

# **Evaluation of the Superfast Broadband Programme**

**State aid evaluation: Main Report**

**February 2023**

Ipsos





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# Glossary of key terms and acronyms

Category	Term / acronym	Meaning
Broadband / technology terminology	NGA	<b>Next Generation Access</b> – This refers to new or upgraded access networks that will allow substantial improvements in broadband speeds. <sup>1</sup> This includes Fibre to the Cabinet, Fibre to the Premises (Fibre to the Home), Wireless and Cable broadband connections.
	FTTP / FTTH	<b>Fibre to the Premises / Fibre to the Home</b> – This refers to an access network structure in which the optical fibre runs from the local exchange to the end user's living or office space.
	FTTC	<b>Fibre to the Cabinet</b> - An access network structure in which the optical fibre extends from the exchange to the cabinet. The street cabinet is usually located only a few hundred metres from the subscriber's premises. The remaining part of the access network from the cabinet to the customer is usually copper wire.
	Cable	Telecommunications infrastructure which utilises cable networks, such as Data Over Cable Service Interface Specification (DOCSIS-3) networks.
	Wireless	High-speed internet access where connections to the premises use radio signals rather than cables.
	GFAST	A type of connection which involves the deployment of additional fibre to a node that is very close to the premises to be served, normally located on a pole or in a chamber. The connection from the node to the premises retains the existing copper. This can achieve speeds up to four times faster than traditional FTTC connections.
	ADSL	<b>Asymmetric Digital Subscriber Line</b> - A technology used for sending data quickly over a conventional copper telephone line. It is used in current internet services with download speeds up to 24Mbps.
	SBB	<b>Standard broadband</b> - with download speeds of up to 30 Mbps.
	SFBB	<b>Superfast broadband</b> - download speeds from 30 Mbps up to 300 Mbps.
	UFBB	<b>Ultrafast broadband</b> - able to deliver download speeds equal or greater than 300 Mbps.
	Gigabit	<b>Gigabit broadband</b> - able to deliver download speeds of at least one gigabit per second (Gbps), equivalent of 1,000 Mbps.
	LLU	<b>Local Loop Unbundling</b> - When communication providers can gain access to the network by placing their own equipment at the exchange. The communication providers then gain control of the line from the local exchange to the customer and the backhaul (the link between the local network and the global internet) runs from the local exchange to their core network.
	VULA	<b>Virtual Unbundling of the Local Loop</b> – an Openreach wholesale product used in the UK for the third party provision of superfast broadband services using VDSL (very high speed digital subscriber loop). It uses a single fibre based access infrastructure which is electronically unbundled and made available to all providers on an equal and non-discriminatory basis.
	ISP	<b>Internet Service Provider</b> – An organisation which provides households / businesses access to the internet. ISPs do not always own the

<sup>1</sup> The term was first used by the European Commission in 2010 to refer 'to upgrades to ADSL networks which had previously relied on end to end copper connections for the delivery of broadband services' – see para 11 at <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010H0572>

<b>Type of telecoms provider</b>	Network provider	infrastructure used to provide services, and can utilise the infrastructure owned by network providers to provide services.
	Programme beneficiary	Telecommunications providers which own infrastructure which is used to deliver internet services.
	Alt-nets	One of the five network providers that were awarded Superfast Broadband contracts.
<b>Public sector organisations involved in delivery</b>	BDUK	<b>Alternative network</b> – Smaller network providers that are not reliant on the Openreach network.
	DCMS	Building Digital UK.
	Local Bodies	Department for Digital, Culture, Media and Sport.
	NCC	Local authorities / devolved Governments responsible for delivering local Superfast Broadband Programme projects.
<b>Financial terms</b>	IRR	<b>National Competency Centre</b> – an entity within BDUK which is responsible for ensuring the Superfast Broadband Programme complies with the European Commission State aid legislation.
	WACC / discount rate	<b>Internal Rate of Return</b> - a measure of an investment's expected future rate of return.
	Capex	<b>Weighted Average Cost of Capital</b> (discount rate for Openreach) - the rate that a company is expected to pay on average to finance its assets.
	Opex	<b>Capital expenditure</b> – expenditure to buy/maintain/improve fixed assets.
<b>Economic and evaluation terms</b>	Cost Benefit Analysis	<b>Operational expenditure</b> – ongoing expenditure associated with delivering a product / running a business.
	Turnover	A comparison of the monetary values of the costs and benefits of an intervention.
	GVA	The amount of money generated by a business (value of sales).
	Outcome	<b>Gross Value Added</b> – The additional value generated from economic activity (in monetary terms).
	Impact	Outcomes are social or economic measures that could be affected by the programme (e.g. jobs, turnover, life satisfaction)
	Benefit	Impacts are the effects on the outcome that are attributable to the programme over and above what would have occurred in the absence of the programme. Impacts occur over a longer time period.
	Efficiency	A measurable improvement of a positive outcome (as perceived a by one or more stakeholders), which contributes towards one or more organisational objectives
	Disagglomeration	A measure of the extent to which a project, or policy's associated throughputs are increased
	Opportunity Cost	A process by which companies or firms no longer need to be in close proximity to one another, and become more geographically dispersed.
	Present Value (PV)	The value of the best alternative use of resources or assets (the benefits foregone on alternatives courses of action when deploying resources or assets).
<b>Superfast Broadband Programme terms</b>	NBS	The current value of a future monetary value, which have been discounted (using a standard discount rate) to allow for the time value of money.
	Implementation Clawback	UK National Broadband Scheme (the Superfast Broadband Programme). A mechanism to recover underspend. In the event of any underspend, the network provider was required to place unused funds in an Investment Fund to help resource further schemes or extend the contract coverage to a greater number of premises than originally offered.

Take-up clawback	If take-up proved to be higher than anticipated at the tendering stage, network providers were required to return a share of the excess revenues generated from additional take-up to the investment fund.
OMR	<b>Open Market Review:</b> A process by which network providers outlined their existing broadband networks and their network roll out plans for the coming three years.
'White' areas (postcodes)	Areas identified in the OMR process where there were no commercial plans to roll-out superfast broadband within three years.
'Grey' areas (postcodes)	Areas identified in the OMR process where one provider was offering or expected to offer superfast broadband services within three years.
'Black' areas (postcodes)	Areas identified in the OMR process where multiple providers were offering or expected to offer superfast broadband.
SCT	<b>Speed and Coverage Template</b> - a list of premises or postcodes that were identified as 'white' in the OMR process and therefore eligible for subsidised infrastructure.
PFM	<b>Project Financial Model</b> – a document which includes all of the financial information (build costs, expected take-up, WACC etc.), which is developed by programme beneficiaries at the start of the local project.
C3 reports	A list of premises or postcodes where the Superfast Broadband Programme has provided upgraded connectivity.

# Executive Summary

Ipsos UK was commissioned by the Building Digital UK (BDUK) directorate of the Department for Digital, Culture, Media and Sport (DCMS) in October 2021 to undertake a second State aid evaluation of the UK National Broadband Scheme (NBS) 2016 (hereafter called the Superfast Broadband Programme).

The Superfast Broadband Programme was announced in 2010 in response to concerns that the commercial deployment of superfast broadband infrastructure would fail to reach many parts of the UK. In June 2010 almost 3 million homes and businesses did not have access to broadband speeds of at least 2Mbps. In November 2011 (the earliest data that is available), Superfast Broadband connections were available to 58 percent of premises in the UK.

The scheme was initially backed by £530m of BDUK funding, with the aim of extending superfast coverage to 90 percent of UK premises by December 2016 (Phase 1). The programme was expanded in 2015, with a further £250m made available to extend coverage to 95 percent of premises by December 2017 (Phase 2). These schemes were funded under the State aid judgement SA.33671 (2012/N).

Phase 3 of the Superfast Broadband Programme was funded under a new State aid Decision covering contracts awarded between 2016 and 2020 (State aid SA. 40720 (2016/N)). Contracts awarded under Phase 3 by early-2022 involved over £1bn<sup>2</sup> in committed public funding. The scheme aims to provide superfast broadband coverage (or faster networks) in areas where availability remained below the 95 percent coverage target and extend superfast coverage beyond 95 percent where possible. This evaluation focuses primarily on contracts awarded under Phase 3 of the programme.

## Evaluation aims and methodological approach

The aims and objectives of the State aid evaluation of the Superfast Broadband Programme are to provide evidence to answer the seven key State aid evaluation questions, as set out in the National Broadband Scheme (NBS) evaluation plan, with a particular focus on the Phase 3 contracts:

- Question 1: To what extent has the aid resulted in increased access to a Next Generation Access (NGA) network being deployed in 'white' NGA areas?
- Question 2: To what extent has the target of the intervention taken-up Superfast Broadband connections and what speeds are available?
- Question 3: Has the aid had a significant incentive effect on the aid beneficiaries?
- Question 4: Has the aid had a material effect on the market position of the direct beneficiaries?
- Question 5: Is there evidence of changes to parameters of competition arising from the aid? (including third parties operating in the relevant intervention area(s))?
- Question 6: Is the gap funding model efficient compared to alternative schemes?

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<sup>2</sup> This figure is based on the Superfast Status Update (CORA) data



- Question 7: Did the aid lead to commercially sustainable networks?

In addition to these seven key evaluation questions, the research has provided an assessment of the overall benefits of the Superfast Broadband Programme to businesses and households, as mentioned in section 3 of the State aid evaluation plan: BDUK will evaluate the wider outcomes and impacts of the programme, such as productivity, employment, and public value.

