



Department for  
Digital, Culture,  
Media & Sport

# Local Full Fibre Network Programme Wave 1 – Interim Evaluation Report

2021

# Contents

1.	Executive summary.....	3
1.1	Evaluation aims and methodological approach.....	3
1.2	Key findings.....	4
2.	Introduction.....	8
2.1	Evaluation aims and objectives.....	8
2.2	Methodology .....	9
2.3	Limitations to the findings.....	10
2.4	Structure of this report.....	12
3.	West Sussex Gigabit project .....	14
3.1	Project overview.....	15
3.2	Progress to date.....	18
3.3	Connectivity outcomes.....	20
4.	Tameside 'Thin Layer model' project.....	27
4.1	Project overview.....	27
4.2	Progress to date.....	33
4.3	Connectivity outcomes.....	40
5.	Trans Pennine Initiative.....	54
5.1	Project overview.....	55
5.2	Progress to date.....	59
5.3	Connectivity outcomes.....	67
6.	Downstream economic impacts .....	75
6.1	Labour supply.....	75
6.2	Reduced unemployment and job creation (net of displacement).....	78
6.3	Earnings.....	81
6.4	Firm productivity effects.....	85
6.5	Cost savings to public building occupants.....	85
6.6	Increased land prices.....	85
6.7	Social and environmental impacts.....	85
7.	Key conclusions.....	87
7.1	Tameside 'Thin Layer model' project.....	87
7.2	West Sussex Gigabit project.....	88
7.3	Trans Pennine Initiative.....	88

# 1. Executive summary

Ipsos MORI (with George Barrett) 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 interim evaluation findings for the Wave One projects. These projects are:

- **The Public Sector Asset Re-use (PSAR) ‘Thin Layer Model’ Tameside project.** This project seeks to demonstrate how far it is feasible to deploy assets owned by the public sector to stimulate the market to increase the supply of Fibre-to-the-Premises (FTTP) connectivity. The LFFN programme offered support for capital costs associated with the re-use or development of public sector infrastructure assets (for example CCTV duct networks) to increase the commercial availability of fibre networks and extend the reach of backhaul or other services.
- **The West Sussex Public Sector Anchor Tenancy (PSAT) project (otherwise known as the West Sussex Gigabit project).** This project provides public sector buildings with gigabit capable connections and seeks to use these connections as long-term tenants. BDUK support for the strategic procurement of fibre connectivity for multiple locations (where the public sector body is the long-term ‘anchor’ tenant) which creates additional fibre infrastructure in the region. This may include multiple public sector agencies. This approach may involve the separation of infrastructure provision from the delivery of services
- **The Trans Pennine Initiative (TPI) project.** This project also aims to demonstrate how far it is feasible to deploy assets owned by the public sector to stimulate the market to increase the supply of Fibre-to-the-Premises (FTTP) connectivity.

## 1.1 Evaluation aims and methodological approach

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.

**Table 1.1: BDUK Benefits Framework**

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

The methodology used to provide the evidence to answer these questions comprised:

- **Review of Management Information (MI) and project documentation:** Documentation on the design and the operation of the projects, such as Business Cases, contractual information provided by BDUK, and information about premises passed and meet me points installed have been reviewed to aid understanding of the projects objectives and progress made.
- **Analysis of secondary data:** A range of secondary sources were examined to explore short term changes in the supply and demand for FTTP in areas nearby the assets brought into use for broadband deployment with LFFN funding, and the evolution of the local economy. These sources included Ofcom Connected Nations data, ThinkBroadband data and published FTTP roll-out plans of Openreach and other telecommunications suppliers, and Office for National Statistics Economic data sources (e.g. Annual Population Survey).
- **Semi-structured qualitative interviews with project stakeholders:** Consultations with stakeholders in the projects were undertaken in April and October 2020 to gather views on how far the projects had delivered against their intended objectives, barriers encountered, and lessons learned. Stakeholders consulted included representatives of the lead local bodies, BDUK project leads, wider stakeholders involved in the delivery of projects and downstream stakeholders that intended to use the projects infrastructure.
- **Econometric analysis:** The most recent longitudinal Connected Nations dataset available at the time of the research was for 2019. This data was used to explore the connectivity impacts of the projects to date in terms of FTTP availability in the area. A matching exercise was completed, matching areas in West Sussex to similar areas in Kent, and areas along the TPI route to areas along the Reading to Bristol rail route, using Propensity Score Matching (PSM).
  - A more detailed analysis of the causal effects of the Tameside ‘Thin Layer Model’ project on local connectivity outcomes for the project was completed by comparing the evolution of FTTP coverage on postcodes within 1km of the ducting assets deployed in the delivery of the project to postcodes that were observationally equivalent in suburban areas of the Liverpool City Region.. Comparisons between Tameside and the comparison area were completed using fixed effects regression models (achieving a Level III on the Maryland Scientific Methods Scale).

## 1.2 Key findings

### 1.2.1 Overarching findings

- **Deployment of FTTP:** Any connectivity impacts the projects may have had are not generally observable in the current Connected Nations dataset. However, given that the connections and infrastructure build was continuing in 2020 for the West Sussex Gigabit project and the Trans Pennine Initiative, it is possible that these projects will not have had any significant impacts on connectivity as yet.
  - For the ‘Tameside Thin Layer model’ project, the network build was completed earlier (in 2018), therefore some limited FTTP coverage impacts are visible in the data. The project seems to have led to a positive impact on deployment of FTTP, however, the placement of LFFN Wave One PoPs might not have been

optimal given the spatial distribution of impacts. ITS Technology appear to have extended the networks in the north of Tameside from Ashton Under Lyne and south from Hyde and Longdendale with these PoPs leading to bigger impacts further from the ring. Cooperative members were not confident that the placement of all PoPs was commercially viable, and findings suggest that it may have been more effective to place the PoPs further north.

- **Economic benefits:** It has not been possible to establish whether the project has had any economic benefits to the areas surrounding the projects as yet, due to the time at which the projects were completed and data lags in the economic data sources. However, given the limited impact on FTTP deployment, it is unlikely the projects have had a significant economic effect as yet.

### 1.2.2 Tameside 'Thin Layer model'

In general, the Tameside PSAR 'Thin Layer Model' project which received funding through LFFN Wave One has evidenced substantive progress in terms of the deployment of FTTP availability with connections made to key public sector buildings, and momentum behind the Cooperative. However, take-up appears limited at this stage.

- **Cooperative membership:** Since 2018 membership of the Cooperative has grown across public sector and private companies operating in Tameside. Over the last year it has attracted interest from further ISPs and network providers including Virgin Media and expanded into two new local authority areas providing ducting infrastructure rather than commercial operators seeking to connect businesses or households. Members are positive of their working relationships established through the Cooperative and believed this to be a key success of the model. However, they believed further growth with private sector companies would better stimulate commercial aspects of the Cooperative, which are currently seen as a barrier to wider roll-out within Tameside.
- **Commercial viability of the Cooperative:** The Cooperative model has shown early signs that it is commercially viable with income generation exceeding expectations set by members in 2019. Data provided suggests that suppliers using the network are generating substantial profits through connections made along the network, which has been confirmed in conversation with ISP members of the Cooperative. .
- **Deployment of FTTP:** The project seems to have led to a positive impact on deployment of FTTP, however, the placement of LFFN Wave One PoPs might not have been optimal given the spatial distribution of impacts. ITS Technology appear to have extended the networks in the north of Tameside from Ashton Under Lyne and south from Hyde and Longdendale with these PoPs leading to bigger impacts further from the ring. Cooperative members were not confident that the placement of all PoPs was commercially viable, and findings suggest that it may have been more effective if PoPs were placed further north.

### 1.2.3 West Sussex Gigabit project

The research for the interim evaluation occurred during the build phase of the project. Therefore, it is expected to be too early to capture the full impact of the project. This report focusses on emerging and expected findings should the project complete the planned build. The key conclusions from the research into the West Sussex Gigabit project are:

- **Network and connection progress:** The installation of the fibre was completed by July 2019. However, connections to public buildings were delayed and were in the process of being installed at the time of the research taking place. It was expected that all connections would be completed by the end of September 2020. As relatively few connections had been made at the time of the research, it is too early to conclude whether the Anchor Tenancy has been successful in aggregating a large number of different proximate public sector sites on a linked and more resilient Public Sector Network. This will be explored in detail in the final evaluation.
- **Challenges encountered:** The main challenges encountered to date centre on resource and quality assurance (QA) with Covid-19 also having a substantial impact:
  - Resource remained a significant barrier particularly with testing capacity required to ensure that the work had been completed to specification. Remedial works were also required and undertaken where the build did not meet the project's specification after installation. In total there were issues with fibre laid at 65 sites. These problems contributed to the delays prior to Covid-19 generating further issues for the programme through reducing the resource and the ability for testing teams to access infrastructure. Covid-19 also led to further delays with the delivery of the fibre supply through an impact on infrastructure deployment and access to public buildings was limited during the pandemic.
  - Wayleaves remained an issue for a small number of public buildings with five still in the process of being negotiated. These were for varying reasons related mainly to landlords and tenants, with three the result of an inability to obtain permission to access NHS sites, one other involving a tenant dispute and a third awaiting sign off once remedial work to remove hazardous material is completed.

#### 1.2.4 Trans Pennine Initiative

The research for the interim evaluation occurred shortly after the completion of the build phase of the project. Therefore, it is expected to be too early to capture the full impact of the project. This report focusses on emerging and expected findings should the project complete the planned build.

The TPI project funded by the LFFN programme and Network Rail has made some progress to date, particularly around completing the physical work to deliver the fibre network and in engaging with potential customers and generating interest in their product. However, take-up of their services had been limited at this stage, which is a function of when the physical work for the project was completed and the timing of this research, and that Network Rail is a new entrant in the market. The key conclusions from the research are:

- **Completion of physical work / Fibre Interface Points (FIPs):** Since the summer of 2019 the TPI project has completed the physical work to deliver the fibre network, and this was completed within a couple of months of the original timeline. There are some key learnings which can be taken from this completion of the work, including having effective oversight from two Government Departments and developing a project delivery team with the right mix of skills and experience. The project has continued working to enhance the value of the network by installing Fibre Interface Points at commercially viable locations along the route, with five of eight FIPs already installed.

- **Market engagement and securing customers:** NRT have engaged in an extensive market engagement process, contacting over 70 ISPs and numerous Local Authorities to attempt to secure customers. This has led to the provision of 16 quotes, with six orders for connectivity, although all these orders come from public sector organisations. NRT have found it difficult to secure commercial customers, and some reasons for this are that they cannot engage in price competition with competitors due to the funding / pricing model agreed (in order to be State aid compliant), which makes it more challenging to get commercial providers to move their connectivity from the suppliers they know (and know the quality of service they will receive).
- **Public sector learning:** The project has generated learning for public sector organisations. Firstly, NRT now know they have a State aid compliant funding / pricing model, which can be utilised in future projects (which would reduce the time required to complete the project). NRT are also generating learning from the market engagement they are currently undertaking. There is evidence of further interest in this model along other rail routes in the UK, which means that this learning can be exploited in the future.

#### 1.2.5 Interpretation of findings

There is an important distinction to make between LFFN Programme objectives and the primary purpose and use of public investment within LFFN projects. This affects the interpretation and presentation of the research findings.

For the avoidance of doubt, the principle purpose of LFFN projects are 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 follow what is known as the Market Economy Operator Principle (MEOP), which means that they have clear projected commercial outcomes and that these outcomes have been externally validated before the projects begin. 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.

## 2. Introduction

Ipsos MORI (with George Barrett) 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 interim evaluation findings for the Wave One projects. These projects are:

- **The Public Sector Asset Re-use (PSAR) ‘Thin Layer Model’ Tameside project.** This project seeks to demonstrate how far it is feasible to deploy assets owned by the public sector to stimulate the market to increase the supply of Fibre-to-the-Premises (FTTP) connectivity.
- **The West Sussex Public Sector Anchor Tenancy (PSAT) project (otherwise known as the West Sussex Gigabit project).** This project provides public sector buildings with gigabit capable connections and seeks to use these connections as long-term tenants..
- **The Trans Pennine Initiative (TPI) project.** This project also aims to demonstrate how far it is feasible to deploy assets owned by the public sector to stimulate the market to increase the supply of Fibre-to-the-Premises (FTTP) connectivity.

### 2.1 Evaluation aims and objectives

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 examines the effects of the project approximately one year following the completion of physical works.

Owing to the limited time elapsing since the completion of the project, the primary focus of this report is on its short-term impact in terms of stimulating demand for and supply of FTTP connectivity in the Tameside area. While downstream economic and social impacts are considered in this report, these types of impact will take time to arise and will be examined in more detail in the final evaluation in October 2022.

**Table 2.1: BDUK Benefits Framework**

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



## 2.2 Methodology

The evidence compiled for this report comprised:

- **Review of Management Information (MI) and project documentation:** Documentation on the design and the operation of the projects, such as Business Cases, contractual information provided by BDUK, and information about premises passed and meet me points installed have been reviewed to aid understanding of the projects objectives and progress made.
- **Analysis of secondary data:** A range of secondary sources were examined to explore short term 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 and connections. 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 official data on the evolution of the local economy was drawn on to provide further evidence on local trends on employment growth and unemployment (though owing to lags in the production of these measures, it is only possible to draw limited inferences regarding the impact of the project at this stage).
- **Semi-structured qualitative interviews with project stakeholders:** Consultations with stakeholders in the projects were undertaken in April and October 2020 to gather views on how far the projects had delivered against their intended objectives, barriers encountered, and lessons learned. Stakeholders consulted included representatives of the lead local bodies, BDUK project leads, wider stakeholders involved in the delivery of projects and downstream stakeholders that intended to use the projects infrastructure. Interviews covered developments in the delivery and management of the project, issues encountered in delivery, emerging demand for fibre services and connections, and impacts of the LFFN project on organisations and local area. The findings from the interviews were analysed thematically. The interviews also highlighted key areas that may warrant further investigation in the final year of research (2022).
- **Econometric analysis:** The most recent longitudinal Connected Nations dataset available at the time of research was for 2019. This data was used to explore the connectivity impacts of the projects to date in terms of FTTP availability in the area. A matching exercise was completed, matching areas in West Sussex to similar areas in Kent, and areas along the TPI route to areas along the Reading to Bristol rail route, using Propensity Score Matching (PSM). The matching sought to find areas matching in characteristics including the details of the telecommunications infrastructure of the postcodes (e.g. distance from the serving exchange) as well as the availability of superfast and ultrafast in previous years.
  - A more detailed analysis of the causal effects of the Tameside 'Thin Layer Model' project on local connectivity outcomes for the was completed using the postcode level data available from Connected Nations. This compared the evolution of FTTP coverage on postcodes within 1km of the ducting assets deployed in the delivery of the project to postcodes that were observationally equivalent in suburban areas of the Liverpool City Region (this excluded central locations in Liverpool). Postcodes were matched on several characteristics

using PSM using the same variables as described above. Liverpool was selected because it applied for, but was not successful in securing, LFFN funding and shared a range of characteristics in common with the Tameside area. However, as Liverpool was an early beneficiary of Openreach's Fibre First programme, commercial deployments of FTTP were relatively extensive in the comparison area. To allow for this, the econometric models were implemented including and excluding postcodes within the boundaries of the upgraded exchanges in Liverpool. Comparisons between Tameside and the comparison area were completed using fixed effects regression models which are robust to any unobserved characteristics of postcodes that do not change with time (achieving a Level III on the Maryland Scientific Methods Scale). Manchester was also considered as a comparator area for Tameside, but was discounted as the matching to areas in Liverpool was a better statistical match, and there were concerns (from a statistical comparison viewpoint) that Manchester Council may join the Cooperative in the future, and therefore would not be suitable as a comparator area. Further detail is provided in the Annex.

## 2.3 Limitations to the findings

### 2.3.1 Ofcom Connected Nations data

The results make extensive use of the Ofcom Connected Nations datasets. 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 superfast, ultrafast and FTTP availability. The research team undertook analysis to compare the datasets in the two years, and presented the findings from the analysis to Ofcom. As a result of further communication between the research team and Ofcom, a change in the methodology used by Ofcom in the two years was identified. This change related to the method used to identify deliverable 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 MORI initially conducted analysis on LFFN areas (approx. 10,000 postcodes max) 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 Annex to this report.

Additionally, the Connected Nations data was around one year old when the analysis took place. This means that some more recent network build will not be included in the data. The data also covers existing networks, and not planned future roll out. This is particularly important to the West Sussex PSAT project as there have been announcements of further connectivity build, but these are yet to be completed.

### 2.3.2 Attribution

#### Tameside 'Thin Layer' Model

The Tameside project involves complex dependencies on other parallel initiatives that makes it challenging to separate the specific impact of the LFFN project:

- **Pre-existing initiatives:** Wave One LFFN funding was used to add spurs to an existing fibre ring developed by TMBC from 2012 onwards. Additionally, a digital infrastructure co-operative was established in 2018 to commercialise the network, with BDUK providing support to help establish the co-operative. Attempts to separate the

impact of two were made in the econometric analysis by allowing effects to vary by both distance from the LFFN funded spurs and distance from the existing fibre ring. However, this may not fully identify the marginal effect of the LFFN funded spurs – extending the network may produce positive externalities by making the existing fibre ring more commercially attractive.

- **LFFN funded expansion of the Cooperative:** The Cooperative network has also expanded to include Blackpool and Manchester City Centre, which received funding from Waves Two and Three of the LFFN programme and will also soon include a link to the Trans-Pennine Initiative. TMBC also received further funding under LFFN Wave Two to expand their network from Mossley station, via Stalybridge and Guide bridge stations to the Manchester Internet Exchange (IX). These LFFN funded expansions of the network may also produce further externalities that drive further commercial FTTP deployments closer to the fibre ring, creating further challenges in isolating the marginal effect of the LFFN project. These types of effect cannot be identified through econometric modelling and will need to be investigated through qualitative research.
- **Openreach Fibre First:** Openreach is rolling out the Fibre First programme in Manchester but while the exchange area to the north-west of Tameside has been upgraded, areas within Tameside have not benefited from this roll-out to date. This raises a potential question as to whether Openreach avoided the area owing to the presence of local incumbents, and there is a need to consult with Openreach to explore how this project (and other LFFN projects in the area) influenced the nature and scale of their rollout plans. At a programme level, there is also a question to be considered as to whether Openreach would have brought forward FTTP deployments at this speed in the absence of the leadership displayed by BDUK in the absence of the LFFN programme.
- **The LFFN Wave 1 TPI project:** The Tameside project has potential attribution difficulties in some areas as the LFFN Wave 1 TPI project, which has provided fibre cable along the Trans Pennine rail route between York and Manchester, runs through parts of Tameside. As these two projects are contributing towards similar outcomes and impacts, it may be difficult to disentangle the effects of the two programmes within the Tameside area.

#### West Sussex PSAT project

The Fibre First programme by Openreach is operating in the West Sussex area with some areas in Worthing part of this rollout. This complicates attribution of impact to LFFN with sensitivity analysis applied to the results of econometric analysis excluding these areas. An open question also remains as to the extent to which this area would have been included in Fibre First plans without the existence of the LFFN project in the area.

#### Trans Pennine Initiative project

The TPI project has potential attribution difficulties in some areas along the route. This is because of the LFFN Wave 1 project which has taken place in Tameside, through which the TPI route runs. As these two projects are contributing towards similar outcomes and impacts, it may be difficult to disentangle the effects of the two programmes within the Tameside area. Additionally, Openreach is rolling out the Fibre First programme in Manchester, and has delivered Fibre First roll out in some areas of Leeds through which the TPI route passes.

However, no other areas on the route have been upgraded through the Fibre First programme, with only two other areas (south Leeds and Tadcaster – between Leeds and York) planned to be delivered to. This raises a potential question as to whether Openreach avoided large areas along the TPI route because of the TPI, and there is a need to consult with Openreach to explore how this project (and other LFFN projects in the area) influenced the nature and scale of their rollout plans. At a programme level, there is also a question to be considered as to whether Openreach would have brought forward FTTP deployments at this speed in the absence of the leadership displayed by BDUK and in the absence of the LFFN programme.<sup>1</sup>

**Figure 1.1: Areas where attribution may be difficult and how the evaluation will address these points**

Other LFFN funded projects operating in same area	Roll out of OpenReach Fibre First investment
Spatial analysis of connectivity outcomes (metres from TPI network), comparison to wider outcomes achieved in other LFFN project area / other TPI areas  Qualitative findings about how projects interact	Qualitative findings from consultations with network providers about roll out plans

### 2.3.3 Impact of COVID-19

The interim evaluation intended to cover qualitative research with public and private sector organisations taking up FTTP connections, and a site-visit to Ashton Old Baths in Tameside. The disruption caused by measures to contain the outbreak of COVID-19 had an impact on Ipsos MORI's ability to undertake the qualitative research at this envisaged scale, because some consultees were too busy and associated impact on delivery meant that the number of confirmed customers at the time of writing was very small.

It should also be noted that the outbreak of COVID-19 may produce a substantial change in the wider context for the project. Social distancing arrangements have created a need for businesses to find new ways of working organised around remote working where feasible. As such, improvements in connectivity induced by the programme may have longer-term and more significant benefits for the areas concerned than will be visible in this report. Improved local broadband infrastructure has the potential to increase the resilience of areas to economic disruption – and it is likely this type of effect can only be partly captured in this evaluation.

## 2.4 Structure of this report

The remainder of this report is set out as follows:

- Section 3 provides the interim evaluation for the West Sussex Gigabit project;
- Section 4 provides the interim evaluation for the Public Sector Asset Re-use (PSAR) 'Thin Layer Model' Tameside project;

<sup>1</sup> This will be explored further in an interview with Openreach, which will be undertaken in 2021.

- Section 5 provides the interim evaluation for the Trans Pennine Initiative;
- Section 6 provides indicators of downstream economic impacts for the projects; and
- Section 7 provides the key conclusions from the research.

### 3. West Sussex Gigabit project

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This section presents the interim evaluation of the West Sussex Gigabit PSAT project. It begins with an overview of the project, before discussing the progress made to September 2020 and the connectivity outcomes achieved.

The research for the interim evaluation occurred during the build phase of the project. Therefore, it is expected to be too early to capture the full impact of the project. This report focusses on emerging and expected findings should the project complete the planned build.

#### **Key findings:**

The installation of the fibre was completed by July 2019. It was expected that all connections would be completed by the end of September 2020. However, connections to public buildings were delayed and were in the process of being installed at the time of the research taking place (September 2020). Therefore, it is still too early to fully assess the outcomes and impacts the project could achieve.

Resource remained a significant barrier particularly with testing capacity required to ensure that the work had been completed to specification. Remedial works were also required and undertaken where build did not meet the required specification after installation. There were issues with fibre laid at 65 sites and this contributed to the delay in completing the work prior to Covid-19 becoming a further issue, impacting resource and the ability for testing teams to access infrastructure. Covid-19 further impacted delivery with further delays to the fibre supply.

Wayleaves remained an issue for a small number of public buildings with five still in the process of being negotiated. These were for varying reasons related mainly to landlords and tenants with three the result of an inability to obtain permission to access NHS sites, one other involving a tenant dispute and a third awaiting sign off once remedial work to remove hazardous material is completed.

As of September 2020, the West Sussex project was still ongoing with the anchor network completed but with a fraction of final connections to public buildings having been made. Connectivity outcomes were not expected to be evident in the Connected Nations dataset for 2019 as a result. This hypothesis was confirmed.

Trends in the West Sussex areas close to the anchor network remained very similar to those in the matched areas in Kent. This confirms the choice of these areas as a counterfactual.

As of September 2020, there had been no significant change in the suppliers operating within the West Sussex areas visible using ThinkBroadband data.

However, CityFibre had announced FTTP build in the West Sussex area which suggests FTTP connectivity in West Sussex will increase in the near future.<sup>2</sup>

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<sup>2</sup> Subsequent to the research being completed, CityFibre announced further plans to build fibre network in the West Sussex area. The impact of the LFFN funded project on these plans will be explored in the final evaluation in October 2022.

### 3.1 Project overview

This section outlines the West Sussex Gigabit project and the anticipated process by which it was expected to deliver its anticipated impacts on FTTP coverage, take-up of higher capacity connections, and wider economic and social impacts.<sup>3</sup> This framework was established by BDUK and Ipsos MORI during the planning phase of the evaluation in 2019 following a series of consultations with BDUK and key stakeholders, review of project documentation, literature review and review of secondary data.

#### 3.1.1 Description of the project and objectives

The West Sussex Gigabit Project involves the delivery of gigabit capable connections to approx. 137 public buildings (providing 148 individual connections) in the West Sussex area. This forms the first example of a public-sector anchor tenancy (PSAT) project delivered through the LFFN programme.

Through improving the quality of the local public network, it is anticipated that public services would be delivered more effectively for local residents and tax payers. In 2018, [Redacted] 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.

#### Figure 3.1: West Sussex County area and planned route of fibre

[Redacted]

#### 3.1.2 Expected outcomes and impacts

The project was expected to lead to several medium and longer term outcomes and impacts that can be summarised into the following categories:<sup>4</sup>

- **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 to experience **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 connected to the network take-up FTTP connections whilst businesses and residents would likely benefit should spill over build occur. For businesses and public sector organisations in West Sussex, this

<sup>3</sup> For further detail on the West Sussex Gigabit project Theory of Change and anticipated outcomes and impacts, see LFFN Wave 1 Evaluation Plan (May 2019).

<sup>4</sup> The expected outcomes and impacts were established by BDUK and Ipsos MORI during the planning phase of the evaluation in 2019 following a series of consultations with BDUK and key stakeholders, review of project documentation, literature review and review of secondary data.

benefit could be due to better data storage and processing power through access to the cloud and faster transmission of files and records, leading to productivity gains, or by supporting more employees to telework.

- **Public sector impacts:** The West Sussex gigabit project aims to provide fibre connections to 143 public buildings through the fibre network.<sup>5</sup> : The West Sussex gigabit project aims to provide fibre connections to 143 public buildings through the fibre network. These enhanced connections are expected to futureproof the service going forward and may provide the opportunity to deliver public services more efficiently/
- **Downstream economic impacts:** Wider access to FTTP connections was expected to lead to increases in firm productivity (increase firms' consumption of telecoms services, or increase the efficiency of telecoms use, potentially raising 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 may be able to start up in West Sussex (for example digital businesses which require reliable and fast internet connections).
  - 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 in turn also reduce unemployment in these areas.
- **Social and environmental:** Specific social and/or environmental effects were not expected. 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 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.

