Local Full Fibre Network (LFFN) Wave one: Programme evaluation

Final evaluation

West Sussex PSAT project

For the avoidance of doubt, the principle purpose of the Local Full Fibre Network (LFFN) wave one projects was not to provide the secondary benefits laid out in this report. For Public Sector Building Upgrades (PSBU)/ Public Sector Anchor Tenancy (PSAT) and Public Sector Asset Reuse (PSAR) projects that purpose is the improvement of public sector connectivity to meet a need, generally demonstrated through a business case, either to reduce the cost of equivalent connections or to provide improved connections which will enable a concomitant improvement in productivity or the provision of public services. PSAR projects followed what is known as the Market Economy Operator Principle (MEOP), which means that they had clear projected commercial outcomes and that these outcomes have been externally validated before the projects began. MEOP is an EU test as to whether a measure is commercial, and thus not State aid, which is a test relevant for those projects commenced prior to the end of the transition period.

The wider benefits which this report describes are secondary to these purposes; however, that does not mean that they are not of legitimate interest to government, local and central, as part of ongoing monitoring of digital connectivity.

To situate this report and the analysis within, note that it was submitted in November 2023.

Contents

1 Introduction

Ipsos UK was commissioned by Building Digital UK (BDUK) in May 2018 to undertake an evaluation of the wave one projects funded through the Local Full Fibre Network (LFFN). This report sets out the final evaluation findings for the West Sussex Gigabit Public Sector Anchor Tenancy project.

1.1 Description of the programme

BDUK launched the LFFN Programme in 2017 with £200 million funding. The aims of the programme were to accelerate and de-risk the deployment of the next generation of digital infrastructure, create UK digital leadership and drive productivity and growth. The programme provided funding to local councils and other public bodies to achieve these aims. Local councils could choose from three delivery models to apply and deliver locally:

- **Public Sector Anchor Tenancy (PSAT):** Bringing together local public sector customers, to create enough broadband demand to reduce the financial risk of building new full-fibre networks;
- **Public Sector Building Upgrades (PSBU):** Directly connecting public sector buildings, such as schools and hospitals, and
- **Public Sector Asset Re-use (PSAR):** Opening up public sector assets, such as existing ducts, to allow fibre to be laid more cheaply.

A Gigabit Broadband Voucher Scheme offering full-fibre broadband connection vouchers for businesses, to increase take-up of services is operated in parallel to the three delivery models above. However, the Gigabit Broadband Voucher Scheme is subject to a separate evaluation, and is therefore not covered in this study.

Wave one of the LFFN programme comprised a selection of pilot projects for the wider LFFN programme, which aimed to demonstrate how the interventions can operate and provide learning for the remaining LFFN projects. The West Sussex Gigabit PSAT project was selected as one of these four projects.

1.2 Context

1.2.1 Context at time of LFFN launch

At the time the LFFN programme was designed and launched in 2017, the government had recognised that there was a growing need for ultrafast and gigabit-capable networks in the UK, in order to support businesses and residents. Faster broadband was of growing importance to firms, with greater bandwidth required to take advantage of a range of new digital services and assure reliability and continuity of operations. For residents, ultrafast speeds were needed to support growing demand for data – for example, content-rich websites, streaming services and cloud services. They were also expected to produce significant social benefits by supporting the development of applications enabling remote service delivery such as remote medical diagnostics.

At the end of 2016, the UK lagged behind a range of international comparators in terms of gigabit-capable deployment, with just 2 percent of premises covered by gigabit-capable networks at the end

of 2016 compared with 100 percent in South Korea, 97 percent in Japan, and 86 percent in Portugal.[1] The UK was third from the bottom of 22 European countries for Fibre to the Premises (FTTP) coverage[2]. Traditional copper-based circuits are insufficient to support the high-capacity and highly reliable infrastructure which ultrafast broadband and 5G infrastructure depend upon. 92 percent of homes in the UK were connected through part-fibre, part-copper lines that operate at superfast speeds[3], such as Fibre to the Cabinet (FTTC). The Superfast Broadband Programme has significantly bolstered the coverage of FTTC networks[4]. However, these technologies are insufficient to meet the demands outlined above.

Several factors were thought to have constrained the roll-out of full fibre networks in the UK in 2017. These included:

- Other countries having a greater share of the population dwelling in highly dense buildings of multiple occupation, increasing the commercial viability of the technology.
- Topological issues, with other countries being flatter, making investment less costly.
- Uncertainty around the willingness of consumers to pay for a service which they may not currently need.
- Regulatory barriers such as requirements in relation to wayleaves.
- Market structure issues, with dominant suppliers in the UK utilising technologies which could not, at that time, provide gigabit-capable networks.
- Lack of public investment, with other countries having significant public investment to boost FTTP coverage. For example, in France the state-owned telecoms company rolled out FTTP in response to regulatory pressure, and the French government invested EUR 20 billion in FTTP rollout.

1.2.2 Current context

Since 2017, there have been significant changes to the landscape of the broadband market. There has been a lot of venture capital investment. Investors recognised the position of the UK regarding fibre networks and the need to provide these, which could offer long-term returns on their investment. This meant that some smaller network providers had more resources to expand their fibre networks, and there were many new market entrants who provide gigabit-capable networks. The regulatory position of Ofcom, which encouraged competition in the market, also contributed to this increase in competition in the market. Finally, a period of low interest rates also encouraged network providers to utilise finance to further expand their networks.

[1] The most recent Ofcom Connected Nations Report (2018) estimated that there were almost 1.8 million homes and businesses (6%) with FTTP connections compared to 840,000 (3%) in 2017. However, the 2% presented in the main text is the most recent estimate available for international comparison.

[2] Ofcom (2017), "International Communications Market Review"

[3] Ofcom (2017), "International Communications Market Review"

[4] Ipsos MORI, Simetrica, Barrett, G. Koutroumpis, P. (2018). Evaluation of the Economic Impact and Public Value of the Superfast Broadband Programme

This increase in market competition has also been characterised by small network providers trying not to overbuild each other's networks, as it would reduce the returns they could generate from their network build.

Further to this, the larger providers of broadband networks, Openreach and Virgin Media, have also increased their investment in fibre networks. In early 2022, it was reported that Virgin Media was seeking to raise hundreds of millions of pounds of investment to support their fibre network rollout.[5] Openreach have also committed to expanding their fibre network, and in 2021 the cost of this additional roll out was estimated to be £15 billion to provide fibre coverage to 80 percent of UK premises.[6]

With an increase in finance and planned commercial roll out, and small competitors trying to avoid each other, the coverage of gigabit-capable networks has grown rapidly over the past six years. This is shown by the latest Ofcom Connected Nations publication (2022), which shows that 70 percent of premises in the UK now have gigabit-capable coverage, compared to two percent in 2016.

Examples of the increase in investment include:

- Connectfibre receiving "significant" investment in March 2022;[7]
- Lightspeed Broadband receiving a cumulative total of £115 million investment by December 2021;[8]
- Truespeed receiving £75 million in January 2022;[9]
- Borderlink receiving a cumulative £174.5 million investment by January 2022;[10]
- Toob receiving £87.5 million in December 2021;[11]
- Zzoomm securing £100 million debt investment in October 2021;[12]
- Cityfibre receiving £1.1 billion in finance in September 2021;[13]

[5] https://www.ispreview.co.uk/index.php/2022/01/virgin-media-o2-uk-reportedly-seeks-funding-for-fttp-rollout.html (Accessed March 2022)
[6] https://www.ispreview.co.uk/index.php/2021/05/bt-raise-fttp-broadband-target-to-25-million-uk-premises.html (Accessed March 2022)
[7] https://www.ispreview.co.uk/index.php/2022/02/connect-fibre-get-funding-for-full fibre-rollout-in-east-of-england.html (Accessed March 2022)
[8] https://www.ispreview.co.uk/index.php/2021/12/lightspeed-broadbands-uk-fttp-rollout-gets-gbp60m-funding-boost.html (Accessed March 2022)
[9] https://www.ispreview.co.uk/index.php/2022/01/truespeed-start-2022-with-gbp100m-boost-for-uk-full fibre-rollout.html (Accessed March 2022)
[10] https://www.ispreview.co.uk/index.php/2022/01/borderlink-get-gbp164m-for-full fibre-rollout-in-north-england-and-scotland.html (Accessed March 2022)
[11] https://www.ispreview.co.uk/index.php/2021/12/toob-gets-gbp87-5m-funding-to-boost-uk-fttp-broadband-rollout.html (Accessed March 2022)
[12] https://www.ispreview.co.uk/index.php/2021/10/zzoomms-uk-gigabit-fibre-rollout-boosted-by-gbp100m-investment.html (Accessed March 2022)
[13] https://www.ispreview.co.uk/index.php/2021/09/cityfibre-secure-gbp1-1bn-to-fuel-uk-fttp-broadband-rollout.html (Accessed March 2022)

- Digital Infrastructure (DI) launching after receiving £100 million investment in 2021;[14]
- Gigaclear securing £525 million in debt funding in 2020;[15] and
- Hyperoptic securing £750 million in two deals in 2018;[16]

This shows that the context for the evaluation is hugely different to the context the UK faced when the LFFN programme was designed and launched.

1.3 Study aims

The key research questions for the evaluation of wave one projects as defined in the Invitation to Tender, are set out in the table below. These broad questions were further refined as part of an initial planning stage that was completed in May 2019, which involved the agreement of bespoke evaluation questions for each of the projects and evaluation approach. This report builds on a baseline, process and early impacts assessment that was completed in July 2019 and the interim evaluations which took place in 2020-2022.

This evaluation report focuses on both the short-term outcomes around coverage and connectivity, alongside the longer-term outcomes and impacts relating to public sector service provision.

Table 1.1: Key evaluation questions

Question area	Sub-questions
What outcomes can be attributed and were they as intended?	What is the range of local level outcomes from LFFN?
	What local level changes made a difference, were there other explanations?
	What, if any, were the wider benefits of LFFN?
	Were there any unintended outcomes?
How has LFFN achieved these outcomes?	To what extent is this affected by context or circumstance?
	How can LFFN achievements be enhanced?
What can we learn to improve future policy designs and implementation?	LFFN Programme
	Other government broadband infrastructure policy or programmes
	Other government future telecommunications infrastructure policy or programmes (including 5G)
	Demand-led delivery approaches

Source: BDUK Invitation to Tender

1.4 Methodology

The evidence compiled for this report comprised:

- **Review of Management Information and project documentation:** Documentation on the design and the operation of the project, such as business cases, contractual information provided by BDUK, information about premises passed and buildings connected, annual project and project close down reports have been reviewed to aid understanding of the projects objectives and progress made.

[14] https://www.digitalinfra.co.uk/latest-news/new-era-full fibre-network-operator-accesses-ps100m-investment (Accessed March 2022)
[15] https://www.ispreview.co.uk/index.php/2020/04/rural-isp-gigaclear-signs-525m-long-term-funding-strategy.html (Accessed March 2022)
[16] https://www.ispreview.co.uk/index.php/2022/02/hyperoptic-aim-gigabit-broadband-at-2-million-uk-homes-by-2023.html (Accessed March 2022)

- **Workshop with key stakeholders:** Prior to final evaluation fieldwork, workshops were held with each wave one project to establish whether alterations were needed in the Theory of Change, which outcomes to focus on and how to evidence wider benefits of projects.

- **Analysis of secondary data:** A range of secondary sources were examined to explore changes in the supply and demand for FTTP in areas nearby the assets brought into use for broadband deployment with LFFN funding. This drew primarily on the Connected Nations dataset published by Ofcom which provides postcode level data on superfast and ultrafast availability, FTTP coverage, connections and data usage. Further data was drawn from ThinkBroadband and the published FTTP roll-out plans of Openreach and other telecommunications suppliers to provide local and regional context for the project. Finally, a variety of additional Office for National Statistics data on the evolution of the local economy was drawn on to provide further evidence on local trends on employment growth and unemployment.

- **Semi-structured qualitative interviews with project stakeholders:** Consultations with stakeholders in the projects were undertaken in between September 2022 and April 2023 to gather views on how the projects had delivered against their intended objectives, the wider impacts achieved, barriers encountered and lessons learned. Stakeholders consulted included representatives of the local councils, BDUK project leads, public sector workers at upgraded buildings. Interviews covered developments in the delivery and management of the project, issues encountered in delivery, emerging demand for fibre services and connections and current and future impacts of the LFFN project on organisations and the local area. The report also builds on previous consultations undertaken for the interim and early impacts research, which included interviews with the same stakeholder groups as above. The findings from the interviews were analysed thematically.

- **Econometric analysis:** The most recent longitudinal Connected Nations dataset available at the time of research was for 2022. This data was used to explore the connectivity impacts of the projects to date in terms of FTTP / gigabit-capable coverage, ultrafast, download speeds, number of connections and data usage in the areas surrounding the LFFN build. The research team worked with BDUK to identify a suitable comparator area for the West Sussex Gigabit PSAT project. Several potential areas were selected based on an initial assessment of key characteristics. These were discussed with BDUK, to get a better knowledge of commercial roll out plans, government interventions. The comparator areas considered included:

  - Kent
  - Southampton
  - Suffolk
  - North Yorkshire

  The selected comparator area for the West Sussex Gigabit PSAT project was areas of Kent. A matching exercise was completed using postcode level data for the areas surrounding the West Sussex Gigabit PSAT project and areas of Kent. The matching exercise sought to find areas matching in characteristics including the details of the telecommunications infrastructure of the postcodes, including distance from the serving exchange as well as the availability of ultrafast and gigabit-capable connections in previous years. Postcodes that received gigabit vouchers were removed from the analysis, in both West Sussex and Kent.