This report builds on a preceding analysis undertaken in 2020 that covered all Phases of the programme (largely because delivery of Phase 3 contracts was insufficiently advanced at the time)<sup>3</sup>. This report focuses exclusively on the impacts of contracts funded under the 2016 to 2020 UK National Broadband Scheme.

A summary of the methodological approach used for the evaluation is presented below:

- **Econometric analysis:** An assessment of the effects of Phase 3 contracts on NGA coverage and take-up was completed by implementing a series of econometric analysis that compared areas benefitting from the programme to other postcodes that were eligible for subsidies. The underlying methodology was as robust as could be achieved within the constraints set by the design of the programme (achieving Level III on the Maryland Scientific Methods Scale). Full details of this analysis are set out in Technical Appendix 1. Econometric analysis of economic and social outcomes using areas that have received connectivity at an earlier stage and those connected at a later date have also been used (again achieving Level III on the Maryland Scientific Methods Scale).
- **Modelling of expected Internal Rates of Return:** An assessment of the 'incentive effect' provided by the subsidies for Phase 3 contracts was completed by comparing the network provider's expected Internal Rate of Return (IRR) to their Weighted Average Cost of Capital (WACC) or discount rate, before and after the award of subsidy. A modelling exercise was completed in which the financial models put forward by network providers as part of the tendering process were updated to account for changes in expected capital costs and observed take-up of the superfast services made available. Full details of this analysis are set out in Technical Appendix 2.
- **Market share analysis:** The effect of the programme on the parameters of local competition was explored by examining changes in the number of network providers active in the Phase 3 contract areas and their market shares between 2016 and 2022. This was completed using network provider level data compiled independently by Thinkbroadband<sup>4</sup>. These analyses focused on changes over the period (in line with the methodology prescribed in the State aid evaluation plan) and achieve Level II on the Maryland Scientific Methods scale.
- **Cost benefit analysis:** A cost-benefit analysis of the programme was also completed to explore issues relating to the cost effectiveness of Phase 3 of the Superfast Broadband Programme and the degree to which its costs were justified by its benefits. The analysis was completed in line with the

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<sup>3</sup> Department for Digital, Culture, Media and Sport (2021) State aid evaluation of the Superfast Broadband Programme. Available at: <https://www.gov.uk/government/publications/superfast-broadband-programme-state-aid-evaluation-report-2020> (Accessed in November 2022).

<sup>4</sup> ThinkBroadband is an independent organisation which collects information and data about internet coverage in the UK. It also runs an online 'speed test' function, where individuals can provide a limited amount of data about their broadband package and test the connection speed that they receive. [www. https://www.thinkbroadband.com/](https://www.thinkbroadband.com/)

guidance set out in the HM Treasury Green Book<sup>5</sup> and the approaches put forward for valuing economic and non-market impacts. Full details of this analysis are set out in Technical Appendix 3.

- **In-depth research with network providers:** The evaluation was supported by a programme of in-depth research with 14 telecommunication companies (including direct beneficiaries of the programme, other network providers and internet service providers that could potentially make use of the infrastructure made available through the programme). The focus of the interviews was on understanding the current conditions in the telecommunications market, the progress made in delivering the Superfast Broadband contracts and the impact the programme has had on beneficiaries and the wider market.

## Key findings

The key findings focus on the seven State aid evaluation questions, and the wider economic and social benefits of the programme.

### Question 1: To what extent has the aid resulted in increased access to a NGA network being deployed in 'white' NGA areas?

Subsidised coverage through Phase 3 of the Programme led to a significant positive impact on the availability of superfast and gigabit capable broadband services by the end of September 2021. Subsidised coverage increased the share of premises in the programme area able to access superfast speeds by 44 to 48 percentage points, and the share of premises with gigabit capable coverage by 43 to 59 percentage points. The impact of the programme on NGA availability was relatively small, however, indicating that in its absence, most premises would have benefitted from some form of enhanced connectivity (albeit via technologies less able to deliver download speeds of 30Mbit/s or higher). These findings are consistent with prior research into the impacts of the programme on broadband coverage.

Estimates of the overall number of additional premises benefitting from NGA, superfast and FTTP/Gigabit capable availability by September 2021 showed that:

- **NGA coverage:** The programme is estimated to have led to 50,000 to 117,000 additional premises with NGA coverage (with a larger estimate of 117,000 premises derived from panel models considered implausibly large given the observed trends in NGA coverage). Additionality (i.e. the share of premises benefitting from superfast coverage that would not have in the absence of the programme) is estimated at between 7 and 17 percent, with most estimates towards the lower end of this range. This implies that to a large degree, premises benefitting from the Superfast Broadband Programme would have received some form of NGA coverage in its absence.
- **Superfast availability:** The Programme is estimated to have increased the number of premises that can access superfast broadband services (30Mbit/s or above) by 202,000 to 247,000 by the end of September 2021. The associated rate of additionality ranges from 69 percent to 85 percent. This indicated that while many premises may have received NGA coverage in the absence of the Programme, these premises would not have been able to access at least superfast speeds (indicating the programme has been highly effective in delivering against its primary objective).

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<sup>5</sup> HM Treasury (2018) The Green Book: Central Government Guidance on Appraisal and Evaluation. Available at: <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

- **FTTP/Gigabit capable coverage:** Subsidised coverage is estimated to have led to 193,000 to 298,000 additional premises with FTTP/Gigabit capable coverage. The rate of additionality ranges from 66 percent to 102 percent (with most estimates in the region of 90 percent). This indicates that the programme has also been highly effective in bringing gigabit capable technologies to rural areas, and these areas were highly unlikely to have benefitted from commercial deployments over the time horizons considered in this evaluation.

#### Question 2: To what extent has the target of the intervention been used and what speeds are available?

The findings indicated that Phase 3 contracts led to a significant increase in the maximum download speeds of connections taken by households and/or businesses by September 2021 (34 to 60 Mbit/s). However, the impacts of the programme on average download speeds were relatively small. This indicates that 'early adopters' have taken advantage of the enhanced broadband connectivity enabled by the Programme. However, the Programme had not led to widespread take-up of faster broadband services by September 2021. It should be noted that most subsidised coverage was delivered in 2019 and 2020. As take-up will lag deployment, it is premature to draw any firm conclusions on the impact of the programme on take-up of faster internet services. Again, this is consistent with prior research into the impacts of the programme on take-up.

#### Question 3: Has the aid had a significant incentive effect on the aid beneficiaries?

Based on projections provided by network providers at the tendering stage, the proposed network build under Phase 3 contracts was expected to either generate losses or to deliver positive rates of return (Internal Rate of Return or IRR) that were substantially lower than the cost of capital faced by the network provider. Network providers project an average IRR of [redacted] in the absence of subsidies at the tendering stage, they are now expected to generate an average IRR of between [redacted] and [redacted]. This highlights that subsidies would almost certainly be needed to stimulate investments in gigabit capable network deployment in these areas. This is also consistent with the high rates of additionality associated with gigabit capable networks described above (i.e. network providers were highly unlikely to roll out similar investments in the absence of public subsidies).

The expected IRR was [redacted] with subsidies at the tendering stage and are projected to fall to between [redacted] and [redacted] based on evidence on actual build costs and take-up. These rates of return are lower than the network provider's discount rate, indicating that BDUK has avoided the risk of providing excess subsidies to network providers (as for Phases 1 and 2 of the programme). This also suggests that contracts would be unprofitable even with public funding. This could be explained if the network provider considered future profitability beyond the clawback period (from which all profits made would be retainable by the supplier). [Redacted]

The clawback mechanism helped prevent network providers earning excess returns and limited the public contribution to the minimum needed to ensure the commercial viability of network deployments in Phases 1 and 2. However, in the case of Phase 3 contracts, the clawback mechanisms has reduced the expected IRRs further to between [redacted] and [redacted]. This raises possible questions regarding the commercial sustainability of the network build, although revenues are expected to exceed to operating costs in the longer run.

#### Question 4: Has the aid had a material effect on the market position of the direct beneficiaries?

At a UK level, there has not been significant changes in the market share of programme beneficiaries in the broadband market between 2016 and 2022. Openreach dominates the market, representing more than

three quarters of the broadband market. The other beneficiaries of the Superfast Broadband Programme represented less than one percent of the market in all years.

The market share for Openreach across Superfast contract areas however declined between 2016 and 2022, from around 97 to 85 percent of all broadband connections. While this is higher than the national average (between 70 and 80 percent), the decline in market share aligns with the national trends for Openreach.

In areas where [redacted] have delivered contracts, they have maintained their market share between 2016 and 2022 [redacted]. However, in areas where [redacted] have delivered contracts, the market share for [redacted] has fallen (particularly in areas where [redacted] have delivered contracts), with the market share of the [redacted] increasing. This suggests that [redacted] are taking market share from [redacted] in these areas.

#### Question 5: How far is there evidence of changes to parameters of competition arising from the aid?

At a UK level, the share of NGA broadband take-up as a proportion of total broadband take-up has increased markedly since 2016. NGA connections represented just over half of all broadband connections in 2016, but this has grown to over 80 percent of internet connections in 2022. Fibre to the Cabinet (FTTC) connections represented the largest proportion of NGA connections in all years (around a third of all broadband connections in 2016 and just over a half in 2020 and 2022). As with the national pattern, FTTC is the dominant technology for NGA connections, representing most of the connections in Phase 3 areas – however, this percentage is lower than the national average (around 40 percent in 2022 in Phase 3 areas compared to 50 percent nationally). FTTP connections represent a higher proportion of the market in Phase 3 areas than nationally in 2022 (24 percent in 2022 compared to 10 percent nationally). This suggests that the take-up of FTTP connections nationally is lower than take-up in Phase 3 areas – which would be expected given that the Phase 3 Superfast Broadband contracts are required to provide gigabit capable networks, and the majority of contracts are doing this through FTTP technologies.