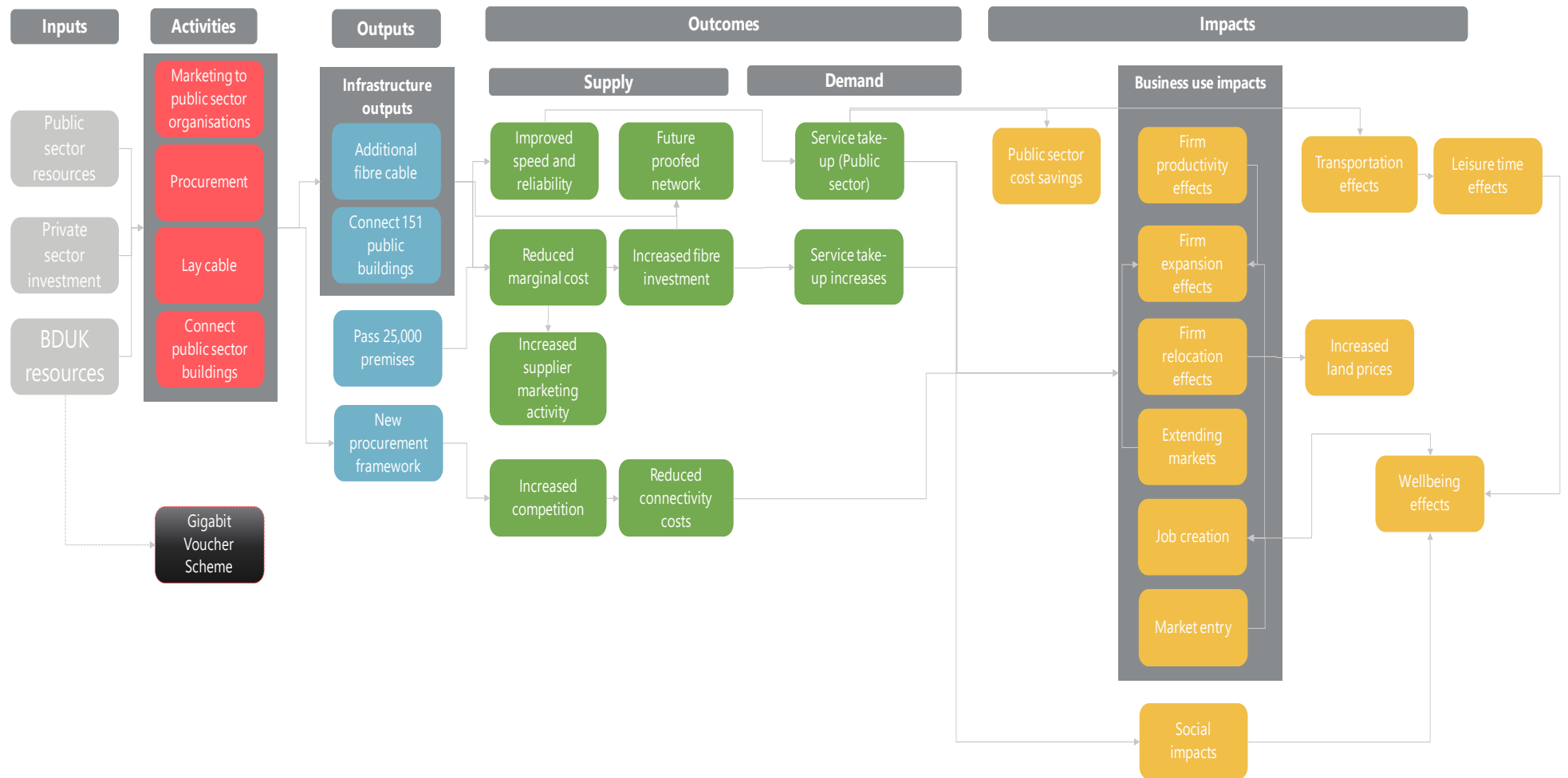
A summary of the initiative's pathways to impact, outlining how the inputs and activities are expected to translate into immediate outputs, short and medium-term outcomes and longer-term impacts, is set out in Figure 3.2.

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<sup>5</sup> The original project plan aimed to provide connections to 151 public sector buildings. However, due to descope (discussed further in Section 3.2), the number of public sector buildings to be connected was reduced to 143.



Figure 3.2: West Sussex Gigabit project logic model



Source: Ipsos MORI

### 3.2 Progress to date

This section provides an update on the West Sussex anchor tenancy project, updating on previous reporting completed by Ipsos MORI in 2019. It draws upon background data and documentation and consultation evidence with BDUK and local authority stakeholders, to provide an overview of emerging outcomes and lessons learned.

#### 3.2.1 Activities and outputs

##### Completion of the anchor network and connections to public sector buildings

The fibre cable was laid in July 2019 by [Redacted] and was followed by the process of installing connections to the public buildings. The data provided indicates a total of 104,435m of fibre laid using a combination of new civil work and use of Physical Infrastructure Access (PIA). The use of PIA reduced costs and was seen to have provided an efficient route to getting the network setup quickly where possible.

The network itself was identified in the MI 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 also taking place at the time of writing (September 2020). The MI provided to BDUK indicated that 35 public sector buildings had been provided with fibre connections as of July 2020 (out of 143 buildings expected to be connected). 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
Bognor Regis	6
Chichester	8
Crawley	2
Horsham	2
Lancing	3
Littlehampton	2
Midhurst	1
Rustington	4
Shoreham	2
Worthing Central	1
Worthing Swanedan	4

Source: BDUK MI

A total of seven sites had been descope<sup>6</sup> by July 2020<sup>6</sup> because the sites were no longer occupied by local authority staff and therefore connection no longer required. Whilst 103 buildings were ready to be connected, five sites were still awaiting wayleaves.

<sup>6</sup> This was the most recent project Management Information available at the time of the research in September 2020.

**The laying of fibre cable and connection of 35 out of 143 public sector buildings demonstrate that the project output of connecting public sector buildings has been partially achieved.**

### Funding

Whilst data was not provided on the total costs of the project (as of September 2020), the BDUK costs had been disbursed upon completion of the network in July 2019 with the remaining costs for the local authorities to bear.

### Testing and quality assurance

A key challenge identified as having had a large impact throughout the course of the West Sussex project since the last wave of reporting in July 2019 has been the quality assurance work undertaken. 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 which was detected in testing but which 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. This remedial work has since been completed.

In addition to this, the supplier and its subcontractors struggled to adequately provide resource to complete this remedial work. This compounded delays in getting connections put into the public sector anchor tenants' buildings as this activity needed to be completed first. Initial estimations of the number of installs possible per week was also revised down, further compounding this issue.

### Resource constraints and COVID-19 impact

As noted above, resource was a constraint in terms of testing prior to Covid-19, however this was exacerbated in early 2020 with the Covid-19 pandemic further reducing capacity of suppliers to test and install connections. Both reductions in staffing levels and inability to safely access sites to complete connections at this time further set the timescales of the project back.

### Wayleaves

At the time the MI provided was collected, five sites were awaiting wayleaves and were in varying positions. Three of these sites were NHS sites and there were issues securing permission from the private landlords to access the premises to install the final connection.

Whilst the BDUK barrier busting team was offered as support, this support was declined by the local leads who were confident they could have the wayleaves in place relatively soon.

A further site was awaiting remedial work to be completed to remove hazardous material that prohibited safe access to install the connection. Finally, a dispute with a tenant was indicated as a factor in the final wayleave.

### Change requests

As noted in previous reporting, earlier delays prior to the network being completed were a result of issues with the design build packs. Revision to the implementation plan in response to these issues pushed some milestones past the original funding cut-off date of March 31

2019, motivating the change request. This cut-off was perceived to be fixed by the supplier based upon interaction with West Sussex County Council (WSSC).

As outlined in the change request guidance document, the issues with the design plans centred on the late delivery of these from the suppliers sub-contractors and the subsequent lack of quality, with the mitigation being that the supplier took the design in-house. Some breakdown in communication was evident in the proposal for a change request stating that “whilst the project had been reported red within (the supplier), the same message had not been communicated to WSSC”. The perception that the March deadline was immovable was seen by stakeholders to have exacerbated issues and contributed to a sense of unease within the supplier upon the discovery of the issues described above. However, communication between WSSC and the supplier improved shortly following the change requests with the fixed end date viewed as unhelpful by all parties.

### 3.2.2 Emerging outcomes

#### Service take-up

Given the remedial work undertaken and work currently being undertaken to install and test connections, there have been few connections taken up to date. As noted previously, the project MI indicates that 35 connections had been made by the end of July 2020<sup>7</sup> however the expectation is that all public sector buildings will be in a position to take up new services from the end of the year. The public sector buildings were selected to be included in the project as their existing broadband contracts were approaching an end – and the public sector buildings let the contracts run down and expire – reducing the challenges they would face in changing broadband supplier / exiting contracts to take up the new service.

#### Procurement framework

As noted in the 2019 process and early impacts report, the procurement framework conceived through the project was approved for use by Worthing and Adur District Council to procure further connections for additional public buildings in the area. Amongst the buildings being considered for connections are libraries, adult social care settings, sheltered housing, leisure facilities, CCTV and fibre points. These further investments will support the ambition of Worthing and Adur to put in place an extensive public Wi-Fi network and have been made possible through the Business Rate Retention Pilot Scheme that allows the local councils to retain 75 percent of the revenue generated by increases in business rates. The connections to these buildings will not be funded by the LFFN programme. Stakeholders previously highlighted the role of the Business Rates Retention Pilot as a complementary intervention that could be used to build upon progress made through the LFFN project. Whilst no other comparable commitments were highlighted in other local authorities, stakeholders anticipated that further commitments are likely to follow upon completion of the LFFN project.

At the time, the challenges described above led to difficulties in the relationship between the supplier and WSSC. However, both parties worked together to resolve the challenges and restore a good working relationship, which is important for future network build in the area due to the terms of the procurement framework.

### 3.3 Connectivity outcomes

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<sup>7</sup> This was the most recent project Management Information available at the time of the research in September 2020.

This section provides an update of the connectivity outcomes achieved to September 2020, drawing on secondary data analysis using Ofcom Connected Nations and ThinkBroadband data. It should be noted that as the fibre network had only recently been completed in 2020, it is still too early for connectivity outcomes to have been achieved.<sup>8</sup>

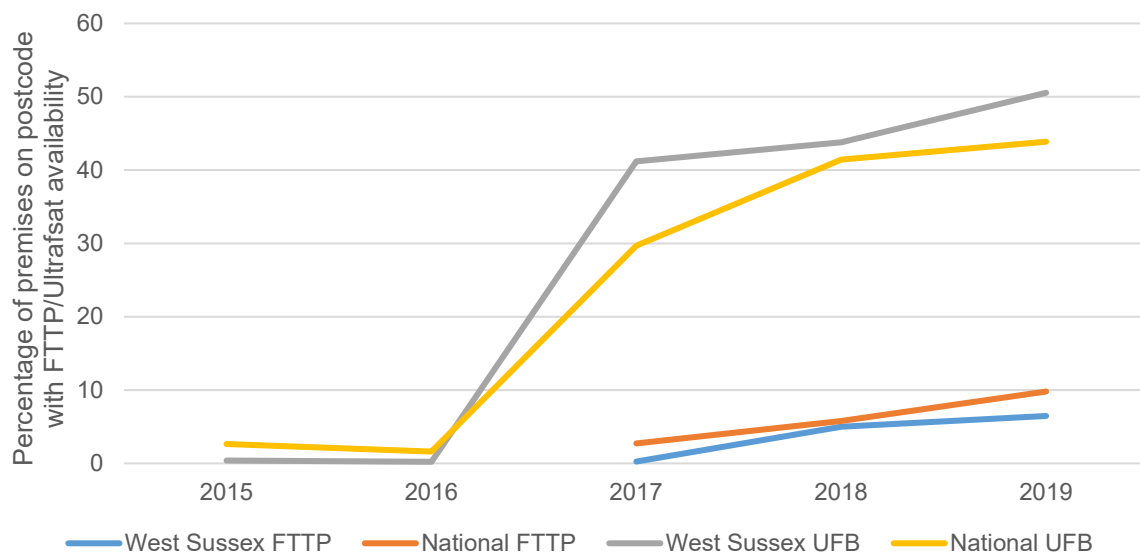
### 3.3.1 FTTP and ultrafast coverage

It was anticipated that the marginal cost of investment for future investment by network providers was expected to fall following the completion of the anchor network in Q2 2019.<sup>9</sup> In turn, this was expected to make it commercially viable to deploy FTTP networks in the vicinity.

The figure below shows the development of FTTP coverage and ultrafast availability amongst premises within 1km of the anchor tenancy, based on the Ofcom Connected Nations dataset.<sup>10</sup> This presents the evolution of FTTP and ultrafast coverage in West Sussex prior to the completion of the LFFN funded project. FTTP coverage has risen slowly from nothing in 2017 (when LFFN funding was awarded and the first year for which FTTP data is available) to around 7 percent in 2019. However, this remains below the national average as of 2019 which was around 10 percent. The availability of ultrafast connectivity has also risen over this period from next to nothing in 2015 to 50.5 percent in 2019 which is above the national average of 44 percent at that time.

It should be noted that CityFibre have announced FTTP networks in West Sussex, although these are yet to be completed.<sup>11 12</sup> This provides an indication that FTTP connectivity in the West Sussex area will increase in the near future.

**Figure 3.3: FTTP and Ultrafast Coverage on postcodes within 1km of West Sussex postcodes**



Source: Connected Nations, Ofcom

<sup>8</sup> The full impact of the LFFN project on connectivity outcomes will be explored in the final evaluation in October 2022.  
<sup>9</sup> Given that the project connections and build was not completed by 2019 (the date of the most recent Connected Nations data) no changes in the FTTP or ultrafast coverage as a result of the LFFN project will be visible in the data.  
<sup>10</sup> In 2018 and 2019 this data is collected as a snapshot as of September of that year.  
<sup>11</sup> CityFibre press release, March 2020: CityFibre reveals 36 more towns and cities to benefit from full fibre as rollout accelerates. Available at: <https://www.cityfibre.com/news/cityfibre-reveals-36-towns-cities-benefit-full-fibre-rollout-accelerates/>  
<sup>12</sup> Subsequent to the research being completed, CityFibre announced further plans to build fibre network in the West Sussex area. The impact of the LFFN funded project on these plans will be explored in the final evaluation in October 2022.

### Suppliers of FTTP

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. 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 the observed changes in FTTP coverage was driven by different suppliers in West Sussex, and whether suppliers were utilising the anchor network. As noted earlier, no MI data was available to identify any further use of the network.

As of September 2020, the coverage of FTTP in the areas covered by the West Sussex project remained relatively patchy in the ThinkBroadband data (see Figure 4.4). The only major supplier operating in and around these areas according to this source was Openreach with coverage across areas in Chichester, Bognor Regis, Worthing, Burgess Hill, Haywards Heath, Horsham and Crawley. This coverage was not extensive however. The picture therefore remains largely unchanged to that at the time of the baseline report (May 2019). Very limited coverage was evident in Crawley, Burgess Hill and Horsham by OFNL as well as the occasional spot of Hyperoptic coverage.

### Change in ultrafast and FTTP availability

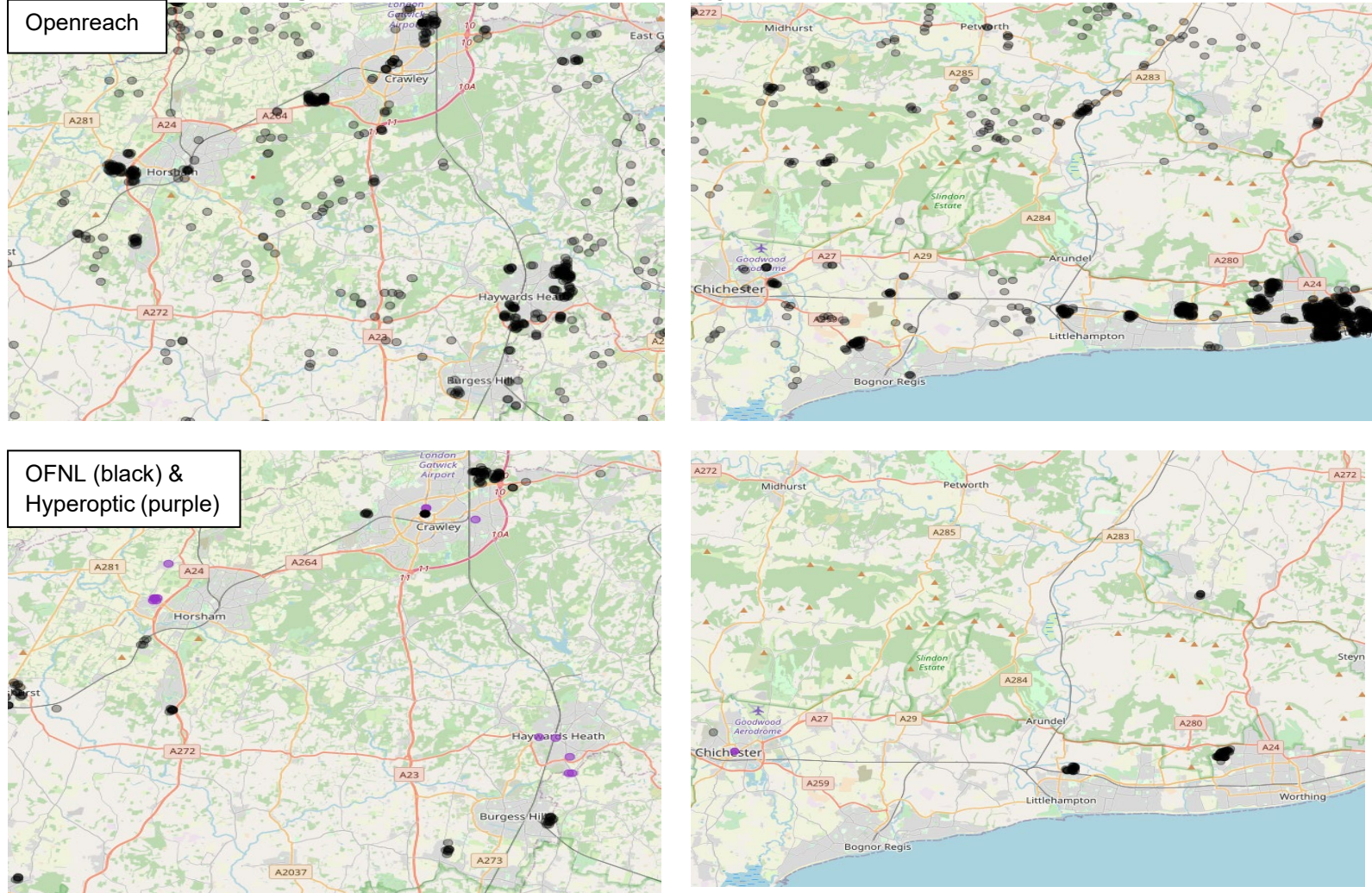
Aggregating Connected Nations data to Output Areas highlighted a range of different increases in FTTP and Ultrafast coverage in areas close to the West Sussex network. Some areas saw large changes in Ultrafast and FTTP coverage whereas a number of areas saw no change or reductions in coverage.<sup>13</sup>

Figure 4.5 shows the geographical distribution of changes in FTTP coverage availability. This shows that there are small changes in most areas that the West Sussex project is covering, with some larger increases in coverage in Burgess Hill and Haywards Heath. A more detailed map (focussing on each area) is presented in the annex.

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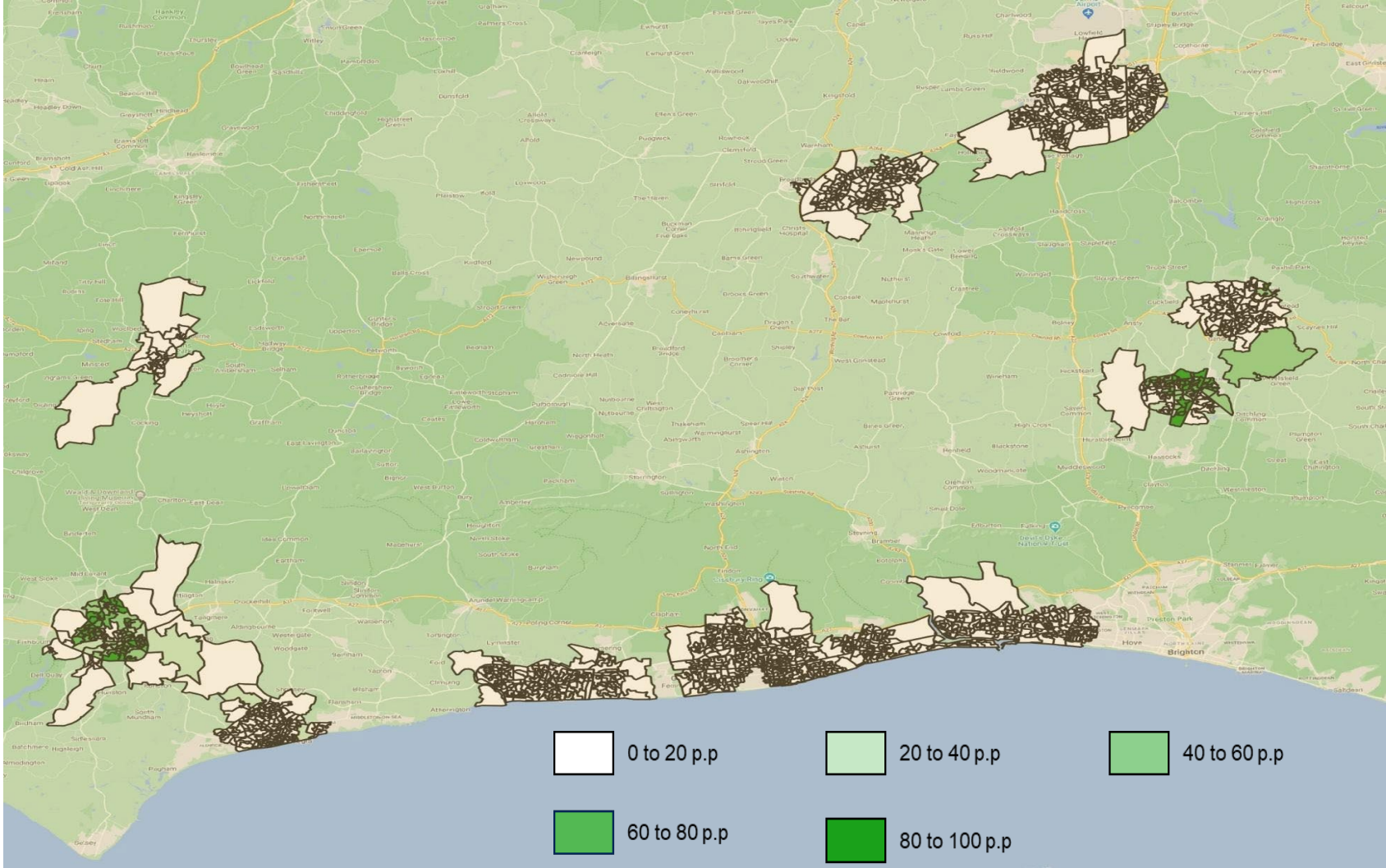
<sup>13</sup> This is expected to be a function of the changes in underlying methodology for CN data as outlined in the annex to this report.

Figure 3.4: FTTP coverage in relevant West Sussex areas by supplier (November 2020)



Source: ThinkBroadband

Figure 3.5: Change in FTTP coverage within 1km of the West Sussex anchor network in percentage points (p.p)



Source: Ofcom Connected Nations; Darker green indicates greater increases in FTTP coverage between 2018 and 2019



Changes in coverage by distance

Between 2018 and 2019, FTTP availability rose at all distances up to 1km from the anchor network. These increases were fairly similar across all distances from the network (ranging from 0.2 percentage points to 2.1 percentage points). Similarly, Ultrafast coverage rose at distances by between 5.7 and 8.7 percentage points.

**Table 3.2: Percentage point change in ultrafast and FTTP coverage in West Sussex areas between 2018 and 2019 by distance from the anchor network**

Distance from anchor network	FTTP availability	Ultrafast availability
Up to 50m	1.5	8.7
Up to 100m	1.2	8.5
Between 100m and 150m	0.8	7.0
Between 150m and 200m	0.2	7.0
Between 200m and 500m	1.3	6.7
Between 500m and 1000m	2.1	5.7

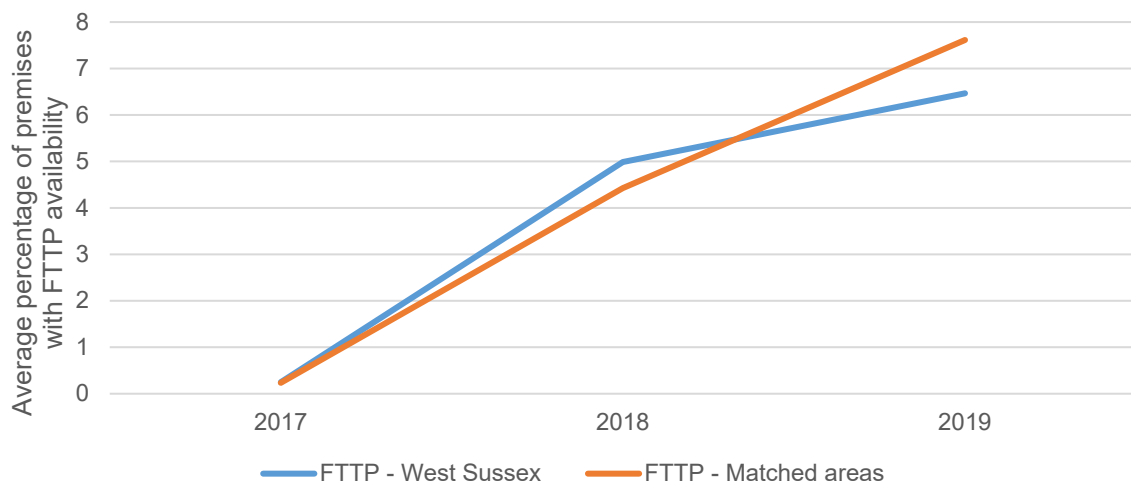
Source: Ofcom Connected Nations

Impact of the LFFN on fibre coverage

To provide an assessment of the extent to which the changes observed in FTTP and Ultrafast coverage could be attributed to LFFN at this stage, an econometric exercise was undertaken comparing the areas within 1km of the anchor network to similar areas in Kent. As the LFFN funded project was not completed in 2019 (the most recent data available), the discussion below presents the evolution of FTTP coverage in West Sussex and similar areas of Kent prior to the completion of the LFFN funded project and does not present the impact of the project.

The trends remain very similar with Ultrafast coverage in both areas equalising in 2019 with the matched areas in Kent seeing greater FTTP coverage by 2019 from a similar base in 2017.

**Figure 3.6: Change in FTTP coverage in areas within 1km of the West Sussex anchor network and in matched areas within Kent**



Source: Ofcom Connected Nations

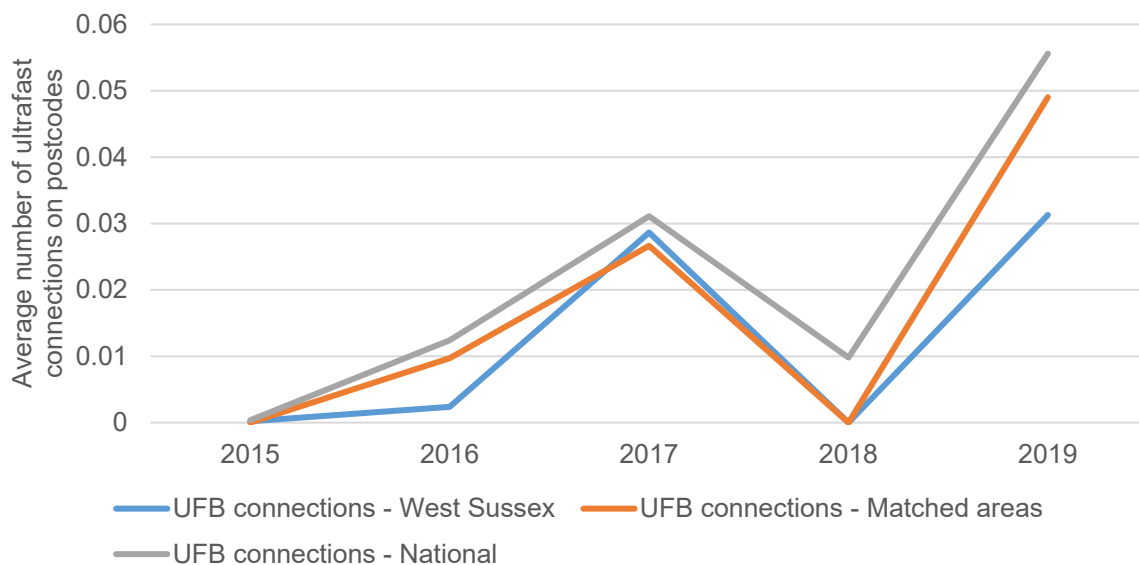
### 3.3.2 Demand side

#### Increased take-up of FTTP/Ultrafast

Public sector organisations are expected to benefit directly from the programme through increased take-up of FTTP connections, and private sector organisations are expected to benefit indirectly through increased take-up of FTTP connections. For businesses and public sector organisations, this benefit could be due to better data storage and processing power through access to the cloud and faster transmission of files and records, leading to productivity gains, or by supporting more employees to telework. Households are also likely to benefit, with communication and content streaming improvements.