More details of the selection of the counterfactual areas and the matching approach are provided in the technical annex.

1.5 Limitations

There are several limitations to the methodological approach described above. These are:

- **Connected Nations discontinuity:** The results make extensive use of the Ofcom Connected Nations datasets. The Connected Nations dataset is the most comprehensive dataset which provides data on broadband coverage and usage. Therefore, it has been used extensively in this research. However, there are some challenges when utilising the dataset to undertake longitudinal analysis. The network providers which provide information to inform the dataset are not consistent over time. Additionally, the methodology used to compile this data has evolved and there are inconsistencies between years. For the years 2018 and 2019, there are notable decreases in some postcodes in terms of broadband coverage. This was due to a change in the methodology used by Ofcom. This change related to the method used to identify premises, with the addition of more premises in areas diluting coverage in some places. This means that we are unable to clearly separate the impact of changes in the data to those impacts on coverage driven by LFFN. Ipsos initially conducted analysis on LFFN areas, which includes approximately 10,000 postcodes, which was then extended to all postcodes in the 2018 and 2019 cross sections. A fuller breakdown of the analysis conducted is available in the technical annex for the wave one reports. These challenges should be considered when interpreting the results presented.

- **Challenges with approach to measure impact:** The approach to measure the impact of the West Sussex PSAT project, described above, has some limitations. The first of these is that the geographic boundary to measure the impact of the project has been selected at 1km away from the network build. However, the project aimed to bring a new provider to the area who could provide greater gigabit connectivity across the whole West Sussex county. The geographic area was selected as the areas closer to the network build were anticipated to be the most likely to benefit from the project, and measuring the impact at a county level would be difficult (at a larger geographic level the impact would need to be much larger to be detectable in the analytical framework). Therefore, the analysis focuses on a smaller geographic area for practical reasons, while it should be acknowledged that some impacts of the project may be overlooked. A second limitation is the selection of a comparator area, which has been selected to closely match the characteristics of the project area. However, it was not possible to know at the point of selection what network provider commercial roll out plans were, which could mean that there were unobservable differences between the project and comparator areas.

- **Challenges with qualitative research:** There were challenges with undertaking the planned qualitative research for this evaluation. The main challenge was arranging interviews with stakeholders with a knowledge of the programme and how the project has supported their organisation. These included:

  - **Lack of contact details for indirect beneficiaries:** The initial evaluation plan aimed to explore the impact of the LFFN wave one projects on businesses in the areas surrounding the network build. The delivery of this project was delayed, as shown below, which means that take up of gigabit connections in project areas is still low. As a result, there are limited businesses that have upgraded to gigabit-capable connections at this stage. Secondly, the projects do not hold (and were not requested to collect) any details of businesses that

are utilising the network, creating an additional challenge for the researchers. The route to obtaining business contact details would have been through the businesses Internet Service Provider, which was not possible.

  - **Staff turnover:** There are several instances across the evaluation where key staff for stakeholders had left. This means new staff have started after the LFFN project had been completed, so they have no ability to compare to before.

- **Limitations of Management Information:** LFFN wave one projects faced some challenges in collecting useful Management Information. This was partially the result of the projects being set up as pilots with the aim of generating learning. The projects were set up at an early stage and did not receive instructions on the type of data that should be collected in order to monitor the project and assess its outcomes. Therefore, requests for this data were not included in project contracts, which meant the data was not collected or shared with BDUK. The data which was collected, such as length of fibre laid and premises passed were provided to BDUK. These issues were addressed by BDUK for subsequent phases of the LFFN programme delivery, but they did present challenges for the wave one evaluation.

- **Limitations given progress of projects:** The completion of the West Sussex PSAT project was slightly slower than anticipated. There were a variety of reasons for the slow progress which are discussed in this report. A challenge for the evaluation of the West Sussex Gigabit PSAT project is that, because of these delays, there are fewer years between the project completion and the final evaluation research than expected, meaning outcomes have had less time to materialise. Therefore, it is still possible that some of the longer-term outcomes and impacts for the projects could be realised in the future and it is still early to form conclusions about the wider impact of some projects. For example, take-up and economic impacts could be expected to be achieved four to five years post completion, meaning these would not have been fully achieved or be observable in the data at this stage. The initial evaluation plan, developed in 2018, did not account for these delays and also anticipated that the longer-term impacts of the programme may materialise sooner than has proved to be the case. Therefore, economic impacts should not be expected to be observed in this evaluation, but the assessment has been undertaken to provide a complete assessment of potential impacts of the intervention. The framework used here could be utilised in the future to investigate if the longer-term impacts are realised in future years. Further, the investment in the West Sussex PSAT project is relatively modest to produce a transformative economic impacts in West Sussex. Therefore, as well as the impacts being longer-term, it would also be expected that any impacts would be relatively small.

Table 1.2: Progress of projects

Project	Baseline (prior to build activity)	Project completed	Interim evaluation research	Years post network build / connections completion for final evaluation fieldwork
West Sussex	2017	2019 – 2020 (all buildings connected by Q3 2020/21)	Late 2020	2

- **Limitations of matching approach:** Undertaking a PSM to improve the comparability of the treatment and comparator areas has some limitations. These are that the approach is data intensive, it discards observations in both the treatment and comparator areas that are not matched. A reduction in the number of observations reduces the statistical power of the

regression models, despite increasing the comparability of the two areas. Therefore, large samples are needed, and the LFFN projects were delivered in relatively small local areas, meaning that the statistical power of the models is low. Secondly, the matching between treatment and comparator areas can only use variables where data exists, but there are factors which could influence broadband rollout and economic performance where data does not exist (such as broadband rollout plans). Therefore, the matching can only be as good as data availability.

- **Openreach Fibre First:** Openreach rolled out their Fibre First programme in many of the areas the LFFN programme has operated in and also in comparator areas. This presents a challenge for the analysis. The impact the LFFN programme had on Fibre First roll out is unclear. For example, would Openreach have brought forward FTTP deployments at this speed without the leadership displayed by BDUK in the LFFN programme? Therefore, for the econometric analysis, areas where the Fibre First Programme[17] has been rolled out have been excluded from the analysis.

These limitations relate to different strands of the research. However, by combining the findings from across the different research strands, the evaluation provides robust conclusions about the likely outcomes and impacts the West Sussex Gigabit PSAT project has contributed towards as of 2022.

1.6 Structure of the report

The remainder of this report is set out as follows:

- Section 2 provides the intervention logic for the project;
- Section 3 provides details of how the West Sussex PSAT project has been delivered;
- Section 4 provides the broadband outcomes for the West Sussex PSAT project;
- Section 5 presents the wider outcomes and impacts of the West Sussex PSAT project; and
- Section 6 presents the conclusions from the evaluation of the West Sussex PSAT project.

[17] The Fibre First programme from Opnereach delivered commercial roll out of gigabit-capable networks to over eight million premises between 2018 and 2022.

2 Intervention logic

This section presents an overview of the project, the rationale for investment, what the physical build work aimed to achieve, before discussing the expected longer-term outcomes and impacts of the West Sussex Gigabit PSAT project.

2.1 Rationale for intervention

West Sussex County Council developed a digital strategy covering the future of public services in the county. Following the development of this strategy, the council understood that county council and other public sector buildings would need to have access to ultrafast internet connections in the future, so that they could efficiently deliver public services. To ensure that public sector organisations have access to this infrastructure, the council sought to put a county wide network in place that would be available to public sector partners. This included NHS, schools, police, enabling our key partners to cost effectively secure gigabit connectivity, enhancing collaboration and innovation opportunities in public service delivery. Another key motivation for the intervention was the need for sustainable, resilient and future proof services that can provide fast speeds for public sector organisations at no extra cost, and in the longer-term could lead to cost savings.

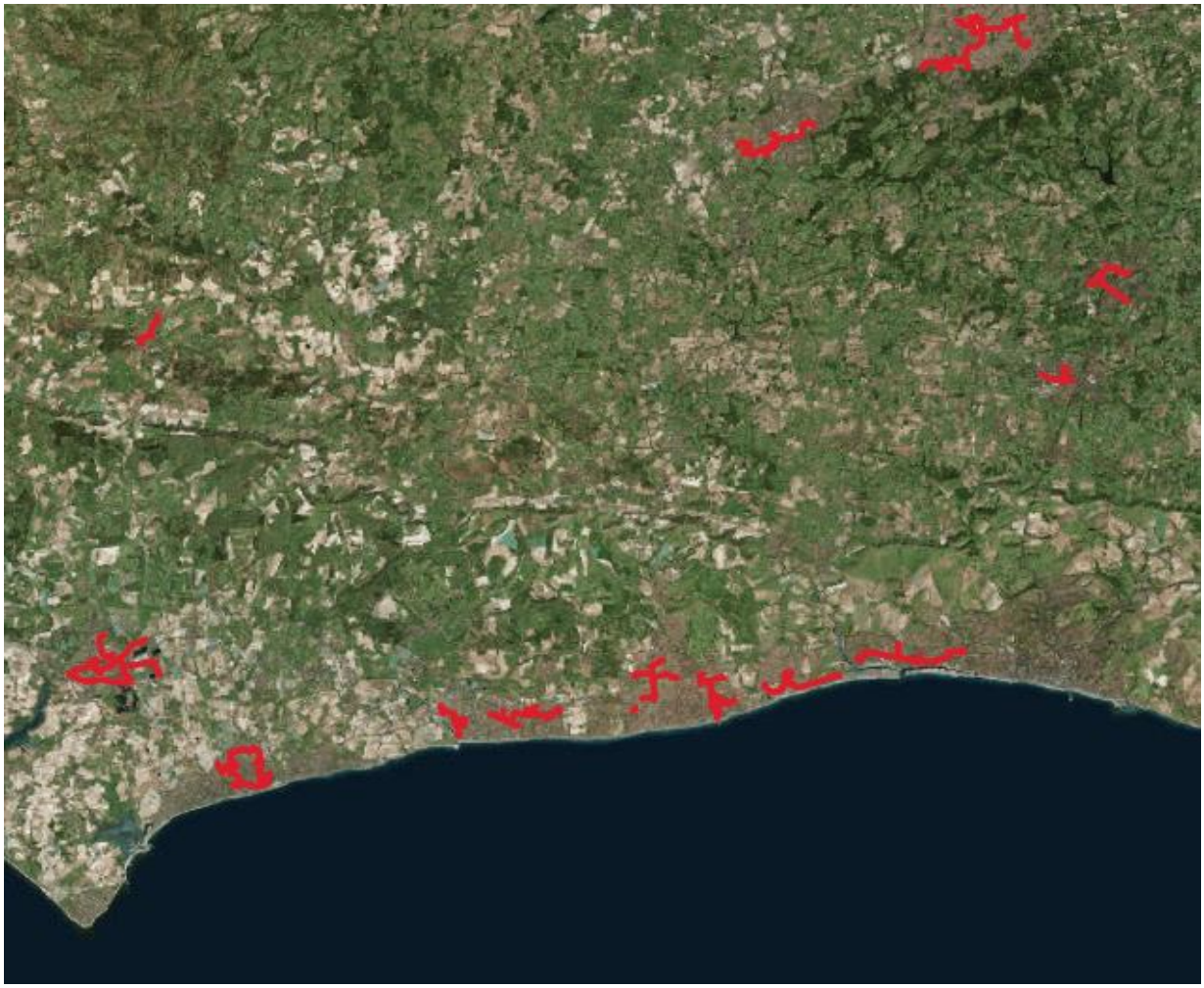
2.2 Description of the intervention

The West Sussex Gigabit PSAT project involved the delivery of 148 individual gigabit-capable connections to public buildings in the West Sussex area. This forms the first example of a PSAT project delivered through the LFFN programme. West Sussex county council initially provided 152 key council buildings to be connected to the fibre network with the expectation that the project is cost-neutral for West Sussex county council and district borough partners in the long-term, although the number of buildings was reduced during the life of the project due to challenges accessing some buildings.

BDUK's original wider aim of the project, in addition to those outlined in Section 2.1, was to improve public services for local residents and tax payers and ensure that the services would be delivered more efficiently. The project also aimed to attract new broadband providers to the area, through publicly funded opportunities and reducing the cost of subsequent build activity, and through this increase broadband coverage in West Sussex. Finally, the project also aimed to generate significant learnings in the area around delivering infrastructure projects and how to utilise enhanced broadband coverage.

In 2018, CityFibre were contracted through a bespoke procurement framework to install dark fibre in strategic locations connected to the public buildings. West Sussex County Council capitalised its current recurring costs for infrastructure in order to procure the dark fibre infrastructure and it is anticipated that future cost savings could be achieved as existing public sector contracts cease, freeing more of the estate to move to the new network. The figure below shows the location of the LFFN funded network build.

Figure 2.1: Planned fibre build as part of the West Sussex Gigabit PSAT project



Source: West Sussex Gigabit PSAT project Full Business Case

2.3 Theory of change

This section outlines the West Sussex Gigabit PSAT project and the anticipated process by which it was expected to deliver its anticipated impacts. Ipsos UK developed this framework in 2019 during the planning phase of the evaluation, and BDUK agreed the evaluation framework. This was done following reviews of project documentation, relevant literature, and secondary data, as well as a series of consultations with BDUK, West Sussex county council and other key stakeholders, review of project documentation, literature review and review of secondary data.