The number of infrastructure providers operating on the postcodes benefitting from subsidised upgrades increased between 2016 and 2022. Although there has been an increase in the number of network providers offering services in Phase 3 areas, most non-beneficiary network providers tended to provide services to only a small number of postcodes within the Phase 3 project areas. This suggests there has not been a large degree of overbuild or crowding out of investment.

The number of ISPs operating in Phase 3 areas has increased between 2016 and 2020, but decreased by 2022. There are a higher number of ISPs with customers in Phase 1 contract areas than Phase 2 and Phase 3. This is unlikely to be due to ISPs stopping providing services to a particular area but continuing elsewhere, and could be a function of a small intervention area where individuals are satisfied with their internet connection, and therefore do not undertake a speed test.

#### Question 6: Is the gap funding model efficient compared to alternative schemes?

The gross public sector cost per additional covered premises over three years was £1,418 for Phase 3 contracts. After allowing for clawback, this will fall to £1,225 to £1,276 per premises passed (depending on whether take-up stabilises at 60 or 85 percent in the long-term).

A review of the literature suggests that there are no evaluations providing quantitative estimates of the cost-effectiveness of comparable initiatives in bringing forward broadband coverage. As such, it has not been possible to benchmark the scheme to explore issues relating to how far the programme design was optimal. However, a study for the European Commission does provide estimates of the projected cost per

covered premises, and it appears that the cost per premises covered for the Superfast Broadband Programme is lower than the projected costs for comparable schemes in the EU<sup>6</sup>. However, it should be noted that the cost per premise passed for these European programmes will be dependent on the type of infrastructure investments made to reach premises, and this information was not available.

#### Question 7: Did the aid lead to commercially sustainable networks?

None of the Phase 3 contracts currently listed on the Superfast Status Report have had services withdrawn by the network provider. This means that there have been no premises which have not been upgraded as a result of a beneficiary withdrawing from the programme.

However, a total of six contracts have been terminated. All of these contracts were awarded and terminated by the same Local Body and were awarded to two beneficiaries. These contracts were terminated by the Local Body, due to the inability of the beneficiaries (and its supply chain) to deliver the network build outlined in their bids to the required quality within the specified timeframe of the contract. These contracts were not terminated due to the commercial viability of the contract.

Analysis of Phase 3 contracts shows that take-up is now close to the maximum expected at PFM stage and has caught up following a slow start to delivery.

#### Wider economy effects

The present value of net public spending required to deliver the Superfast Broadband Programme over the lifetime of Phase 3 contracts was estimated to be £273m in nominal terms.

The findings of the evaluation indicate that the programme has led to a range of economic and social benefits in the areas benefitting from Phase 3 coverage between 2016 and 2021. The key results included:

- **Local employment impacts:** Subsidised coverage from Phase 3 was estimated to have increased employment in the areas benefitting from the programme by 0.88 percent, leading to the creation of 6,261 local jobs by March 2021. The programme as a whole was estimated to have led to 23,700 more local jobs up to March 2021.
- **Turnover:** Subsidised coverage also increased the turnover of firms located in the areas benefitting from Phase 3 of the programme by 1.6 percent by 2021, increasing the annual turnover of local businesses by £827m per annum. Estimates for the whole programme suggested that turnover of firms in areas benefitting from coverage increased by 1.4 percent (equating to around £2.6bn).
- **Number of firms:** The evidence indicated that a share of these local economic impacts were driven by the relocation of firms to the programme area. The evidence indicated that subsidised coverage increased the number of businesses located in the areas benefitting by around 0.5 percent – suggesting the programme may have encouraged the ‘disagglomeration’ of economic activity to rural areas.
- **Turnover per worker:** There were also signals of efficiency gains - turnover per worker of firms in the areas benefitting from Phase 3 coverage rose by 0.42 percent in response to subsidised

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<sup>6</sup> European Commission (2020) The role of State aid for the rapid deployment of broadband networks in the EU; Available at: <https://ec.europa.eu/competition/publications/reports/kd0420461enn.pdf>

coverage. This was not solely driven by more productive businesses moving into areas with improved broadband infrastructure. Firms that did not relocate over the period also saw their turnover per worker rise by 0.17 percent by 2021, indicating that subsidised coverage has also raised the efficiency of firms. It should be noted that while subsidised coverage had a stable effect on turnover, impacts on employment increased with time. This led to the strength of the gains in turnover per worker appearing to decay with time.

- **Wages:** The impacts of the programme were also visible in wages. Employees working for firms located in the areas benefitting from subsidised coverage saw their hourly earnings increase by between 0.6 and 0.8 percent in response to the upgrade. This gives greater confidence that the programme led to an increase in productivity.
- **Unemployment:** Local job creation also appeared to translate into reduced unemployment, with the number of unemployed claimants falling by 9.8 for every 10,000 premises upgraded.
- **House prices:** The programme led to an increase in house prices (of between £1,900 and £4,900) suggesting that buyers valued the technology.

It is important to note that while most of these findings account for the possibility that businesses benefitting from the programme may have claimed market share from local competitors, they should not be interpreted as net economic impacts at the national level. At the national level, the programme is estimated to have resulted in:

- **Economic benefits:** Phase 3 is estimated to have led to a cumulative total of £7.2m in productivity gains between 2016/17 and 2021/22. This rises to between £20.8m and £23.1m over the 2016/17 to 2030 period. Additional economic benefits from the reduction in long-term unemployment is estimated to be £5.5m between 2016/17 and 2021/22, rising to between £15.7m and £17.4m over the 2016/17 to 2030 period.
- **Social benefits:** Based on its impacts on house prices between 2016/17 and 2021/22, the programme is estimated to have led to social benefits valued at between £370.3m and £946.9m.

The estimated Benefit to Cost Ratio (BCR) was between £1.76 and £4.57 per £1 of net lifetime public sector costs based on its impacts between 2016/17 and 2021/22. This assumes that the house price premium is a reasonable approximation of the average welfare gain associated with the programme, and that the house price premium can be applied to all premises in the upgraded areas. The width of the range is driven largely by modelling uncertainty regarding the size of the house price premium associated with subsidised coverage. Allowing for future economic benefits to 2030, the BCR is estimated to rise to between £1.87 and £4.70 per £1 of net public sector spending.

However, it is possible that the house premium overstates the average welfare gain associated with enhanced broadband connectivity. Therefore, a lower bound estimate was derived by assuming the house price premium only provided a reasonable approximation of the welfare gains associated with the programme in cases where houses were sold after the premises was upgraded (114,162). The BCR for the lower bound estimate is between £0.78 and £1.97 per £1 of net lifetime public sector costs between 2016/17 and 2021/22, and between £0.89 and £2.11 per £1 of net public sector spending allowing for economic benefits to 2030.



# 1 Introduction

Ipsos UK was commissioned by the Building Digital UK (BDUK) directorate of the Department for Digital, Culture, Media and Sport (DCMS) in October 2021 to undertake a second State aid evaluation of the UK National Broadband Scheme (NBS) 2016 (hereafter called the Superfast Broadband Programme).<sup>7</sup> This document presents the final State aid evaluation report, examining the impacts of the programme between 2016 and 2022.

## 1.1 Description of the programme

The Superfast Broadband Programme was announced in 2010 in response to concerns that the commercial deployment of superfast broadband infrastructure would fail to reach many parts of the UK. In June 2010 almost 3 million homes and businesses did not have access to broadband speeds of at least 2Mbps. In November 2011 (the earliest data that is available), Superfast Broadband connections were available to 58 percent of premises in the UK.

The Government established the programme to fund network providers to extend provision to areas where deployment was not commercially viable, on the expectation that doing so would result in economic, social and environmental benefits.

The scheme was initially backed by £530m of BDUK funding, with the aim of extending superfast coverage to 90 percent of UK premises by December 2016 (Phase 1). The programme was expanded in 2015, with a further £250m made available to extend coverage to 95 percent of premises by December 2017 (Phase 2). These schemes were funded under the State aid judgement SA.33671 (2012/N).

Phase 3 of the Superfast Broadband Programme was funded under a new State aid Decision covering contracts awarded between 2016 and 2020 (State aid SA. 40720 (2016/N)). Contracts awarded under Phase 3 by early-2022 involved over £1bn<sup>8</sup> in committed public funding. The scheme aims to provide superfast broadband coverage (or faster networks) in areas where availability remained below the 95 percent coverage target and extend superfast coverage beyond 95 percent where possible. This evaluation focuses primarily on contracts awarded under Phase 3 of the programme.

## 1.2 Aims and objectives of the evaluation

The aims and objectives of the State aid evaluation of the Superfast Broadband Programme are to provide evidence to answer the seven key State aid evaluation questions, as set out in the National Broadband Scheme (NBS) evaluation plan, with a particular focus on the Phase 3 contracts:

- Question 1: To what extent has the aid resulted in increased access to a Next Generation Access (NGA) network being deployed in 'white' NGA areas?
- Question 2: To what extent has the target of the intervention taken-up Superfast Broadband connections and what speeds are available?

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<sup>7</sup> The previous State aid evaluation report is available at: <https://www.gov.uk/government/publications/superfast-broadband-programme-state-aid-evaluation-report-2020>

<sup>8</sup> This figure is based on the Superfast Status Update (CORA) data

- Question 3: Has the aid had a significant incentive effect on the aid beneficiaries?
- Question 4: Has the aid had a material effect on the market position of the direct beneficiaries?
- Question 5: Is there evidence of changes to parameters of competition arising from the aid? (including third parties operating in the relevant intervention area(s))?
- Question 6: Is the gap funding model efficient compared to alternative schemes?
- Question 7: Did the aid lead to commercially sustainable networks?