As was expected given the evidence on FTTP and Ultrafast availability outlined above, there was little evidence of increased take-up of Ultrafast connectivity in areas near to the anchor network. Connected Nations data showed the average number of connections per postcode in West Sussex was just 0.03 in 2019, lower than the national average (0.06 connections per postcode) and in similar matched areas within Kent (0.05 connections per postcode). This is illustrated in the figure below.

**Figure 3.7: Ultrafast take-up on postcodes within 1km of the anchor network**



Source: Ofcom Connected Nations

## 4. Tameside ‘Thin Layer model’ project

This section presents the interim evaluation of the Tameside ‘Thin Layer Model’ PSAR project. It begins with an overview of the project, before discussing the progress made to August 2020 and the connectivity outcomes achieved.

### Key findings:

The project was completed in 2018. The LFFN Wave One build was 4km short of the 17km target set out in 2017, and the wider network is 7.7km below the 50km target (as of January 2020 data provided to Ipsos MORI).

Cooperative membership has grown substantially since 2018 including new suppliers such as Virgin Media. Recent growth in membership has been driven by two new local authority members (Blackpool and Manchester City Councils) which are providing assets.

Deployment of FTTP in Tameside has improved, however, the placement of LFFN Wave One PoPs might not have been optimal given the spatial distribution of impacts to date.

ITS Technology have driven private sector extensions to the networks in the north of Tameside from Ashton Under Lyne and south from Hyde and Longdendale with these PoPs leading to bigger impacts further from the ring.

Take-up of ultrafast connections appears negligible at this stage. The Cooperative members also suggested that there have been lessons learned in terms of the service levels (SLAs) needed to provide services to larger businesses and public sector organisations.

Public sector members further suggested that as membership of the Cooperative expanded, they learned more about how broadband markets work and commercial requirements for operating the Cooperative. They believed shared learning events held with other public sector bodies were beneficial to better understand the market and disseminate their experiences with the project.

### 4.1 Project overview

This section outlines the Tameside ‘Thin Layer Model’<sup>14</sup> PSAR project and the process by which it was expected to deliver its anticipated impacts on FTTP coverage, take-up of higher capacity connections, and wider economic and social impacts. This framework was agreed with BDUK during the planning phase of the evaluation in 2019 following a series of consultations with BDUK, TMBC and key stakeholders, review of project documentation, literature review and review of secondary data.

#### 4.1.1 Description of the project and objectives

TMBC started to invest (with other public sector partners) in its own fibre network in 2012 when existing contracts with suppliers came up for renewal. TMBC’s objectives in investing in its own network was to:

<sup>14</sup> The ‘thin layer model’ describes a model by which public sector partners invest in telecommunications infrastructure assets. The assets are joined together to form a coherent, integrated telecommunications infrastructure that can be shared in a co-operative alliance.

- TMBC and other public sector organisations to make savings on expenditure.
- Promote public sector innovation.

In addition to these primary objectives, there were several secondary objectives of investing in the network:

- Ensure network investment covered the nine towns in Tameside<sup>15</sup> (known as the spine network or Tameside fibre-8 ring).
- Retain economic activity in the area on the expectation that other areas would receive investment in FTTP networks first, creating incentives for firms to relocate.
- Ensure a “dig once” policy was enacted across Tameside to secure duct space for future use.

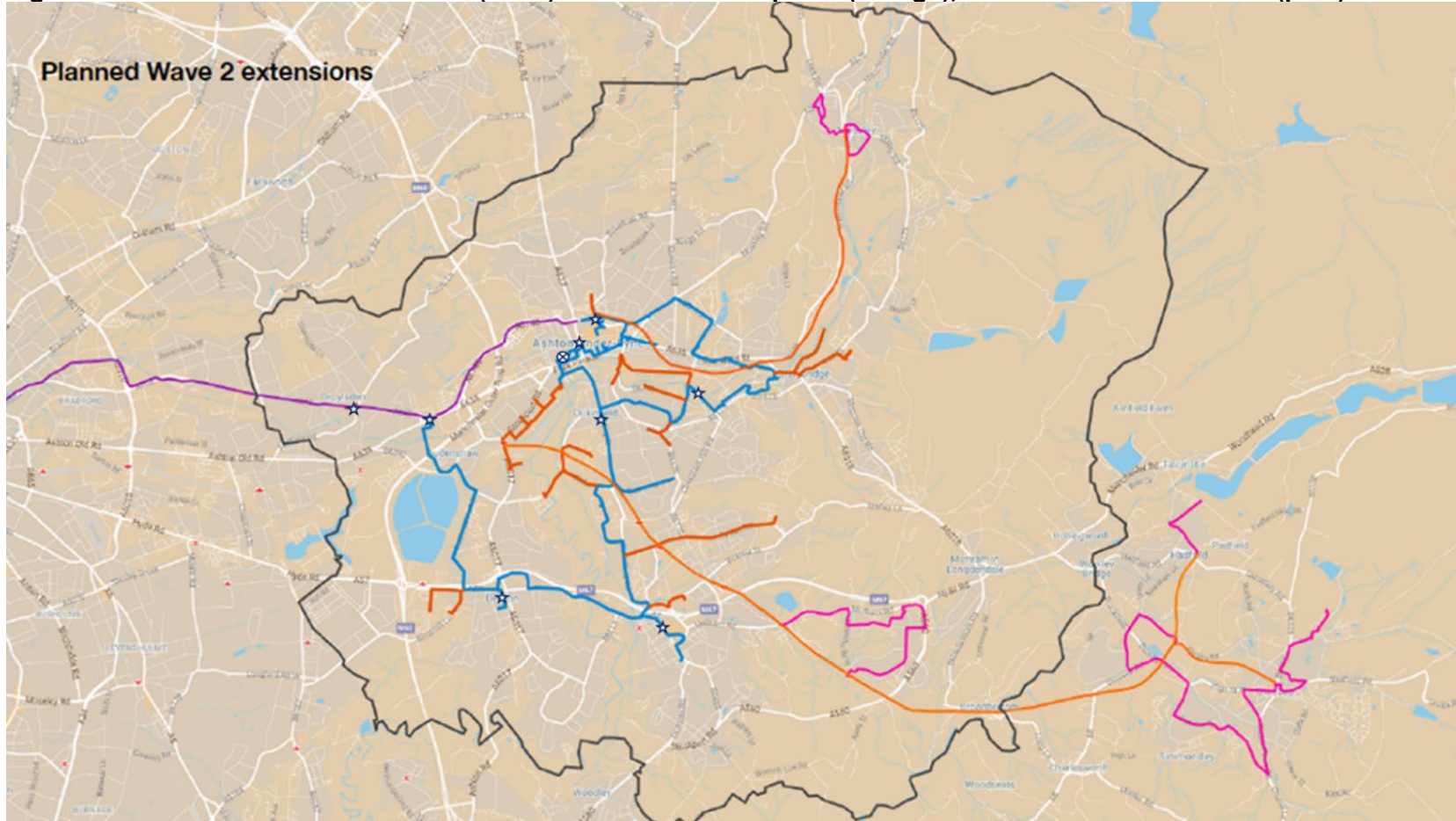
In 2017, TMBC were awarded funding for LFFN funding to expand its fibre network to further public sector buildings via seven Points of Presence (PoPs) or “mini-Digital Exchanges (mini-DX)” in each of the main towns on the fibre-8 ring, to enable further fibre network build (as displayed in the figure below). The investment was expected to provide significant running cost savings for the Council and other public sector members over time, and provide resilience across the backbone network TMBC had established. The network would pass within 200 metres of 38,000 premises (including 4,000 businesses) and connect to a Digital Exchange hosted in a data centre in nearby Ashton Old Baths.<sup>16</sup> It also addressed concerns that while the Tameside 8-ring connected key public sector buildings, it missed or bypassed many of the key employment areas across Tameside. This raised concerns that local businesses and residents would not benefit directly from their initial investment where infrastructure remained costly (or commercially unattractive) for suppliers to connect in these areas.

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<sup>15</sup> Key population centres include Ashton-under-Lyne, Audenshaw, Denton, Droylsden, Dukinfield, Hyde, Longdendale, Mossley and Stalybridge

<sup>16</sup> The capital investment into the project is estimated to be £2.26m (matching the £2m estimated value of the existing infrastructure in Tameside at the point of agreement).

Figure 4.1: LFFN Wave 1 funded PoPs (stars) and extension “spurs” (orange), LFFN Wave 2 extensions (pink)<sup>17</sup>



Source: TMBC report to Strategic Planning and Capital Monitoring Panel, September 2018

<sup>17</sup> Blue lines denote the existing fibre-8 ring in Tameside funded by TMBC in 2012.

## The Cooperative

At the time LFFN funding was awarded, TMBC launched a Notice of Intention for local Internet Service Providers (ISPs) and telecommunications businesses to participate in the network development and better understand their needs and barriers to deployment. Following this consultation, TMBC established a Cooperative of private and public sector members to act as an operating vehicle for commercialising the network assets and stimulate further investment from the private sector. The members of the Cooperative each have one vote to ensure it is serving the interests of all members equally. There are four types of members:

- **User member:** Pay wholesale fees to access the dark fibre and rack space (e.g. ISPs, IT, telecoms businesses);
- **Contributor member:** Contributes duct, floor or roof space and receives a fee (e.g. public sector organisations or land owner);
- **Investor member:** Invests up to £100,000 in the cooperative network for an “interest-style” return<sup>18</sup>; and
- **Expert member:** Expert members are individuals or organisations who contribute voluntary time and expertise, by invitation (a role introduced in 2019).

Cooperative members were expected to ‘light’ the fibre locally. Cooperative Network Infrastructure (CNI), previously Tameside Digital Infrastructure Cooperative (TDIC), was founded with six members when the LFFN project was funded and had grown to 17 members when baseline research was conducted in 2019.<sup>19</sup>

During 2019, the Cooperative set up an ‘Operations Group’ where individuals sit as representatives of their businesses and organisations and meet once a month to discuss issues such as expansion of the network, marketing of the Cooperative to potential customers, or maintenance of assets.

## Ashton Old Baths and Digital Exchange (DX)

LFFN Wave One funding was also committed to purchasing five racks within the Digital Exchange to be used by suppliers in the Cooperative. TBMC and NHS also have five racks each for use in the provision of their services across Greater Manchester. Alongside the LFFN investment, TMBC is developing the Ashton Old Baths building to house small digital and creative businesses in aims of creating a digital hub (or data centre) in the Tameside local authority area.

## LFFN Wave Two Tameside

Under LFFN Wave Two, Greater Manchester Combined Local Authority will be expanding the Cooperative network to key population and business hubs across Tameside and Glossop (see pink lines in Figure 3.1). NHS Tameside and Glossop CCG (who is a member of the Cooperative) will act as an anchor tenant for multiple sites as part of the project, and there is expected to be further expansion into population centres such as Denton Windmill Lane and Ryecroft Business Park through asset re-use delivery models. The Greater Manchester

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<sup>18</sup> There was no limit if the investor member was a local authority.

<sup>19</sup> <https://cni.coop/>

project is combining a mix of LFFN delivery models and aims to use the Cooperative to support their plans.<sup>20</sup> The LFFN Wave Two project is out of the scope of this evaluation.

#### 4.1.2 Expected outcomes and impacts

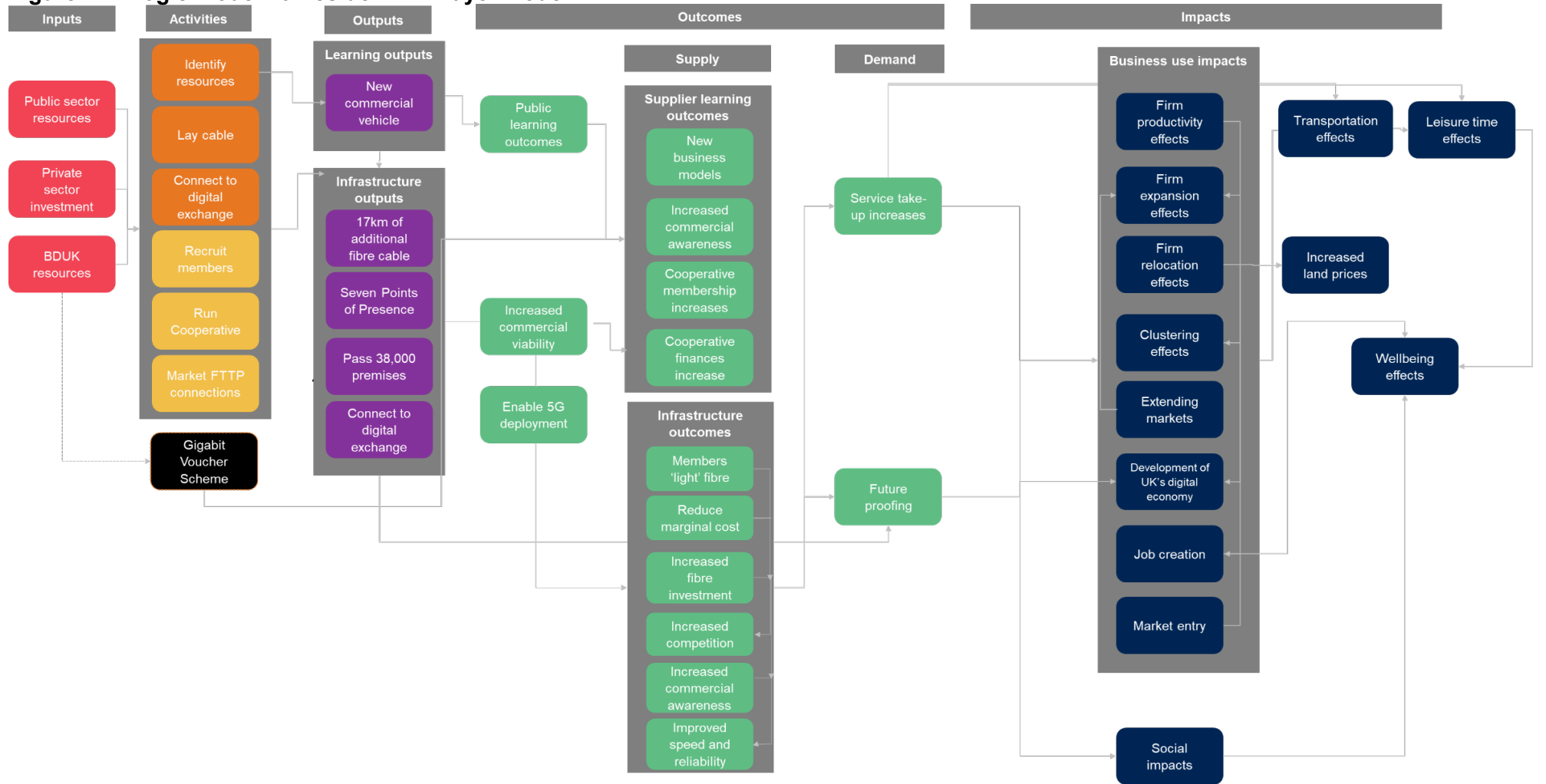
The physical work undertaken for the Wave One project was completed in Autumn 2018 and was expected to lead to several medium and longer-term outcomes and impacts which can be summarised in the following key areas:

- **Connectivity outcomes:** It was expected that the project would reduce the marginal cost of extending the network from the Points of Presence (PoPs), leading to increases in FTTP availability and take-up of ultrafast and gigabit capable lines. It is hoped this will increase competition for fibre in the local area. It is also expected that the network will provide improved speeds and reliability and end-users should, in turn, take up new fibre connections.
- **Growth of the Cooperative:** It was hoped that LFFN investment in the project would also influence outcomes relating to the success of the Cooperative by creating incentives to join (leading to an expansion in membership) and demonstrating the commercial viability of the model.
- **Public sector learning:** A key outcome is to enhance learning for public sector organisations participating in the project, including working with suppliers (through the Cooperative) to be better able to use this delivery model in other areas in the future, barriers to adoption/development, implications for state aid compliance and opportunities for all stakeholders, and maintenance and build of infrastructure.
- **Business use and economy:** As businesses take up new fibre connections along the network it is anticipated that firms may relocate to Tameside's key business hubs (including the data centre in Ashton Old Baths). A secondary objective of the project was to attract small digital and creative businesses to Tameside and enable technological enhancements of existing manufacturing businesses. This may enable clustering of similar businesses to the area and has potential for further job creation and development of the area's digital economy.
- **Social and environmental:** Specific social and/or environmental effects were not expected. However, as the project has the potential to lead to spill over FTTP build to residential properties, 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 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.

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<sup>20</sup> Greater Manchester Full Fibre Networks Challenge Fund Bid (2019)

Figure 4.2: Logic model Tameside 'Thin Layer Model'



Source: Ipsos MORI



## 4.2 Progress to date

This section provides an update of the project delivery to date, updating on previous reporting completed by Ipsos MORI in 2019. It draws upon background data and documentation and consultation evidence with BDUK and Cooperative members to provide an overview of emerging outcomes and lessons learned.

### 4.2.1 Activities and outputs

The physical work associated with The Tameside 'Thin Layer Model' LFFN Wave One investment was delivered in 2018. LFFN Wave One funding set out to enhance Tameside's existing fibre-8 ring with 17km of fibre cable and ducting, seven PoPs in key towns in Tameside, and ensure the network passed 38,000 premises.<sup>21</sup> The project was broadly delivered as planned, though the length of ducting brought into use with the LFFN Wave One investment was 4km short of the target at 13km as reported in data provided to the research team in January 2020.

#### Infrastructure build

Including 17km LFFN investment, the Cooperative network aimed to lay 50km of fibre cable into existing ducts. These were provided by public sector members of the Cooperative and the network would also provide connectivity to key business and residential sites across the nine towns of Tameside near to where LFFN PoPs were installed. LFFN Wave One funding was made available for three key areas of investment:

- £910,000 for Core Infrastructure Equipment (ducting and PoPs);
- £123,000 for Connectivity and Resilience (including rack space at Ashton Old Baths); and
- £1,229,000 for Fibre Infrastructure across the network.

Total project spending targets were met in 2018 at £2,262,000.<sup>22</sup> No difficulties with project build were reported by stakeholders in consultation.

There are 15 products provided by LFFN Wave One funding in Tameside's network, including seven PoPs across Tameside towns. The 15 LFFN Wave One products made 13.5km<sup>23</sup> of fibre and ducting available for use by suppliers including installation of "spur" ducting extensions and connecting networks through PoPs. Combined with the existing assets provided by public sector members of the Cooperative (including Tameside's existing fibre-8 ring), there is 42.3km of ducting available. Additionally, LFFN Wave One funding led to 1,176 fibre cores being laid by suppliers and 299 wireless access points created. Combined with the existing fibre-8 ring network, 2,280 fibre cores have been laid and 712 access (or "breaking-in") points created.<sup>24</sup>

<sup>21</sup> TMBC Strategic Planning and Capital Monitoring Panel (2018); Available at:

<http://tameside.moderngov.co.uk/documents/s37823/ITEM%205%20-%20Digital%20update%20FINAL.pdf>

<sup>22</sup> Figures taken from 'LOCAL FULL FIBRE NETWORK FUNDING: STRATEGIC PLANNING AND CAPITAL MONITORING PANEL' dated September 2018; confirmation of full Wave 1 project spend from interviews with BDUK and TMBC.

<sup>23</sup> Ipsos MORI have made an assumption on the unit of measurement from MI data and have sought clarification from BDUK and TMBC.

<sup>24</sup> Management Information (MI) provided by BDUK provided by TMBC (January 2020)

The LFFN Wave One build was 4km short of the 17km target set out in 2017, and the wider network is 7.7km below the 50km target (as of January 2020 data provided to Ipsos MORI).

**This presents evidence that the expected project output has been partially achieved.**

#### Premises passed

A key aim of the Tameside ‘Thin Layer Model’ LFFN project was to ensure the network passed 38,000 premises within 200m of the Tameside 8-ring. Consultations with BDUK and TMBC suggest this target was met. The fibre network (fibre-8 ring and LFFN Wave One extensions) installed passes within 50m of 29,000 premises (2,000 businesses and 27,000 households) and within 200m of 38,000 premises (nearly 34,000 households and 4,000 businesses). This means the network passes within 200m of over half of all businesses in Tameside and over one third of households.<sup>25</sup>

**This presents evidence that the expected project output has been fully achieved.**

#### Ashton Old Baths data centre

The Tameside fibre network is connected to a data centre in Ashton-under-Lyne which is undergoing refurbishment alongside the project. The centre houses a Digital Exchange (DX) and five rack spaces were bought with LFFN Wave One investment for TMBC to rent back to Cooperative members as planned. Consultations with stakeholders suggested all five racks are rented. TMBC and NHS have also purchased rack space to provide resilience to their public-sector networks additional to LFFN funded space.<sup>26</sup>

Stakeholders consulted suggested the installation of additional rack space in the DX enabled resilience across the LFFN funded PoPs or “mini-DX”<sup>27</sup> points and reduced costs of backhaul installation for suppliers. The additional rack space meant that suppliers and the Council could install direct local lines “from Stalybridge [businesses] into Stalybridge mini-DX” with one backhaul connection to Ashton Old Baths DX. This reduced costs across the network as suppliers would only need one core connection from the PoPs back to the Digital Exchange, enabling connections to 10-20 businesses in a town rather than multiple lines from individual businesses into the Digital Exchange.

The two ISPs consulted provided mixed views on the attractiveness of the data centre. One believed the data centre would “absolutely influence future membership” positively as they said it provided a stable backbone for the infrastructure, but would also ideally create a digital “ecosystem” in the area – in line with the original objectives of the investment. However, another ISP provider did not have strong views positively or negatively on the investment and said it would very much depend on the wider Cooperative offering (including pricing, administration, Service Level Agreements (SLAs) etc.).

**This presents evidence that the expected project output has been fully achieved.**

<sup>25</sup> No further information on premises passed was provided by BDUK or TMBC in consultation or MI.

<sup>26</sup> MI data does not indicate sold or rented rack space (costs to do this only) and no further documentary evidence was provided.

<sup>27</sup> Points of Presence (PoP) or, commonly known as mini-Digital Exchange (“mini-DX”), hold multiple servers, routers, and all other interface equipment to provide a local access point to the internet for Internet Service Providers (ISPs).

## 4.2.2 Cooperative

### Cooperative membership growth

Cooperative Network Infrastructure (CNI) currently comprises 22 members (as of March 2020), 16 of which have joined since LFFN funding was awarded.<sup>28</sup> In the first year, membership grew to 17 including six public sector organisations from Tameside and surrounding areas and 11 private companies, either providing assets (e.g. Jig Saw Housing) or using the network (e.g. ISPs and network providers). Five additional members have joined since 2018 (as of March 2020).

The balance of these five newer members has been towards providers of ducting infrastructure rather than commercial operators seeking to connect businesses or households. Three of the five new members are contributors of further ducting assets and are from local authority areas which have received funding from the LFFN programme (Manchester City Council, Blackpool Council, and the Mid-Counties Cooperative). As highlighted below, this will considerably extend the networks available to users. One additional ISP (Link IP Networks) has joined the Cooperative. Stakeholders consulted stated that the growth of the Cooperative into new local authority areas has been a success and feel that this will attract further local Alt-Nets to provide services across the network.

One ISP believed that there was “insufficient aggregation of demand” in Tameside prior to the creation of the Cooperative to make it an attractive area for investment as well as an “insufficient aggregation of assets” to be able to deliver the network at a cheap cost. This view supports the case for LFFN investment in the Cooperative infrastructure in Tameside, and the stakeholder suggested that the Cooperative alleviates investment concerns among network providers. Other ISPs consulted did not share this view. They believed that there was already sufficient infrastructure build across Tameside before joining the Cooperative (suggesting further publicly funded infrastructure build was not necessary). They also did not believe there to be a lack of demand for fibre services in Tameside before or after the Cooperative setup. They stated that their motivations for joining the Cooperative were to better understand the operations of the network in Tameside, and how far the Cooperative objectives could align with their own business strategy to reduce build costs and collaborate with local authorities to re-use public assets.

**This presents evidence that the expected project output has been fully achieved, and that project outcomes of increased Cooperative memberships and investment are being realised.**

### Expansion of the network

The network covered by the broader project has been extended significantly, both by investments made by existing public sector members and (as noted) by new members. These developments are likely to extend the potential markets that can be addressed by users significantly with the potential to attract further commercial interest, although it is notable that these extensions have largely been funded by LFFN.

**This presents evidence that the project outcome of increased investment in fibre are being realised.**

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<sup>28</sup> <https://cni.coop/members>

### *Growth from within the cooperative*

As outlined in the introduction, TMBC was awarded an additional £2,120,000 through LFFN Wave Two funding for 37.5km of ducting in 2017. These products will be made available to the Cooperative as they are completed, the last of which is due to complete in December 2020. The additional points included in Wave Two funding are: Mossley Loop, Hattersley, Broadbottom, Glossop, Hadfield, Hyde to Hattersley, Hyde Fire Station, Ashton Fire Station and a Network Rail link (Mossley to Manchester Internet Exchange).

Private sector members also added an additional 4.5km to the network including connections to notable public sites in Hyde and Denton in 2019. The Cooperative was due to add a further 1.4km of ducting in 2019, although these projects have been delayed due to planning permissions and are currently ongoing. A further five Cooperative sites are currently listed “on hold” with a total of 0.7km ducting projected from these products, though some data is missing within management information for these sites.<sup>29</sup> As qualitative interviews were limited, it was not possible to explore motivations for these additional investments.

Once these investments are complete, the network build (including the existing fibre-8 ring and LFFN funded PoPs) will total 86.4km of available ducting, 3,060 fibre cores laid and 1,526 access points. The expansion of the network since 2018 was considered a key success of the project in providing fibre access routes to commercial providers providing services to local businesses and residents. However, it should be noted that most of the investment and extension of the network has come from public funding, predominantly through the LFFN programme (Waves One and Two), although this does not include any costs for connections made. **This presents evidence that the project outcome of increased investment in fibre is being realised.**

### *Growth driven by new members*

In 2019, two local authorities outside Tameside joined the Cooperative, and a further local authority has expressed an interest to join, with ambitions to use the cooperative model to commercialise assets in their areas:<sup>30 31</sup>

- **Blackpool Council** joined the Cooperative in December 2019. Blackpool Council received £3m LFFN Wave Two funding to expand the fibre network across the coastline in Blackpool centre and connect 39 public buildings and 13,657 premises.<sup>32</sup> Members reported being “quite excited about the potential that new infrastructure will bring”. Additionally, members said Blackpool Council have facilitated marketing opportunities for suppliers and network providers including introductions to the Federation of Small Business and Chamber of Commerce in Blackpool.
- **Manchester City Council** officially joined the Cooperative in January 2020 and Cooperative members have not yet established connections in Manchester City. Cooperative members stated that the Manchester City Council joining the network was “very welcome” and as many existing Cooperative members have existing customers

<sup>29</sup> Tameside MBC MI data sourced from file name: Tameside - Co-Op Post-Build MI Jan 20. These ongoing and on-hold projects will be explored in the qualitative interviews with Cooperative members.