2.3.1 Inputs

For the West Sussex Gigabit PSAT project, the most significant expected input was capital investment. The capital investment came from BDUK, and similar capital investment would be provided by West Sussex county council. Alongside the capital investment, staff time and expertise from within BDUK and West Sussex county council would be used to deliver the project.

There was no private sector investment specified in the West Sussex Gigabit business case, but it was anticipated by BDUK that the project would lead to private investment in the form of spill over build. This would also include maintenance costs for the upkeep of the funded network build.

2.3.2 Activities

The key activities outlined for the West Sussex Gigabit PSAT project were:

- Consultations with stakeholders to identify public buildings: The project, and fibre connectivity, would be discussed with local stakeholders to develop interest in the project and identify public sector buildings which could be included in the network.

- Procurement and due diligence: a procurement exercise using the Official Journal of the European Union would be undertaken to appoint a contractor to carry out the civil engineering work;

- Obtaining of wayleaves: the local council and CityFibre would be responsible for the obtaining of wayleaves and other permits required for the work to be completed;

- Laying of fibre cable ('dark fibre'): The fibre cable would be laid to ensure fibre connections could be provided.

- Inspection of fibre: CAPITA would complete inspections of the public sector buildings sites on behalf of West Sussex county council, in preparation for the core network being completed and the installation of connections to the premises, and an inspection of the quality of the core network;

- Connecting public sector buildings to the fibre network: The public sector buildings involved in the project would be connected to the fibre network.

2.3.3 Outputs

The initial stated outputs of the West Sussex Gigabit PSAT project were:

- Connect approximately 150 public buildings to the network: The project aimed to provide fibre connections to around 152 public sector buildings – however, this was reduced to 148 connections over the life of the project. Note that the public buildings were not required to take-up a gigabit-capable service as a result of the project, but the connection must be fibre and capable of being 'lit' in the future to provide gigabit services.

- Pass 25,000 premises: The network aimed to pass within 50m of 2,000 premises and within 200m of 25,000 premises.

- Lay cable: The project involved laying new fibre cable in West Sussex, to connect the approximately 150 public buildings to the network. This 'dark fibre' could then be lit to provide services to public buildings.

- Develop procurement framework: West Sussex county council developed a new procurement framework to reduce transaction costs for other local bodies in the area. An output of the project would be to build capacity within the local public bodies to procure similar services in the future.

2.3.4 Outcomes and impacts

The West Sussex PSAT project did not specify longer-term outcomes and impacts, however BDUK developed some expected outcomes during an evaluation scoping exercise. BDUK expected the project to lead to several medium and longer term outcomes and impacts that can be summarised into the following categories:

- **Connectivity outcomes:** the anchor network was expected to reduce the marginal cost of further fibre investment, meaning new areas will likely become commercially viable for suppliers. These additional investments were expected to encourage suppliers to make

additional investments in fibre connectivity, increasing the size of the network in the medium and long-term.

  - Linked to the above, end users would expect **improved speed and reliability** in their connectivity service. More extensive FTTP deployments can be expected to produce a range of network benefits in terms of increased speeds, latency, and resilience. FTTP also has potential to reduce maintenance costs.

  - On the **demand side**, direct take up effects are expected to arise as public sector organisations take up faster connections through the new network. Businesses and residents could subsequently benefit from spill over build. The take up effects that public sector organisations can experience are better data storage and processing power due to access to cloud-based technologies. This also allows for faster transmission of files and records, leading to productivity gains. Lastly, organisations can support more employees to telework, or hybrid work, which increases wellbeing and productivity.

- **Public sector impacts:** The West Sussex Gigabit PSAT project aimed to provide fibre connections to approximately 150 public buildings through the fibre network.[18] These enhanced connections are expected to provide an opportunity to deliver public services more efficiently.

- **Downstream economic impacts:** Wider access to FTTP connections was expected to lead to increases in firm productivity, although this was not included in West Sussex county councils business case. By increasing firms' consumption of telecoms services or the efficiency of telecoms use, it could potentially raise average labour productivity. In the medium term, adoption of FTTP may raise productivity in other ways. For example if firms have access to higher quality labour inputs, or if they can develop more efficient business models.

  - Market entry: By providing easier access to FTTP connections, new firms which require reliable and fast internet connections, such as digital businesses, may be able to start up close to the fibre network built in West Sussex.

  - Business relocations: The availability of a full fibre network in West Sussex is also expected to lead to a range of firm relocation effects. The increased desirability of areas with a full fibre network is expected to attract businesses to these areas and in particular young start-ups dependent on full fibre connectivity or similar technologies.

  - Firm expansions and market entries: As a result of the provision of FTTP, connections could, in turn, create jobs, specifically in digital industries. This could also reduce unemployment in these areas.

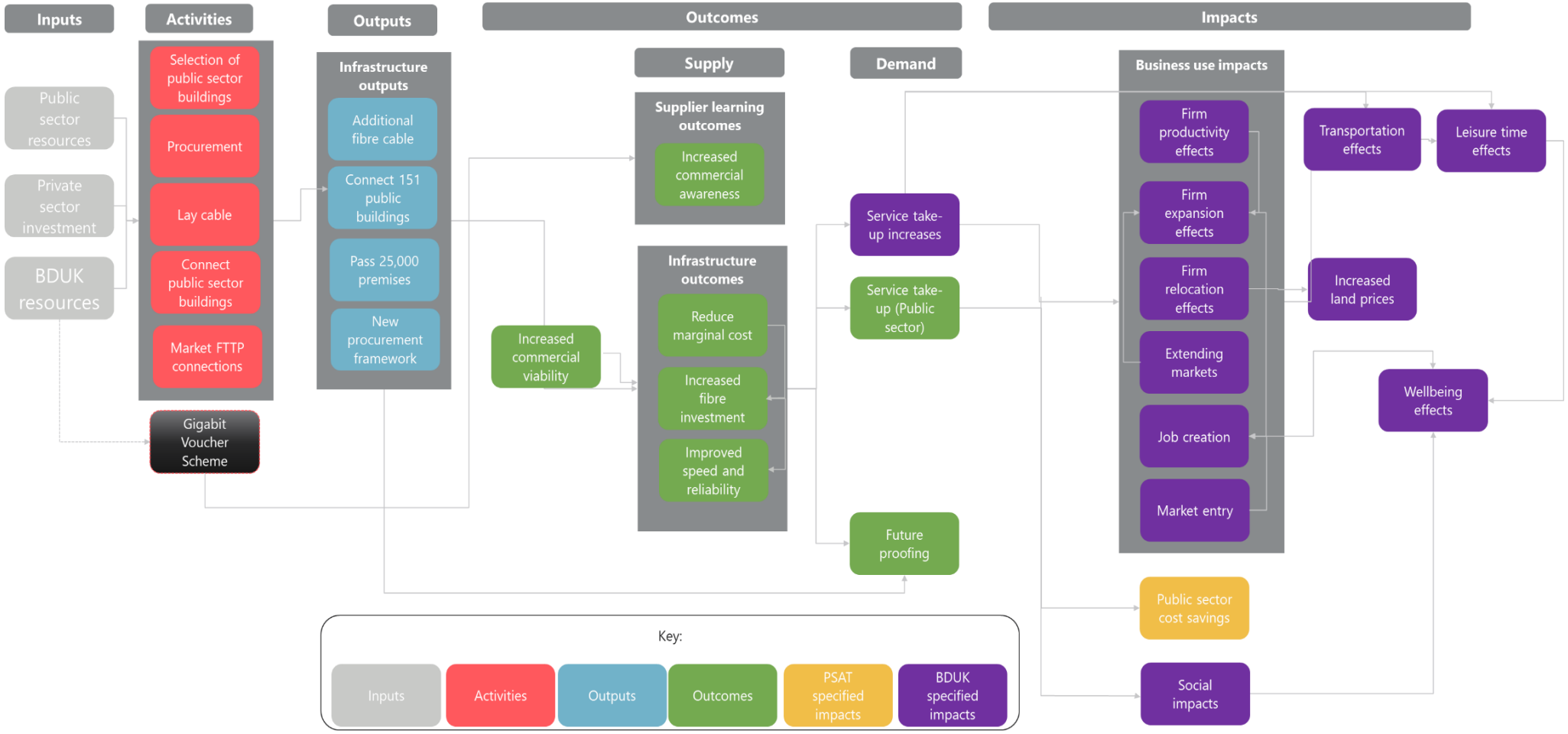
- **Social and environmental:** Specific social and environmental effects were not to be achieved within the evaluation period, and have not been included in the Theory of Change. However, as the project has the potential to lead to spill over FTTP build, general social and environmental impacts could potentially be anticipated. This may include reduced commuting enabled by remote working, increases in leisure time or reducing the digital divide in the

[18] The original project plan aimed to provide connections to 151 public sector buildings. However, due to descoping (discussed further in Section 3), the number of public sector buildings to be connected was reduced to 143.

community through, for example, digital education programmes. The latter stages of the evaluation will explore the extent to which the project led to these types of impact.

A summary of the initiative's pathways to impact, outlining how the inputs and activities are expected to translate into immediate outputs, short and medium-term outcomes and longer-term impacts, is set out in Figure 2.2.

Figure 2.2: Logic model for the West Sussex Gigabit PSAT project



3 Project Delivery

This section discusses the physical works and subsequent activity which was required to deliver the West Sussex Gigabit PSAT project. It presents the expenditure, an assessment of the physical works and the procurement framework.

3.1.1 Network build

The total project cost was £4.7 million, which was the initial budget allocated to the project. This was used to lay 104,435m of fibre by July 2019 by CityFibre and was followed by the process of installing connections to the public buildings. The new fibre used a combination of new civil work and use of Physical Infrastructure Access. The use of Physical Infrastructure Access reduced costs and was seen to have provided an efficient route to getting the network setup quickly where possible. However, it was not possible to use Physical Infrastructure Access as much as the project desired due to blocked ducting. This meant that the project required more civil work than hoped which had cost and delivery time implications.

The network itself was identified in the Management Information to have passed within 200m of 73,658 properties, both commercial and residential. The vast majority of these were residential with 64,087 properties whilst the remaining 9,571 were commercial. A total of 19,458 of the residential premises passed were within 50m compared to 4,340 commercial premises within 50m of the network.

The connection of public buildings was finalised in Q3 of 2020/21. The Management Information provided to BDUK indicated that 137 public sector buildings had been provided with fibre connections, providing 148 connections. Nine premises have two connections, and one building has three connections, for added resilience. These were spread over a range of areas as illustrated below.

Table 3.1: Public sector building locations connected by area

Location	Number of buildings connected	Number of connections
Bognor Regis	20	21
Chichester	13	16
Crawley	20	21
Haywards Heath	6	9
Horsham	17	18
Lancing	6	6
Littlehampton	10	11
Midhurst	2	2
Rustington	12	12
Shoreham	7	7
Worthing Central	14	15
Worthing Swandean	9	9
Worthing West	1	1
Total	137	148

Source: BDUK MI

However, there were some challenges with the delivery of the network and providing connections to the buildings. The key challenges were:

- **Testing and quality assurance:** As part of the build, the supplier was required to test the infrastructure installed to assure that it achieved the specification required. However, this highlighted some issues. Most notably, a problem was identified with the compliance of fibre laid for around 65 sites. This was detected during testing, and required significant remedial work to correct. This in part accounts for some of the delay between the fibre being laid and the buildings intended to receive connections beginning to receive enhanced connectivity. The supplier and its subcontractors struggled to adequately provide resource to complete this remedial work, and this led to issues with the supply of fibre for the project to be completed, as the civil work continued into the Covid-19 pandemic where supply chains were blocked. This has meant that some snagging work had not been completed at the time of research in 2022,(for example correcting pathing made uneven by the civil works, although the most significant issues were resolved. The remedial work also had a knock-on effect in the timing of connections being provided to public sector buildings.

- **Wayleaves:** There were issues around securing wayleaves for some sites, which led to delays in connecting some buildings or led to some buildings being descoped. This was particularly acute for NHS sites that had been built using public private partnerships. BDUK's barrier busting team offered to support the project. However, this team was set up after most of the issues had been resolved by West Sussex county council, therefore the project was not able to utilise the support.

- **Change requests:** In the early stages of the project, there was a challenge relating to change requests in design build packs, which led to further management issues within the project relating to funding milestone payment deadlines. However, communication between West Sussex county council and the supplier improved following the change requests, and the improvement in communications helped support the successful delivery of the project.

3.1.2 Procurement framework

Alongside the initial connections being delivered in the county through the LFFN project, Adur and Worthing, Chichester, Crawley, Horsham and Arun councils have approved the use of the framework put in place during the initial phases of projects to procure further connections for additional public buildings in the area. Buildings which could be connected included libraries, adult social care settings, sheltered housing, leisure facilities, CCTV and fibre points. The procurement framework had a maximum value of £5 million, and it was reported by stakeholders that the framework was subsequently used to its maximum value to provide further gigabit-capable network in West Sussex.

The use of the procurement framework was highlighted as a key success of the project, as it allowed West Sussex county council to leverage the project to procure further public sector gigabit-capable connections using the existing framework.