In addition to these seven key evaluation questions, the research has provided an assessment of the overall benefits of the Superfast Broadband Programme to businesses and households, as mentioned in section 3 of the State aid evaluation plan: BDUK will evaluate the wider outcomes and impacts of the programme, such as productivity, employment, and public value.

This report builds on a preceding analysis undertaken in 2020 that covered all Phases of the programme (largely because delivery of Phase 3 contracts was insufficiently advanced at the time)<sup>9</sup>. This report focuses exclusively on the impacts of contracts funded under the 2016 to 2020 UK National Broadband Scheme.

### 1.3 Method

The methodology used to undertake the State aid evaluation of the Superfast Broadband Programme follows the requirements set out in the UK NBS evaluation plan<sup>10</sup> agreed between the European Commission and BDUK in 2016. Some changes to the agreed methodology have been made with the agreement of the European Commission, owing to the availability of the data required to undertake the analysis foreseen. These limitations are set out in Section 1.4 of the report.

The methodology used is presented in detail in the Technical Annexes to this document, but a summary of the approach is detailed below:

- **Econometric analysis:** An assessment of the effects of Phase 3 contracts on NGA coverage and take-up (Questions 1 and 2 of the evaluation plan) was completed by implementing a series of econometric analysis that compared areas benefitting from the programme to other postcodes that were eligible for subsidies. This was achieved by linking data on local broadband availability and take-up captured by Ofcom's regular Connected Nations report to management data compiled by BDUK describing the premises that were eligible for the programme. The underlying methodology was as robust as could be achieved within the constraints set by the design of the programme (achieving Level III on the Maryland Scientific Methods Scale). Full details of this analysis are set out in Technical Appendix 1.
- **Modelling of expected Internal Rates of Return:** An assessment of the 'incentive effect' provided by the subsidies for Phase 3 contracts was completed by comparing the network provider's expected

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<sup>9</sup> Department for Digital, Culture, Media and Sport (2021) State aid evaluation of the Superfast Broadband Programme. Available at: <https://www.gov.uk/government/publications/superfast-broadband-programme-state-aid-evaluation-report-2020> (Accessed in November 2022).

<sup>10</sup> Department for Digital, Culture, Media & Sport (2017) National Broadband Scheme Evaluation Plan (Redacted version). Available at: <https://www.gov.uk/government/publications/national-broadband-scheme-evaluation-plan> (Accessed in November 2020)



Internal Rate of Return (IRR) to their Weighted Average Cost of Capital (WACC), before and after the award of subsidy. This analysis is motivated by the theoretical proposition that businesses in the private sector will maximise their profits if they implement all investment projects that generate expected returns that exceed their cost of capital. However, the rates of return earned on contracts awarded cannot be observed directly because revenues and operational costs will be realised in the long-term (i.e. over 15 to 20 years) and cannot be monitored directly by BDUK. To address this challenge, a modelling exercise was completed in which the financial models put forward by network providers as part of the tendering process were updated to account for changes in expected capital costs and observed take-up of the superfast services made available. Full details of this analysis are set out in Technical Appendix 2.

- **Market share analysis:** The effect of the programme on the parameters of local competition was explored by examining changes in the number of network providers active in the Phase 3 contract areas and their market shares between 2016 and 2022. This was completed using network provider level data compiled independently by Thinkbroadband<sup>11</sup>. These analyses focused on changes over the period (in line with the methodology prescribed in the State aid evaluation plan) and achieve Level II on the Maryland Scientific Methods scale.
- **Cost benefit analysis:** A cost-benefit analysis of the programme was also completed to explore issues relating to the cost effectiveness of Phase 3 of the Superfast Broadband Programme and the degree to which its costs were justified by its benefits. The analysis was completed in line with the guidance set out in the HM Treasury Green Book<sup>12</sup> and the approaches put forward for valuing economic and non-market impacts. The analysis was supported by a variety of econometric analyses examining the effect of subsidised coverage on businesses, workers, households, and the public sector. These analyses employed a 'pipeline' design in which those areas benefitting from subsidised coverage in later years were compared to those benefitting in earlier years (again, achieving levels of robustness equivalent to Level III on the Maryland Scientific Method Methods Scale). Full details of this analysis are set out in Technical Appendix 3.
- **In-depth research with network providers:** The evaluation was supported by a programme of in-depth research with 14 telecommunication companies (including direct beneficiaries of the programme, other network providers and internet service providers that could potentially make use of the infrastructure made available through the programme). The focus of the interviews was on understanding the current conditions in the telecommunications market, the progress made in delivering the Superfast Broadband contracts and the impact the programme has had on beneficiaries and the wider market. Interviews were transcribed and analysed, with perspectives offered validated against the objective evidence available from monitoring information where possible. Key findings were also validated by key BDUK officials responsible for the design and delivery of the programme.

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<sup>11</sup> ThinkBroadband is an independent organisation which collects information and data about internet coverage in the UK. It also runs an online 'speed test' function, where individuals can provide a limited amount of data about their broadband package and test the connection speed that they receive. [www. https://www.thinkbroadband.com/](https://www.thinkbroadband.com/)

<sup>12</sup> HM Treasury (2018) The Green Book: Central Government Guidance on Appraisal and Evaluation. Available at: <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

## 1.4 Outcomes and how they have been measured, over what period

The following table provides an overview of the primary outcome measures for the evaluation, data sources, and the time-frame over which effects are considered (which varies across data sources).

**Table 1.1: Outcome measures and time-frames for evaluation**

State aid evaluation question	Outcome indicators	Source	Time frame
1. To what extent has the aid resulted in increased access to an NGA network being deployed in 'white' NGA areas?	<ul style="list-style-type: none"> <li>Number of premises passed by NGA services</li> <li><i>Number of premises with superfast (30Mbps) coverage</i></li> <li><i>Number of premises with Fibre-to-the-Premises coverage</i></li> </ul>	Connected Nations (Ofcom)	June 2016 to September 2021
2. To what extent has the target of the intervention been used and what speeds are available?	<ul style="list-style-type: none"> <li>Number of live NGA-delivered connections</li> <li><i>Number of premises connected to superfast (30Mbps) services</i></li> <li>Mean download speed of broadband connections</li> <li>Mean upload speed of broadband connections</li> </ul>	C3 reports, BDUK Connected Nations (Ofcom)	January 2016 to September 2021 June 2016 to September 2021
3. Has the aid had a significant incentive effect on the aid beneficiaries?	For each winning supplier: comparison of the supplier's expected Internal Rate of Return (with and without subsidy) versus their Weighted Average Cost of Capital (WACC) / Discount rate	Modelling based on Project Financial Models (PFMs), observed costs (Finance Trackers), and reported take-up (C3 reports)	January 2016 to September 2021
4. Has the aid had a material effect on the market position of the direct beneficiaries?	For each winning supplier: <ul style="list-style-type: none"> <li>Supplier's market share of all active NGA lines within the relevant county/unitary local authority area(s)</li> <li>The supplier's market share of all active NGA lines within the UK</li> </ul>	Data provided by Thinkbroadband	2016 to 2022
5. Is there evidence of changes to parameters of competition arising from the aid? (Including third parties operating in the relevant intervention area(s))?	For each of the relevant county/unitary local authority area(s), and for the UK: <ul style="list-style-type: none"> <li>Take-up of NGA lines as a % of all broadband take-up</li> <li>Market share (of take-up) for each NGA technology</li> <li>Number of infrastructure providers offering NGA services</li> </ul>	Data provided by Thinkbroadband	2016 to 2022
6. Is the gap funding model efficient compared to alternative schemes?	Comparison against non-gap-funded UK and EU schemes in terms of: <ul style="list-style-type: none"> <li>Public funding per covered premises (using the maximum in-life coverage for closed schemes)</li> <li>Public funding per live end user connection to the network (using the maximum in-life take-up for closed schemes)</li> <li>Public funding per live end-user connection-years</li> </ul>	The role of State aid for the rapid deployment of broadband networks in the EU (European Commission 2020)	N/A

7. Did the aid lead to commercially sustainable networks?	<p>For each winning supplier, their actual versus original forecast:</p> <ul style="list-style-type: none"> <li>• Annual cashflow (before subsidy)</li> <li>• Take-up volumes</li> <li>• Average revenue per user</li> <li>• Average operational costs per user</li> </ul> <p>For the interventions funded by the 2016 NBS:</p> <ul style="list-style-type: none"> <li>• The number of projects, if any, from which services have been withdrawn (e.g. due to corporate insolvency, or project losses)</li> <li>• The number of premises covered by such projects, and the number of live connections for such projects</li> <li>• The % share of the overall 2016 NBS accounted for by such projects (in terms of number of projects, public funding, premises covered, take-up volumes)</li> </ul>	Observed costs (Finance Trackers), and reported take-up (C3 reports) and qualitative findings	N/A
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*Outcome measures not originally included in the State aid evaluation plan have been italicised.*

## 1.5 Limitations

There are some limitations to the evaluation that should be considered when interpreting the findings of the analysis. These are:

- **Progress with programme delivery:** At the time of the evaluation, many Phase 3 contracts were yet to be completed. Much of the data on which the evaluation is based was also only available to September 2021. Just over half (52 percent) of the contracted number of premises to be upgraded were complete at this stage. This creates challenges in assessing the long-term additionality of the infrastructure upgrades, the effect of the programme on the market shares of beneficiaries, and the expected rate of return on the contracts awarded.
- **Causality:** The programme was not delivered as a Randomised Control Trial and econometric methods have been used to establish estimates of the causal effects of the programme. These methods are based on comparisons between postcodes that benefitted from coverage subsidised by the programme and other postcodes that were eligible for investment but not chosen by network providers when developing their proposals to deliver the schemes. This creates the possibility that there are systematic differences between those areas benefitting from the programme and the comparison group that could bias findings. The commercial viability of network upgrades in areas benefitting from the programme could be expected to be higher than in eligible areas that did not. While steps have been taken to mitigate this risk, the results may overstate the impact of the programme due to unobserved confounding factors.
- **COVID-19:** The data deployed in this analysis ran to mid-2021 and does not allow for an analysis of the impacts of the programme in relation to COVID-19. It is plausible that the programme enabled benefits such as remote working, the delivery of public services (e.g. General Practitioner consultations) on-line and increased local resilience through supporting social distancing arrangements. However, if COVID-19 has induced greater demand for superfast services amongst residential consumers, the rates of return earned on Superfast contracts will also be higher than when projected based on historic growth in take-up. This could make some upgrades commercially

viable that previously were not (implying that additionality in the longer term was overstated). The COVID-19 pandemic may also have had some negative impacts, such as the beneficiaries ability to deliver upgrades (although telecommunications providers did not think this was a substantial issue) and on wider economic performance.