<sup>30</sup> Qualitative research with Blackpool and Manchester City Councils was not possible in Spring 2020, so Ipsos MORI has been unable to explore motivations for joining the Cooperative from these new members.

<sup>31</sup> Subsequent to the research being completed, a further four local authorities have joined the Cooperative. This will be explored in the final evaluation in October 2022.

<sup>32</sup> Presentation by BDUK Justin Lees entitled ‘LFFN: Are You Ready?’ (document name ‘DCMS-LFFN-Feb2019’) accessed via <https://cni.coop/>

across Oldham, Rochdale and other Greater Manchester areas, “anything that would help us get out to those regions as well would be extremely welcome”.

- **Mid-Sussex Council** also expressed an interest to join the Cooperative and was in talks with CNI about joining their £2.2 million LFFN Wave Two funded development of Burgess Hill (at the point the research was undertaken. This development also aimed to connect into Brighton Digital Exchange (BDX) which was funded under the Superconnected Cities programme in 2015.<sup>33 34</sup>

Consultations also suggest that Network Rail and TMBC have been in contact to discuss connecting the Trans-Pennine Initiative (TPI)<sup>35</sup> route into Stalybridge in Tameside. This will enable Cooperative suppliers’ access to the route and believe that the Cooperative “will be the first commercial customer of Network Rail through TPI fibre”.<sup>36</sup> Consultations suggested the aim of establishing a connection to TPI is to ensure that “fibre connectivity could be part of [...] underpinning [the] Northern Powerhouse agenda, and delivery”. The potential for strengthened relationships across this network and supported networks for businesses across Manchester, Leeds and York will be covered in latter phases of the evaluation in parallel with the evaluation of the TPI Wave One project.

One ISP member stated that whilst they considered the Cooperative has grown well and relationships between members are positive, that “it could have and should have [...] grown quicker and particularly on the service provider and reseller end of the market”. They suggested there was an initial tension in ways of working between public sector and private sector members and that there are “frustrations” with the commercial positioning of the Cooperative in terms of attracting new members (due to State aid requirements). Despite having a dedicated commercial group within the Cooperative, the member stated that “it works more as a board of trustees of a Cooperative” than a commercial working group or board. They stated this could be a barrier to “drive the dynamic forward” in terms of commercial growth.

**This presents evidence that the project outcomes of increased Cooperative memberships and investment are being realised.**

#### Management of the Cooperative

Management of the Cooperative has not required much time from its members over the last year, and members reported that this has significantly reduced from the first year of establishment. In the first year, it was estimated that founding members provided roughly 20 days of time towards administrative and management tasks, including agreeing operational arrangements, processes for evaluating membership and attending meetings. As the Cooperative expanded into new local areas and larger suppliers (particularly Virgin Media) joined, processes and procedures needed formalising. Stakeholders suggested this took “more time and effort” than originally anticipated. Some members said that conversations to formalise processes at the beginning were at times “frustrating” or lengthy as they ironed out how the Cooperative would operate in practice, but that two-years into establishment, they feel they are working well and not spending “too much” extra time on Cooperative matters.

<sup>33</sup> <https://broadband.coop/brighton-digital-exchange>

<sup>34</sup> Subsequent to the research being completed, since the research was conducted, MSDC have joined the CNI.

<sup>35</sup> The TPI is a separate LFFN Wave One funded project. Subsequent to the research being completed, the TPI network has been connected in Stalybridge

<sup>36</sup> In fact, research for the LFFN Wave 1 TPI project suggests that Kirklees Council will be the first customer of the TPI project. However, Tameside Council and the Cooperative were in advanced stages of forming an agreement with the TPI in August 2020, so will likely be one of the first customers of the TPI project.

It was reported that members give personal time on a voluntary basis (i.e. alongside work commitments) towards the Cooperative. However, members did not feel the voluntary nature of their contribution would negatively impact the future running of the Cooperative. Stakeholders suggested discussions around hiring a part-time administrator (to process invoicing, contractual documents, and internal communications) were floated in meetings, but this has not been agreed at this stage.<sup>37</sup>

Members suggested that the agreements that commercial companies need and want in place to deliver commercial services through the infrastructure are a key area of focus for the Cooperative going forward. It was suggested that agreements created by suppliers in the Cooperative may be insufficient to compete with larger suppliers, specifically Openreach. An example of Service Level Agreements (SLAs) were raised by several members in consultations. SLAs were cited as being of particular concern for public sector customers such as NHS hospitals where resilience agreements are “tighter” and required services such as 24/7 engineering to fix potential problems that may arise (services not provided by the Cooperative or Alt-Net members). Both ISPs consulted stated that this was their primary concern with the Cooperative and only potential barrier to making customer connections from the network. One stated that they had email exchanges as “reassurance” on the maintenance team’s availability and from TMBC stating that they can assure a core SLA of “four hours next working day”. The ISP stated that in principle the Cooperative has sent them their existing SLA whilst noting that the Cooperative “can be flexible” on terms, however, the ISP believed this would not be enough for many of their customers nor central management at their firm.

A stated example to model their agreements on was Openreach’s Matters Beyond Our Reasonable Control (MBORC)<sup>38</sup> policy which provides Openreach security in the event of maintenance issues “outside reasonable control”, allowing them to remedy issues outside their usual contractual timescales. Examples of where this may apply include when Openreach are not able to provide 24/7 engineering support to requests made by public sector customers.

Cooperative members also suggested that the Cooperative still need to do more to convince some public sector customers that they can provide reliable services to suit public sector customer needs. Cooperative members reported there are now formal reference documents in place from the Cooperative to provide to public sector customers on this (though the same reference document has not yet been drafted for ISP member assurances).<sup>39</sup>

### Relationship between members

In 2019 during consultations with Cooperative members, private sector members reported they were apprehensive about working closely with businesses traditionally viewed as competitors. However, the Cooperative members consulted in April and May 2020 considered the model has worked well since, and members are coordinating services amongst one another.

Cooperative members believe any anxiety has been alleviated through working together under shared assets, meaning traditional competitors have created space within the growing market for one another. One Cooperative member suggested that a key benefit was the new business relationships it has enabled them to create. They have secured work with another member within and outside of the Cooperative network area, where they traditionally would have been

<sup>37</sup> Subsequent to the research being completed, a part-time administrator has been appointed.

<sup>38</sup> <https://www.openreach.co.uk/orpg/home/mborc.do>

<sup>39</sup> As of March 2020.

competitors, and believed this relationship would continue. Another stakeholder said there is “room for everybody” in the broadband market and the Cooperative, in their view, has reflected this.

Overall, a key success factor cited by members was that the processes from joining, communications, to operating within the network were “open and transparent” and believed the Cooperative would continue to operate well as membership expanded into new regions.

### Commercial viability of the Cooperative

As the membership of the Cooperative expands to cover new geographical areas and investment into expanding Cooperative infrastructure is made, the number of customers served from the network should increase. This in turn should improve the Cooperative’s commercial sustainability through increased sales to individual members, stimulating investment back into the network or further re-investment into the network. For the Cooperative to be viable the income generated by the activities of members should exceed the costs involved in the long run. The limited amount of consultations with Cooperative members has made it difficult to assess the commercial viability of the Cooperative to date, but this will be revisited in the next phase of research.

The financial arrangements for the Cooperative can be allocated into the following categories:

- **Cooperative running costs:** User members pay fees to the Cooperative which are used for maintenance and rent of assets. The annual income of the Cooperative from products in the network was £38,580 in 2019.<sup>40</sup> No information was available on the costs of maintaining the ducting assets (provided by Core Integrated Solutions, a member of the Cooperative). However, consultations with members suggest that in the first year a small surplus was made, suggesting that income generation has been sufficient to cover running costs. However, the income generated does not appear to yet exceed the cost of the capital deployed to bring the ducting assets into commercial use.<sup>41</sup> As membership expands into other areas, stakeholders stated each local authority will retain their own fibre maintenance arrangements, with user members of the Cooperative covering maintenance costs. Consultations suggest that Core Integrated Solutions is also working with Blackpool, although we were unable to speak to representatives from both organisations.<sup>42</sup>
- **Contributor members:** Contributor members of the Cooperative generate income through renting assets such as duct or rack space which is paid for by user members of the Cooperative. A standard rental fee across contributor members is benchmarked to Ofcom PIA rates (indicating that the users obtain access on similar terms as they would to Openreach owned infrastructure). Contributor members are required to contribute a minimum of 50m duct or fibre ‘swap’.<sup>43</sup> Contributor members are expected to grant relevant permissions allowing Core Integrated Solutions to maintain infrastructure and effect repairs to fibre and colocation equipment, but they may have their own agreements to repair assets (e.g. ducting) which could incur further costs to public sector members.<sup>44</sup> Monitoring information data provided to BDUK does not

<sup>40</sup> Management Information (MI) provided by BDUK provided by TMBC (January 2020)

<sup>41</sup> Based on the costs of the components of the project funded by LFFN alone, and assuming 20-year life span for the assets, net income of £165,000 per annum would be needed to generate an IRR of 3.5 percent (the discount rate recommended by HMT, which can be considered a measure of the opportunity cost of capital for the public sector).

<sup>42</sup> CNI Member prospectus (April 2020)

<sup>43</sup> Ibid.

<sup>44</sup> Ibid.

capture the total income earned by contributor members from leasing their assets (although TMBC generated a further £8,916 annually). The Cooperative membership prospectus also states that contributor members will generate a yearly incoming of £0.60/m (sub-duct or duct space) for up to 10 years.

- **User members:** Users generate income from providing connectivity to end-users. Management information suggests that the total cost for connectivity across 48 public sector sites connected through LFFN Wave One are £523,900 per annum.<sup>45</sup> This suggests suppliers (as a group) receive income that exceeds the rental costs involved. However, as the additional capital and operating costs are unknown (and qualitative interviews with commercial providers has been limited), it has not been possible to determine the level of profits being made by users. One network provider consulted suggested that they had established connections jointly with another Cooperative member (ITS Technology) and have generated more income than costs through utilising Cooperative assets. However, another Cooperative network provider cited that it has been “business as normal” for them and are not earning “more” income than they would outside of the network. As they tended to work directly with local authorities as a core foundation of their business, they acknowledged the Cooperative as a “unique” platform to build strategic relationships with local authorities and potential public sector customers. One Cooperative Member (a network provider) confirmed that they expect to generate a good Internal Rate of Return (IRR) from the project which their shareholder is also “comfortable” with.

### 4.3 Connectivity outcomes

This section provides an update of the connectivity outcomes achieved to date, drawing on secondary data analysis using Ofcom Connected Nations and ThinkBroadband data, and consultation evidence with Cooperative members.

#### 4.3.1 FTTP and ultrafast coverage

As the full fibre network is extended around Tameside and the seven LFFN-funded PoPs are installed, the marginal cost of future investment for Cooperative members was expected to fall. In turn, this was expected to make it commercially viable to deploy FTTP networks in the vicinity. As indicated in the previous section, there was qualitative evidence from suppliers that the project did produce reductions in the marginal cost of deployment (an expected positive outcome of the intervention).

The figure below shows the development of FTTP coverage and ultrafast availability amongst premises within 1km of the Tameside fibre-8 ring, based on the Ofcom Connected Nations dataset.<sup>46</sup> FTTP coverage was close to zero prior in 2017 (when LFFN funding was awarded and the Cooperative was founded) but rose to 9 percent in 2019 following project completion (broadly in line with the national average).<sup>47</sup> Ultrafast availability has also risen rapidly over the period (to 54 percent in 2019). The Connected Nations dataset may (substantially) understate FTTP availability in the area as most ISPs and infrastructure providers that are members of the Cooperative are not required to provide and have not provided data to Connected Nations. These included TNP, Link IP Networks, Telcom, Concept Solutions People, Core Integrated Solutions and The Loop. It is also important to note that the

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<sup>45</sup> Management Information (MI) provided by BDUK provided by TMBC (January 2020).

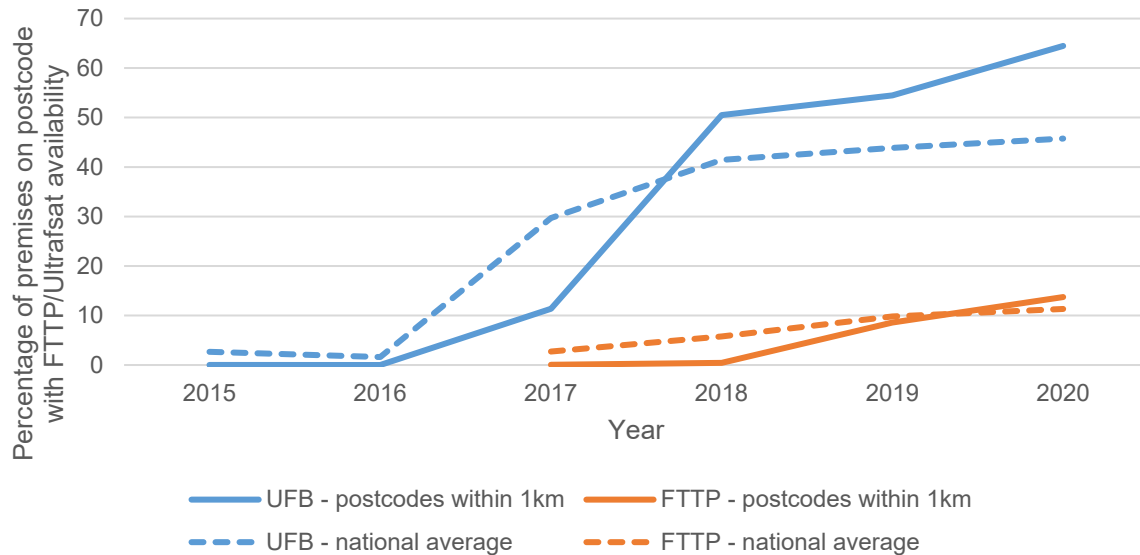
<sup>46</sup> In 2018 and 2019 this data is collected as a snapshot as of September of that year.

<sup>47</sup> This may be due to the inclusion of local supplier ITS Technology in the 2019 Connected Nations dataset and will be explored further in the case study research.



longitudinal Connected Nations data used in this analysis was collected in mid-2019, and that this is a time prior to when Cooperative members may have made their networks available, so may understate the level of coverage in Tameside in 2020. The final evaluation will capture the further coverage provided by Cooperative members in 2020 and 2021.

**Figure 3.3 FTTP and Ultrafast Coverage on postcodes within 1km of the Tameside fibre ring<sup>48</sup>**



Source: Connected Nations, Ofcom

### Suppliers of FTTP

Data from ThinkBroadband (which provides a breakdown by supplier and is more up to date than Connected Nations) was used to provide some insight into how far the observed increase in FTTP coverage was driven by cooperative suppliers making use of the ducting assets made available through the project. It should be noted that ThinkBroadband data differs from Ofcom estimates of coverage<sup>49</sup> and does not provide complete coverage of Cooperative members.<sup>50</sup>

The figure below shows the current level of FTTP coverage in Tameside (in May 2020) and at the time of the baseline report in 2019. In 2019, there were only two suppliers offering connections in a small number of areas: Hyperoptic FTTP (purple) and Openreach native FTTP (black). By 2020, this data suggests FTTP deployments were extensive in the Tameside area, with three providers offering FTTP connections (Hyperoptic, Openreach Native, ITS). The apparent change in coverage has been driven by the coverage from ITS<sup>51</sup>, with only a small increase in coverage by Openreach and no change in Hyperoptic coverage<sup>52</sup>.

<sup>48</sup> Data for 2020 refers to coverage as of January 2020 reported in the 2020 Connected Nations Spring update.

<sup>49</sup> This is due to how the data is collected. Connected Nations data is based on a supplier submission to Ofcom.

ThinkBroadband data is crowdsourced and relies on suppliers / customers making ThinkBroadband aware of locations where FTTP is available.

<sup>50</sup> The ThinkBroadband dataset includes FTTP coverage data for the following cooperative members: ITS and Virgin Media. It does not include any data on FTTP coverage of: The Loop or Telcom.

<sup>51</sup> ITS Technology were not available on Connected Nations in 2018 but have been added to Connected Nations datasets as of 2019 update (used in this paper). There is a difference in the data presented from ThinkBroadband and Ofcom Connected Nations data which has been flagged with BDUK in April 2020.

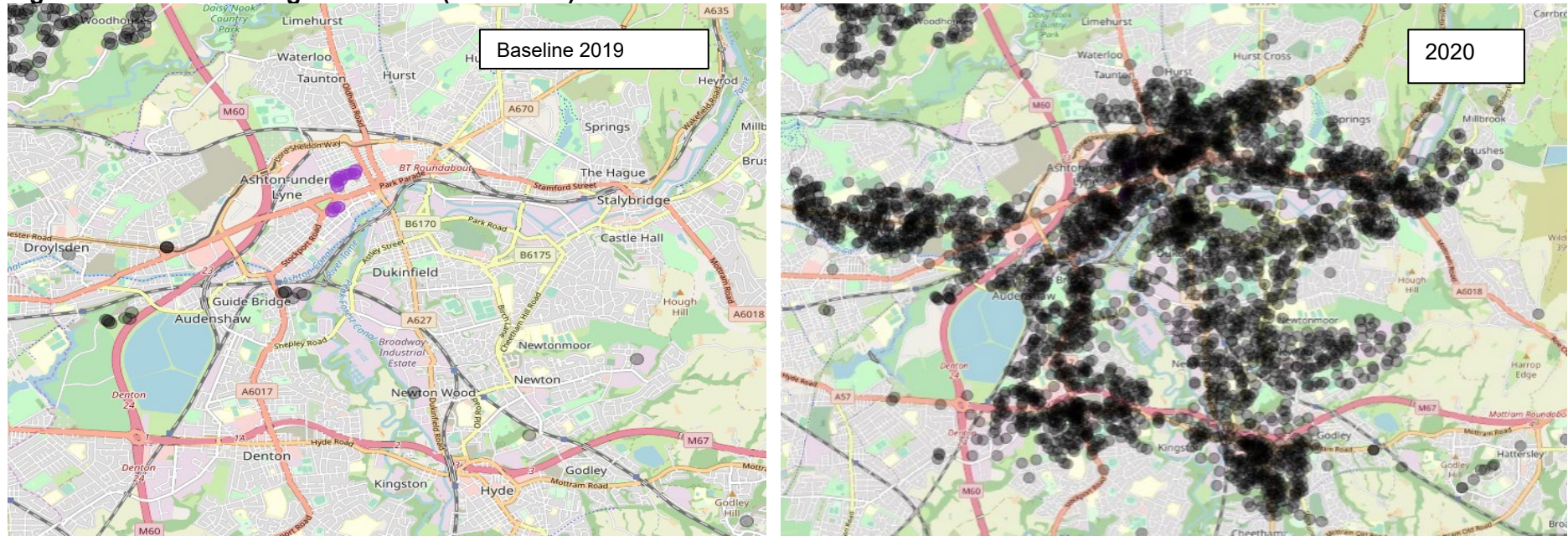
<sup>52</sup> The analysis of the ThinkBroadband data presents a higher degree of FTTP connectivity in Tameside than suggested by the Connected Nations (Ofcom) data, which may reflect lags in the Connected Nations dataset, as the ThinkBroadband data is notionally 'live'.

In August 2019, Virgin Media (a Cooperative member with an extensive footprint in Tameside) reported completion of 3,700 FTTP connections to premises across Hyde re-using public assets provided through the Cooperative and building onto their own network under its Project Lightning programme.<sup>53</sup> However, when consulted, Virgin Media stated they are using their own network (not re-using public assets) to reach these premises in Tameside. These deployments have also not been classified as FTTP in the ThinkBroadband data, and it is possible that these connections were made through Hybrid Fibre Coaxial technology (this would also explain the substantial increase in ultrafast availability but relatively modest gains in FTTP coverage).

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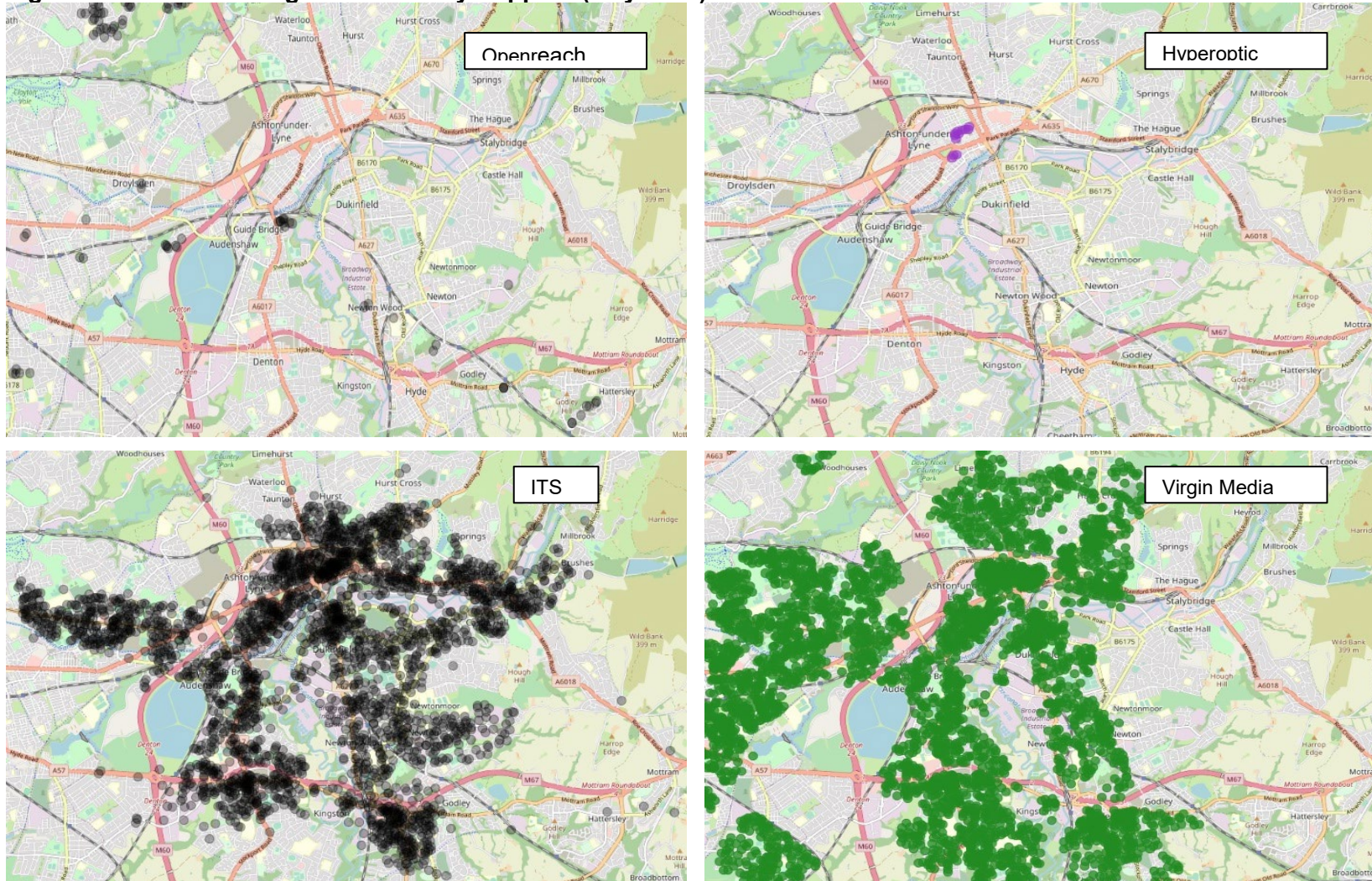
<sup>53</sup> <https://www.ispreview.co.uk/index.php/2019/08/virgin-media-complete-ftp-build-to-3700-premises-in-hyde-tameside.html>

Figure 4.4: FTTP coverage Tameside (2019-2020)



Source: ThinkBroadband and BDUK MI analysis

Figure 4.5: FTTP coverage Tameside by Supplier (May 2020)



Source: ThinkBroadband

The number of ISPs offering services within Tameside has been explored. This involved selecting postcodes in each town and examining the internet connections available in these postcodes. In total, there were over 20 ISPs providing any kind of internet connection in most towns covered by the fibre ring, including large players such as Virgin Media, BT, Plusnet, TalkTalk, Sky, Vodafone, and smaller suppliers such as StreamNetworks, TrunkNetworks and Pine Media. The analysis also looked to examine the ISPs which were providing services at high speeds. In the postcodes examined, only ITS were offering gigabit FTTP options. There were a small number of providers (a maximum of seven ISPs in the postcodes examined) which were offering ultrafast speeds of over 330 Mbps connections, including Virgin Media, BT and smaller providers like Zen, TrunkNetworks, Cerberus and IDnetwork. Virgin Media were not currently offering speeds above 350 Mbps in any of the postcodes examined.