4 Broadband coverage in the local area

4.1 Number of network providers

The Connected Nations dataset does not break down coverage by supplier, making it difficult to establish how far changes in coverage can be linked to the scheme or attributed to individual suppliers with that dataset. ThinkBroadband provides a breakdown by supplier and is more up to date than Connected Nations and was used to provide some insight into how far changes in gigabit-capable coverage could have been driven by different suppliers in West Sussex, and whether suppliers were utilising the anchor network.

At the time of baseline research in 2019, and early impacts research in 2020, the only major network provider offering gigabit-capable networks operating in and around these areas was Openreach. According to Connected Nations, Openreach had coverage in Chichester, Bognor Regis, Worthing, Burgess Hill, Haywards Heath, Horsham and Crawley. However, this coverage was not extensive. There was limited coverage evident in Crawley, Burgess Hill and Horsham by OFNL as well as the occasional spot of Hyperoptic coverage in 2020.

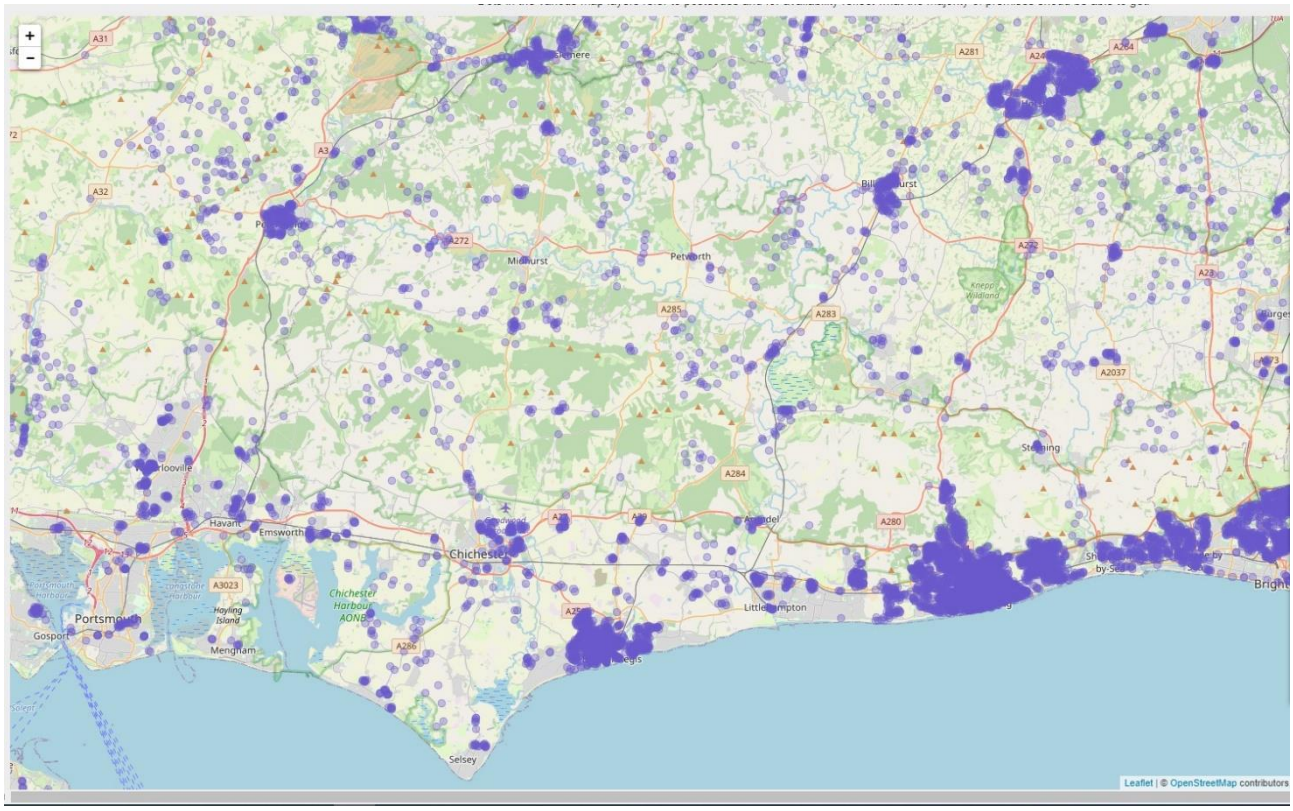
As of January 2023, the coverage of gigabit-capable networks in the areas covered by the West Sussex Gigabit PSAT project had increased significantly since 2020. There was evidence of at least 11 network providers offering gigabit-capable services in the delivery or adjacent area. CityFibre, the providers of the West Sussex Gigabit project had significant coverage in Worthing, Bognor Regis and Chichester. Other new entrants included Box, with a presence in Westergate and Southwater. FW Networks/Hey Broadband had also built in Billingshurst, Southwater and Horsham, and Trooli in the Storrington area.).

The coverage of Openreach, the one network provider to offer significant gigabit-capable coverage in the area, has also increased markedly. There have been significant increases in coverage in areas such as Worthing, Bognor Regis and Chichester. Virgin Media also now provide gigabit-capable services across Worthing and Chichester, whereas in 2019 their network in West Sussex did not offer gigabit speeds. OFNL and Hyperoptic have not significantly increased their footprint between 2020 and 2023, with small pockets of coverage in West Sussex.

This suggests that there has been an increase in competition among network providers in the West Sussex area. This could lead to an increase in products available to customers which would lead to improved consumer outcomes in the area.

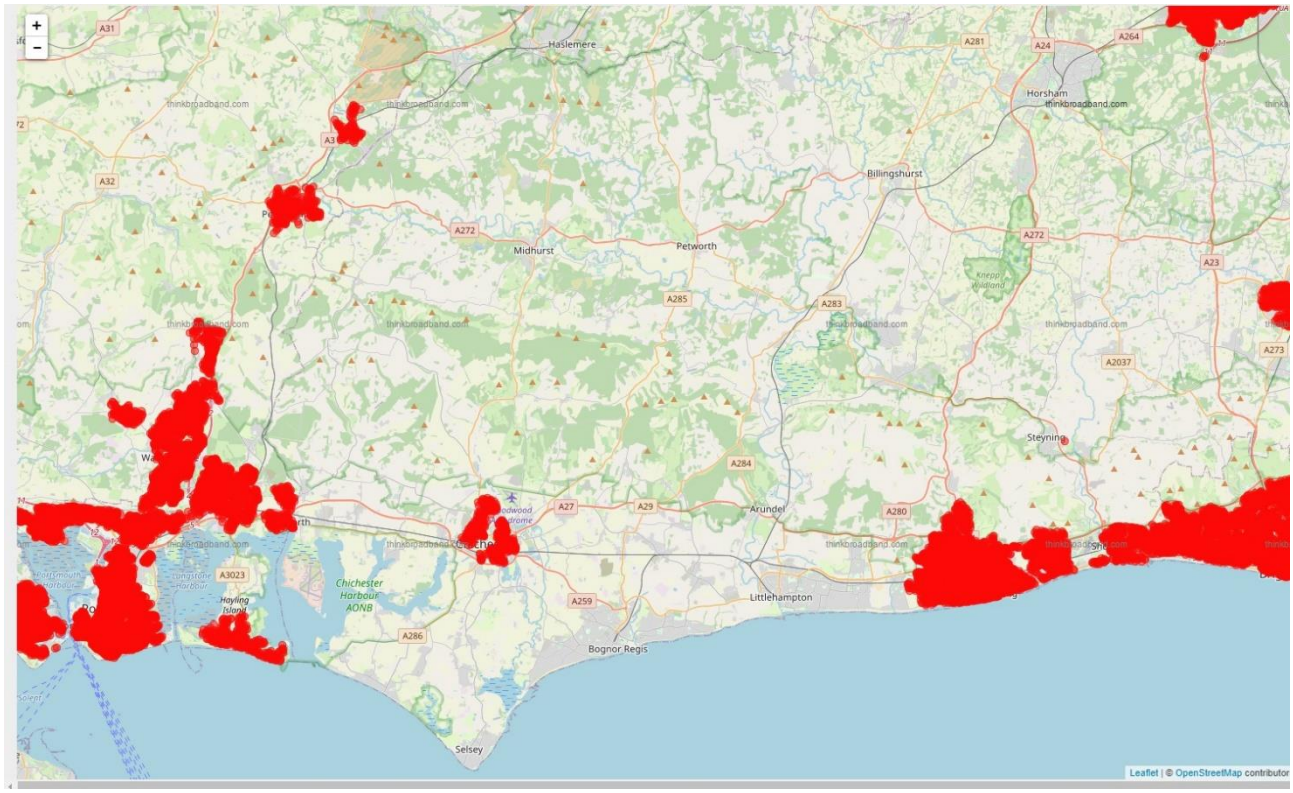
The figures below present the coverage of the network providers with the largest amount of coverage in the West Sussex region in January 2023.