- **Data availability:** The NBS evaluation plan agreed in 2016 identified data sources to be used to undertake the analysis plan set out in the document. However, as noted above, not all this data could be made available to the evaluation team. The data that was not available and the alternative data sources used are presented in Table 1.2 below. These changes were communicated to the European Commission by the BDUK Benefits and Evaluation team in May and October 2020.

**Table 1.2: Unavailable data sources and alternatives used**

Intended data source	Alternative data source	Key differences
It was anticipated that Ofcom would provide premises level data on NGA coverage between 2016 and 2020 (relevant to Q1 and Q2).	Ofcom Connected Nations report September 2021.	The data runs to September 2021 and is only available at postcode level. Analyses have lower spatial resolution and cover a less extensive period than envisaged. However, as sample sizes are substantial, this does not limit the statistical precision.
Actual data on revenues and operational costs are needed to observe network providers actual rate of return but are not monitored by BDUK (relevant to Q3 and Q7).	Modelling was completed by applying assumptions regarding operational costs and average revenue per user to take-up (which is monitored by BDUK). Not all projects in Phase 3 had all the required information to calculate IRRs.	This approach assumes that operational costs and average revenues per user are static over time and align with the assumptions put forward by network providers in tenders. This has meant that it has not been possible to address some aspects of Q7 (i.e. annual cashflows and average revenues costs and costs per user) and rates of return are modelled rather than observed in relation to Q3.
Network provider level returns provided to Ofcom to compile the Connected Nations report could not be made available for this analysis due to commercial sensitivities. As such, the anticipated data to address Q4 and Q5 was not available.	Thinkbroadband network provider coverage data and Speed Test data	Thinkbroadband data is not collected or validated by the telecommunications regulator, Ofcom. Take-up data by ISP is collected from Speed Tests undertaken by consumers, rather than information collected by ISPs and submitted to Ofcom. This limits the robustness of the answers to Q4 and Q5, as consumers providing speed tests may not be representative of the broader population. Sample sizes were often small at the level of the individual contract area, limiting the degree to which results can be broken down at this level.
Management information about ISPs utilising upgraded networks (to establish how far network providers have made use of open access arrangements) has not been monitored (relevant to Q5)	Thinkbroadband Speed Test data and qualitative information	ISPs utilising the upgraded networks has been identified from the ISPs operating in Superfast Broadband Programme areas (the postcodes which the programme has built networks to). This is not a comprehensive list of ISPs operating in these areas, as it is based on speed tests completed.
It was anticipated that benchmarks would be available providing estimates of the value for money associated with alternative scheme designs (relevant to Q6).	No evaluations have examined the cost-effectiveness of other types of broadband programmes in bringing forward superfast broadband coverage. However, projected costs per premise information for schemes across Europe have been analysed.	The absence of benchmarks makes it challenging to provide answers to questions relating to whether the scheme design was optimal and whether alternative designs may have produced superior outcomes.

## 1.6 Structure of report

The remaining sections of this report are structured as follows:

- Section 2 provides an overview of the Superfast Broadband Programme, the analytical framework deployed in the evaluation and the delivery of the programme at the point of the analysis taking place;
- Section 3 outlines the evidence of the effectiveness of the Superfast Broadband Programme;
- Section 4 details the evidence of the direct impacts of the Superfast Broadband Programme on programme beneficiaries;
- Section 5 presents the evidence of the indirect impacts of the Superfast Broadband Programme on programme beneficiaries;
- Section 6 shows the wider economic effects of the Superfast Broadband Programme on businesses and households;
- Section 7 describes the evidence of the proportionality and appropriateness of the intervention; and
- Section 8 summarises the key conclusions from the evaluation.

## 2 Superfast Broadband Programme

This section provides an overview of the Superfast Broadband Programme. This includes a description of the aims and objectives of the programme, how it was delivered and an overview of the processes by which it was expected to produce its intended impacts on broadband coverage and take-up and associated economic and social benefits. This serves as an analytical framework guiding the definition of the evaluation questions and the interpretation of results.

### 2.1 Superfast Broadband Programme

The first Ofcom Infrastructure report in November 2011 showed that 58 percent of UK households had access to Next Generation Access broadband services capable of delivering superfast broadband speeds (download speeds exceeding 30Mbps)<sup>13</sup>. NGA technologies encompass the installation of fibre-optic networks to connect the telephone exchange to the cabinets serving customers (Fibre-to-the-Cabinet) or to their premises (Fibre-to-the-Premises), improvements to cable networks, and wireless technologies that allow customers to obtain broadband services without a cabled connection to the network.

At the time, private investment in the required infrastructure was expected to be constrained in less densely populated areas of the UK. The costs of investing in the fixed infrastructure needed to provide these services are usually substantial. Where population density is low, this will reduce commercial viability as the consumer base will be smaller and the costs of network build may be higher (e.g. if properties are more distant from the serving telephone exchange).

The Superfast Broadband Programme was announced in 2010 to respond to these concerns that superfast broadband would fail to reach many parts of the UK. On the expectation that extending superfast broadband coverage to these areas would produce economic, social and environmental benefits, the Government established the programme to provide £530m of public resources to fund further deployment with the aim of increasing coverage to 90 percent of UK premises by early 2016. The programme was extended in 2015, with a further £250m made available to extend coverage to 95 percent by the end of 2017.

The Superfast Broadband Programme was extended a second time under a new State aid approval covering the 2016 to 2020 period, although the areas targeted were still those that were not expected to be reached by commercial deployment of superfast broadband. Contracts awarded under this State aid scheme (commonly known as Phase 3) are the focus of this evaluation report. These projects had a greater focus on gigabit connectivity (download speeds of 1000Mbps) than those funded in prior phases, aligning with broader Government objectives to increase FTTP coverage in the UK.

### 2.2 Theory of Change

This section sets out an overarching theory of change for the programme based on the frameworks developed for prior studies, which are set out in more detail in Technical Annex 3. The theory of change has been augmented to consider how the programme's impacts may have been conditioned by the

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<sup>13</sup> Ofcom (2011) Communications and Infrastructure report 2011. Available at: <https://webarchive.nationalarchives.gov.uk/ukgwa/20200803095351/https://www.ofcom.org.uk/research-and-data/multi-sector-research/infrastructure-research> (Accessed October 2022). In 2011, Ofcom used 24 Mbps as the Superfast speed threshold – see footnote 1 in the Ofcom report.



COVID-19 pandemic as well as broader contextual changes in the wider broadband market (explained further below).

### 2.2.1 Infrastructure Effects

The first order effects of the programme will be primarily in terms of the additional superfast broadband infrastructure brought about by subsidies by BDUK and associated increases in available speeds. The extent of these effects will be determined by a number of factors:

- **Additionality:** Making subsidies available for infrastructure delivery involves a risk that private sector providers face an incentive to seek public funds for investments that they would have made anyway (enabling them to earn higher rates of return). The extent to which the Superfast Broadband programme will produce an increase in superfast broadband availability will depend on the effectiveness of the mechanisms used to allocate public resources to infra-marginal schemes (i.e. upgrades to cabinets that would not have been deemed by suppliers to be commercially viable without a public subsidy). The programme involves a number of processes that are designed to maximise the extent to which public funding is directed at marginal activity:
  - **Allocation of subsidies:** Subsidies were allocated to local authorities on the basis of an ex-ante assessment (by BDUK) of the gap funding requirement to upgrade each cabinet in the UK. In Phase 1, BDUK funding was allocated based on local shares of the gap funding requirement to reach the initial target of 90 percent superfast coverage in each area. In Phase 2, resources were allocated on the basis of the gap funding needed to reach the 95 percent coverage at the lowest cost (maximising the number of premises covered for the available subsidy<sup>14</sup>). There was an aspiration that local authorities would match BDUK resources with local funds on a 1:1 basis (including their own funds, ERDF funding and the Local Growth Fund). A number of local authorities were deemed ineligible for BDUK support on the basis that existing commercial plans were already extensive.
  - **Open Market Review and public consultation:** Local authorities were required to manage an Open Market Review process and public consultation process before they issued tenders (under Phase 1 and 2 of the scheme), and this process was repeated for Phase 3 of the Programme. The first stage of this process involved local authorities requesting suppliers of broadband services to describe their commercial plans to roll-out basic and superfast broadband coverage over a defined time window. This resulted in an initial identification of postcodes where there were no commercial plans to roll-out superfast broadband ('white' postcodes), postcodes where one provider was offering or expected to offer superfast broadband services ('grey' postcodes), and postcodes where multiple providers were offering or expected to offer superfast broadband ('black' postcodes). There was a subtle change in the process for Phase 3, where suppliers were asked to provide data at a premises level, rather than at a postcode level (as was the case in Phase 1 and 2). The view on future superfast broadband availability provided by the suppliers was then subject to public consultation to refine this view.