The analysis of the ThinkBroadband data suggests that Cooperative members (ITS) are providing the vast majority of Gigabit capable connectivity in Tameside. Virgin Media, as a member of the Cooperative, were not currently offering gigabit speeds to premises in any of the postcodes investigated, and other network providers and ISPs have not entered the market in Tameside beyond the connectivity already established in 2019. This could mean that the presence of the Cooperative is discouraging other network providers and ISPs to offer FTTP connectivity in Tameside. These findings have been confirmed by Cooperative ISPs over Summer 2020. At present, there appears to be a sole provider from the Cooperative (ITS) offering FTTP connectivity in Tameside who described themselves as the “primary network provider” in the borough. However, the network provider stated that they do not provide services directly to customers and are instead a B2B network provider in the area. Virgin Media stated that they are offering fibre services in Greater Manchester but could not confirm FTTP connectivity figures in Tameside.<sup>54</sup>

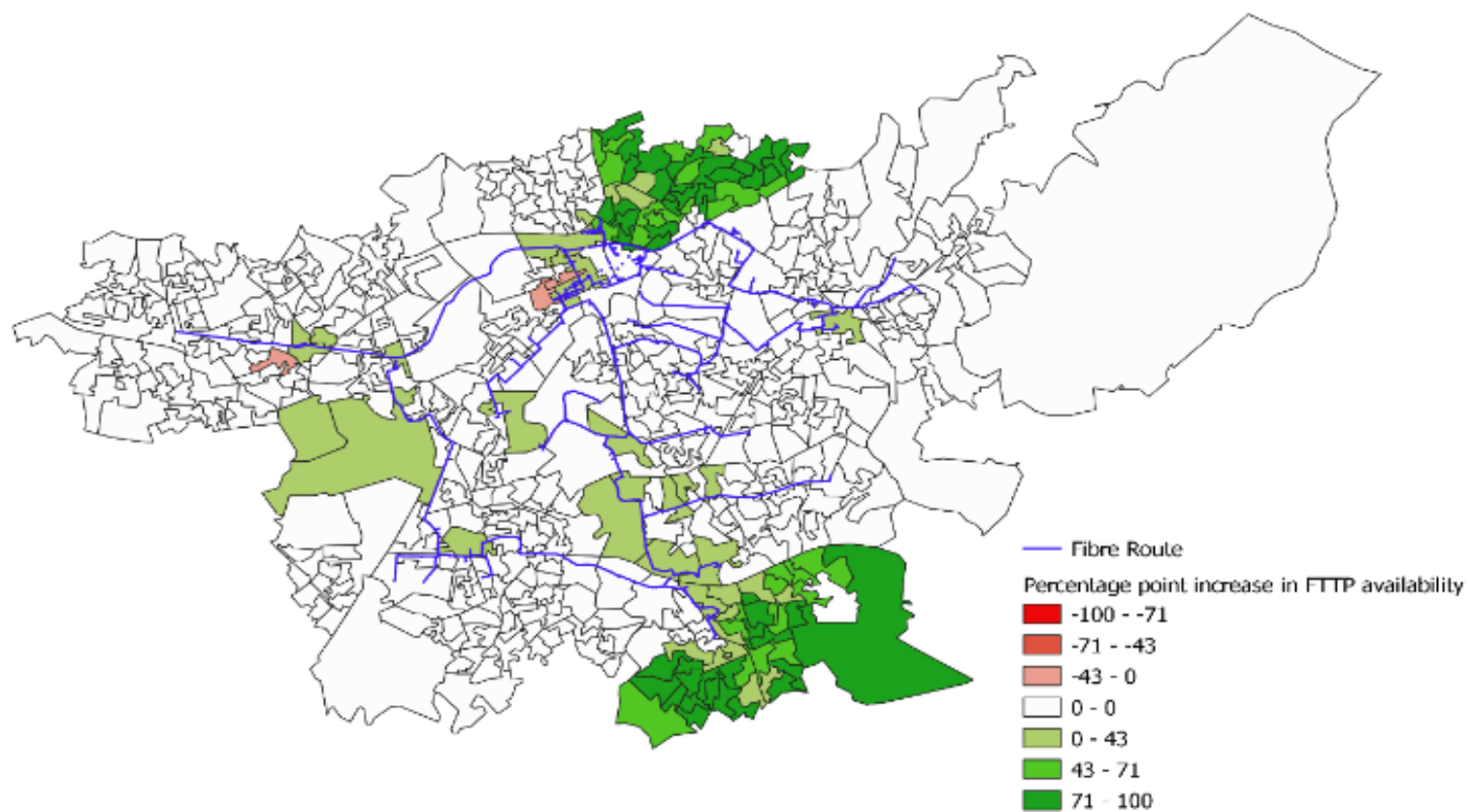
#### Geographical distribution of FTTP coverage

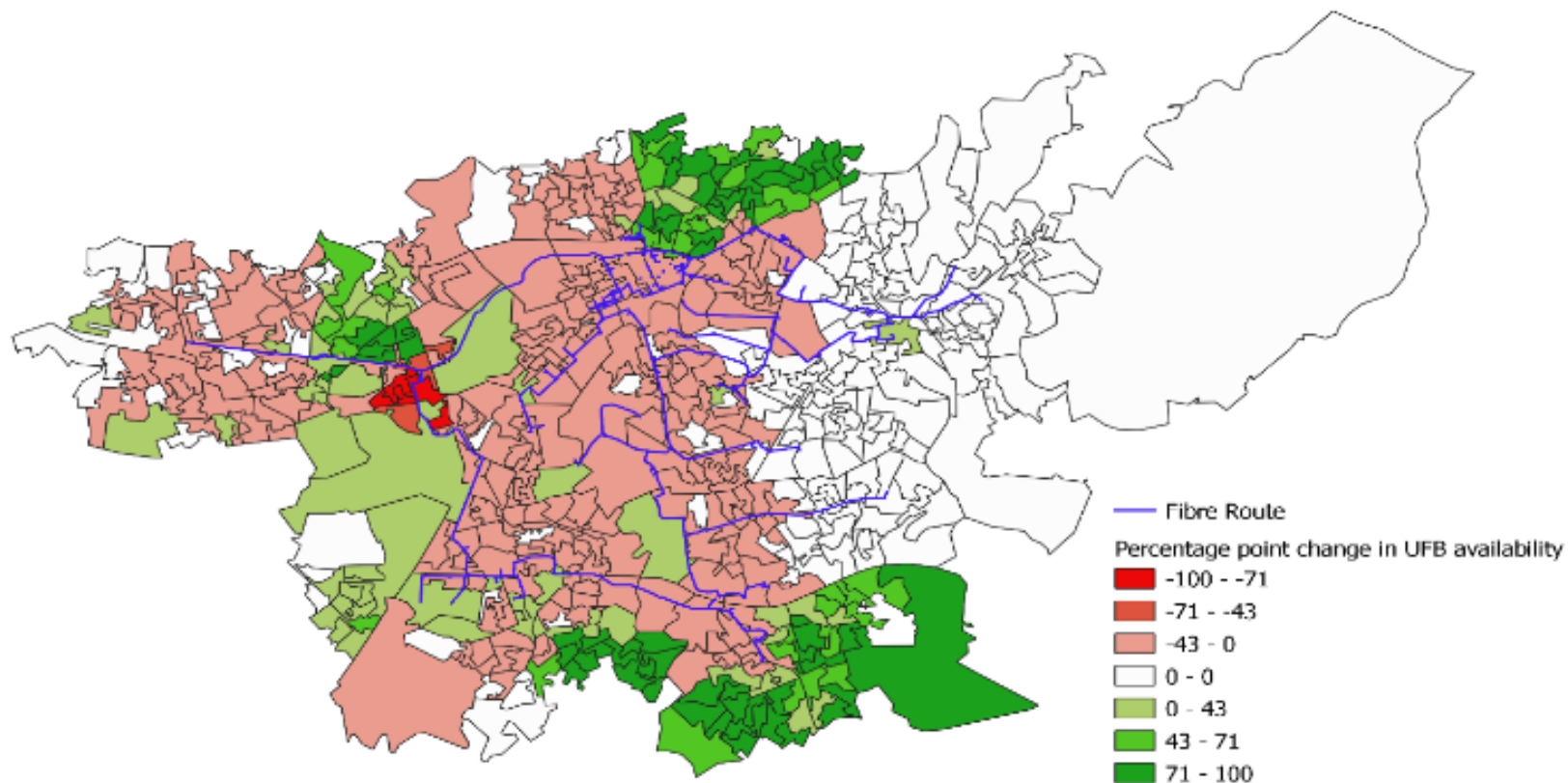
The figures below show the geographical distribution of changes in FTTP coverage and ultrafast availability. Areas in the north in Ashton and in the south around Longdendale and Hyde appear to have seen a significant increase in FTTP and ultrafast coverage, while other areas saw little change. Based on the analysis above, it seems that FTTP deployments are now more extensive in the Tameside area with ITS seemingly building out networks in these two towns first.

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<sup>54</sup> As of March 2020.

Figure 4.6: Change in FTTP availability (2018-19)





Source: Ofcom Connected Nations

LFFN funded PoPs were placed in Council buildings across the towns in Tameside with one aim being to extend the network and stimulate investment from these points. One stakeholder suggested that looking back at the placement of PoPs across Tameside “there are some which you will probably say that probably aren’t really commercially viable” due to lack of take-up but also commented that there “are others where we’d look at and say, we probably should’ve doubled the size of that one, because that clearly is going to be full very quickly”. The appropriateness of the PoP locations will be explored in more detail in the final evaluation, as it was still too early to conclude whether the PoPs are in the appropriate locations.

This may be further evidenced by the FTTP availability provided in the north and south of Tameside (through extensions in the network north of Ashton under Lyne, and south of Hyde and Longdendale). Hyde houses an industrial business park with 23 occupants mainly from the manufacturing sector, where the PoP is located. Ashton also houses the Ashton Old Baths data centre (with 14 occupants) and digital exchange and two LFFN Wave One PoPs. It is also where many key public sector buildings located in Tameside centre such as the Ashton Old Town Hall, Tameside General Hospital and Ashton Old Baths Business Centre are located, all of which have been connected through Wave One funding.<sup>55</sup> Consultations with Cooperative members suggested that ITS Technology had generated most of the connections to businesses through the Cooperative network (though in partnership with other network providers). However, another ISP consulted suggested that Tameside, when compared to other areas within Greater Manchester, was “well built out already” and they did not see a need to stimulate build any further beyond their own network and that of the Cooperative.

#### Change in coverage by distance from the fibre-8 ring

Between 2018 and 2019, FTTP availability rose at all distances up to 1km from the fibre-8 ring. Unexpectedly, these increases were on average larger for areas further away from the fibre ring (with the largest increases at 500m and 1000m). This appears consistent with the maps set out above, where networks appear to have been built out north and south from the PoPs in Ashton and Hyde respectively. This could raise questions as to whether PoPs could have been located more efficiently. One ISP stated that they consider the Cooperative network and PoPs to be within their “strategic planning” or network mapping in Tameside and surrounding areas. However, they stated it took a “long time” to receive GIS mapping data from the Cooperative to build into their internal planning system, to try to avoid duplication of build. Now they have received the data they suggested that they would “be able to identify [the appropriate PoPs or build-out locations] in the planning phase” which they were unable to do one year ago. They further asserted that receiving this data was the primary route to articulating their plans in Tameside with the central management team at their company and that “a lot of [these plans] are resting on that at the moment”.<sup>56</sup>

<sup>55</sup> <https://www.ashtonoldbaths.co.uk/>; <https://suite.endole.co.uk/explorer/postcode/sk14-4ug>; Management Information (MI) provided by BDUK provided by TMBC (January 2020)

<sup>56</sup> This will require further investigation with Cooperative members in the final stages of the evaluation.



**Table 4.1: Percentage point change in ultrafast and FTTP coverage in Tameside between 2018 and 2019 by distance from the fibre-8 ring**

Distance from the Fibre Ring	FTTP availability		Ultrafast availability	
	LFFN Spurs	Non-LFFN Spurs	LFFN Spurs	Non-LFFN Spurs
Up to 50m	0.8	0.5	-8.9	-13.2
Between 50m and 100m	1.1	1.2	-5.6	-6.7
Between 100m and 150m	3	2.7	-2.5	-2.2
Between 150m and 200m	1	3.5	-5	-0.3
Between 200m and 500m	2	7.6	-4.5	7.1
Between 500m and 1000m	8	14.1	4.2	20.9

Source: Ofcom Connected Nations

#### Impact of LFFN on FTTP and ultrafast coverage

To provide a clearer view of the impact of the LFFN Wave One project in Tameside on FTTP coverage, postcodes within 1km of the fibre-8 ring were compared to similar postcodes sharing similar characteristics in the Liverpool City Region (excluding Liverpool city centre). Suburban areas of Liverpool were selected as comparison areas at the evaluation planning stage owing to their similarity to Tameside. Some additional challenges were faced with the selection of the counterfactual area, which were addressed by utilising two comparator groups (one for matched Liverpool postcodes, and one for matched areas excluding where Openreach were deploying their Fibre First programme.<sup>57</sup>

An econometric analysis was undertaken using a fixed effects analytical framework. For more details of the analytical approach please see the Annex. The analysis comparing FTTP and ultrafast availability in areas within Tameside to matched areas in Liverpool found:

- Increases in both FTTP and Ultrafast coverage in Tameside relative to the counterfactual:** Compared to matched areas in Liverpool excluding those covered by Fibre First delivery, both FTTP and ultrafast coverage within 1km of the fibre ring was shown to have increased by 5.1 and 13.6 percentage points respectively. When compared to matched areas in Liverpool including Fibre First areas, the findings suggested the scheme has had negative impacts on FTTP coverage across each distance band aside from the 500m to 1000m band. As noted above, this would only hold if the scheme encouraged Openreach to divert investment from Tameside.
- Effects on FTTP availability grew with distance from the fibre-ring:** The findings compared to areas excluding Fibre First also indicated that the effects on FTTP availability grew with distance from the fibre-8 ring and were largest at distances of 500m to 1000m. The impact of the scheme on ultrafast availability was relatively uniform across the distance bands analysed (this would be consistent with the hypothesis that this was driven primarily by Virgin Media deployments as its footprint was relatively extensive over the Tameside area).

<sup>57</sup> More details are provided in the Annex.

- **Approx. 3,200 additional FTTP enabled premises:** Taking the average proportion of premises with FTTP available in 2018 on postcodes within 1km of Tameside infrastructure (0.45%) and applying the percentage point increase estimated in the overall model of figure 4.7 below (5.1) with the average number of delivery points on these postcodes (22.7), results in an estimated 1.2 additional premises with FTTP availability per postcode. Given 2,839 postcodes within 1km of the Tameside fibre ring, this implies 3,287 additional premises with FTTP coverage.<sup>58</sup>

Further analyses were completed to explore how far the effect of the LFFN funded spurs could be separated from the rest of the fibre-8 ring (by allowing the impacts to vary by distance from both sets of ducting assets). When the analysis excluded Fibre First areas in Liverpool (as these areas are not comparable to Tameside), the impact on postcodes surrounding the LFFN funded spurs was smaller than the impact on postcodes surrounding the wider fibre-8 ring. This aligns with the spatial distribution of the increase in FTTP availability, which had primarily increased in those areas that did not benefit from LFFN funded spurs. As noted, this may be a timing issue as ThinkBroadband data suggests that FTTP deployments are now extensive across the Tameside area.

#### Impacts at the regional level

The nature of the results set out above are heavily conditioned by the degree to which the scheme may have diverted Openreach investment from the Tameside area. To explore this further, further analysis was completed to compare the evolution of FTTP coverage in similar postcodes across the Greater Manchester and Liverpool City Regions (excluding city centres). These analyses suggest that the increase in FTTP coverage was 4.2 percentage points lower in Greater Manchester compared to Liverpool between 2018 and 2019 (suggesting Openreach has prioritised the latter in the short term). Given the broader investment in FTTP connectivity through the LFFN programme in the Manchester area, it may be helpful to explore how far LFFN influenced Fibre First roll-out in the final stages of the evaluation (through in-depth interviews with network providers that are not part of the Cooperative).

#### 5G deployment

Fibre infrastructure development will enable the future deployment of 5G networks, which use fibre assets including backhaul networks. The fibre network in Tameside runs along the same route as c.2000 street lights meaning fibre technology could be installed with connection back to the Digital Exchange. Previous consultations with TMBC in 2018 suggested that street light columns are currently in use for CCTV networks and town centre Wi-Fi. Installation of 5G infrastructure has not been reported in project documentation or in consultation with stakeholders for this report, however, the Tameside Digital Strategy outlines a key aim to “expand free Wi-Fi across all communities and be at the forefront of 5G rollout”.<sup>59</sup> Further infrastructure investments (through LFFN Wave 2) into Manchester IX and extension along the Trans-Pennine Initiative network may enable further ability of 5G deployment across Tameside and neighbouring areas. This outcome will be explored further in the final evaluation.

#### 4.3.2 Demand side

<sup>58</sup> Calculated as:  $((0.051 * 22.7) - (0.045 * 22.7)) * 2839$

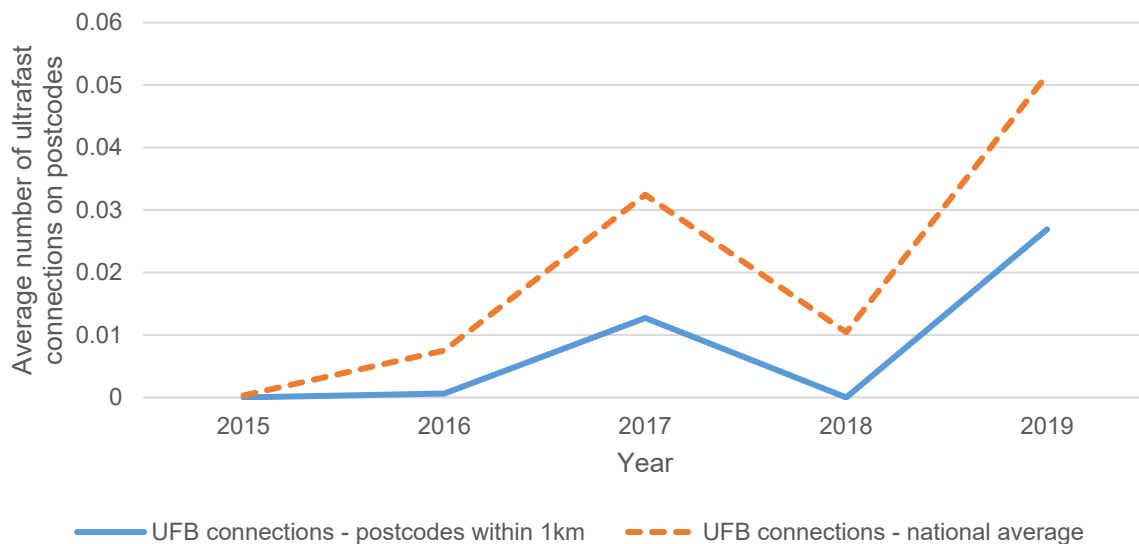
<sup>59</sup> Tameside Metropolitan Borough Council Digital Strategy V2 [NOT PUBLICLY AVAILABLE YET]

Increased take-up of fibre-enabled services

The Tameside ‘Thin Layer Model’ project is expected to provide benefits to both public and private sector organisations through increased take-up of FTTP connections. For businesses and public sector organisations in Tameside, this benefit could be due to better data storage and processing power through access to the cloud and faster transmission of files and records, leading to productivity gains, or by supporting more employees to telework. Households are also likely to benefit, with communication and content streaming improvements.

The Connected Nations data however, does not suggest widespread take-up of FTTP or ultrafast within Tameside as of September 2019 with the average number of connections per postcode lower than the national average. This is illustrated in the figure below.

**Figure 4.7: Ultrafast take-up on postcodes within 1km of the Tameside fibre ring**



Source: Ofcom Connected Nations

Cooperative members consulted reported that connections with multiple public sector organisations (such as GPs and schools) and local businesses have been connected through the network. Of the 48 public sector buildings connected, 25 sites moved from Openreach connections to Connections operated via the Cooperative. MI data provided states that a further 261 FTTP connections have been made from the entire network in Tameside (total 309), with 137 from LFFN Wave One products. 67 of these connections have been made from Summers Quay apartment buildings and 48 from Cavendish Mill social housing developments. Cooperative members further suggested that take up of fibre connections by local businesses “exceeded expectations” in 2019 and that the growth of the Cooperative into Blackpool centre has already enabled network providers to establish FTTP connections with key hospitality businesses in Blackpool.<sup>60</sup>

Improved take-up speeds

<sup>60</sup> Only four consultations with Cooperative members were conducted, two of which were network providers and no ISPs. No further documentary evidence was provided to substantiate connectivity findings as this is deemed commercially sensitive by many members.

More extensive FTTP deployments can be expected to produce a range of network benefits in terms of increased speeds, latency, and resilience. To explore this, speed outcomes were also assessed. Comparisons to matched areas in Liverpool including and excluding Fibre First areas indicated:

- **Limited and inconsistent impacts on download speeds:** Some decreases were evident on average and median download speeds when compared to matched areas without Fibre First postcodes in Liverpool. However, results were inconsistent across models and across the comparison groups.
- **Increased average and median upload speeds:** Consistent effects were identified on average and median upload speeds within 1km of the fibre ring in Tameside. These suggest that the ring had led to an average increase of up to 1.5Mbit/s in areas 500m to 1000m from the ring. Positive impacts were evident across both comparison groups, with and without Fibre First areas in the matched sample. Increase upload speeds may be indicative of some FTTP take-up given the more asymmetrical nature of those connections; however the degree to which these increased on average is relatively small.

### Futureproofing

An outcome of the Tameside 'Thin Layer Model' project is that networks with (current) excess capacity will be developed such that demand can be met in the future. Consultations highlighted the interest in using the network to support public sector resilience and upskilling, for example through boosting the capabilities of the Data Science courses held at Tameside College<sup>61</sup> and supporting technology upgrades at local hospitals.<sup>62</sup> However, due to limitations in the qualitative research, no further evidence towards futureproofing was provided at this stage from end-users or public sector Cooperative members, however, the final evaluation will explore demand amongst private and public sector organisations in more detail.

#### 4.3.3 Public sector learning

A key outcome for the project is to learn lessons from the innovative delivery approach of the Cooperative to be better able to use this delivery model in other areas in the future. Specific lessons will include barriers to adoption and development, implications for State aid compliance and opportunities for all stakeholders involved.

Cooperative members, including TMBC, have reported learning around State aid and the legal and commercial requirements for setting up a cooperative model. The State aid compliance arrangements for the project were addressed during the application and due diligence stages of LFFN programme (before funding was released) by TMBC with BDUK staff, and stakeholders consulted suggest they have shared this advice with other local authorities and members. Additionally, the Cooperative has held meetings and shared learning events on their model with BDUK to explain the aims of the project and ways of working to other local authorities. Stakeholders believed this shared learning exercise was a strength of the Tameside project, and hoped this would continue across the LFFN programme in coming years.

<sup>61</sup> [https://www.tameside.ac.uk/pages/course\\_info.aspx?x=173503](https://www.tameside.ac.uk/pages/course_info.aspx?x=173503)

<sup>62</sup> Tameside Metropolitan Borough Council Digital Strategy V2 [NOT PUBLICLY AVAILABLE YET]

Public sector members consulted suggested that as membership of the Cooperative expanded, they learned more about how broadband markets work and commercial requirements for operating a vehicle such as the Cooperative. When Virgin Media joined the Cooperative in its first year, stakeholders consulted said they gained a better understanding of the relationships between suppliers and how to work better with larger network providers. They echoed findings above on relationships between members as a key learning for them through this project. One member also asserted that as membership expanded into new local authority areas the Cooperative “began to operate far more commercially” such as setting up processes for finance reimbursement and invoicing rather than “relying on the goodwill of members” as they had done previously. However, as above-mentioned, ISP members disagreed with this assertion and believe the Cooperative could still improve in its commercial approach.

Members further asserted that as membership expanded, it encouraged thinking around marketing and communications to end-users. Originally, it was anticipated that the Cooperative would operate “in the background” with suppliers marketing its services to users directly, however, members suggested that public sector “backing” provides potential customers with confidence, for example, assuring them of the strengthened resilience of the network or explaining the benefits of fibre connectivity to local businesses.<sup>63</sup>

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<sup>63</sup> There is no Marketing and Communications plan for the Cooperative, however, consultations suggest guidance for private and public sector organisations joining will be provided to enable further growth and connections from the network.

## 5. Trans Pennine Initiative

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This section presents the interim evaluation of the Trans Pennine Initiative project. It begins with an overview of the project, before discussing the progress made to August 2020 and the connectivity outcomes achieved.

The research for the interim evaluation occurred shortly after the completion of the build phase of the project. Therefore, it is expected to be too early to capture the full impact of the project. This report focusses on emerging and expected findings should the project complete the planned build.

### Key findings:

The physical works were completed in December 2019, with a core fibre optical cable installed and operational between Manchester and York, and to internet exchanges.

The overall aim was to install nine Fibre Interface Points (FIPs) along the route, of which five had been completed by August 2020. Network Rail are planning to install further FIPs along the route (beyond the planned nine), to try to enhance the impacts of the network. These will utilise internal Network Rail funding or funding from external sources, but not LFFN funding.

Network Rail has secured a small number of public sector customers and is generating income from these customers. Additionally, a small number of private sector companies have expressed an interest in utilising the network. However, as of August 2020, Network Rail has not been able to secure any direct private sector customers – which if continued will limit the impact of the project.<sup>64</sup> Some of this delay can be attributed to COVID-19 restrictions. The reasons for the lack of private sector customers will need to be explored in later stages of the evaluation to fully assess how viable the business model for the TPI is.

As the TPI project completed the network build in mid to late 2019, it is not expected that any potential connectivity outcomes or impacts will be visible in the Connected Nations dataset for 2019. However, these datasets have been examined to show how the key outcomes have altered over time, and how these compared to the national average prior to the completion of the TPI project.

Deployment of FTTP connections within 1km of the TPI route has increased between 2017 and 2019 (from three percent to 13 percent), with the increase being in line with the increase at a national level. Between 2018 and 2019, FTTP availability rose in postcodes within 1km of the TPI route. This pattern was observed at all distances from the route.

There has been an increase in the number of suppliers providing FTTP services along the TPI route since 2019 – when there was good coverage from Virgin and pockets of coverage from BT, Vodafone, Hyperoptic and CityFibre. In August 2020 there was still sporadic coverage from Vodafone, Hyperoptic and CityFibre, but the degree of coverage from BT had increased dramatically since 2019, and ITS had increased coverage in the Tameside area of the route.

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<sup>64</sup> It is important to note that since the research was conducted, National Rail have launched a Trackside Connect Service Brochure for TPI fibre. Therefore the findings presented here predate the launch of this service.

The take-up of FTTP services along the TPI route has followed the national trend, rising to 0.02 connections per postcode (compared to 0.06 connections nationally). The same pattern is observed in the comparator area between Reading and Bristol.

## 5.1 Project overview

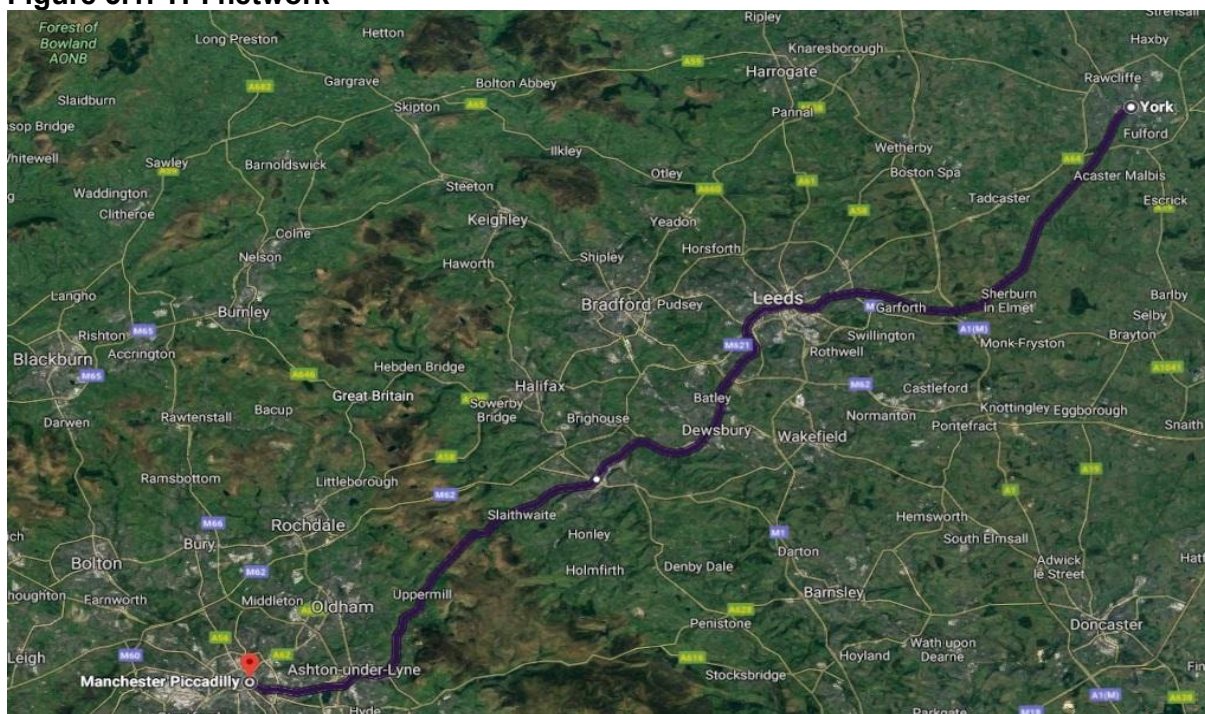
This section outlines the Trans Pennine Initiative (TPI) and the anticipated process by which it was expected to deliver its anticipated impacts on FTTP coverage, take-up of higher capacity connections, and wider economic and social impacts. This evaluation framework was agreed with BDUK during the planning phase of the evaluation in 2019 following a series of consultations with BDUK, Network Rail Telecoms (NRT) and key stakeholders, review of project documentation, literature review and review of secondary data.

### 5.1.1 Description of the project and objectives

The Trans Pennine Initiative (TPI) laid gigabit capable infrastructure along 117km of the Trans Pennine railway route between York and Manchester Piccadilly, connecting to Digital Exchanges in Leeds and Manchester. The network was laid in existing or new trackside troughing, an existing public asset (see Figure 2.1). It is one of several Public Sector Asset Reuse (PSAR) projects delivered through the Local Full Fibre Network (LFFN) programme.