Figure 4.1: Openreach native FTTP coverage in West Sussex, January 2023



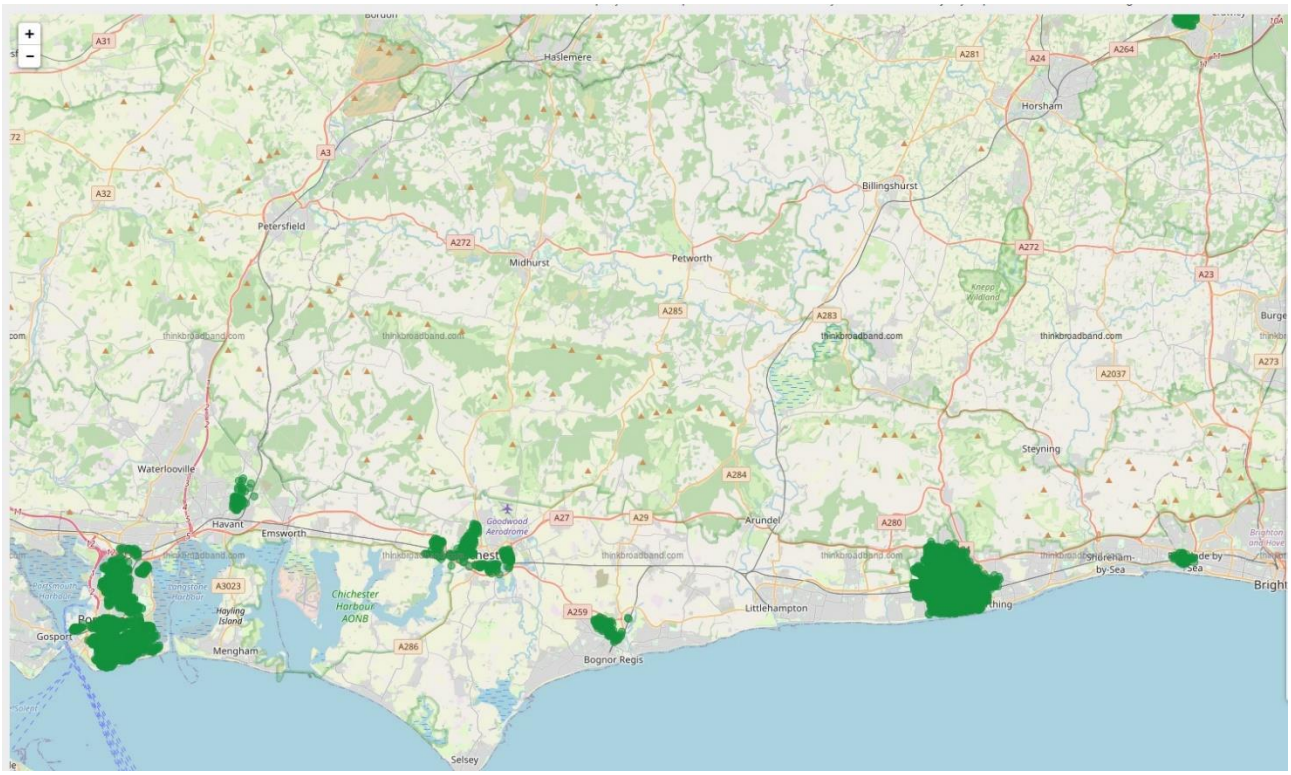
Source: ThinkBroadband

Figure 4.2: Virgin Media coverage in West Sussex, January 2023



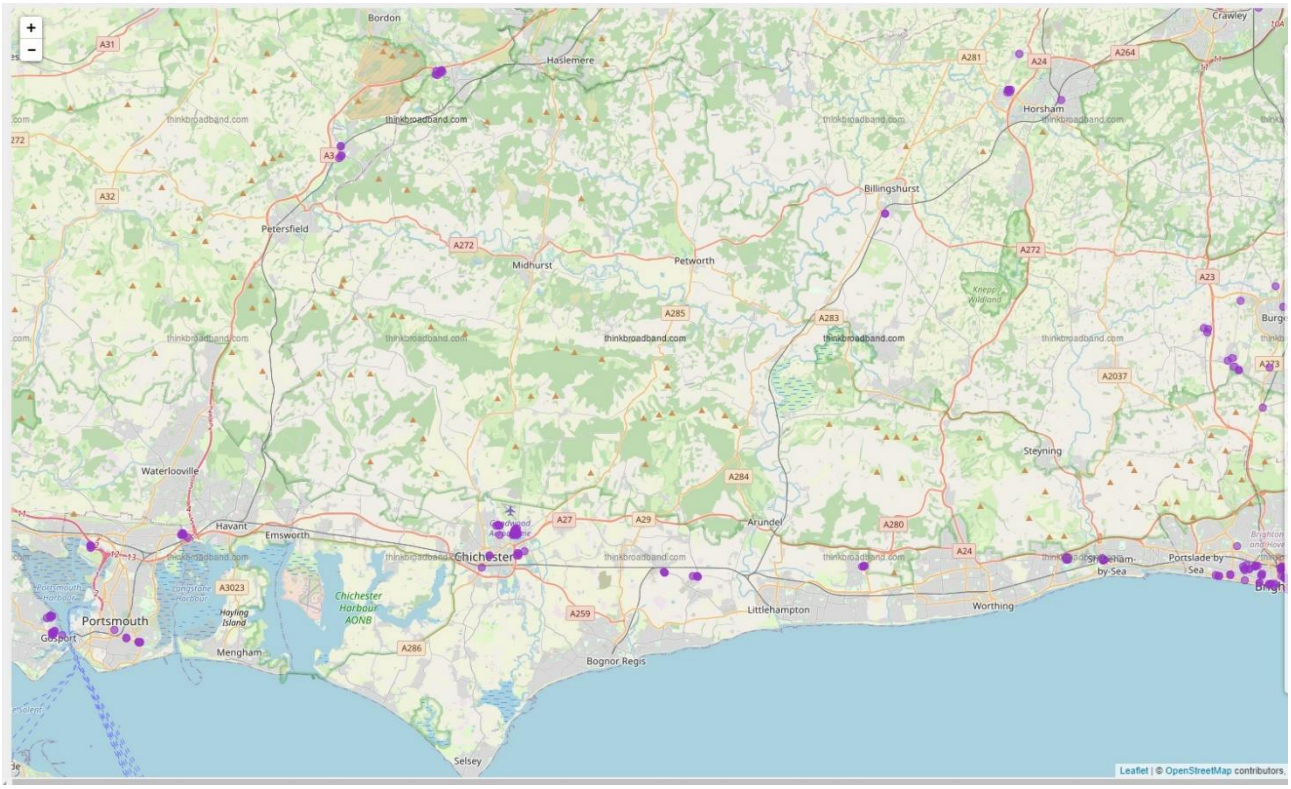
Source: ThinkBroadband

Figure 4.3: CityFibre coverage in West Sussex, January 2023



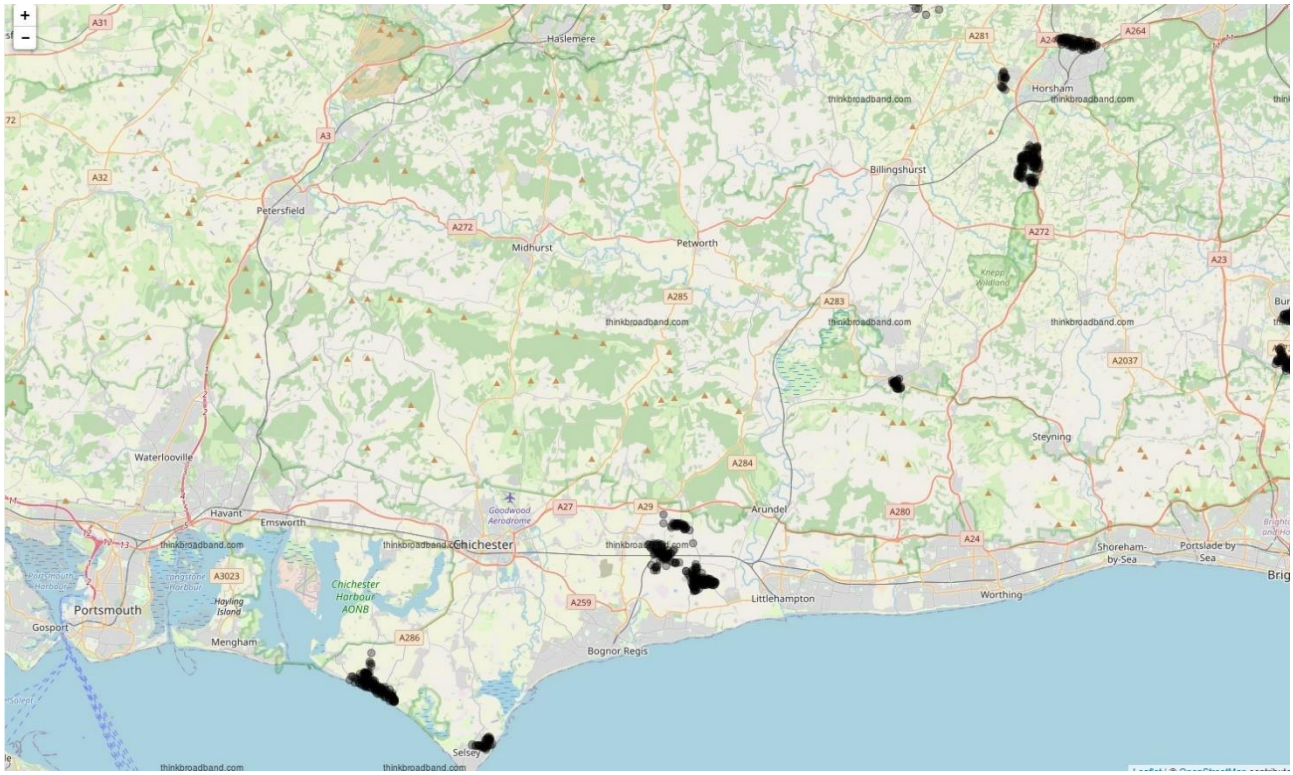
Source: ThinkBroadband

Figure 4.4: Hyperoptic coverage in West Sussex, January 2023



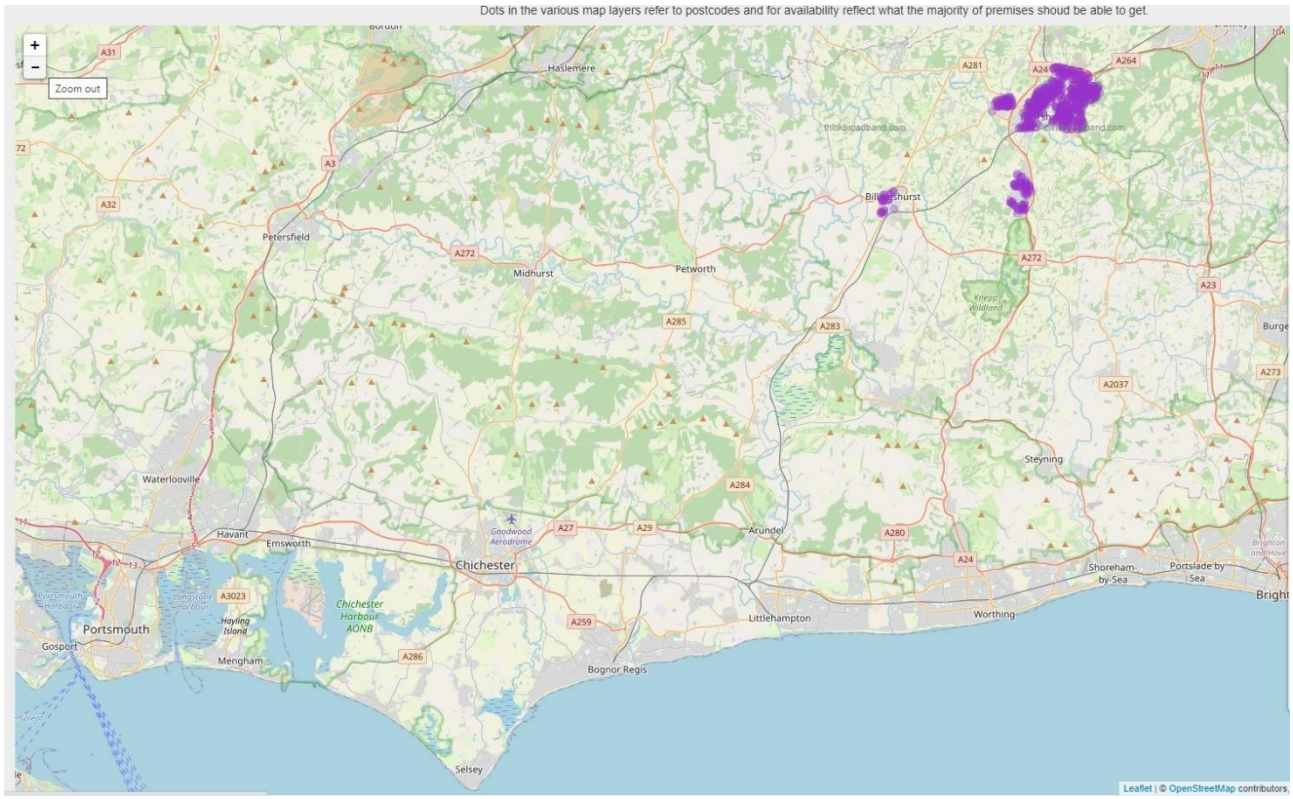
Source: ThinkBroadband

Figure 4.5: Box Broadband coverage in West Sussex, January 2023



Source: ThinkBroadband

Figure 4.6: FW Networks / Hey Broadband coverage in West Sussex, January 2023



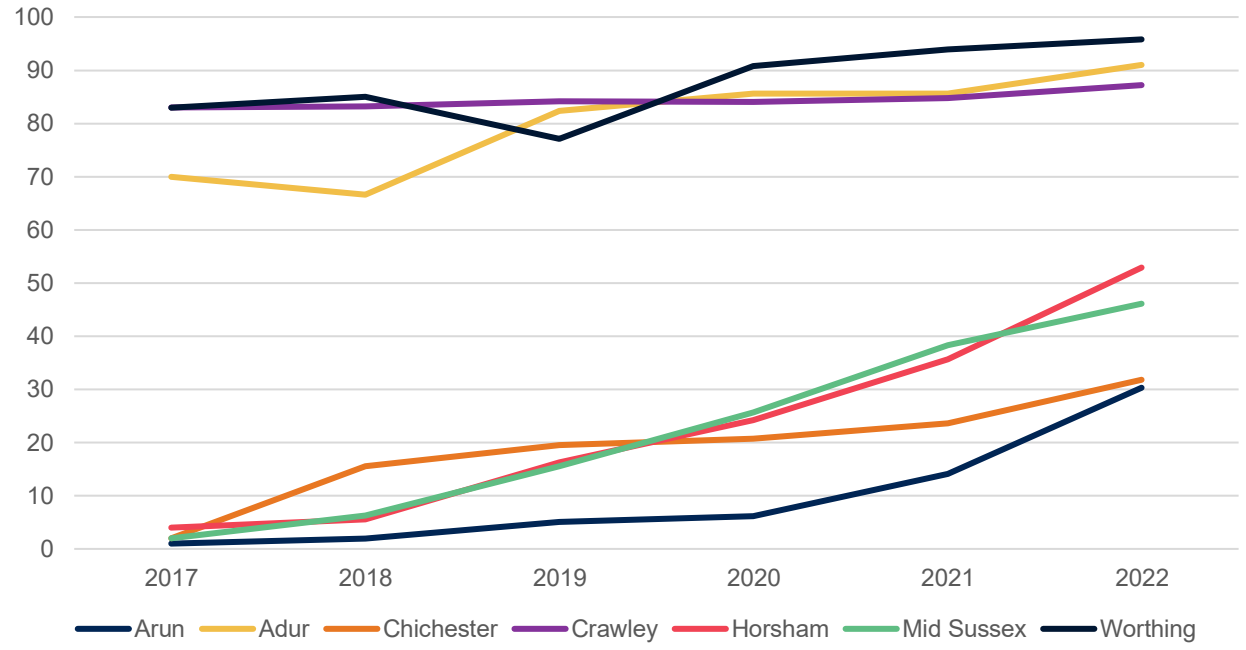
Source: ThinkBroadband

4.2 Broadband coverage

The Connected Nations dataset provides data on broadband coverage at the postcode and local authority level. This allows a detailed analysis of how broadband coverage in areas close to the LFFN build and across the wider region has altered over time. However, there have been some changes to the Connected Nations dataset which impacts upon this analysis. In 2020, Connected Nations introduced gigabit-capable coverage as a new variable, whilst removing the FTTP variable from their publicly available data. FTTP and gigabit-capable are similar, in that all FTTP coverage is gigabit-capable, however the gigabit-capable variable also includes other technologies that deliver gigabit-capable speeds but are not FTTP, such as cable. The analysis below presents the FTTP and gigabit-capable variables together as a single time series, but the change in definition explains the large increase in 2020.

The coverage of ultrafast and gigabit-capable across the West Sussex area was explored between 2017 and 2022. This is because the West Sussex PSAT project and subsequent procurement framework aimed to increase gigabit-capable coverage across the West Sussex region. As presented below, there has been a large increase in ultrafast coverage all local authority areas in West Sussex, but there are two distinctive groups of local authorities. These are Arun, Adar and Crawley, where ultrafast coverage was already high in 2017 and is now around 90 percent; and the remaining local authority areas, where ultrafast coverage was negligible in 2017 but coverage has grown to between 30 and 55 percent.