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<sup>14</sup> However, under initial calculations, this would have resulted in Scotland and Northern Ireland receiving a smaller share than would be implied by their population shares. A share of funds available equivalent to population share was allocated to the two DAs, while resources were distributed across England and Wales in the manner suggested.



- **Tendering:** This view of the future trajectory of the local broadband availability was expressed in the form of a Speed and Coverage Template which accompanied a tendering exercise in which local authorities sought to procure additional investment in upgrading the local telecommunications infrastructure (either through a framework of suppliers established by BDUK or via an Official Journal in the European Union (OJEU) process<sup>15</sup>). Only ‘white’ postcodes were eligible for subsidised infrastructure, with competing suppliers outlining which postcodes (and premises in Phase 3) they proposed to cover for the available funding. Suppliers were required to provide a project financial model, which included estimates of the overall costs associated with delivering the project, and take-up assumptions (determining expectations of future revenues), which determined the overall level of subsidy to be offered.
- **Underspend:** Protections for the public sector against the risk that suppliers overestimated their delivery costs were put in place through the introduction of a mechanism to recover any underspend. The principle underlying contracts was that the supplier paid first, then BDUK and lastly local authorities. In the event of any underspend, funds are returned to local authorities and BDUK through a clawback mechanism (the supplier could opt to place these funds in an ‘investment fund’ during Phase 1 and 2 of the Programme to help resource further schemes or extend the contract coverage to a greater number of premises than originally offered – during Phase 3 overclaimed funds were paid back to the local authority).
- **Gain-share:** Further protections for the public sector were introduced through gain-share clauses in contracts. If take-up proved to be higher than anticipated at the tendering stage, then suppliers are required to return a share of the excess revenues to BDUK.
- **Impact of COVID-19:** COVID-19 may have altered the economics of investments in broadband technologies. On the one hand, the introduction of social distancing arrangements led to an increase in demand for data amongst households as many shifted to more remote working arrangements. This may feed through into greater demand for faster broadband services, improving the commercial viability of investments in the deployment of superfast and gigabit capable networks. This could reduce the additionality of some investments supported by the programme. At the same time, frictions and supply issues caused by COVID-19 could also increase the costs of deployment (although stakeholders consulted as part of the familiarisation process indicated that network providers had generally managed these effectively).
- **Vibrancy of the broadband market:** Stakeholders engaged in familiarisation consultations also highlighted that over the course of Phase 3 of the programme, the broadband market has become increasingly vibrant. Openreach, Virgin Media, as well as several alternative network providers have begun to invest in the deployment of FTTP networks and other gigabit capable technologies. These investments have been concentrated in the urban centres where network providers are expected to earn the greatest returns, and there is a risk that this reduces the attractiveness of network build in rural areas owing to the opportunity costs associated with prioritising projects only expected to earn a marginal return.

However, these trends could also increase the additionality of coverage brought forward with BDUK investment to the degree that subsidies have diverted investment from urban centres (allowing rural

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<sup>15</sup>OJEU process refers to a procurement which is advertised through the OJEU.

areas to benefit from gigabit capable technologies much more rapidly than they may otherwise have done). Stakeholders also highlighted that Phase 3 of the programme may also lead to spill-over effects as the deployment of gigabit capable networks in rural areas has reduced the marginal costs of extending those networks to nearby areas. This could lead to some areas receiving gigabit capable coverage more rapidly than they would have otherwise done in the absence of the programme as network providers plan their rollout.

- **Supplier behaviour during Open Market Review process:** Some suppliers may see an incentive to understate their commercial plans during the Open Market Review process to increase the likelihood they are able to secure a subsidy for activity they saw as not commercially viable without subsidy. Discussions with BDUK suggested, however, there may be disincentives for this type of behaviour in that an understatement of commercial plans may risk the emergence of a subsidised competitor and, indeed, qualitative interviews with suppliers suggested that there was suspicion that some suppliers were using the Open Market Review process to overstate their commercial plans to protect themselves from these types of risk and preserve local monopolies. Given that the Open Market Review process offered a market signal to both businesses and households regarding the likely future availability of superfast broadband, any effects of this nature may have negative economic consequences through the misallocation of private sector development/resources to areas in which superfast broadband did not ultimately emerge.

The process evaluation completed as part of the previous State aid report highlighted some of the issues caused by the static nature of the Open Market Review process, in that it only captures commercial deployment plans at a point in time. This has been reviewed for the roll-out of Project Gigabit (which can be seen as a successor programme to the Superfast Broadband Programme). However, stakeholders consulted during the familiarisation stage indicated that, owing to the growth of interest in gigabit capable technologies, some network providers have extended their commercial roll out plans to some areas in the build plans of Phase 3 contracts. This has required some premises to be 'descoped,' creating some efficiency issues and a risk that in some cases, subsidised networks could be overbuilt by commercial deployments more rapidly than originally anticipated.

- **Supplier behaviour during the tendering process:** The underspend and clawback mechanisms of the contract should, in principle, have eliminated systematic incentives for suppliers to overstate the gap funding requirement (since any overstatement of costs at the tendering stage would be recovered via the underspend clawback mechanism<sup>16</sup>, and any understatement of future revenues would be recovered via the gain-share mechanism). Understating expected costs or overstating take-up expectations would result in the supplier ultimately taking a loss.

Stakeholders also highlighted possible ex-post risks arising from the potential impacts of Openreach's Equinox pricing product (explained in more detail in Section 2.3.3 below), and fears that this could reduce revenues earned on investments in the deployment of gigabit capable technologies. The risk here is that gap funding awarded through the programme does not prove sufficient to make the investments in broadband deployment commercially viable in practice, leading to possible issues with commercial sustainability.

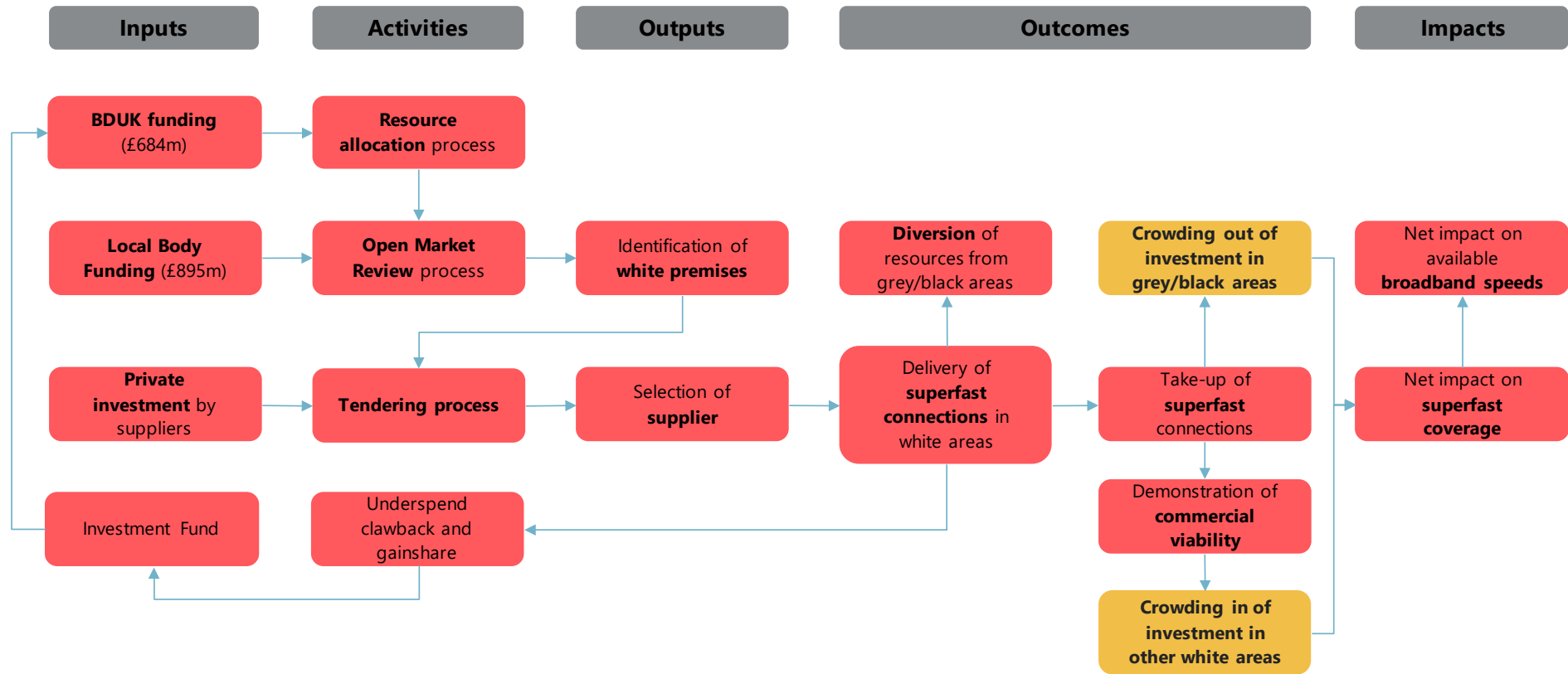
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<sup>16</sup> Unless subsidies encourage less efficient delivery.