One of the aims of the project was to develop a commercial business model to sell access to the fibre network laid along the route. Suppliers would be able to use the TPI network to connect existing or newly built fibre networks to the Digital Exchanges in Leeds and Manchester, providing greater speeds and resilience for their fibre networks. It was expected that this would generate spillover build in the local areas in proximity to the TPI route, increase take-up of fibre services and provide income to Network Rail (as the owner of the fibre network).

**Figure 5.1: TPI network**



### 5.1.2 Expected outcomes and impacts

The BDUK funded physical work undertaken for the Wave One project was completed in December 2019, and coupled with market engagement and commercial development work undertaken by NRT is expected to lead to several medium and longer-term outcomes and impacts that can be summarised into the following categories:

- **Connectivity outcomes:** The gigabit capable infrastructure between York and Manchester 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 other suppliers to make additional investments in fibre connectivity, increasing the size of the network in the medium and long term. The TPI network was also expected to reduce the marginal cost of extending the network to serve households and businesses in the local areas in close proximity to the line.
  - Linked to the above, end users would expect to experience 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.
- **Commercial outcomes:** It was expected that TPI would enable Network Rail to develop a commercially sustainable business model through ownership of the network. It would be able to sell access to the network to suppliers, covering the capital expenditure of the build and maintenance costs. The TPI project will generate increased commercial awareness (via demonstration effects) of the possible rates of return for fibre network investment and demonstrate the commercial viability of fibre investment in existing railway infrastructure. This may reduce investor uncertainty and stimulate further investment on the railway network in other, non-LFFN Wave 1 areas.
- **Public sector learning:** A key outcome for the project is to learn lessons from the delivery of the TPI project. Network Rail are considering similar approaches for other parts of the rail network; therefore, it is crucial that key lessons are learned from this pilot about the suitability of the approach. Specific lessons will include the additional cost of laying fibre (above the cost of the planned rail upgrade) barriers to delivery, and opportunities for suppliers. The cancellation of the wireless component of the project provides one such lesson in that it appears to be least disruptive to include such upgrades as part of other upgrade work. Part of the reason given for the cancellation of this component was the disruption that would have been caused by closing the line, the affordability and deliverability of the component, all of which were discovered after a survey of the line undertaken as part of the project.
- **Business use and economy:** As businesses take up new fibre connections along the network it is anticipated that firms may relocate to be closer to the TPI route (including both the towns and cities along the route, but also in more rural areas where connectivity could be improved by the project). This may enable clustering of businesses in areas which has potential for further job creation. It may also change the profile/sector of businesses operating in these areas.
- **Transportation effects:** The TPI programme also aimed to contribute to improvements in the transport service delivered along the TPI route. These impacts

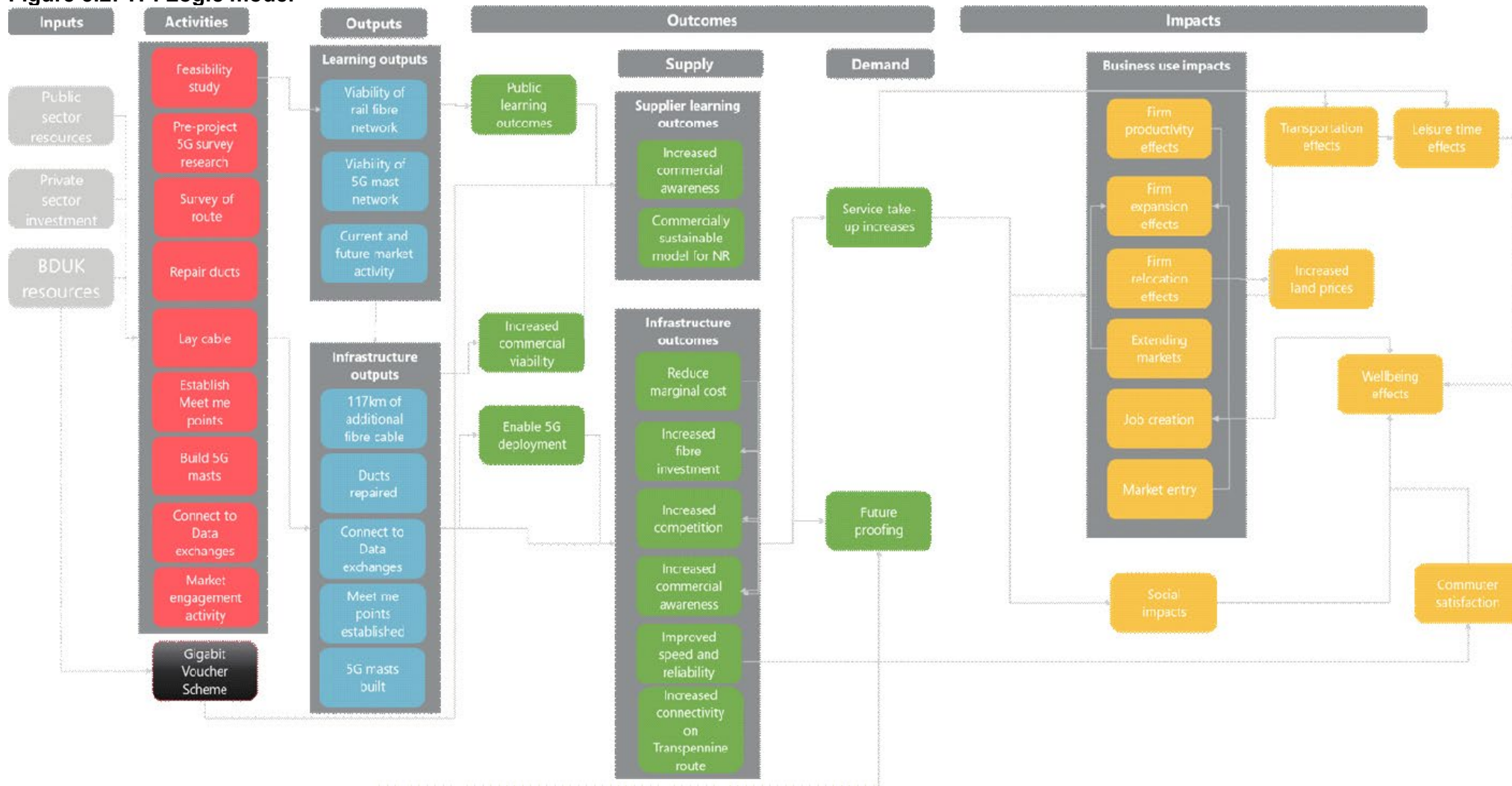


would be improved connectivity at stations along the route, allowing passengers to have better access to the internet at these points, and also provide more accurate and timely updates on the rail services to the stations. Additionally, the fibre technology can also be used to enhance the safety of rail travel along the route.

- **Social and environmental:** Specific social and/or environmental effects were not expected. However, as the project has the potential to lead to spillover 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 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 the figure below:

Figure 5.2: TPI Logic model



Source: Ipsos MORI

## 5.2 Progress to date

This section provides an update of the TPI project delivery up to August 2020, updating on previous reporting completed by Ipsos MORI in 2019. It draws upon background data and documentation and consultation evidence with BDUK, NRT and DfT, and one consultation with a customer, to provide an overview of emerging outcomes and lessons learned.

### 5.2.1 Activities and outputs

#### Laying of the network

The physical works associated with the LFFN funded TPI fibre network were completed in December 2019 with the connection and installation of the 432 core fibre optical cable between Manchester and York, and to two internet exchanges: AQL Leeds Data Centre and Equinix Manchester Data Centre.<sup>65</sup> This was delivered a few months behind the original timeline but only just outside to the overall project timeline set by Network Rail, which allowed for some slippage.

At the end of FY 2019/20, the TPI project had [REDACTED] in expenditure, with the largest proportion of expenditure being for capital build (infrastructure costs), comprising £[REDACTED] ([REDACTED] of total costs). A summary of TPI expenditure is presented in the Table below.

**Table 5.1: Summary breakdown of Expenditure FY 2019/20**  
**[REDACTED]**

Source: Network Rail Telecom TPI Schedule FY19-20

In August 2020, oversight of TPI was handed over from BDUK project delivery to Network Rail Telecom (NRT) Operations (supported by BDUK ) for business as usual delivery. At the time of consultation (August 2020), the only remaining physical work was outstanding dilapidation assessments for two of the 41 sections of the route. These ‘snagging’ surveys would be completed by NRT as part of business as usual operations by the end of 2020.

**This presents evidence that the infrastructure build outputs have been fully achieved.**

#### Funding / pricing mechanism

The funding arrangement for the TPI project and the pricing strategy that Network Rail can use to sell their product are dictated by State aid requirements. These requirements can be summarised in the following way:

- Network Rail maintains ownership of the fibre network and receives fees from suppliers using the network. Network Rail is responsible for the maintenance of the TPI network.
- The funding from BDUK has been treated as a sales contingent loan for the TPI project. Therefore, Network Rail will pay a royalty to BDUK over a 20 year term, dependent on the success of the project. This will be paid back using a percentage of the revenue generated from the TPI network. This arrangement was put in place to ensure the project was State aid compliant.

<sup>65</sup> TPI Operational Report 1 January-March 2020 – Category 4 supporting documentation.

- Network Rail sells access to the TPI network to network providers / customers. This has to be sold at commercial rates (prices in line with the rest of the market) to maintain State aid compliance;
- In this way, Network Rail maintains control of the TPI network and can generate funds to maintain the network, but is operating in a commercial manner (having to repay investment, providing access at market rates).

#### Fibre Interface Points (FIPs)

As part of the TPI project, BDUK and NRT sought to establish a series of connection points (FIPs) along the route for customers to access FTTP connectivity. The overall aim is to install eight FIPs along the route, of which five had been completed by June 2020. These FIPs are installed in the rail corridor and extend the fibre network to the railway boundary. To make a connection to a FIP no railway specific health and safety working arrangements will be required. This shows that substantial progress had been made on this work package, but delivery was ongoing, with a small number of TPI-funded FIPs still under construction. All FIPs were expected to be fully deployed by the end of FY 2020/21.

The FIPs work package was slightly delayed for three reasons:

- **The original FIPs delivery plan needed to be updated:** The delays with the TPI network physical works meant that the original delivery plan to deploy the FIPs needed revising when NRT engaged with the market, and feedback from the market suggested the FIPs should be relocated and should meet all of the requirements identified using BAU National Rail resources where possible. This meant that the FIP construction had to be replanned, and was not prioritised by Network Rail (in terms of booking in physical work) as it was not directly related to the provision of rail services.
- **The Market Economy Operator Principle (MEOP)<sup>66</sup> for FIPs found that the original approach was not State aid compliant.** In the original plan, BDUK, DfT and NRT would identify FIPs locations based on their internal assessments (i.e. locations with suitable surrounding communities and backhaul). This approach would potentially distort the market for FTTP. Consequently, the project delivery team adopted a demand-led approach, informed by an updated market assessment that established clear customer requirements.
- **The agreed funding mechanism, whereby NRT would generate profit from the network and make a royalty payment to BDUK and DfT (in order to remain State aid compliant), encouraged NRT to spend more time ensuring it chose the optimal FIPs locations.**

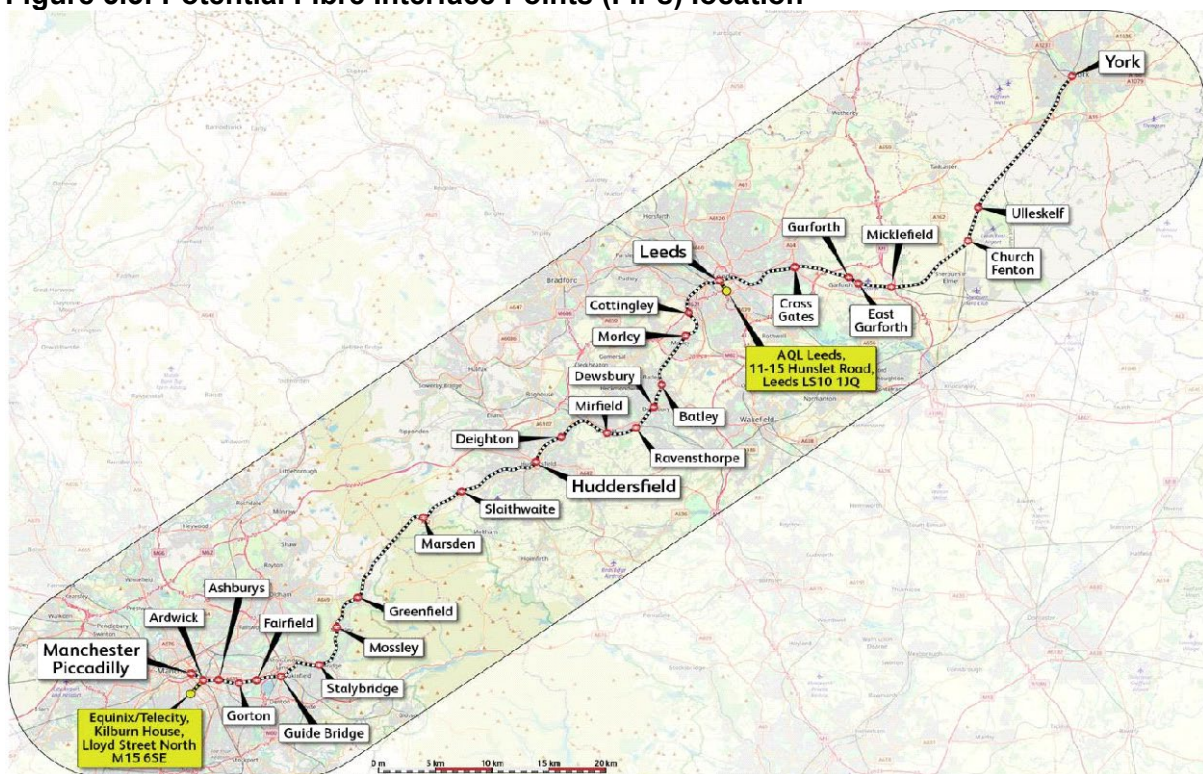
Consultees agreed that the slight delay was an important part of ensuring NRT could progress the FIPs work package with confidence. The delivery plan was also adjusted to reflect the changes in the overall scope of the TPI project: the project was able to use smaller FIPs rather than the medium-sized FIPs that would have been required had the 5G work package gone ahead.

NRT adopted an iterative approach to selecting the location of the FIPs. Firstly, NRT completed an appraisal of potential sites. These were located on the boundary of the network

<sup>66</sup>The Market Economy Operator Principle (MEOP) is used to determine whether a transaction entered into by a public body is market distorting.

(the edge of the railway line) to minimise the complications / delays in accessing the sites.<sup>67</sup> The locations considered by NRT are outlined in the map presented in Figure 3.1. The first three FIPs were placed at train stations in York, Dewsbury and Huddersfield. This decision was based on a desk based commercial assessment to find the areas with the likely highest demand for FTTP connectivity (this included an assessment of whether the Local Authority had explicit connectivity ambitions, the local population, socio-economic considerations etc.). Consultees reported that the selection process for FIPs location became more sophisticated as NRT and BDUK better understood the delivery process and deepened their understanding of the market.

**Figure 5.3: Potential Fibre Interface Points (FIPs) location**



Source: Network Rail FIP Location Tool version 8

Construction and testing of the York, Dewsbury and York FIPs was completed in March 2020 and was followed by the delivery of two additional locations in Stalybridge and Marsden (using the first TPI fibre path, connecting Marsden to AQL-Leeds). Three additional locations were in progress and were expected to be completed by the end of 2020. The location and station of the FIPs are detailed in the Table below.

**Table 5.2: Location of FIPs**

<sup>67</sup> Only Network Rail staff are permitted to undertake physical work on the railway line, and additional permission is needed to access areas on the railway that may disrupt rail services (e.g. cables / FIPs too close to the railway line). By placing the FIPs at the boundary of the railway, this reduces the risk that engineers would not be able to access the FIP, and allows engineers from other network providers (customer organisations) to access the FIP.

Location	Status (Aug-20)
Dewsbury	In-service
Huddersfield station	In-service
Marsden station <sup>68</sup>	In-service
Stalybridge Station	In-service
York	In-service
Guide Bridge	In-build
Mossley Station	In-build
White Rose Shopping Centre, Leeds	In-build

Source: Network Rail MI, BDUK MI, June 2020

Network Rail were also exploring the possibility of constructing further FIPs in the future. It was suggested that this could potentially be at every rail station along the route, although they would go through the same market assessment process as they used to place the current FIPs. These FIPs would not be funded by the LFFN, but either internally by Network Rail (from any profits generated from the sale of fibre services) or external funding sources (for example Local Authorities).

**This presents evidence that the infrastructure build outputs have been fully achieved and that public sector learning outcomes are being realised.**

#### Marketing and promotion

A campaign to raise awareness and stimulate interest in the Trans Pennine fibre was launched in 2019. This was informed by a high-level communications plan that was developed by NRT, supported by BDUK, and coordinating with the Trans Pennine Route Upgrade team to ensure it aligned with and contributed to their existing communications. The marketing activities were targeted at regional Internet Service Providers (ISPs), including integrated service providers<sup>69</sup> and Local Authorities along the route, with a particular focus on those with connectivity ambitions on their development strategies. NRT has made contact with over 70 ISPs and several Local Authorities to advertise the availability of their product. These contacts were a mixture of face to face meetings (around 40 meetings) and telephone / email contacts.

The marketing activity undertaken by NRT is limited by the pricing strategy agreed as part of the funding mechanism. NRT cannot offer products that are below the prevailing market rate. This means that they can only try to sell their product based on quality – the example of the sales pitch was “I’m sure you want something different...let me tell you why this is better than what you have”.

The NRT Development Lead was able to deliver parts of the planned marketing and sales processes in the early months of 2020: by March, there were two complete orders for Dark Fibre services to support the provision of wider gigabit capable connectivity in North England, 10 full quotes provided and 30 leads explored.

The ongoing COVID-19 health crisis impeded delivery of the full package of marketing activities, including key ‘show and tell’ events planned with potential customers. Under new

<sup>68</sup> Marsden FIP is not TPI funded.

<sup>69</sup> These are Internet Service Providers which offer services directly to customers, but also own and utilise their own networks (rather than using wholesale products to offer services to customers), e.g. Virgin Media.

social distancing restrictions and a greater prevalence of remote working, NRT continued to conduct video and telephone calls with possible clients. Consultees reported that the pandemic had also changed the Telecommunications market: ISPs were more risk averse, prioritising business as usual delivery over expansion.

## 5.2.2 Emerging outcomes

### Service take-up

As of September 2020, there had been six total orders for FTTP connectivity, and a further 16 quotes had been provided to potential customers. Two Local Authorities were most advanced in their progress to connect into the TPI infrastructure: Tameside Council and Kirklees Council. A summary of Kirklees Council's progress to date is summarised in the box below.

**TPI and Kirklees Council**

Kirklees Council was in the final stages of connecting to the TPI Network. The TPI connection was closely aligned to its 5-year IT Technology Strategy launched in early 2020. The council area was historically dependent on Huddersfield for connectivity, creating a single point of failure. It had previously invested in its own dark fibre network in Huddersfield and Dewsbury but the two areas were not connected, preventing connection to the Council's two BT data centres and impeding its ability to efficiently direct FTTP connectivity to its key infrastructure (e.g. Council offices) The work to connect the two data centres formed an essential part of Kirklees' 'building resilience' ambitions.

The Council invested to connect the Huddersfield Data Centre to the TPI route and leveraged additional internal funds to connect it to the Dewsbury Data Centre. In early October 2020, the programme was very close to completion. The Council expected to complete the route between Huddersfield and Dewsbury summer 2020 before connecting to the TPI network and completing testing with Network Rail in November 2020.

This piece of work was expected to generate the following benefits for Kirklees Council:

- **Improved connectivity resilience (short term):** the Council will be futureproofed from interruptions to their internet connectivity at either the Huddersfield or Dewsbury sites. If there is a disruption, connectivity can easily be channelled through other branches of the local infrastructure without causing disruption to end users. This was considered a vital step to ensuring business continuity and fulfilling the local digital strategy.

- **Cost savings from circumventing private sector annual circuit charges (short- to medium-term):** the connection between Huddersfield and Dewsbury would generate long-term cost savings for the Council. It would have cost them approximately £4k per year to pay for a private ISP to connect a cable to the Council building, instead they will make a one off payment of around £8k to connect using TPI.

- **Improved connectivity for other local infrastructure (medium- to long-term):** the new connectivity between Huddersfield and Dewsbury is lined with strategically placed ducts that are proximate to significant local infrastructure – e.g. Police headquarters, NHS buildings and Kirklees College. This is expected to incentivise / support seedling efforts in local areas so that local third parties will connect into the infrastructure.

The project delivery had been slightly delayed. The consultee identified three reasons for this:

- The legal requirements for putting ducts at Dewsbury to complete the backhaul works was more complicated than anticipated.

- The physical works to connect to the FIPs were delayed by COVID-19, partly because of the lock down and social distancing measures but predominantly because Council resources were redeployed to the COVID-19 response.

- Kirklees was Network Rail's first customer for TPI and some of the customer processes were not fully established, meaning the process was sometimes slightly disjointed.



As yet, the TPI had not generated any direct private sector customers (ISPs). They have received positive feedback from ISPs and been approached for quotes for their services. However, these have not led to any customers.<sup>70</sup>

The feedback they received from potential customers receiving quotes was that the offer made by the TPI was competitive, however the customers decided to utilise other network providers where the construction of their networks went ahead. Some theories were provided by stakeholders as to why private customers may not have taken the quote forward – these were:

- Private network providers had obtained a quote from NRT to use as part of bids for further public sector funding (such as to BDUK for other projects), as the network providers thought that this may help them be successful in their bid. However, either these bids for funding were not successful, or if they were successful (and NRT stated that some had been successful) then the network provider changed backhaul provider after the bid had been made;
- The State aid funding agreement used for this project limits the way in which the TPI project can operate commercially, particularly around the prices it is able to charge. This means that the TPI project cannot set prices to undercut existing backhaul suppliers, which means they cannot compete with competitors using price – they have to compete on the quality of the service. A further complication is that as NRT are a new market entrant, they cannot demonstrate a track record of delivering a high quality service / a service which is better than competitors. This limits the potential to generate private sector commercial customers.
- It can be more difficult to become an approved supplier, or equivalent at private sector network providers. These companies have existing suppliers with guaranteed levels / quality of service and these will have been through some due diligence exercises and have existing relationships. The quality / level of service is more of an unknown with the TPI, which makes companies reluctant to move to the TPI (especially when considered alongside the pricing point above).

NRT are currently trying to obtain more feedback about the decision making processes of these potential customers, to try to understand how they can encourage customers to utilise their services. The decision making processes of potential customers, and NRTs response to these will be explored further in the final evaluation.

#### Public sector learning

Consultation evidence highlighted some promising early interest in the TPI model from Virgin Media and Scottish Enterprise and reported that the TPI model was due to be tested on the London to Brighton rail route. There was also further interest in the delivery model from other areas in the UK where railway engineering work is planned – for example (provided by interviewees) the proposed East West rail link (Oxford to Cambridge) and in North Wales. Should these areas utilise a model similar to that used in the TPI project, they would take the delivery learnings from this project (such as not having to negotiate a funding agreement) which would mean the project can be delivered faster and more efficiently.<sup>71</sup>

<sup>70</sup> It is important to note that since the research was conducted, National Rail have launched a Trackside Connect Service Brochure for TPI fibre. Therefore the findings presented here predate the launch of this service.

<sup>71</sup> Other examples, announced after the research was completed, include East-West Rail, London to Brighton and Merseyrail.

A key challenge remains for this type of delivery model in that it requires upfront capital investment to deliver the initial construction of the network. Network Rail are not able to provide this, so the funding needs to be sourced from elsewhere.<sup>72</sup>

There are further learnings for NRT around their commercial engagement strategy, although this activity is still ongoing and has been impacted by the COVID-19 outbreak. This learning will be around who they are engaging with and how they are presenting the TPI network to potential customers, particularly around how they differentiate from other network providers offering backhaul services. There were also additional commercial lessons around where to place FIPs, and how to source the evidence (for example through market engagement) to ensure FIPs are placed in commercially viable locations.

There were technical learnings from the physical work undertaken for the TPI, which were highlighted in the previous early outcomes report. These included the type of fibre optic cable to use for the network and the importance of inspecting the troughing prior to construction.

**This presents evidence that public sector and supplier learning outcomes are being realised.**

### 5.2.3 Future outcomes

- **Potential benefits to rail operators and rail passengers:** DfT was in the process of reporting whether fibre and mobile connectivity reduce delays for rail services through intelligent monitoring of maintenance requirements. If this report demonstrates an impact then it is possible that the TPI project will be extended to other rail routes to generate the originally intended customer benefits.<sup>73</sup> In addition, the TPI network will soon be used to provide backhaul for enhanced wireless coverage on the rail corridor for rail operations and passenger connectivity.
- **Public sector cost savings:** It is anticipated that the TPI project will generate a profit for Network Rail in the future, and this profit will be used to fund investments according to the relevant Control Period delivery plan.

### 5.2.4 Reflections

The consultations with stakeholders highlighted what has worked well and where the challenges were in the TPI delivery to date.

#### What worked well

- **NRT was proactive and extremely responsive to the COVID-19 health crisis.** It established new ways of working and swiftly implemented safety procedures required for work to be delivered. Though the pandemic did halt some non-essential work (e.g. survey of the route), these efforts prevented major disruptions from the pandemic.

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<sup>72</sup> Subsequent to the research for this report being completed, Network Rail announced Project Reach (April 2021). This aims to secure £1 billion in private investment into trackside fibre optic infrastructure. This will help to resolve some of the funding constraints, and will also utilise some of the key learning from the TPI project. The impact of the TPI project on Project Reach will be explored in the final evaluation in October 2022.

<sup>73</sup> As presented in the above footnotes, the delivery model used in the TPI has been extended to other rail routes since the research was completed. The impact of this will be fully captured in the final evaluation in October 2022.

- **The delivery team had the right skills and expertise to progress the work.** DfT was a helpful 'broker' between BDUK and NRT, helping to develop shared understanding between the two organisations and manage expectations. The NRT Development Lead was a key asset to the project because they had previously worked in central government and had holistic knowledge of the various parties needs and protocols.
- **The Cross Governmental Rail Connect Corridor Governance Board gave effective oversight of the project.** It replaced an earlier DCMS – NRT senior board and brought DfT staff into the governance discussions.

### Challenges

- **Demand from ISPs had a longer lead in time for FIPs than anticipated** and had been slightly suppressed by the COVID-19 health crisis. This was only an issue in the early stages of customer engagement that had to be conducted virtually, as opposed to more in-depth engagement events and 'show and tell' workshops. Once interest had been established the discussions progressed as planned.
- **Funding / pricing mechanism limits the ways in which the TPI can compete with existing backhaul providers.** NRT can only compete with existing suppliers based on the quality of service, and cannot undercut the prices charged by existing suppliers. As they are not established in the market and cannot demonstrate a track record of delivering a high quality service, this presents a challenge to the business model.
- **Expectations were not initially aligned on the timing and process of closing railway tracks and stations.** Examples of this included the notice required to close the rail route for construction works, and Network Rail having to cancel work very last minute because of requests from local railway providers. It was presumed that Network Rail could postpone until the following day but they had to reapply and wait 12 weeks. Network Rail used an approach of booking multiple periods for work to be completed to mitigate this risk. The project has led to improved knowledge of the logistical challenges of engineering work on the railways for all delivery partners and a realigning of expectations for any future collaborative work.
- **The scale of the State aid issue was not correctly categorised in NRT's original business case.** The other LFFN projects involved direct working with local authorities, which had different State aid consideration than working with private providers. Network Rail sought expert legal advice to develop the business case.

