Fermanagh and Omagh District Council — Mid Ulster District Council — Causeway Coast and Glens Borough Council — Derry City and Strabane District Council — Ericsson — Three

	— Vodafone — Freshwave — Cellnex
Cumberland	— AWTG — Boldyn Networks — Borderlands Partners – Cumberland Council Dumfries & Galloway Council Northumberland County Council Scottish Borders Council and Westmorland & Furness Council — Crichton Trust — Destination Tweed / Tweed Forum — Emtelle Group — English Heritage — FarrPoint — Forestry England — Forestry and Land Scotland — Kielder Observatory — Kielder Water and Forest Park Development Trust — Lake District National Park — Lancaster University — Lucy Ziodion Ki — Moffat Community Observatory — National Trust — Northumberland National Park — Peira Consulting — Scotland 5G Centre — Scottish Futures Trust — South of Scotland Destination Alliance — South of Scotland Enterprise — Tweedsmuir Community Company — University of Edinburgh — Visit Scotland — Yorkshire Dales National Park
Glasgow	— Amazon Web Services — Boldyn Networks — CENSIS — CityFibre — iOpt — North Glasgow Housing Association — Safehouse — University of Glasgow — University of Strathclyde — University of the West of Scotland — Wheatley Housing Group

Grater Manchester	— Daikin – Energy Specialists — Electricity Northwest (ENW) — Scottish and Southern Electricity (SSE) — Freshwave — Virgin Media 02 — Virgin Media Business (VMB) — Vivacity — Cisco — Attocore — Weaver Labs — CJ Founds Associates — Authorities (immediately involved) — Greater Manchester Combined Authority — Wigan Council — Manchester City Council — Southways Homes (MCC) — Northward Homes (MCC) — Transport for Greater Manchester (TfGM) — Science and Technology Facilities Council (STFC Hartree) — University of Salford
North Ayrshire	— Scottish 5G Centre (S5GC) — Scottish Enterprise — Ayrshire Chamber of Commerce — National Manufacturing Institute Scotland (NMIS) — University of the West of Scotland (UWS) — Ayrshire College — Digital Processing Manufacturing Centre (DPMC) (DESG) — Vodafone Ltd — Neutral Wireless — CENSIS FarrPoint — Booth Welsh — Spirit AeroSystems — GE Caledonian — UPM Caledonian — Breahead Food — Wallace McDowall — McCallum Bagpipes

Oxfordshire	— The Six Berkshire Unitary councils led by West Berkshire Council — Oxfordshire County Council (with district councils) — Buckinghamshire Council — Central Bedfordshire Council — Cambridgeshire & Peterborough Combined Authority — Norfolk County Council — Milton Keynes Council — Network Rail — Chiltern Railways — East-West Rail — Virgin Media/O2 (VMO2) — NEOS — Freshwave — ONTIX — JISC Science and Technology Facilities Council (STFC) — Harwell Campus — European Space Agency — UK Space Agency — JISC — Westcott — Cambridge Wireless — Cambridge Science Park — Arc Universities — Cornerstone — AWTG

Shropshire	— Birmingham City University — Environment Agency — Forestry Commission — Gloucestershire County Council — Gloucestershire LEP — Herefordshire Council — Homes England — Local Nature Partnerships — Malvern Hills District Council — Marches LEP — Monmouthshire County Council — National Farmers Union — Natural England — Natural Resources Wales — Powys County Council — Severn Rivers Trust — Severn Trent Water — Shropshire Council — Telford and Wrekin Council — Tewkesbury Borough Council — Water Resources West — Wildlife Trusts — Worcester City — Worcestershire County Council — Worcestershire LEP — Wychavon District Council — Wyre Forest District Council — Airband Community Internet — Cardiff Skills Partnership — Cellnex — Coventry and Warwickshire Local Growth Hub — Freshwave Facilities Limited — Harper Adams University – Agri Epi Centre — Hartpury University and Hartpury College — Keele University — Koolmill Systems Limited — Marches Forward Partnership — Midlands Cyber — Midlands Net Zero Hub — Mobile UK — NexGworx Limited — NHS Hereford & Worcestershire ICS — NHS Shropshire Telford and Wrekin – ICS — QinetiQ Malvern Technology Centre — Satellite Catapult — Sheffield Hallam University – National Centre of Excellence in Food — Telet Research (NI) Limited — UKTIN — University of Chester — University of Lincoln — University of Stirling — University of Warwick — UtterBerry Limited — Vodafone — West Midlands 5G — Digital Catapult — Mullers — NHS Arden & GEM Commissioning Support Unit Industry — Places Catapult — Security experts e.g. (QinetiQ) — Supply side O-Ran ecosystem — MNOs