Figure 4.7: Ultrafast broadband coverage in local authorities in West Sussex, 2017-2022



Source: Connected Nations, Ofcom

A comparator group for West Sussex was selected from areas of Kent. At a local authority area level, the baseline position in Kent is similar to in West Sussex, with six local authorities having negligible coverage, with the remaining local authorities having some ultrafast coverage (ranging from 20 percent to 76 percent. However, the evolution of ultrafast coverage follows a different route to that observed in West Sussex. Those with negligible coverage see a larger rise in ultrafast coverage than in West Sussex, to between 40 and 73 percent coverage in 2022. Those with higher initial levels of ultrafast coverage also saw large increases in ultrafast coverage, to between 64 and 85 percent.

The table below presents more details of the evolution of ultrafast and gigabit-capable broadband coverage in local authority areas in West Sussex and Kent. This shows that for gigabit-capable coverage, both areas were in a similar position in 2017, and that the increase in gigabit-capable coverage has been broadly similar, although slightly below the national increase.

Table 4.1: Change in ultrafast and gigabit-capable coverage in local authorities in West Sussex and Kent, 2017 to 2022

Area	Ultrafast coverage 2017 (%)	Change in ultrafast coverage from 2017 to 2022 (p.p.)	FTTP / Gigabit-capable coverage 2017 (%)	Change in FTTP / gigabit-capable coverage from 2017 to 2022 (p.p.)
Adur	70	21	0	90.1
Arun	1	29.3	2	27.2
Chichester	2	29.8	1	29.5
Crawley	83	4.2	1	85.6
Horsham	4	48.9	4	46.1
Mid Sussex	2	44.1	2	43.4
Worthing	83	12.8	1	94.7
West Sussex average	*35*	*27.2*	*1.4*	*59.5*
Dover	0	61.7	0	61.7
Thanet	0	63.9	0	63.8
Folkestone	1	57.4	1	57.3
Ashford	37	26.7	1	61.7
Canterbury	0	42.8	0	42.8
Swale	27	42.6	1	66.7
Maidstone	41	31.6	1	68.4
Tunbridge Wells	0	72.6	0	69.8
Tonbridge	25	49.4	2	70.1
Sevenoaks	20	46	1	64.9
Dartford	41	33.6	3	70.1
Gravesham	54	23.4	1	72.2
Medway	76	9	0	82.4
Kent average	*24.8*	*43.1*	*0.8*	*65.5*
UK	*36.2*	*33.8*	*2.4*	*77.6*

Source: Connected Nations, Ofcom

The figures below present the evolution of superfast[19], ultrafast[20] and FTTP / gigabit-capable[21] coverage in the areas within 1km of the LFFN funded network build in West Sussex. This shows that prior to the intervention, superfast coverage in West Sussex was above the national average, and ultrafast coverage was broadly in line with the national average, increasing from just above zero to around 40 percent by 2017. Ultrafast broadband coverage has continued to increase steadily since 2017, to 66 percent in 2022, slightly above the national average.

[19] Superfast broadband connections provide download speeds from 30 Mbps up to 300 Mbps.

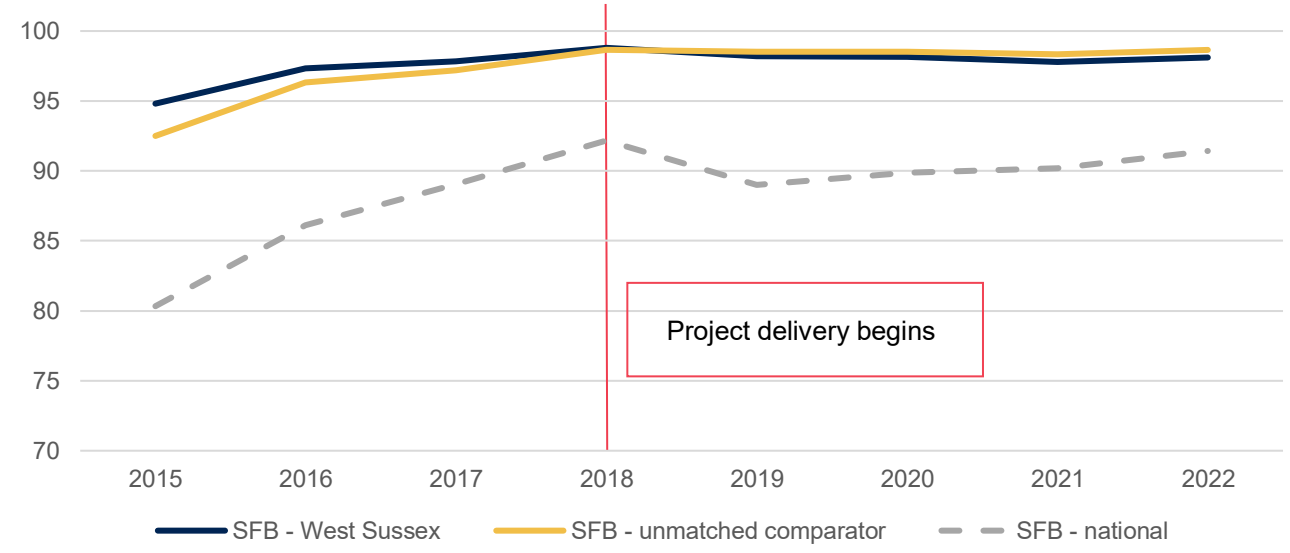
[20] Ultrafast broadband connections provide download speeds of over 300 Mbps.

[21] FTTP / Gigabit broadband connections provide download speeds of over 1,000 Mbps.

Gigabit-capable coverage prior to the intervention was broadly in line with the national average, at around five percent in 2018. Coverage in West Sussex then fell below a national average until 2021, but in the last year coverage has increased to meet the national average at around 64 percent.

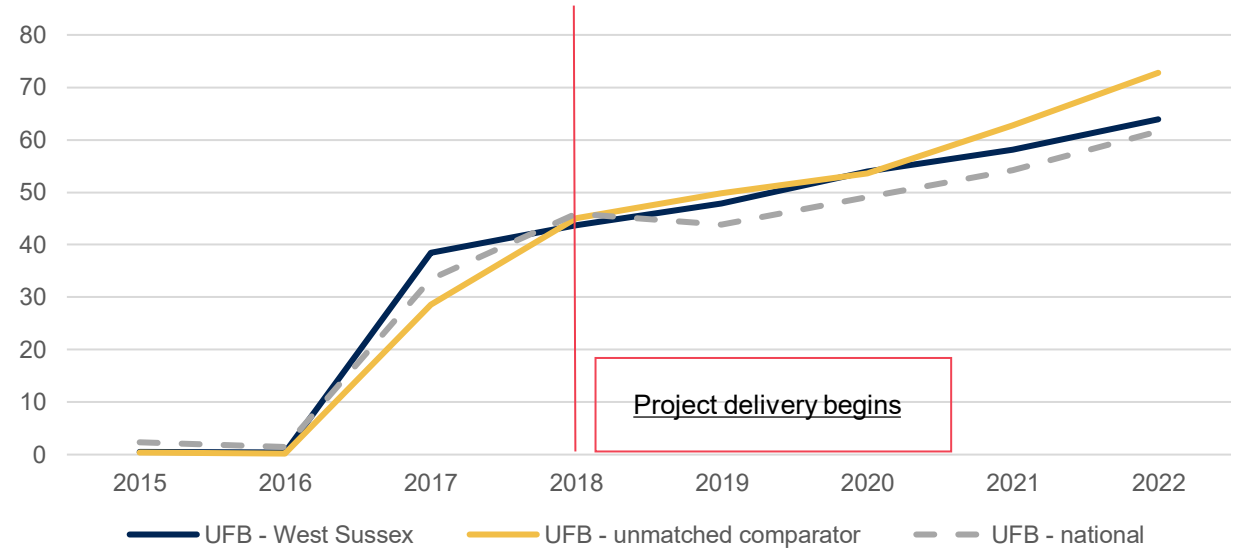
A comparator area for the West Sussex LFFN project has been formed using postcodes in Kent (for more details see the technical annex). The evolution of superfast, ultrafast and gigabit-capable networks in the comparator area is also presented in the figures below. This shows that the evolution of superfast, ultrafast and gigabit-capable networks in the areas of Kent closely matches that of West Sussex, although from 2020 to 2022 the coverage of ultrafast and gigabit-capable networks in Kent has grown at a faster rate than in West Sussex. Ultrafast capable coverage is now nine percent higher in Kent, and gigabit-capable coverage is ten percent higher.

Figure 4.8: Superfast broadband coverage within 1km of the LFFN network build in West Sussex, nationally and in Kent comparator area, 2015 - 2022



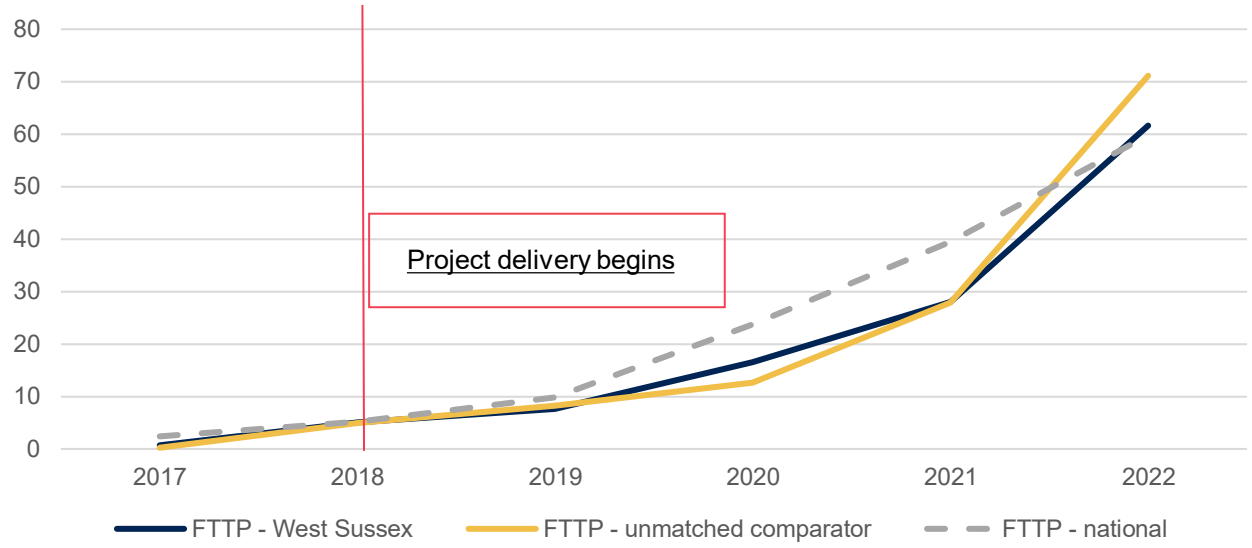
Source: Connected Nations, Ofcom

Figure 4.9: Ultrafast broadband coverage within 1km of the LFFN network build in West Sussex, nationally and in Kent comparator area, 2015 - 2022



Source: Connected Nations, Ofcom

Figure 4.10: Gigabit-capable / FTTP broadband coverage within 1km of the LFFN network build in West Sussex, nationally and in Kent comparator area, 2015 - 2022



Source: Connected Nations, Ofcom

The change in ultrafast and gigabit-capable networks has also been analysed at different distances from the network build. The table below presents the findings from this analysis, which shows that the biggest changes in coverage are seen further away from the LFFN funded network build, particularly for gigabit-capable networks.

Table 4.2: Percentage point change in ultrafast and gigabit-capable / FTTP coverage in West Sussex areas between 2018 and 2022 by distance from the anchor network

Distance from anchor network	Change in Ultrafast availability	Change in Gigabit-capable availability
Within 50m	20.63	43.76
50m to 100m	22.07	51.26
100m to 150m	21.53	56.47
150m to 200m	22.29	55.36
200m to 500m	23.37	60.32
500m to 1000m	22.75	66.48

Source: Connected Nations, Ofcom

4.2.1 Impact of the West Sussex PSAT project

To provide a clearer view of the impact of the LFFN Wave 1 project in West Sussex on gigabit-capable coverage, postcodes within 1km of the LFFN network build were compared to similar postcodes sharing similar characteristics in Kent. More details can be found in the technical annex of the LFFN wave one evaluations.

An econometric analysis was undertaken using a fixed effects analytical framework. For more details of the analytical approach please see the technical annex of the LFFN wave one evaluations. The

analysis comparing gigabit-capable and ultrafast availability in areas within West Sussex to matched areas in Kent found that the LFFN programme had a statistically significant impact on ultrafast and gigabit-capable coverage in the areas surrounding the West Sussex Gigabit PSAT project. This analysis found that there was a slight decrease of 0.8 percentage points for gigabit-capable networks and of 4.2 percentage points for gigabit-capable networks.

One explanation for these results could be that the subsidised coverage in West Sussex has discouraged other network providers from building in the adjacent area as much as they would have done in the absence of the project. Consultations with network providers suggests that smaller network providers attempt to build gigabit-capable networks in areas where they would face no, or minimal competition from other small providers. Therefore, the presence of CityFibre may have discouraged smaller network providers from building in the adjacent area. Alternatively, these results could be due to the way the network was built. This project sought to maximise public sector building connections, rather than the number of premises passed. Commercial plans are more likely to target the maximum number of premises passed for the lowest cost. Therefore, commercial build could have faster roll out within an area. Additionally, the network provider delivering the contract may have concentrated their resources on commercial contracts outside West Sussex, meaning a slower roll out of the publicly funded network in West Sussex.