- **Crowding out:** The provision of subsidies for superfast broadband investment may have had a negative impact on other areas if suppliers face resource constraints – either in the labour market or in financial markets (for smaller suppliers). If firms are not able to expand their overall capacity to deliver the programme of subsidised infrastructure improvements, then this may result in delays or abandonment of schemes planned without subsidy in ‘grey’ or ‘black’ areas (partly offsetting the effects of the programme in ‘white’ areas).
- **Variability across space and time:** The pattern of effects of the programme could be expected to vary across areas with different characteristics. On the presumption that the supplier installation decision can be simplified to a basic NPV criterion, then it might be expected that local variability in the effects of the programme will be driven largely by factors determining the cost of installation and maintenance (such as local topography, characteristics of the local network – such as the prevalence of exchange only lines, distance from regional population centres) and demand for the technology (e.g. incomes of households, the industrial structure of the local economy, or the speed of existing broadband services). These factors are also unlikely to be static over time (technological progress may result in reductions in the cost of installation, while demand for higher speeds may rise as more data intensive applications emerge).

This process is summarised in the logic model below.

**Figure 2.1: Logic Model – Infrastructure Effects of the Superfast Broadband Programme**



## 2.2.2 Economic and social benefits

As set out in the State aid evaluation plan, the Superfast Broadband Programme was expected to produce a variety of downstream benefits for businesses, workers, households, the public sector and the environment. These expected benefits have been mapped in the BDUK Benefit Framework. This report does not cover all anticipated benefits of the programme – for example, environmental benefits have been considered out of scope at this stage. A comprehensive theory of change, setting out the causal process by which subsidised coverage is expected to produce these economic and social impacts is provided in Technical Appendix 3 (Cost-Benefit Analysis).

## 2.3 Context

This section outlines the key context in which the Superfast Broadband operates and some recent developments in the broadband market that have the potential to influence the outcomes of the programme.

### 2.3.1 Overview of broadband services

Based on the typology adopted by Ofcom, there are four types of fixed-line internet services available to customers in the UK.<sup>17</sup>

- Narrowband, having the capacity of a standard voice channel (64 Kbps);
- Standard broadband (SBB), with download speeds of up to 30 Mbps;
- Superfast broadband (SFBB), with download speeds from 30 Mbps up to 300 Mbps;
- Ultrafast broadband (UFBB), able to deliver download speeds equal or greater than 300 Mbps;
- Gigabit broadband, able to deliver download speeds of at least one gigabit per second (Gbps), equivalent of 1,000 Mbps.

The 2021 Connected Nations<sup>18</sup> report illustrated that the UK Government target of 97 percent coverage of at least SFBB by 2020<sup>19</sup> had been reached.<sup>20</sup>

### 2.3.2 Broadband providers

Ofcom analysis suggests that there are four main Internet Service Providers (ISPs) in the UK retail broadband market: BT (with a market share of 34 percent), Sky (23 percent), Virgin Media (20 percent), and TalkTalk (10 percent).<sup>21</sup> In addition to these, there are regional network providers such as KCOM, or

<sup>17</sup> Ofcom (2018) Wholesale Broadband Access Market Review 2018. Available at: [https://www.ofcom.org.uk/\\_\\_data/assets/pdf\\_file/0010/115111/Draft-statement-Wholesale-broadband-access-market-review-2018.pdf](https://www.ofcom.org.uk/__data/assets/pdf_file/0010/115111/Draft-statement-Wholesale-broadband-access-market-review-2018.pdf) (Accessed November 2019).

<sup>18</sup> Ofcom (2021). Connected Nations 2021 UK Report. Available at: <https://www.ofcom.org.uk/research-and-data/multi-sector-research/infrastructure-research/connected-nations-2021> (Accessed November 2022).

<sup>19</sup> Although this was a UK Government target, it was not a stated objective for the Superfast Broadband Programme – rather the Programme was used to help the UK Government achieve this aim.

<sup>20</sup> There is no single agreed upon definition of 'superfast broadband'. The UK Government considers superfast broadband as having download speeds of 24 Mbps, whilst Ofcom and the European Commission define superfast broadband as connections of at least 30 Mbps. For details, Hutton, Georgina, and Baker, Carl (2018). Briefing Paper CBP06643. Superfast broadband in the UK. Accessed at: <http://researchbriefings.files.parliament.uk/documents/SN06643/SN06643.pdf> on 5 November 2019.

<sup>21</sup> Ofcom (2022) The Communications Market 2022. Available at: <https://www.ofcom.org.uk/research-and-data/multi-sector-research/cm/the-communications-market-2022> (Accessed October 2022).

full-fibre service providers such as Hyperoptic and Gigaclear, and small network providers in rural areas (providing broadband services based on satellite or mobile technologies), which together have a market share of approximately 14 percent.

BT has an incumbent position in the market as a result of being the former national network provider. Openreach, a wholly-owned subsidiary of BT, owns the largest copper-based telecom network in the UK covering nearly every premise, and an extensive fibre backbone network which reached around 91 percent of all UK premises in 2018 (the majority of this being provided by Fibre to the Cabinet (FTTC) connections, with Fibre to the Premises (FTTP) increasing in recent years). Most competitors rely on access to the Openreach network via wholesale agreements to provide services to customers. Ofcom regulation requires Openreach to offer wholesale access to its networks where possible.

Virgin Media is the third-largest provider and the main competitor of Openreach in terms of broadband infrastructure, and in 2017 reached around 50 percent of all households.<sup>22</sup> Following recent upgrades of its network, most of the premises connected to Virgin Media's network should be able to access gigabit capable speeds.<sup>23</sup>

### Investment in the market

Increased competition is evident in investments made in companies providing fibre broadband networks. Many fibre network providers have received substantial financial investments in recent years to build new fibre broadband networks. Examples of this include:

- Connectfibre receiving “significant” investment in March 2022;<sup>24</sup>
- Lightspeed Broadband receiving a cumulative total of £115 million investment by December 2021;<sup>25</sup>
- Truespeed receiving £75 million in January 2022;<sup>26</sup>
- Borderlink receiving a cumulative £174.5 million investment by January 2022;<sup>27</sup>
- Toob receiving £87.5 million in December 2021;<sup>28</sup>
- Zzoomm securing £100 million debt investment in October 2021;<sup>29</sup>
- Cityfibre receiving £1.1 billion in finance in September 2021;<sup>30</sup>

<sup>22</sup> Ofcom (2022). Communications Market Report 2022. Available at: <https://www.ofcom.org.uk/research-and-data/multi-sector-research/cm/the-communications-market-2022/communications-market-report-2022-interactive-data> (Accessed November 2022).

<sup>23</sup> Ofcom (2021). Connected Nations 2021 UK Report. Available at: <https://www.ofcom.org.uk/research-and-data/multi-sector-research/infrastructure-research/connected-nations-2021> (Accessed November 2022).

<sup>24</sup> <https://www.ispreview.co.uk/index.php/2022/02/connect-fibre-get-funding-for-full-fibre-rollout-in-east-of-england.html> (Accessed March 2022)

<sup>25</sup> <https://www.ispreview.co.uk/index.php/2021/12/lightspeed-broadbands-uk-ftp-rollout-gets-gbp60m-funding-boost.html> (Accessed March 2022)

<sup>26</sup> <https://www.ispreview.co.uk/index.php/2022/01/truespeed-start-2022-with-gbp100m-boost-for-uk-full-fibre-rollout.html> (Accessed March 2022)

<sup>27</sup> <https://www.ispreview.co.uk/index.php/2022/01/borderlink-get-gbp164m-for-full-fibre-rollout-in-north-england-and-scotland.html> (Accessed March 2022)

<sup>28</sup> <https://www.ispreview.co.uk/index.php/2021/12/toob-gets-gbp87-5m-funding-to-boost-uk-ftp-broadband-rollout.html> (Accessed March 2022)

<sup>29</sup> <https://www.ispreview.co.uk/index.php/2021/10/zzoomms-uk-gigabit-fibre-rollout-boosted-by-gbp100m-investment.html> (Accessed March 2022)

<sup>30</sup> <https://www.ispreview.co.uk/index.php/2021/09/cityfibre-secure-gbp1-1bn-to-fuel-uk-ftp-broadband-rollout.html> (Accessed March 2022)

- Digital Infrastructure (DI) launching after receiving £100 million investment in 2021;<sup>31</sup>
- Gigaclear securing £525 million in debt funding in 2020;<sup>32</sup> and
- Hyperoptic securing £750 million in two deals in 2018;<sup>33</sup>

Alongside this investment among alternative providers of broadband services, the larger providers of broadband networks (Openreach and Virgin Media) have also increased their investment in fibre networks. In early 2022, it was reported that Virgin Media was seeking to raise hundreds of millions of pounds of investment to support their fibre network rollout.<sup>34</sup> Openreach have also committed to expanding their fibre network, and in 2021 the cost of this additional roll out was estimated to be £15 billion to provide fibre coverage to 80 percent of UK premises.<sup>35</sup> Further to this, information from the scoping consultations suggested that BT Group were currently trying to sell BT Sport, a subscription sports channel, in order to raise capital to further invest in their fibre network.

This investment suggests that alongside the Superfast Broadband Programme network build, there is also likely to be a large volume of commercial network build occurring at the same time. As highlighted above, this could potentially have an impact on the ability of suppliers to deliver (or the level of priority given to) Superfast Broadband contracts.