Sunderland	— Newcastle City Council — Northumberland County Council — North Tyneside Council — Gateshead Council — South Tyneside Council — Durham County Council — North of Tyne Combined Authority — Newcastle University — PROTO — Digital Catapult — Space North East — Port of Tyne — Port of Blyth — Boldyn Networks — BT — Animmersion UK Ltd — ArtAV — Nissan — Connected Places Catapult — Department for Transport — National Innovation Centre for Data (NICD) — National Innovation Centre for Rural Enterprise (NICRE) — Rural Design Centre
West Midlands	— Jaguar Land Rover Group (JLR) — Birmingham City Council (BCC) — City of Wolverhampton Council (WCC) — Coventry City Council (CCC) — Made Smarter — Midlands Aerospace Alliance — Warwick Manufacturing Group* — Manufacturing Technology Centre* — Dudley Metropolitan Borough Council — Sandwell Metropolitan Borough Council — Solihull Metropolitan Borough Council — Walsall Council — NHS Coventry & Warwickshire ICB — NHS Birmingham & Solihull ICB — NHS Black Country ICB — TechWM — Vodafone — VM02 — BT — Ericsson — Qualcomm — Deloitte — Mayor of the West Midlands Lead Sponsor — JLR Lead Sponsor — Virgin Media 02 Tech Ecosystem — Vodafone Tech Ecosystem — BT Tech Ecosystem — Deloitte Tech Ecosystem — Ericsson UK Tech Ecosystem — Qualcomm Technologies Tech Ecosystem — Intel Tech Ecosystem — Birmingham City Council (BCC) Lead Sponsor — City of Wolverhampton Council (WCC) Lead Sponsor

	— Coventry City Council (CCC) Lead Sponsor — Sandwell Council Local Authority — Walsall Council Local Authority — Solihull Metropolitan Borough Council Local Authority — Dudley Council Local Authority — Shropshire Council Local Authority — CW Growth Hub (Made Smarter) Tech Ecosystem — UKTL / NPL Tech Ecosystem — Midlands Aerospace Alliance Tech Ecosystem — TechWM Tech Ecosystem — West Midlands Tech Commissioner Tech Ecosystem — nexGWorx Tech Ecosystem — Manufacturing Technology Centre Tech Ecosystem — Warwick Manufacturing Group (University of Warwick) Tech Ecosystem — Freshwave Facilities Tech Ecosystem — Innovation Nottinghamshire Tech Ecosystem — NHS Birmingham & Solihull ICB Health & Social Care — NHS Black Country ICB Health & Social Care — NHS Coventry & Warwickshire ICB Health & Social Care — National Hub for Social Care & Technology (University of Wolverhampton) Health & Social Care — NHS Arden & GEM Commissioning Support Unit Health & Social Care — West Midlands Health Technologies Cluster Tech Ecosystem — Platform Housing Group Housing Groups — Housing LIN Housing Groups — Wolfram Research Europe Tech Ecosystem — Accelleran Tech Ecosystem — Athonet UK Tech Ecosystem — CityFibre Tech Ecosystem — Ontix Ltd Tech Ecosystem — Cellnex UK Tech Ecosystem — Teki-health Solutions Tech Ecosystem — Corporate Health International Tech Ecosystem — IOT Solutions Group Tech Ecosystem — Hyperoptic Tech Ecosystem — ITS Technology Group Tech Ecosystem
West Sussex	— East Sussex County Council — VM02 Business (VMO2) — West Sussex Growers Association (WSGA) — Brinsbury College — South Downs National Park — 10 District and Borough Councils — Plumpton College

10.2 SIPP

Application	List of partner organisation
Cambridge	— Cambridgeshire County Council (CCC) — Cambridgeshire & Peterborough Combined Authority (CPCA) — Greater Cambridge Partnership (GCP) — Cambridge City Council's (CambCity) CCTV team — Connecting Cambridgeshire (ConCamb) — Ontix — Signify — Kerb

Kingston	— The Royal Borough of Kingston (RBK) — Boldyn Networks' — LBS — Volker Highways
Oxford	— Oxfordshire County Council (OCC) — Zeta Specialist Lighting (Zeta) — Virgin Media/O2 (VMO2) — Freshwave
North Ayrshire	— North Ayrshire Council — BT/EE
Tees Valley	— Tees Valley Combined Authority (TCVA) — Teeside International Airport (TIA) — Hartlepool Borough Council — Dense Air — Latos Data Centre Ltd
Westminster	— Westminster City Council (WCC) — FM Conway — Ontix — Breathe London — NSL — Siemens