This estimated impact on gigabit-capable coverage around the LFFN build area is similar to those seen in two other project areas, where there was not a positive impact on gigabit-capable coverage. Only the Trans Pennine Initiative demonstrated a positive impact on coverage, and this could be due to the urban areas the route passes through.

4.3 Take-up

The Connected Nations dataset provides data on broadband take-up at the local authority and postcode level (the number of connections taken up). This allows a detailed analysis of how broadband coverage in areas close to the LFFN build has altered over time.

The Connected Nations data does not suggest widespread take-up in any local authority area of West Sussex. In 2022, the highest level of take-up was observed in Crawley and Worthing, with just over ten percent of premises having an ultrafast broadband connection. However, take-up was lower in other local authority areas, such as Arun and Chichester, where take-up was around two percent. Take-up of ultrafast broadband connections has increased in West Sussex from negligible levels in 2017 and 2018.

This is a similar pattern as is observed across Kent, where a comparator area for the West Sussex PSAT project has been selected from. Again, the highest levels of take-up are around ten percent of premises, in Dartford, Medway and Tonbridge Wells, but lower take-up in other local authority areas, such as Canterbury. The table below presents the changes in take-up of ultrafast take-up in local authorities in West Sussex and Kent.

Table 4.3: Change in take-up of ultrafast broadband connections in local authorities in West Sussex and Kent, 2017 to 2022

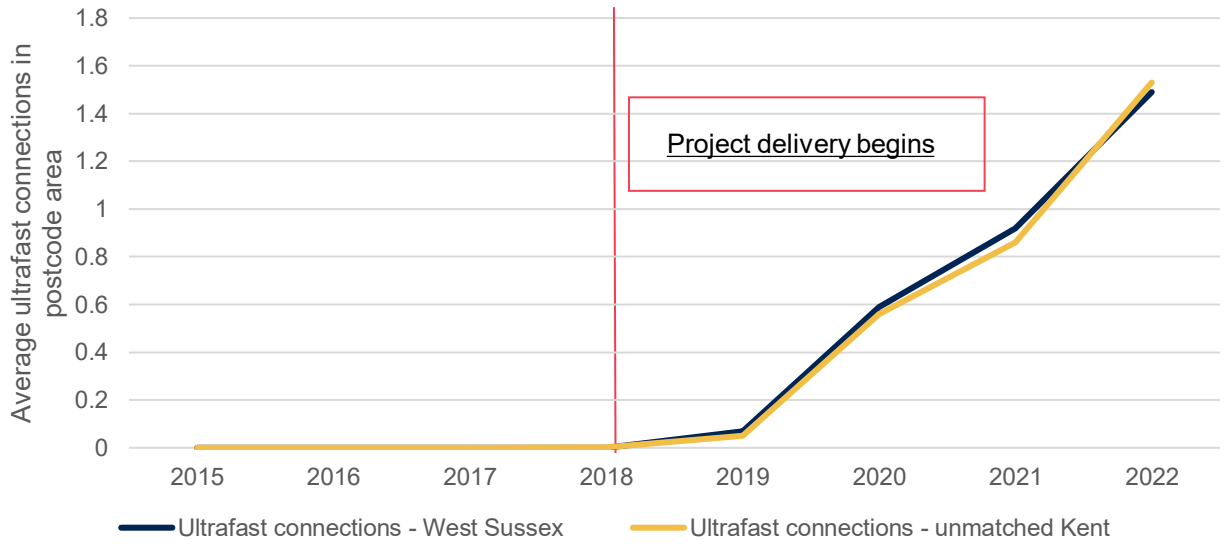
Area	Ultrafast take-up (% of premises) 2017	Ultrafast take-up (% of premises) 2022	Change in ultrafast take-up (p.p.) 2017-2022
Adur	0.2	9.5	9.2
Arun	0.0	1.6	1.6
Chichester	0.0	2.3	2.3
Crawley	0.2	11.5	11.3

Horsham	0.0	4.6	4.6
Mid Sussex	0.0	4.3	4.3
Worthing	0.3	10.7	10.4
West Sussex average	*0.1*	*6.4*	*6.3*
Dover	0.0	5.4	5.3
Thanet	0.0	3.8	3.8
Folkestone	0.0	6.1	6.1
Ashford	0.1	7.1	7.0
Canterbury	0.0	1.8	1.8
Swale	0.1	5.6	5.5
Maidstone	0.1	7.6	7.5
Tunbridge Wells	0.0	5.9	5.9
Tonbridge	0.2	10.4	10.2
Sevenoaks	0.3	6.4	6.2
Dartford	0.1	10.0	9.9
Gravesham	0.1	8.5	8.4
Medway	0.3	10.6	10.3
Kent average	*0.1*	*6.9*	*6.8*

Source: Connected Nations, Ofcom

The Connected Nations data does not suggest widespread take-up of FTTP or ultrafast in the West Sussex area as of 2022 with the average number of connections per postcode around 1.5 in 2022 in the areas surrounding the West Sussex PSAT build. However, the take-up has shown a rapid increase since 2019, where connections per postcode were still hovering around zero. The increase in take-up of ultrafast connections in West Sussex has been mirrored by the increase in areas of Kent, with the exact pattern observed in both areas. This is illustrated in the figure below.

Figure 4.11: Ultrafast broadband connections, 2015-2022



Source: Connected Nations, Ofcom

4.3.1 Impact of the West Sussex PSAT project

To provide a clearer view of the impact of the West Sussex Gigabit PSAT project on take-up of faster broadband connections, postcodes within 1km of the network build were compared to similar postcodes sharing similar characteristics in Kent. An econometric analysis was undertaken using

the same fixed effects analytical framework as described above. The analysis suggests that the LFFN programme had a small but statistically significant negative impact on take-up of ultrafast connections, with a decrease of less than 0.1 connections per postcode between 2018, when the project began, and 2022. This decrease is in line with the negative impact on coverage described above.

This estimated increase in ultrafast take-up around the West Sussex PSAT project is broadly in line with the findings from the other LFFN wave one projects. The estimations for the other projects mostly showed either no significant impact or a negative effect on take-up, which again is in line with the estimated changes in gigabit-capable coverage in the other project areas. Only the Trans Pennine Initiative showed any positive effect on take up of ultrafast connections.

5 Knowledge and spillover benefits

5.1.1 Procurement framework

As mentioned above, the procurement framework used as part of the project was seen by some stakeholders as a key success in providing further gigabit-capable network build in West Sussex. It allowed local councils in the area to commission network build to public sector buildings efficiently, and stakeholders explained that without the framework much of this network build would not have been commissioned. This was put down to both the ease of using the framework and the increased awareness of how to procure network build in West Sussex.

However, some stakeholders raised some concerns about how the framework had been used. These concerns can be split into two categories:

- Concern around the buildings connected: Some stakeholders felt some of the public sector buildings had been selected for ease. Some buildings chosen were part of a cluster of public sector buildings, or they happened to be on a route between two other public buildings being connected. The concern was that these buildings had been selected for the upgrade in a planning stage despite not needing a gigabit-capable connection, and that this diverted resources away from other buildings that did need better broadband.

- Concern around strategic planning: This was a concern that diverting resources towards connections for public sector buildings through the framework was potentially delaying or preventing CityFibre from undertaking commercial build to other areas in West Sussex which may provide greater benefit to the local population (for example connections to business parks or housing estates). CityFibre did not share this concern.

The level of awareness of the procurement framework and that stakeholders were examining how it had been used should be seen as a positive development in West Sussex, as it shows that engagement with digital infrastructure planning has increased over the course of the project.

5.1.2 Cost neutrality of project

One of the key aspects of the project design was its cost neutrality, and that public sector buildings would not experience an increase in the cost for their broadband connection following the upgrade. This means that public sector buildings connected through the project now have gigabit-capable connections at a price that which could be below the market rate for these connections. This demonstrates that the project is cost neutral to the public sector in West Sussex.

Alongside the cost neutrality, there is also a saving to West Sussex county council for the maintenance and management of the connections. This has been estimated to be around £78,000 per year, further demonstrating public sector cost savings.

5.1.3 Public service provision and future proofing

The evaluation faced a challenge in identifying how public sector buildings had utilised the enhanced connectivity they now had, as staff turnover at the connected buildings meant that there were limited stakeholders available to offer views on how services had changed. However, there were some examples of how the enhanced connectivity was being used, such as offering communication and some services online, and utilising online phone services.

There was more evidence about how the connection of public sector buildings helped to future proof service provision in West Sussex. Existing and forthcoming digital strategies from councils in West

Sussex aim to provide more public services online, and by improving the connections at the buildings this will support these strategies being rolled out. Additionally, some of the buildings connected provided health and social care, and future services in this area are likely to require enhanced connectivity.

5.1.4 Knowledge outcomes

Key learning has been acquired over the delivery of the West Sussex Gigabit PSAT project, many of which have been documented in the lessons learned exercise undertaken by West Sussex county council and BDUK as part of the project closure. The main lessons learned by West Sussex county council for the delivery of projects have been:

- **Contractual arrangements and data collection:** West Sussex county council and BDUK have learned that metrics need to be clearly set out at project inception and contractual arrangements made in order to collect information to monitor and assess the project. This was not the case for the West Sussex Gigabit PSAT project, as it was a pilot project and the full data requirements had not been established by BDUK, which led to challenges in collecting data.

- **Building relationships with suppliers:** There have been some challenges with delivery in the project, but it was acknowledged that the best way to overcome these is a strong working relationship between the council and the supplier, with flexibility available on both sides. This was key learning for West Sussex county council, and for BDUK. It has benefited BDUK across all funded projects, especially for wave two and three of the LFFN programme,

- **Early planning:** In order to successfully deliver the project, early planning is required by both West Sussex county council and other local authorities running BDUK projects, and their suppliers. For example applications for wayleaves to prevent this holding up delivery to ensure the project can be delivered in a timely manner.

There was also key learning generated from the project for CityFibre. This was their first major publicly funded broadband contract, therefore they generated learning about interacting with the public sector. The key learnings for CityFibre were:

- **Building a strong relationship:** As above, CityFibre acknowledged that a strong working relationship was crucial to the delivery of the project, with the relationship involving frequent and open communication.

- **A better understanding of the requirements of public sector clients:** The provision of network build for a public sector client differs from commercial roll out, as the network providers needs to take into account the needs of the public sector organisation, for example timings, milestones and routes. CityFibre have indicated that they are now more willing to consider public sector contracts and at the time of the research (2022) were monitoring potential opportunities.

5.1.5 Further investment

Following the completion of the West Sussex Gigabit PSAT project and subsequent procurement framework activity, CityFibre have committed to further investment in providing gigabit-capable networks in the area. They have committed to a £195 million roll out plan across Sussex. Prior to the project CityFibre did not have a presence in West Sussex, and they have indicated that the provision of the project contributed to their decision to provide further roll out in the area. This roll out has not yet been completed and will not show up in the data sets analysed in Section 4.

5.2 Economic impacts

It should be noted that the qualitative research suggested that the economic impacts of the project may be limited. This is because there was no evidence that the local areas surrounding the West Sussex build, the area selected for analysis, has increased connectivity when examined alongside a comparator area, and the subsequent investment described above will not have generated any take-up.

Additionally, the investment from the LFFN wave one project is relatively modest to produce a transformative effect in the West Sussex area, in a time of major macroeconomic factors driving change, such as Brexit and the Covid-19 pandemic. Therefore, as well as the impacts being longer-term, it would also be expected that the impacts would be relatively small.

5.2.1 Labour supply

The tables below highlights that the labour supply across the districts of West Sussex, alongside the West Sussex and national averages. This shows that six of the eight areas now have economic activity rates which exceed the national average, and West Sussex exceeds the national average. This is the same pattern as was observed in 2017, prior to the West Sussex Gigabit PSAT project being implemented. There have been large decreases in economic activity in Chichester and Crawley between 2017 and 2022. Unemployment in West Sussex was low, meaning at a local authority level it could not be reported, however at a West Sussex level unemployment is lower than the national average.

West Sussex has a higher proportion of the population qualified to degree level than the national average. This is true for four of the local authorities within West Sussex, with the other four slightly below the national average. West Sussex has seen a larger increase in the proportion of the population educated to degree level than the national average since 2017, with particularly large increases in Adur, Arun and Mid Sussex.