### 5.3 Connectivity outcomes

This section provides an update of the connectivity outcomes achieved to date, drawing on secondary data analysis using Ofcom Connected Nations and ThinkBroadband data, and consultation evidence with BDUK, NRT and DfT, and one consultation with a customer.

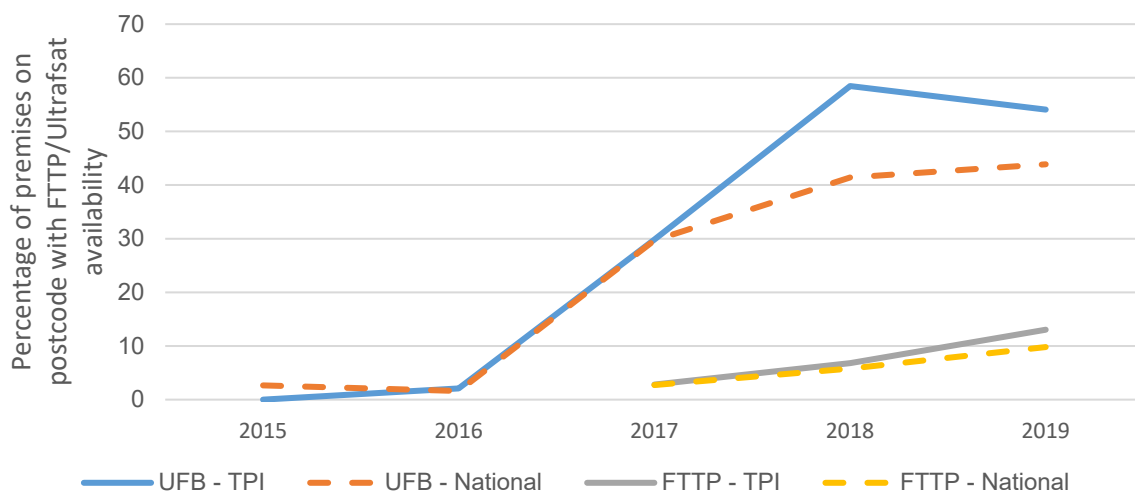
#### 5.3.1 FTTP and ultrafast coverage

As the gigabit capable infrastructure is extended along the TPI route and the FIPs are installed, the marginal cost of investment of future investment for network providers was expected to fall. In turn, this was expected to make it commercially viable to deploy FTTP networks in the

vicinity. As indicated in the previous section, this does not appear to have been brought forward currently, although some public sector organisations have utilised the network.

The figure below shows the development of FTTP coverage and ultrafast availability amongst premises within 1km of the TPI project, based on the Ofcom Connected Nations dataset.<sup>74</sup> FTTP coverage was close to zero prior in 2017 (when LFFN funding was awarded) but rose to 13 percent in 2019 following project completion (slightly above the national average).<sup>75</sup> Ultrafast availability has also risen rapidly over the period (to 54 percent in 2019), which again is above the national average. FTTP coverage at the end of 2019 was broadly in line with the national average, and ultrafast coverage was higher than the national average, when in 2017 both were at the national average.

**Figure 5.4: FTTP and Ultrafast Coverage on postcodes within 1km of the TPI route**



Source: Connected Nations, Ofcom

### Suppliers of FTTP

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. Data from ThinkBroadband (which provides a breakdown by supplier and is more up to date than Connected Nations) was used to provide some insight into how far the observed increase in FTTP coverage was driven by different suppliers along the TPI route, and whether these suppliers were utilising the TPI network. As mentioned earlier, Network Rail had reported that no suppliers were making use of the TPI network presently.

The figure below shows the current level of FTTP coverage along the TPI route (September 2020). At the time of the baseline report (May 2019), the area was extensively served by numerous network providers:

- Virgin media provided coverage across most of the populated areas along the TPI route;
- Openreach native FTTP provided pockets of coverage in York, Leeds and Manchester;

<sup>74</sup> In 2018 and 2019 this data is collected as a snapshot as of September of that year.

<sup>75</sup> This may be due to the inclusion of local supplier ITS Technology in the 2019 Connected Nations dataset and will be explored further in the case study research.

- CityFibre offered FTTP within York;
- Hyperoptic had pockets of FTTP coverage in Leeds and Manchester; and
- Vodafone offered FTTP within Leeds and Huddersfield.

However, there was little coverage in many of the less populated areas of the route and a limited amount of competition in many places (only one network provider offering services) along the route.

Figure 5.5 below shows that there has been an increase in FTTP coverage along the TPI route. Openreach Native FTTP is more widely available, and there has been a large increase in provision from ITS in the Manchester area (for more information on this please see the report for the Tameside LFFN project). There has also been a slight increase in the coverage of Hyperoptic, with CityFibre maintaining their coverage in York and Vodafone with pockets of coverage in Leeds and Huddersfield. There is provision in a small number of postcodes from OFNL, Fibrenest Persimmon. Although much of the FTTP coverage is still concentrated in the urban areas, there does seem to be more provision along the route, largely driven by Openreach and ITS expanded coverage.

The number of ISPs offering services along the TPI route has been explored. This involved selecting postcodes in several locations along the route and examining the internet connections available in these postcodes. In the larger urban areas (York, Leeds, Huddersfield, Manchester), there were over 20 ISPs providing any kind of internet connection, including large players such as Virgin Media, BT, Plusnet, TalkTalk, Sky, Vodafone, and smaller suppliers such as StreamNetworks, TrunkNetworks and Pine Media. The analysis also looked to examine the ISPs which were providing services at high speeds. In the postcodes examined, only Virgin Media were offering ultrafast speeds and above (in half of the postcodes examined), but were only offering speeds in excess of 1,000Mbps in one location. In the remaining locations no ISPs were offering connection speeds in excess of 330 Mbps.

#### Change in ultrafast and FTTP availability

Figure 5.6 below shows the geographical distribution of changes in FTTP coverage (larger maps showing FTTP and ultrafast changes presented in Annex). This shows that there are small areas along the route where there have been significant increases in FTTP coverage, while other areas saw little change. Areas in south west York, central (and central east) and pockets of south Leeds, east Huddersfield and northern Tameside. Based on the ThinkBroadband data above, it seems likely that the large changes in Tameside were due to increased coverage from ITS, the changes in York are most likely driven by CityFibre and changes in Leeds driven by Vodafone and Openreach.

Figure 5.5: FTTP coverage along the TPI route by supplier, 2020

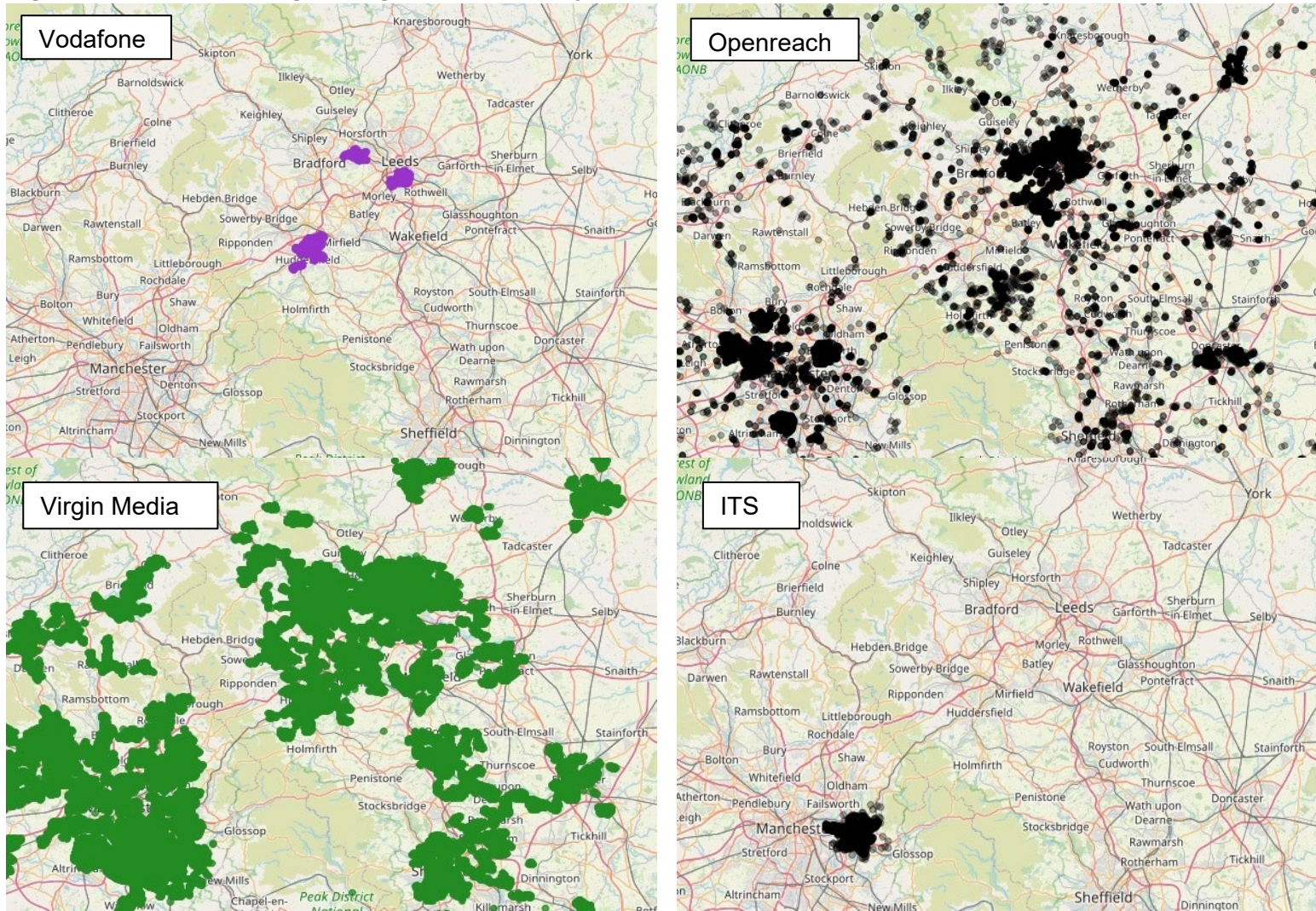
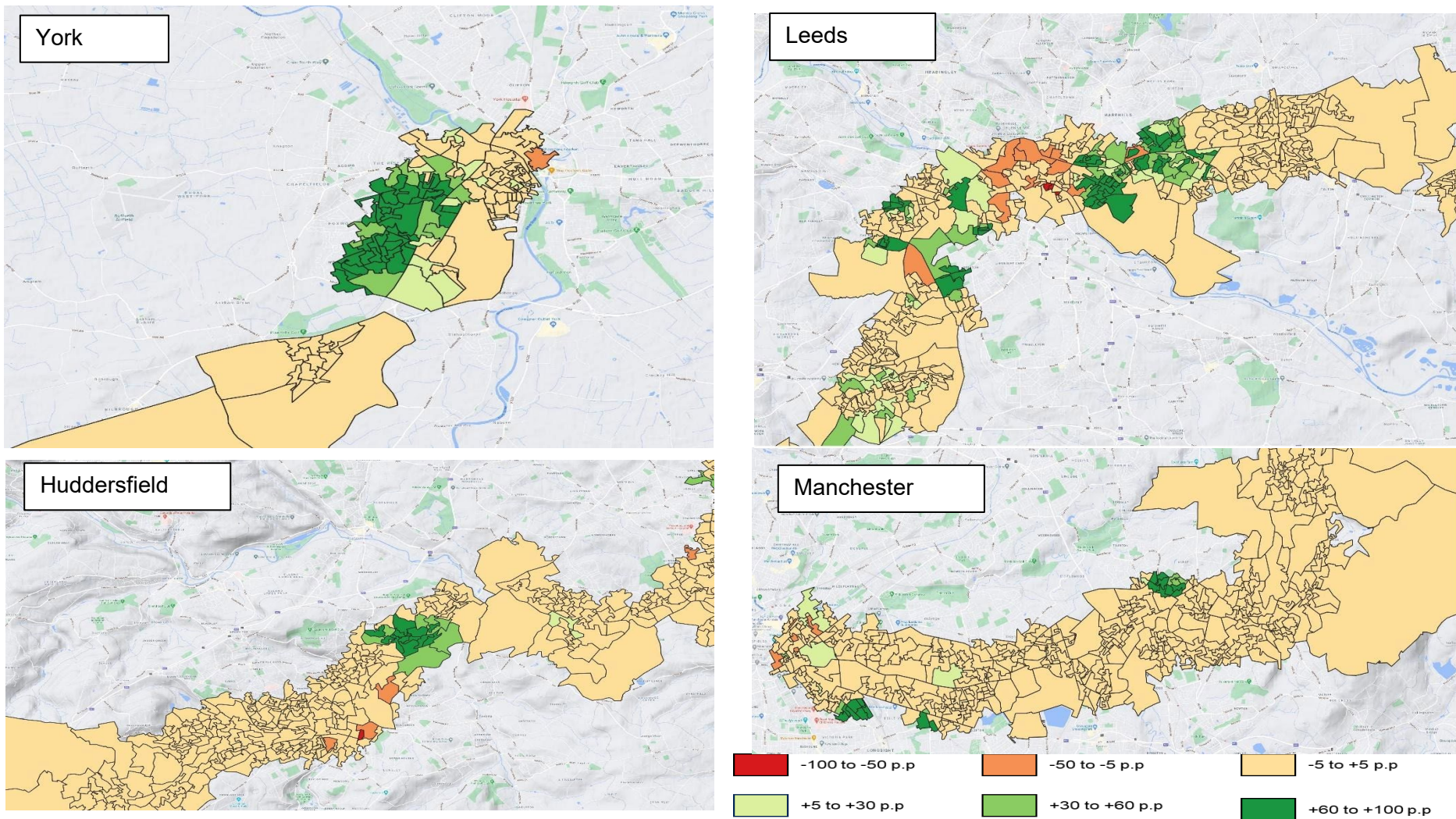


Figure 5.6: Change in FTTP coverage within 1km of the TPI route



Source: Ofcom Connected Nations

### Changes in coverage by distance from the TPI route

Between 2018 and 2019, FTTP availability rose at all distances up to 1km from the TPI route. These increases were fairly similar across all distances from the route (ranging from 6.6 percentage points to 9.5 percentage points). There have also been increases in ultrafast coverage across all distances from the TPI route.

**Table 5.3: Percentage point change in ultrafast and FTTP coverage along the TPI route between 2018 and 2019 by distance from the anchor network<sup>76</sup>**

Distance from anchor network	FTTP availability	Ultrafast availability
Up to 50m	7.9	3.3
Up to 100m	7.7	3.0
Between 100m and 150m	8.6	2.1
Between 150m and 200m	9.5	1.4
Between 200m and 500m	6.6	0.5
Between 500m and 1000m	8.2	4.4

Source: Ofcom Connected Nations

### Impact of the TPI on fibre coverage

To provide a clearer view of the impact of the LFFN Wave One project in the TPI route on FTTP coverage, postcodes within 1km of the TPI route were compared to similar postcodes sharing similar characteristics along the Great Western rail route from Reading to Bristol. This route was selected in the scoping stage for the evaluation owing to their similarity of the route to the TPI route (mixture of urban and rural areas, similar starting positions of broadband coverage). The figures below present the evolution of connectivity along the TPI and GWR routes (before matching has been undertaken). This shows that connectivity along the TPI and GWR routes are moving in the same direction over time.

As mentioned in Section 1 of the report, the building of the TPI route was not completed until mid to late 2019, and it was not expected that the intervention would have any observable effects of FTTP coverage in the 2019 dataset. Therefore, the 2019 data has been used as part of the matching algorithm and is being considered a baseline for any future analysis. Along both rail routes, postcodes where Openreach have or are currently constructing Fibre First networks have been excluded from the analysis. To see more details of the matching approach, see Annex 2.

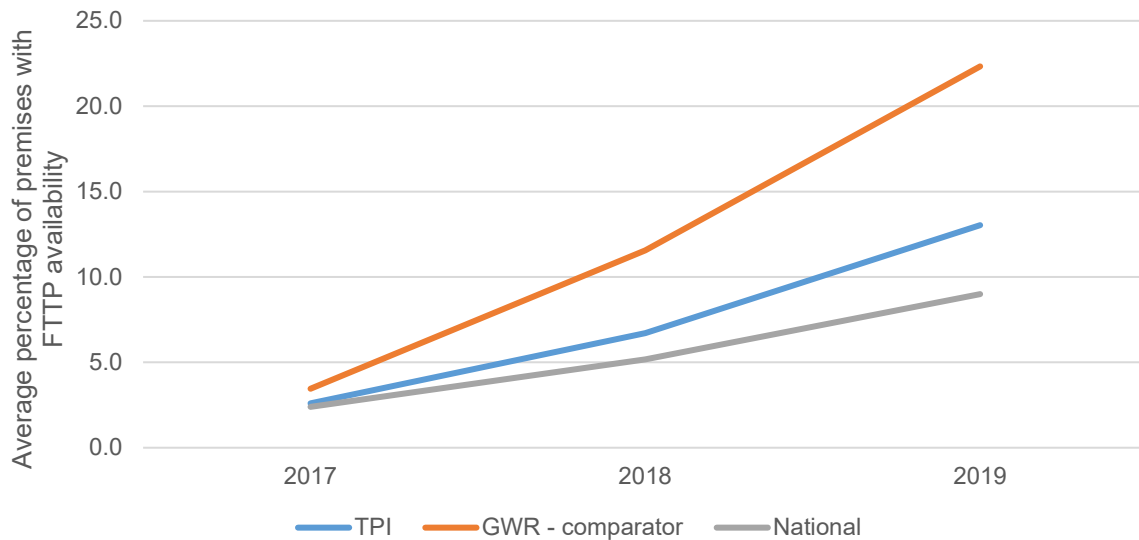
However, the research team also undertook some econometric modelling to ensure that no unexpected results were being observed in the change in FTTP coverage between 2018 and 2019.<sup>77</sup> This modelling, as expected, showed that there was no significant additional impact on FTTP coverage along the TPI route compared to that observed between Reading and Bristol.

<sup>76</sup> There are an additional 3,000 postcodes within 1km of the TPI route in the CN2019 dataset than were in the CN2018 dataset. The level of coverage in these 3,000 postcodes is significantly lower than the coverage in the 9,000 that cover both periods. This means that when comparing the postcodes that appear in both datasets (9,000) there is an increase in FTTP and UFB, when taking the whole postcodes in the dataset there is a decrease in UFB coverage (see Figure 4.1).

<sup>77</sup> For this analysis, the same matching approach was used (as shown in Annex 2), but the variables used in the matching approach only included 2018 indicators, rather than indicators from 2018 and 2019.



**Figure 5.6: Change in FTTP along the TPI and GWR (unmatched) routes and nationally**



Source: Ofcom Connected Nations

### Commercial deployment of 5G

5G deployment was an initial aim of the TPI project. However, this part of the programme was discontinued in the delivery phase. This means that no 5G outcomes have been generated as of yet. However, the TPI route could be used to enhance backhaul to the internet exchanges in Leeds and Manchester, which could be used to support 5G networks in the future.

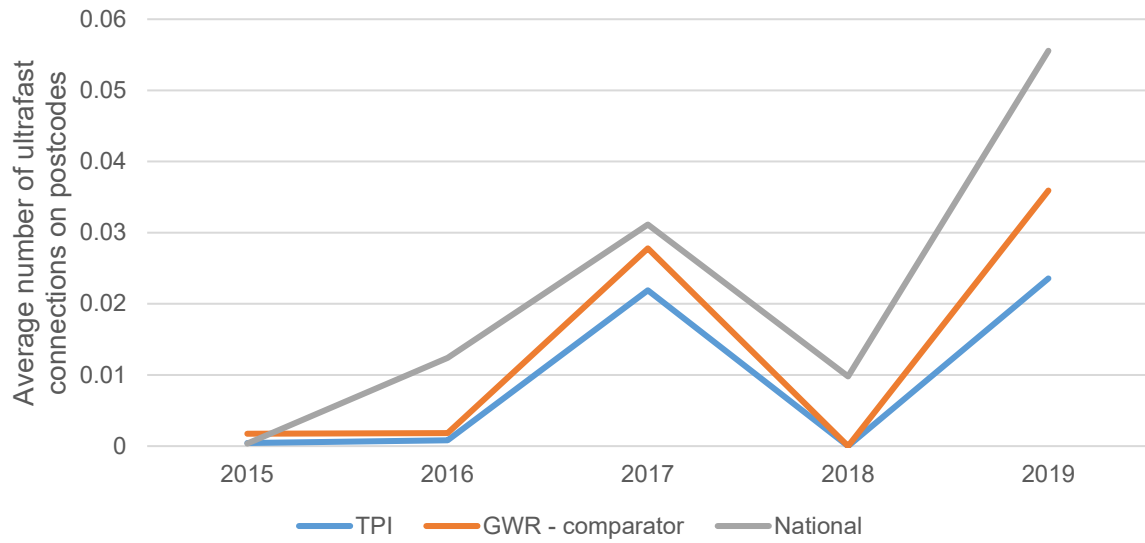
### 5.3.2 Demand side

#### Increased take-up of fibre services

The TPI project is expected to indirectly lead to benefits to both public and private sector organisations through increased take-up of FTTP connections. For businesses and public sector organisations alongside the TPI route, this benefit could be due to better data storage and processing power through access to the cloud and faster transmission of files and records, leading to productivity gains, or by supporting more employees to telework. Households are also likely to benefit, with communication and content streaming improvements.

The Connected Nations data however, does not suggest widespread take-up of FTTP or ultrafast along the TPI route as of September 2019 with the average number of connections per postcode (0.02 connections per postcode) lower than the national average (0.06 connections per postcode). This is illustrated in the figure below.

**Figure 5.7: Ultrafast take-up on postcodes within 1km of the TPI route**



Source: Ofcom Connected Nations

## 6. Downstream economic impacts

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This section provides a summary update to the characteristics of the local economy in local authorities where there was network build for the projects. Any changes in this data at a local authority level should not be directly attributed to the LFFN programme but be viewed as a potential indicator of the direction of change.

### **Key findings:**

Economic analysis presented is limited at this stage as data access through the Secure Research Service (SRS) was not feasible due to data availability, economic impact findings will need substantial further analysis in the final evaluation.

The analysis that has been undertaken was unable to provide robust evidence that economic and social impacts have been realised yet in Tameside. This is most likely because insufficient time has passed for the impacts to be generated – particularly given the low levels of take-up of FTTP services in Tameside. The final evaluation will explore the economic and social impacts in more detail.

However, in Tameside, the project has shown positive indications of economic benefits. Between 2018 and 2019 (since the completion of the LFFN project) there has been on average 2.3 fewer JSA claimants per Lower Super Output Area (LSOA) within 1km of the network (estimated using a fixed effects modelling approach).

### **6.1 Labour supply**

#### 6.1.1 Tameside 'Thin Layer model' project

The local labour supply in Tameside is characterised by an average economic activity rate and slightly higher than average unemployment rate of 4.4 percent (reduced from 5.4 percent in 2018).<sup>78</sup> This is also consistent across other areas in the east of Greater Manchester, such as Oldham and Rochdale, although Stockport has a higher economic activity rate than average. Given the level of unemployment overall it is unlikely that labour supply constraints will limit the outcomes of the LFFN project.

Tameside has a much lower share of population educated to degree level than the national average. This data has not yet been updated for 2019, so the position is the same as reported in the baseline report.<sup>79</sup>

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<sup>78</sup> Source: Annual Population Survey, 2020

<sup>79</sup> NVQ4+ data available for Jan-Dec periods and were not updated to 2019 figures at the point of research.

**Table 6.1: Labour supply characteristics in Tameside and surrounding areas (2019)**

Area	Economic activity rate (% aged 16-64)	Unemployment rate (% aged 16-64)	NVQ4+ (% aged 16-64)	Population aged 16-64 (%)	Population aged 65+ (%)
Oldham	71.2	4.6	27.9	71.3	20.9
Rochdale	74.1	6.6	25.5	72.2	20.6
Stockport	81.6	4.6	41.3	69.9	26
Tameside	78	4.4	26.2	72.9	22.4
North West	77.4	4	35.5	71.8	22.7
United Kingdom	78.7	4	39.2	72.2	22.4
Oldham	71.2	4.6	27.9	71.3	20.9
Rochdale	74.1	6.6	25.5	72.2	20.6

Source: ONS Annual Population Survey (APS)

### 6.1.2 West Sussex Gigabit project

The local labour supply in West Sussex is characterised by a higher than average economic activity rate and lower than average unemployment rate. Brighton and Hove however, has a low economic activity rate at nearly 79 percent yet it is aligned with the national economic activity rate. Unemployment also remains high in Arun at over five percent. Such a low level of unemployment overall may pose limits to any potential employment benefits to be gained from the LFFN project in most areas should firms in the wider area take-up FTTP connections.

The county appears to have a similar share of population educated to degree level with 40 percent of those aged 16 to 64 holding a qualification of at least NVQ level 4. However, the proportion of NVQ 4+ in Worthing is significantly below the national average of 40 percent at nearly 32 percent. Brighton and Hove and Adur have the highest proportion of degree educated population.

In terms of the age of the population, West Sussex has a higher than average proportion of the population aged 65 and over at 27 percent compared to the UK average of 22 percent. Several local authorities included in the LFFN areas have higher proportions of the population aged 65 and over with the average at the county level likely brought down by the low proportion in Brighton and Hove and Crawley (see Table below). As a consequence of the relatively aged populations in these areas, benefits arising from changes in working patterns or worker productivity may be lower than may otherwise be the case in other areas.

**Table 6.2: Labour supply characteristics in West Sussex (2019)**

Area	Economic activity rate (% aged 16-64)	Unemployment rate (% aged 16-64)	NVQ4+ (% aged 16-64)	Population aged 16-64 (%)	Population aged 65+ (%)
Adur	90.4	-	48.9	73.6	23.1
Arun	80.0	5.1	40.7	58.1	36.8
Chichester	87.8	3.0	43.1	65.3	29.3
Crawley	82.8	3.7	38.8	75.1	20.8
Horsham	83.1	-	44.2	68.0	28.1
Mid Sussex	87.3	3.8	46.7	71.4	24.6
Worthing	83.4	3.1	31.8	69.4	23.7
Brighton and Hove	78.9	3.4	56.4	77.5	17.7
West Sussex	84.5	3.0	41.9	67.7	27.5
UK	78.8	4.0	40.2	77.5	22.5

Source: ONS Annual Population Survey (APS)

### 6.1.3 Trans Pennine Initiative

The table below highlights that the labour supply across the TPI districts is below the national average. This is because each TPI district has a lower economic activity rate than the national average of 78.8 percent except for York at 81.3 percent. Unemployment across the seven areas varies with areas such as York and Kirklees both below the 4 percent national average at 2.6 and 2.8 percent respectively. This contrasts with Manchester which has an unemployment rate of 6.3 percent, yet this may be explained by Manchester's relatively high percentage of the population within the working age (16 to 64) at 89.7 percent, compared to the national average of 77.5 percent.

City districts have a higher proportion of their populations with degree level education. The districts of Leeds, Manchester and York all compare favourably with the 40.2 percent national average of the total population, with Manchester and York above the national average with 43.7 and 49.1 percent respectively, whereas Leeds is slightly below the UK average. The non-city districts are considerably below the national average, with 26.9 percent of residents of Oldham being degree educated, followed by Tameside with 28.1 percent.