Table 5.1: Table 6.3: Labour supply characteristics in West Sussex (2022)

Area	Economic activity rate (% aged 16-64)	Unemployment rate (% aged 16-64)	NVQ4+ (% aged 16-64)[22]	Population aged 16-64 (%)	Population aged 65+ (%)
Adur	77.5		47.8	69.5	30.5
Arun	85.5	4.3	36.4	70.4	29.6
Chichester	65.4		46.1	62.5	37.5
Crawley	80.8		35	87.1	12.9
Horsham	91.1		41	72.8	27.2
Mid Sussex	82.7		56.5	71.4	28.6
Worthing	80.3		40.9	72.4	27.6
West Sussex	81.2	2.2	43.2	71.9	28.1
UK	78.3	3.6	41.3	77.1	22.9

Source: ONS Annual Population Survey (APS)

[22] Most recent data available for 2021

Table 5.2: Change in labour supply characteristics, 2017 to 2022

Area	Economic activity rate (aged 16-64)	Unemployment rate (aged 16-64)	NVQ4+ (aged 16-64)[23]	Population aged 16-64	Population aged 65+
Adur	1.5p.p	!	19.1p.p	-1.8p.p	1.8p.p
Arun	6.7p.p	-1p.p	12.4p.p	6.1p.p	-6.1p.p
Chichester	-16.1p.p	!	9p.p	-5.9p.p	5.9p.p
Crawley	-10.7p.p	!	1.8p.p	8.8p.p	-8.8p.p
Horsham	7.4p.p	!	-1.4p.p	-3.6p.p	3.6p.p
Mid Sussex	1.2p.p	!	10.2p.p	-6.2p.p	6.2p.p
Worthing	-5.4p.p	!	-0.6p.p	-4.8p.p	4.8p.p
West Sussex	-1.7p.p	-0.7p.p	6.5p.p	-1.1p.p	1.1p.p
UK	0.1p.p	-0.9p.p	4.9p.p	-0.9p.p	0.9p.p

Source: ONS Annual Population Survey (APS)

5.2.2 Impact on unemployment

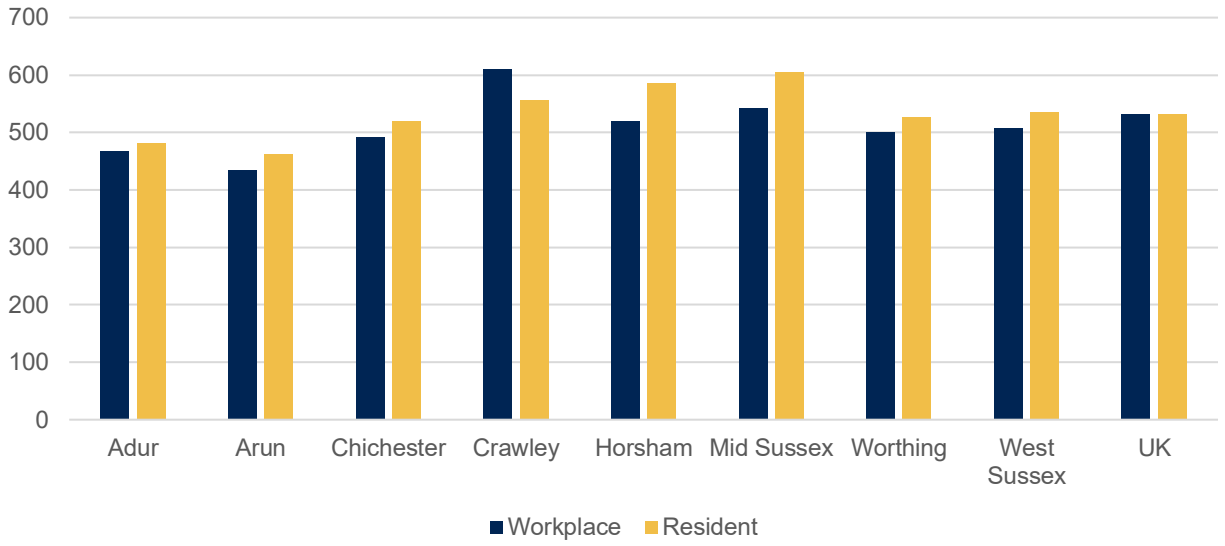
The Department for Work and Pensions provide data on unemployment claimant counts at a Lower Super Output Area (LSOA) level on a monthly basis. To provide a clearer view of the impact of the West Sussex Gigabit PSAT project on unemployment, LSOAs which contained a postcode within 1km of the West Sussex Gigabit PSAT project were compared to similar LSOAs sharing similar characteristics which are in Kent. An econometric analysis was undertaken using the fixed effects analytical framework as described in Section 4. The analysis found that the West Sussex Gigabit PSAT project did not appear to have had a statistically significant impact on unemployment in the area.

5.2.3 Earnings

Analysis of earnings looked at two variables, workplace data and resident data. Workplace data describes how much an employer in that area pays, while resident data describes how much an employee living in that area earns. Analysis of median hourly pay highlighted that employers in Crawley and Mid Sussex pay slightly above the national average earnings, with employers in the remaining areas in West Sussex paying slightly below average earnings. For people living in the West Sussex area, earnings are slightly higher than the national average, with residents in Mid Sussex, Horsham and Crawley having above average earnings. This suggests that some people living in West Sussex have high paying jobs outside the county. The figure below highlights pay in West Sussex.

[23] Most recent data available for 2021

Figure 5.1: Median hourly pay in LFFN areas in 2019



Source: ONS Annual Survey of Hours and Earnings (ASHE) 2022. Workplace earnings refers to employees working in each area; Resident earnings refers to workers that live in each area.

Changes in earnings can be viewed as a proxy measure for changes in productivity, as employers are more likely to pay productive staff higher wages. Median wage growth was broadly consistent across West Sussex between 2017 and 2022. Pay by employers based in West Sussex grew in line with the national average, with both growing at a rate of 18.7%. However, wage growth was notably higher for employers in Chichester, Worthing and Arun, whereas it was markedly below the national average. There is less variation in the residents growth in earnings, with all areas experiencing a larger than national average growth in earnings between 2017 and 2022 with the exception of Mid Sussex.

Table 5.3: Change in earnings, 2017 to 2022

Area	Percentage growth in earnings (%) - workplace	Percentage growth in earnings (%) - resident
Adur	12.0%	19.4%
Arun	27.3%	10.8%
Chichester	32.0%	25.4%
Crawley	17.6%	20.0%
Horsham	24.9%	28.3%
Mid Sussex	17.7%	13.9%
Worthing	28.4%	21.8%
West Sussex	18.7%	19.2%
UK	18.7%	18.7%

Source: ONS Annual Survey of Hours and Earnings (ASHE) 2022. Workplace earnings refers to employees working in each area; Resident earnings refers to workers that live in each area.

5.2.4 Impact on earnings

The ONS Secure Research Service allows access to more granular data on earnings. To provide a clearer view of the impact of the West Sussex Gigabit PSAT project on earnings, the research team examined workplace based earnings for businesses within Output Areas containing a postcode within 1km of the project build and those for businesses in comparator areas of Kent. An econometric
analysis was undertaken using the fixed effects analytical framework as described in Section 4. The

analysis found the West Sussex Gigabit project had no impact on earnings. More details on the modelling approach are presented in the Technical Annex.

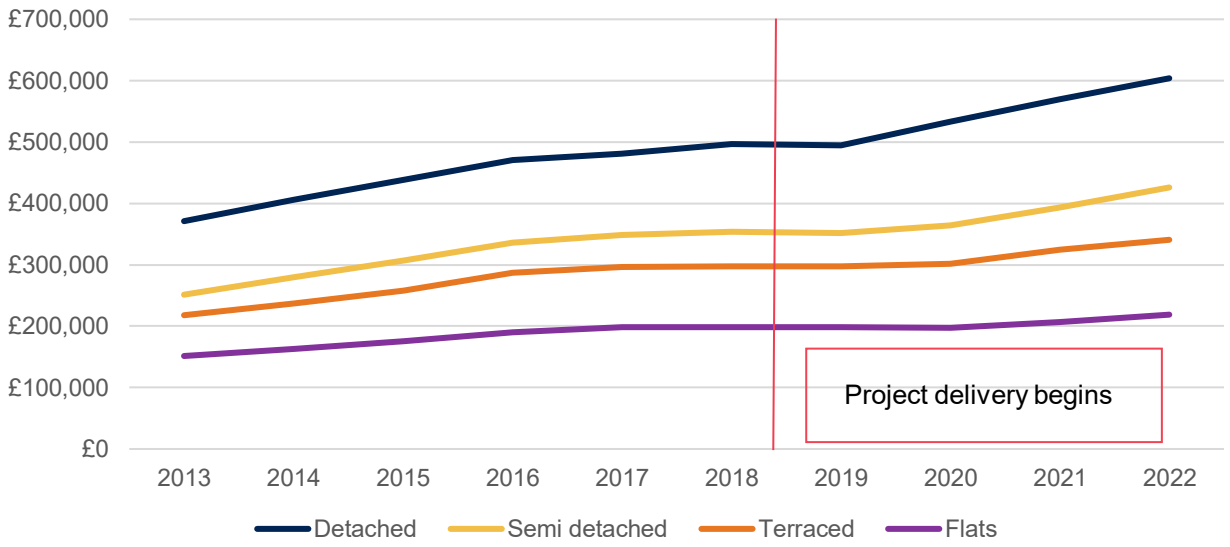
5.2.5 Impact on businesses

The ONS Secure Research Service allows access to granular data on business performance through the Business Structure Database. This data was also examined using a similar framework to that described in Section 4.2.2, and explored the impact of the West Sussex Gigabit PSAT project on the number of jobs, turnover and productivity (turnover per worker) on businesses located within 1km of the project. The analysis found that there was no statistically significant impact on the number of jobs, turnover or productivity.

5.2.6 House prices

Data from the Land Registry provides information about the prices paid for premises at a postcode level. Using this data, the research team have been able to explore the evolution of house prices within 1km of the West Sussex Gigabit PSAT project. The figure below presents the evolution of house prices within 1km of the project build from 2013 to 2022. This shows that there has been a general positive trend in house prices.

Figure 5.2: Evolution of house prices within 1km of the West Sussex Gigabit PSAT project, by type of premises (2013 to 2022)



Source: Land Registry, 2013 to 2022.

Exploring the change in prices in more detail, house prices have increased most markedly for detached and semi-detached properties, with increases of 26 and 22 percent respectively between 2017 and 2022 (2017 being the year prior to work starting on the West Sussex Gigabit PSAT project). These changes were compared to the changes in house prices for properties in comparator areas in Kent. Base house prices in Kent were broadly comparable with those seen in West Sussex in 2017. However, the growth in prices in Kent have exceeded those observed within 1km of the West Sussex gigabit PSAT project for all property types with the exception of detached houses.

The analysis here presents an overview of house prices in two areas, but does not attempt to draw inferences of the impact the West Sussex Gigabit PSAT project has had on house prices. This is because the qualitative findings did not suggest that there has been widespread use of the networks to provide additional gigabit-capable coverage to the West Sussex area. Without this we would not expect to see changes to house prices being driven by the West Sussex Gigabit project.

Table 5.4: Change in house prices, 2017 to 2022

Area	West Sussex Gigabit PSAT project		Kent comparator area	
	Average price 2017 (£)	Increase in price 2017-2022 (%)	Average price 2017 (£)	Increase in price 2017-2022 (%)
Flat	£198,000	10.5%	£178,500	18.3%
Terraced	£296,200	15.0%	£235,500	24.6%
Semi-detached	£348,200	22.4%	£307,900	25.2%
Detached	£480,900	25.6%	£477,100	27.6%

Source: Land Registry data (2017-2022).

6 Conclusions

The key findings from the West Sussex Gigabit PSAT project evaluation are:

- The installation of the fibre was completed by July 2019, and all connections to public sector buildings were made by 2020/21 Q3. This has led to 137 buildings being connected and 148 connections being made. Additionally, the fibre network passes within 200m of 73,658 properties, both commercial and residential.

- It was reported that the procurement framework developed as part of the project has subsequently been used to the maximum contract value of £5 million. The use of the procurement framework was highlighted as a key success of the project, as it allowed West Sussex county council to leverage the project to provide further gigabit-capable infrastructure in the area. There were some concerns about the buildings connected and locations where the framework has delivered gigabit-capable networks.

- The project has contributed towards CityFibre announcing a £195 million roll out plan across Sussex. Prior to the project CityFibre did not have a presence in West Sussex, and they have indicated that the provision of the project contributed to their decision to provide further roll out in the area.

- The design of the project has led to public sector cost savings, both to the buildings connected (with the cost of a gigabit connection held at the same price as the previous, slower connection) and to West Sussex county council, with a decrease in management and maintenance costs of £78,000 per year.

- Deployment of gigabit-capable networks within 1km of the West Sussex Gigabit PSAT project network build has increased between 2017 and 2022. The econometric analysis undertaken, comparing connectivity outcomes in West Sussex to a matched area in Kent, indicates that the project may have led to a slight decrease in gigabit-capable connectivity in the area. This is potentially due to other network providers rolling out gigabit-capable networks at a faster rate than CityFibre in comparable areas.

The table below summarises the West Sussex Gigabit PSAT projects achievements against its original stated objectives and those included in the Theory of Change:

Table 6.1: Summary of West Sussex Gigabit PSAT project achievements

Objective	Achieved
Generate learning	Learning generated West Sussex county council and CityFibre in terms of delivering publicly funded infrastructure projects.
Public sector cost savings	Evidence that public sector buildings have gigabit-capable connections at no additional cost.
Enhanced (public sector) service provision	Evidence that there have been some changes in public service provision.
Improve resilience	Evidence that broadband connections are more reliable than previous connections.
Future proofing	Evidence that public service providers will be able to enhance services in the future as a result of better internet connections.
New broadband providers	Evidence that CityFibre has entered West Sussex as a result of the project.
Broaden connectivity	Limited evidence of enhanced connectivity in West Sussex as of 2022.
Economic and social outcomes	Limited evidence that the project has led to economic and social benefits as of 2022.

Green highlights strong evidence of achievement; orange indicates limited evidence of progress towards objective

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