**Table 6.3: Labour supply characteristics in TPI areas (2019)**

Area	Economic activity rate (% aged 16-64)	Unemployment rate (% aged 16-64)	NVQ4+ (% aged 16-64)	Population aged 16-64 (%)	Population aged 65+ (%)
York	81.3	2.6	49.1	75.3	24.7
Selby	75.0	4.9	30.0	80.0	20.0
Leeds	77.9	4.2	40.1	82.1	17.9
Kirklees	75.0	2.8	31.8	78.7	21.3
Oldham	73.2	3.6	26.9	78.0	22.0
Tameside	78.2	4.1	28.1	77.9	22.1
Manchester	71.3	6.3	43.7	89.7	10.3
UK	78.8	4.0	40.2	77.5	22.5

Source: ONS Annual Population Survey (APS)

## 6.2 Reduced unemployment and job creation (net of displacement)

Employment growth is a potential outcome that is anticipated to arise from the LFFN project should the project result in a significant degree of spill-over build and take-up of FTTP connections by businesses in the areas around the anchor network.

### 6.2.1 Tameside 'Thin Layer model' project

Overall employment in Tameside has increased by 3 percent from 2010 to 2018, and by 4.5 percent since 2015. This rate is slightly ahead of the rate for Great Britain as a whole which saw employment rise at just over 3.5 percent, but behind the North West average at just below 5.3 percent. Employment growth in Rochdale rose by 12.9 percent over the period 2015 to 2018, just above the national and regional averages. Similarly, employment growth was positive in Stockport over the same period at 10.7 percent. This suggests that Tameside has still not had the strong economic performance over this period comparative to its neighbours.

The public sector is a key employer in Tameside. Health is the second largest sector in Tameside, with the Pennine Care Trust and Tameside and Glossop Acute Care NHS Trust listed as the two single largest employers in the area. Additionally, TMBC employs many people in Tameside as teachers (education is the fourth largest sector) and across their services. Therefore, central and local government spending decisions have had an impact on employment growth in Tameside. Retail is the third largest sector in Tameside, which are characteristically low-value sectors.<sup>80</sup>

**Table 6.4: Percentage employment growth in Tameside and surrounding areas (2015-18)**

Area	Percentage growth 2015-2016	Percentage growth 2016-2017	Percentage growth 2017-2018	Overall percentage growth 2015-2018
Within 200m	-2.2%	4.0%		
Oldham	1.3%	6.2%	-4.7%	2.5%
Rochdale	1.4%	5.6%	5.3%	12.9%
Stockport	2.5%	2.4%	5.5%	10.7%
Tameside	0.0%	3.0%	1.5%	4.5%
North West	2.7%	1.4%	1.2%	5.3%
GB	1.7%	1.2%	0.7%	3.5%

Source: ONS Business Register and Employment Survey (BRES)

### Impact on unemployment

Using a similar approach as to the assessment of connectivity outcomes (a fixed effects analytical framework, using a matched comparator area in Liverpool, achieving Level III on the Maryland Scientific Methods Scale), it was possible to explore the unemployment impacts of the fibre ring using Jobseeker Allowance (JSA) data for 2019. JSA data at the Lower Super Output Area (LSOA) was collected for areas that contained at least one postcode within 1km of the fibre ring in Tameside and for comparison areas in Liverpool. At this level of geography, it was not possible to neatly exclude Fibre First areas, and so estimates of impact are compared to LSOAs that may have seen FTTP availability increased through Fibre First.

<sup>80</sup> See report Annex for breakdown by sector until 2018.

Areas near to Tameside were again matched using Propensity Score Matching (PSM) to those around Liverpool, however the necessary use of LSOA data limits the sample size of areas available for analysis and there were just 178 LSOAs within 1km.

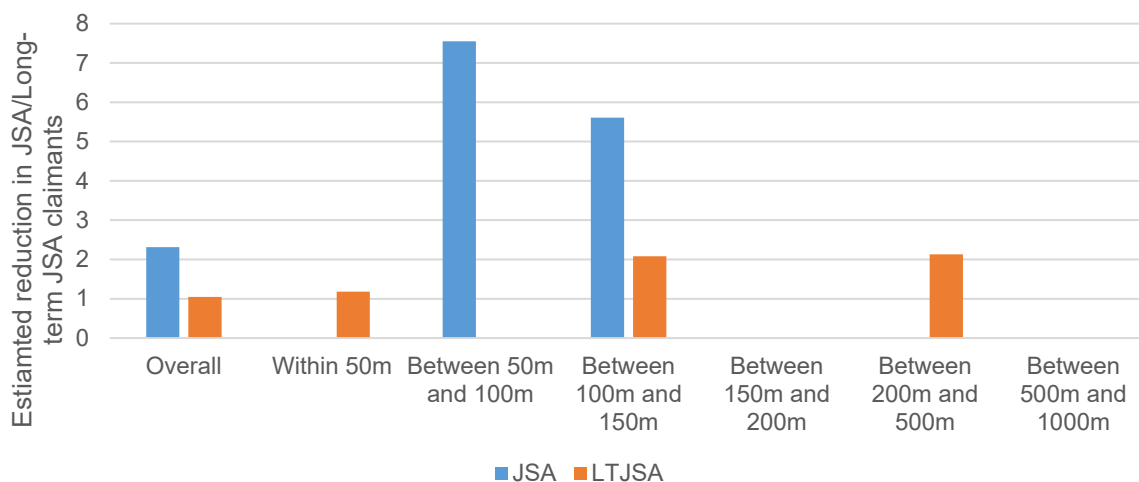
The results suggest:

- Localised effects on the total number of JSA claimants:** Overall, the analysis suggests that there has been a decrease in unemployment in the areas within 1km of the fibre network since the completion of the physical work. There are, on average 2.3 fewer JSA claimants per LSOA, with this finding consistent at all distances from the fibre ring, although the effects are limited however to areas containing postcodes that were 50 to 150m from the fibre ring.
- Marginal effects on JSA claimants claiming for 12 or more months:** Smaller effects were evident on long term unemployment in the form of reduced numbers of people claiming JSA for 12 or more months. Overall, these results imply 1 fewer such claimant per LSOA on average.
- Approx. 486 fewer JSA claimants and 186 long term claimants:** Aggregating the effects across the 178 LSOAs using the overall results presented in the figure below results in just under 500 fewer JSA claimants in 2019 and just under 200 fewer long-term claimants.

These results provide preliminary indications that the fibre ring in Tameside may have been successful in reducing unemployment and could have had some positive economic impacts in the area. However, the sample size limitations of this analysis mean these effects should be viewed with caution and extensive analysis using SRS data will be needed to explore the potential for these effects in more detail.

The figure below sets out the estimated reduction in claimants of each category by distance from the fibre ring.

**Figure 6.1: Estimated impact on total Jobseekers Allowance and claimants claiming for at least 12 months by distance from fibre ring**



Source: Ipsos MORI analysis; JSA Claimant data (significant effects only)

### 6.2.2 West Sussex Gigabit project

The data for West Sussex areas indicates that employment growth in West Sussex has continued to rise since 2015 from 366,000 employees in 2015 to 387,000 in 2018, a rise of over five percent over three years. This rate is far above the rate for Great Britain as a whole at just over three percent. Employment growth in Crawley rose fastest and reached almost 11 percent over this period. Similarly, employment growth was strong in both Arun and Worthing over the same period at over nine percent in Arun and nearly seven percent in Worthing, although employment in Worthing remained static between 2017 and 2018.

However, not all of the local authority districts covered by the LFFN project have seen employment growth of this level. Employment in Adur and Horsham remained static between 2017 and 2018 and employment fell in Crawley and Mid Sussex in 2018.

**Table 6.5: Percentage employment growth in West Sussex (2015-18)**

Area	Percentage growth 2015-2016	Percentage growth 2016-2017	Percentage growth 2017-2018	Overall percentage growth 2015-2018
Adur	0.0	5.0	0.0	5.0
Arun	4.5	2.2	2.1	9.1
Chichester	1.7	-1.6	3.3	3.3
Crawley	9.4	2.2	-1.1	10.6
Horsham	1.9	0.0	0.0	1.9
Mid Sussex	1.7	1.7	-5.0	-1.7
Worthing	4.4	2.1	0.0	6.7
Brighton and Hove	2.2	0.0	0.7	3.0
West Sussex	4.1	1.0	0.5	5.7
Great Britain	1.7	1.2	0.7	3.5

Source: ONS Business Register and Employment Survey (BRES)

### 6.2.3 Trans Pennine Initiative

Between 2015 and 2018 the seven local authority districts along the TPI route experienced a combined employment growth of 7.2 percent, exceeding Great Britain's average of 3.3 percent over the same period. Table 5.2 highlights that employment growth has not been evenly distributed across the TPI areas, with Manchester and Leeds, the areas with the largest populations, growing by 12 and 8.1 percent respectively, whilst other areas, such as Oldham and Tameside have grown more closely in line with the national average at 3.7 and 4.4 percent. Kirklees has experienced the lowest employment growth over this period, growing by 0.6 percent between 2015 and 2018.



**Table 6.6: Percentage employment growth in TPI areas (2015-18)**

Area	Percentage growth 2015-2016	Percentage growth 2016-2017	Percentage growth 2017-2018	Overall percentage growth 2015-2018
York	-1.9%	4.8%	-0.9%	1.9%
Selby	0.0%	5.3%	0.0%	5.3%
Leeds	-0.2%	3.4%	4.8%	8.1%
Kirklees	-1.2%	1.9%	0.0%	0.6%
Oldham	2.4%	4.8%	-3.4%	3.7%
Tameside	0.0%	1.5%	2.9%	4.4%
Manchester	6.7%	3.7%	1.3%	12.0%
All TPI areas	1.7%	3.4%	1.9%	7.2%
Great Britain	1.4%	1.1%	0.7%	3.3%

Source: ONS Business Register and Employment Survey (BRES)

### 6.3 Earnings

Increased productivity is a potential outcome that is anticipated to arise from the LFFN project should the project result in a significant degree of spill-over build and take-up of FTTP connections by businesses in the areas around the anchor network.

#### 6.3.1 Tameside 'Thin Layer model' project

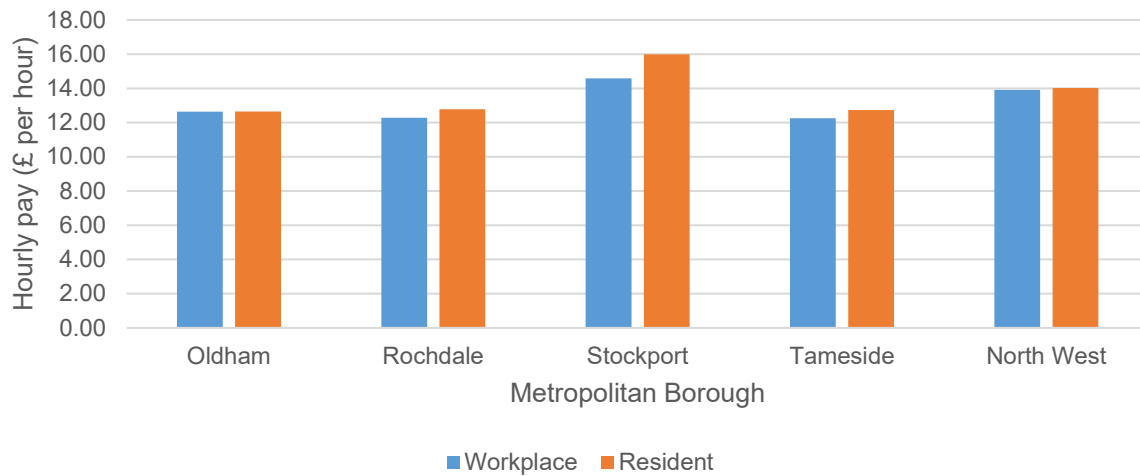
Median wage growth (as a proxy measure for productivity growth) in Tameside and neighbouring boroughs shows significant variation. In Tameside, median wage growth for full-time workers has been comparable to the UK and North west average from 2014 to 2019. This growth rate is also comparable to Stockport and Rochdale boroughs, but lower than Oldham. Despite this growth in Tameside, the borough is still an area with a low median wage for its residents and workers.

**Table 6.7: Annual median wage growth in Tameside LFFN areas and surrounding areas (2014 to 2019 full-time workers)**

Area	2015 (% growth)	2016 (% growth)	2017 (% growth)	2018 (% growth)	2019 (% growth)	2014 to 2019 (% growth)
Oldham	1.9%	1.3%	2.7%	6.7%	4.1%	17.7%
Rochdale	0.9%	2.5%	3.9%	0.9%	6.4%	15.4%
Stockport	-0.8%	3.3%	3.2%	1.7%	7.8%	15.9%
Tameside	0.4%	2.0%	6.4%	0.3%	4.9%	14.6%
North west	1.5%	3.0%	2.0%	3.1%	3.2%	13.5%
UK	1.4%	2.3%	2.5%	2.6%	3.5%	13.1%

Source: ONS Annual Survey of Hours and Earnings (ASHE)

**Figure 6.2: Median hourly pay in Tameside LFFN areas (2019)**



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

### 6.3.2 West Sussex Gigabit project

Median wage growth (as a proxy measure for productivity growth) also varied between local authorities. Data for the local authorities in West Sussex shows significant variation in the rate of growth across local authorities with Adur, Arun, Chichester, Worthing, and Brighton and Hove, all seeing double-digit growth in median wages between 2014 and 2019. However, Adur, Arun and Chichester also had the lowest median wages across all areas covered by LFFN in 2014.

West Sussex as a whole fell behind Great Britain over this period with total median wage growth reaching nearly twelve percent compared to thirteen percent for Great Britain. The improvements have been observed in Table 5.3 in the annex and would suggest that, in recent years, West Sussex has seen productivity growth around the national rate overall, but the bulk of productivity growth is generated in just the three local authority areas described above leaving several areas to lag behind in this regard, particularly Crawley, Horsham and Worthing.

**Table 6.8: Annual median wage growth in West Sussex areas (2014 to 2019 full-time workers)**

Area	2015 (% growth)	2016 (% growth)	2017 (% growth)	2018 (% growth)	2019 (% growth)	2014 to 2019 (% growth)
Adur	3.4	1.0	10.3	-1.2	9.8	25.0
Arun	8.0	1.0	-3.3	11.8	0.1	18.2
Chichester	8.6	4.4	-2.6	5.1	0.9	17.1
Crawley	-0.3	0.8	-2.0	5.5	-3.7	0.1
Horsham	-0.9	0.5	1.6	3.2	7.9	12.7
Mid Sussex	-2.4	-1.2	9.6	0.2	-2.2	3.6
Worthing	2.5	-3.4	0.7	4.9	5.9	10.9
Brighton and Hove	1.0	0.2	7.3	0.6	9.5	19.8
West Sussex	2.7	-0.9	2.8	4.7	2.0	11.7
Great Britain	1.4	2.3	2.5	2.6	3.5	13.1

Source: ONS Annual Survey of Hours and Earnings (ASHE)

Median wages for workers in West Sussex (workplace) remain below the UK average with only wages in Crawley and Brighton and Hove above the national average at £15 per hour. This would imply that productivity within West Sussex still lags behind that of the national average to a small degree.

**Figure 6.3: Median hourly pay in West Sussex in 2019**



Source: ONS Annual Survey of Hours and Earnings (ASHE) 2019 – Workplace earnings refers to employees working in each area; Resident earnings refers to workers that live in each area.

### 6.3.3 Trans Pennine Initiative

Median wage growth (as a proxy measure for productivity growth) varied between local authorities along the TPI route. As Table 5.3 highlights, Kirklees and York experienced wage growth of 22.4 and 18.6 percent, respectively, considerably higher than the Great Britain average (13.2 percent between 2014 and 2019). Leeds (12.3 percent), Selby (12.6 percent) and Manchester (12.8 percent) each experienced lower median wage growth than the Great Britain average over the same time period.

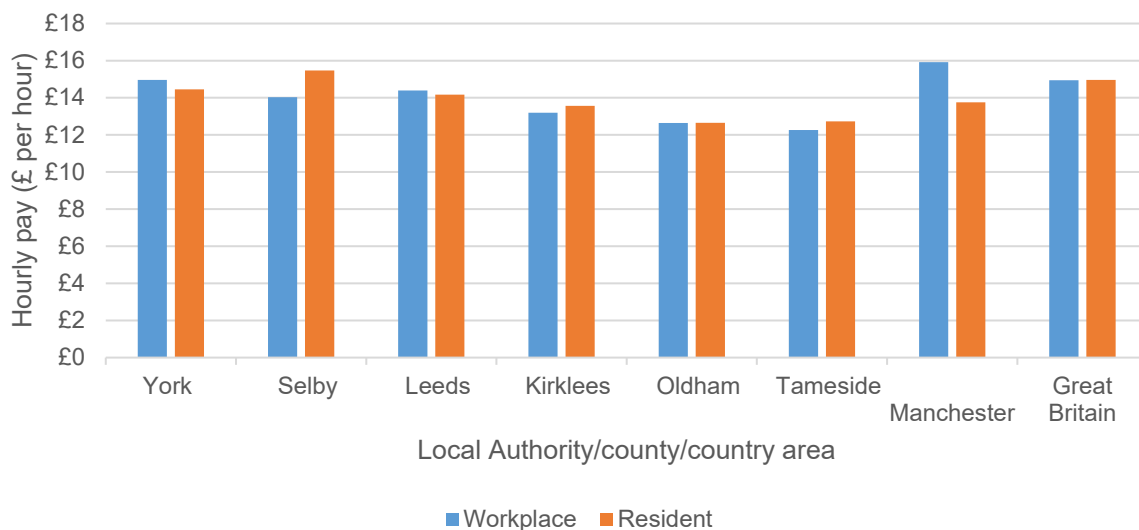
**Table 6.9: Annual median wage growth in TPI areas (2014 to 2019 full-time workers)**

Area	2015 (% growth)	2016 (% growth)	2017 (% growth)	2018 (% growth)	2019 (% growth)	2014 to 2019 (% growth)
York	-0.6%	3.2%	5.1%	-0.7%	10.7%	18.6%
Selby	0.1%	-0.5%	4.0%	-2.5%	11.4%	12.6%
Leeds	5.3%	1.6%	0.7%	1.4%	2.9%	12.3%
Kirklees	5.5%	1.6%	5.0%	4.0%	4.5%	22.4%
Oldham	1.9%	1.3%	2.7%	6.8%	4.0%	17.7%
Tameside	0.4%	2.0%	6.4%	0.3%	4.9%	14.6%
Manchester	0.8%	3.2%	4.4%	-2.2%	6.2%	12.8%
All TPI areas	1.9%	1.8%	4.0%	0.8%	6.4%	15.7%
Great Britain	1.5%	2.2%	2.6%	2.4%	3.8%	13.1%

Source: ONS Annual Survey of Hours and Earnings (ASHE)

Analysis of median hourly pay highlighted that areas that have recently experienced high levels of median wage growth do not necessarily experience higher median hourly pay (see Figure 5.1). Kirklees, which experienced median wage growth of 22.4 percent between 2014 and 2019 is still considerably below the national average, with those who are resident in Kirklees having median hourly pay of £13.56 (national average of £14.94), and those that work in Kirklees having a median hourly pay of £13.19 (compared to the national average of £14.96).

**Figure 6.4: Median hourly pay in LFFN areas in 2019**



*Source: ONS Annual Survey of Hours and Earnings (ASHE) 2019. Workplace earnings refers to employees working in each area; Resident earnings refers to workers that live in each area.*

#### **6.4 Firm productivity effects**

It is anticipated that in the short term, the adoption of FTTP services in the project areas would add to firms' consumption of telecoms services, potentially raising average labour productivity (GVA per worker, or turnover per worker as a proxy). However, as the network builds were only completed in 2018 or 2019 and the current data available in the SRS only runs until 2018, no analysis could be conducted to explore this issue at the current time.

#### **6.5 Cost savings to public building occupants**

The TPI project, by providing connections to local authorities and public service providers, is expected to drive efficiency gains and cost savings. As highlighted in section 5 of this report, it is expected that Kirklees Council will make a saving of £4,000 per year two years after they have been connected to the TPI network. As the connection has not yet been made, there is no evidence as to how the connections will impact upon productivity – although as these buildings would have been connected to fibre services in the absence of the TPI, it is likely that any productivity effects would be minimal. We will explore this further in the next stage of the evaluation, once public sector buildings have been connected to the fibre network.

No evidence was available which could demonstrate the potential cost savings to public sector buildings for the Tameside 'Thin Layer model' project or West Sussex Gigabit project.

#### **6.6 Increased land prices**

Increased demand for land in the areas benefiting from fibre networks in the project areas due to relocation effects, clustering effects, and firm expansion could put pressure on land prices and rentals. However, it is still too early to estimate the impact of the LFFN projects on land prices. The final report the evaluation may look to explore median house prices at Middle Layer Super Output Area (MSOA) level which records residential spaces.<sup>81</sup>

#### **6.7 Social and environmental impacts**

There is no specific expectation of social and/or environmental effects associated with the project. However, as the project has the potential to lead to spill over FTTP build to residential properties, the general social and environmental impacts identified in the scoping report could potentially be anticipated. However, it is not expected that these would be evidenced at this stage so close to completion of the build and evidence towards this will be explored in the final evaluation assessment.

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<https://www.ons.gov.uk/peoplepopulationandcommunity/housing/datasets/hpssadataset2medianhousepricebymsoaquarterlyrollingyear>



## 7. Key conclusions

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The final section of the report provides a broad overview of the realisation of outcomes from each section above.

### 7.1 Tameside 'Thin Layer model' project

In general, the Tameside PSAR 'Thin Layer Model' project which received funding through LFFN Wave One has evidenced substantive progress in terms of the deployment of FTTP availability with connections made to key public sector buildings, and momentum behind the Cooperative. However, take-up appears limited at this stage.

- **Cooperative membership:** Since 2017 membership of the Cooperative has grown across public sector and private companies operating in Tameside. Over the last year it has attracted interest from further ISPs including Virgin Media and expanded into two new local authority areas providing ducting infrastructure rather than commercial operators seeking to connect businesses or households. Members are positive of their working relationships established through the Cooperative and believed this to be a key success of the model. However, they believed further growth with private sector companies would better stimulate commercial aspects of the Cooperative, which are currently seen as a barrier to wider roll-out within Tameside.
- **Commercial viability of the Cooperative:** The Cooperative model appears to be commercially viable with income generation exceeding expectations set by members in 2019. Data provided suggests that suppliers using the network are generating substantial profits through connections made along the network, which has been confirmed in conversation with ISP members of the Cooperative. However, much of this profit is solely generated to ISP member ITS Technology and their B2C partners who are the primary network provider in the borough.
- **Deployment of FTTP:** The project seems to have led to a positive impact on deployment of FTTP, however, the placement of LFFN Wave One PoPs might not have been optimal given the spatial distribution of impacts. ITS Technology appear to have extended the networks in the north of Tameside from Ashton Under Lyne and south from Hyde and Longdendale with these PoPs leading to bigger impacts further from the ring. Cooperative members were not confident that the placement of all PoPs was commercially viable, and findings suggest that if PoPs were placed further north, costs to deployment may have been smaller.
- **Take-up of ultrafast connections:** Findings suggest that take-up appears negligible at this stage. However, it is likely that this will improve over time, and will be revisited in the final evaluation report. The Cooperative suggested that there have been lessons learned in terms of the service levels (SLAs) needed to provide services to larger businesses and public sector organisations which are being worked through at present.
- **Economic benefits:** The project has shown some limited early positive indications of economic benefits. In the LSOAs within 1km of where the LFFN Wave One project delivered, there was on average 2.3 fewer JSA claimants per LSOA. However, as further analysis through SRS was not possible at this stage, economic impact findings will need substantial further analysis in the final evaluation.

## 7.2 West Sussex Gigabit project

The key conclusions from the research into the West Sussex Gigabit project are:

- **Network and connection progress:** The installation of the fibre was completed by July 2019. However, connections to public buildings were delayed and were in the process of being installed at the time of the research taking place. It was expected that all connections would be completed by the end of September 2020. As relatively few connections had been made at the time of the research, it is too early to conclude whether the Anchor Tenancy has been successful in aggregating a large number of different proximate public sector sites on a linked and more resilient Public Sector Network. This will be explored in detail in the final evaluation.
- **Challenges encountered:** The main challenges encountered to date centre on resource and QA with Covid-19 also having a substantial impact:
  - Resource remained a significant barrier particularly with testing capacity required to ensure that the work had been completed to specification. Remedial works were also required and undertaken where build did not meet specification after installation. In total there were issues with fibre laid at 65 sites. These problems contributed to the delays prior to Covid-19 generating further issues for the programme through reducing the resource and the ability for testing teams to access infrastructure. Covid-19 also led to further delays with the delivery of the fibre supply.
  - Wayleaves remained an issue for a small number of public buildings with five still in the process of being negotiated. These were for varying reasons related mainly to landlords and tenants with three the result of an inability to obtain permission to access NHS sites, one other involving a tenant dispute and a third awaiting sign off once remedial work to remove hazardous material is completed.
- **Deployment of FTTP:** Any connectivity impacts the project may have had are not observable in the current Connected Nations dataset. However, given that the public sector connections were being put in place over 2020, it is possible that the project will not have had any significant impacts on connectivity as yet.
- **Economic benefits:** It has not been possible to establish whether the project has had any economic benefits to the areas surrounding the network to date. The economic datasets required to undertake the analysis are not available for 2020. Additionally, given that the public sector connections were being put in place over 2020, it is unlikely that the project will have had any significant economic impacts.

## 7.3 Trans Pennine Initiative

The TPI project funded by the LFFN programme has made some progress to date, particularly around completing the physical work to deliver the fibre network and in engaging with potential customers and generating interest in their product. However, take-up of their services is limited at this stage, which is a function of when the physical work for the project was completed and the timing of this research, and that Network Rail is a new entrant in the market. The key conclusions from the research are:



- **Completion of physical work / Fibre Interface Points (FIPs):** Since the summer of 2019 the TPI project has completed the physical work to deliver the fibre network, and this was completed within a couple of months of the original timeline for completion. There are some key learnings which can be taken from this completion of the work, including having effective oversight from two Government Departments and developing a project delivery team with the right mix of skills and experience. The project has continued working to enhance the value of the network by installing Fibre Interface Points at commercially viable locations along the route, with five of eight FIPs already installed.
- **Market engagement and securing customers:** NRT have engaged in an extensive market engagement process, contacting over 70 ISPs and numerous Local Authorities to attempt to secure customers. This has led to the provision of 16 quotes, with six orders for connectivity, although all these orders come from public sector organisations. NRT have found it difficult to secure commercial customers, and some reasons for this are that they cannot engage in price competition with competitors due to the funding / pricing model agreed (in order to be State aid / compliant), which makes it more challenging to get commercial providers to move their connectivity from the suppliers they know (and know the quality of service they will receive).
- **Public sector learning:** The project has generated learning for public sector organisations. Firstly, NRT now know they have a State aid / compliant funding / pricing model, which can be utilised in future projects (which would reduce the time required to complete the project), and NRT are also generating learning from the market engagement they are currently undertaking. There is evidence of further interest in this model along other rail routes in the UK, which means that this learning can be exploited in the future.
- **Deployment of FTTP:** As the project was only completed in mid to late 2019, any connectivity impacts the project may have had are not observable in the current Connected Nations dataset. However, given that the TPI currently has no commercial customers, it is unlikely that the project will have had any significant impacts on connectivity as yet.
- **Economic benefits:** It has not been possible to establish whether the project has had any economic benefits to the areas surrounding the TPI route as yet. This is because the project was only completed in mid to late 2019, and the economic datasets required to undertake the analysis are not available for 2020. Additionally, given that the TPI currently has no commercial customers, it is unlikely that the project will have had any significant economic impacts.



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