### 2.3.3 Regulation of the telecommunications market in the UK

#### Ofcom

Ofcom is the National Regulatory Authority in the UK and assumed its powers on 29 December 2003. Its competency spans telecommunications (fixed-line and mobile networks and services), postal services, TV and radio broadcasting, as well as the airwaves (radio spectrum) over which mobile, Wi-Fi and many other services operate.<sup>36</sup> It has concurrent powers under the UK Competition Act and cooperates with the European Commission's Directorate-General for Competition (DG COMP) to safeguard a level playing field in the telecoms market in the UK.<sup>37</sup>

#### Regulation of Openreach

Openreach Ltd is a fixed-line telecoms infrastructure company, wholly owned by BT Group. Openreach are responsible for the development and maintenance of and installations across the UK's formerly nationalised telecoms infrastructure. In 2006, Openreach was set up as a business division of BT that works on behalf of service providers (such as BT, Sky or TalkTalk) to maintain the local access network it covers and allows service providers to sell phone, broadband or TV services direct to customers using the network.

<sup>31</sup> <https://www.digitalinfra.co.uk/latest-news/new-era-full-fibre-network-operator-accesses-ps-100m-investment> (Accessed March 2022)

<sup>32</sup> <https://www.ispreview.co.uk/index.php/2020/04/rural-isp-gigaclear-signs-525m-long-term-funding-strategy.html> (Accessed March 2022)

<sup>33</sup> <https://www.ispreview.co.uk/index.php/2022/02/hyperoptic-aim-gigabit-broadband-at-2-million-uk-homes-by-2023.html> (Accessed March 2022)

<sup>34</sup> <https://www.ispreview.co.uk/index.php/2022/01/virgin-media-o2-uk-reportedly-seeks-funding-for-ftp-rollout.html> (Accessed March 2022)

<sup>35</sup> <https://www.ispreview.co.uk/index.php/2021/05/bt-raise-ftp-broadband-target-to-25-million-uk-premises.html> (Accessed March 2022)

<sup>36</sup> Ofcom (2019). Accessed at: <https://www.gov.uk/government/organisations/ofcom> on (Accessed November 2019).

<sup>37</sup> European Commission (2019). Overview. Telecommunications. Available at:

[https://ec.europa.eu/competition/sectors/telecommunications/overview\\_en.html](https://ec.europa.eu/competition/sectors/telecommunications/overview_en.html) on (Accessed November 2019).

In 2016, after the Ofcom Digital Communications Review (DCR),<sup>38</sup> Ofcom announced that it required BT and Openreach to “legally separate” (i.e. set up Openreach as a subsidiary within BT Group). This was partly due to concerns that BT (through Openreach) could favour its own retail business over other Communications Providers (CPs) when making network investment decisions and in provision, operations and maintenance processes.<sup>39</sup> These decisions include strategic decisions around fibre rollout measures, the cost of services to providers wishing to access the network, and eventual prices offered to consumers.<sup>40</sup>

In early 2017, BT Group agreed to the separation, and in July 2017 Ofcom established an Openreach Monitoring Unit to assess the legal separation in practice. In November 2018, Ofcom stated that they were “broadly satisfied” with the legal separation of Openreach from BT, if commitment from BT and Openreach on the following was maintained:

- Strengthening independent decision making;
- Improve industry engagement through customer consultations; and
- Openreach commitment to investing in faster, better broadband through full fibre (FTTP).<sup>41</sup>

Following an Ofcom statement in June 2019,<sup>42</sup> Openreach allowed access for retail service providers to their Physical Infrastructure Access (PIA) portfolio, allowing them to share Openreach duct and pole infrastructure. PIA may only be used for public electronic communications services/network build. A retail supplier may access the network through the following:

- Buy a license to install a sub duct or cable within an access duct; and/or
- Buy a license to attach and maintain equipment on existing Openreach poles.<sup>43</sup>

Retail suppliers may also buy Points of Presence (PoPs) through Openreach’s Access Locate product for the purposes of co-mingling equipment for other products, and/or through “pull-in” cables through Openreach infrastructure to a supplier’s own PoP in the digital exchange (through a separate Cablelink product).<sup>44</sup>

## Wholesale Telecoms Market Review

In March 2021, Ofcom published the Wholesale Fixed Telecoms Market Review (WFTMR), which introduced new regulation and pricing controls for the broadband market. The aim of this regulatory change

<sup>38</sup> See <https://www.ofcom.org.uk/phones-telecoms-and-internet/information-for-industry/policy/digital-comms-review>

<sup>39</sup> Ofcom (2016). Update on plans to reform Openreach. Available at: <https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2016/update-on-plans-to-reform-openreach> (Accessed November 2019).

<sup>40</sup> Ofcom (2018). New Ofcom rules to boost full-fibre broadband, 23 February 2018. Available at <https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2018/new-rules-boost-full-fibre> (Accessed November 2019).

<sup>41</sup> Hutton, G. (2019). BT and Openreach House of Commons Briefing Paper, Number CP 7888, 11 January 2019.

<sup>42</sup> Ofcom (2019). Statement: Promoting competition and investment in fibre networks – review of the physical infrastructure and business connectivity markets. Available at: <https://www.ofcom.org.uk/consultations-and-statements/category-1/review-physical-infrastructure-and-business-connectivity-markets> (Accessed November 2019).

<sup>43</sup> It should be noted that the majority of third party services are provided using LLUA/VULA mechanism, rather than through PIA.

<sup>44</sup> Openreach (2019). Physical Infrastructure Access. Available at:

<https://www.openreach.co.uk/orpg/home/products/ductandpoleaccess/ductandpoleaccess.do> (Accessed November 2019).



was to promote competition and investment in gigabit-capable networks.<sup>45</sup> The key aspects of the WTFMR are:<sup>46</sup>

- **Access to Openreach's telegraph poles and underground ducts:** Openreach will continue to be required to allow all network operators to lay their own fibre networks using Openreach's infrastructure through its Physical Infrastructure Access (PIA) product. Different approaches to regulating Openreach's residential broadband products will be taken in different parts of the UK:
  - In competitive areas where there is established competition, Ofcom will not regulate Openreach's broadband products.
  - In areas with the potential for material competition (70 percent of UK), Openreach will continue to be required to provide wholesale access to its network.
  - In areas where Openreach is the only network provider, Ofcom have set a cost-based charge control which allows Openreach to recover the costs of both its existing copper network and its investment in a new FTTP (Fibre to the Premises) network.
- **Increase the price which Openreach is allowed to charge for FTTP broadband:** Openreach will be allowed to charge more (£1.70 per month extra) for their 40 Mbps service if it is delivered over FTTP rather than FTTC.
- **Promote network competition:** There are two main measures which Ofcom has introduced to promote network competition, which are:
  - Openreach are prohibited from offering geographic discounts on its superfast and FTTC broadband wholesale services; and
  - Openreach are required to give at least 90 days' notice of the introduction of certain commercial terms (such as volume discounts) that might prevent retail ISPs from using competing networks.
- **Provide support for Openreach in retiring its copper network:** Ofcom stated Openreach should not be penalised for having to run two parallel networks (a copper and a full fibre network), and Ofcom are supporting Openreach in the migration of customers to FTTP services. Ofcom state they will progressively transfer regulation (including price protections) from copper to FTTP services in exchange areas where fibre is available.

The WTFMR also introduced additional regulatory measures around leased lines, plans for regulation of the broadband market (and how their decisions will be informed) and maintaining a quality service.

### Pricing in the market

A recent development (at the time of writing) in the fibre broadband market has been the introduction of the Equinix pricing offer. This pricing offer provides ISPs a discounted price to utilise Openreach's wholesale fibre network if they stop making slower broadband products (ADSL and FTTC products) to

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<sup>45</sup> <https://www.ofcom.org.uk/phones-telecoms-and-internet/information-for-industry/telecoms-competition-regulation/the-openreach-monitoring-unit>

<sup>46</sup> [https://www.ofcom.org.uk/data/assets/pdf\\_file/0022/216085/wftmr-statement-volume-1-overview.pdf](https://www.ofcom.org.uk/data/assets/pdf_file/0022/216085/wftmr-statement-volume-1-overview.pdf)

customers, encouraging customers to utilise FTTP connections. ISPs would have the discounted price available to them if at least 80 percent of their new sales were for FTTP products. This product would provide lower costs for ISPs to use Openreach's fibre network, and these savings could be passed on to the consumer, boosting take-up of FTTP connections and potentially benefitting the consumer.<sup>47</sup> The discounted connection charge is £25 for new-to-network connections and £50 for other connections.<sup>48</sup>

However, the proposed pricing offer has been challenged by many alt-nets that are currently building new fibre networks. They state that the Equinox offer provides wholesale access at a lower price than it costs to deliver the service, and that this results in an anti-competitive practice in areas where Openreach competes with alt-nets. In essence, the discount provided by Equinox means that Openreach offer a price which cannot be matched by their competitors, and this will drive the competitors out of the market leaving Openreach as the sole provider.<sup>49</sup>

The Equinox pricing offer was referred to Ofcom, the regulator in the broadband market. This is because Openreach are required to notify Ofcom of all pricing changes prior to introducing them, as part of the regulatory requirement from the separation of Openreach and BT. In September 2021, Ofcom published a ruling that there was no requirement for Ofcom to act on the Equinox pricing offer, and that Openreach could make this offer to ISPs.<sup>50</sup> Cityfibre have subsequently launched a legal challenge to the Ofcom decision on the Equinox pricing offer.<sup>51</sup> This challenge took place in the summer of 2022 and was dismissed by Ofcom.

## 2.4 Programme delivery

### 2.4.1 Target areas for Phase 3 contracts

The target areas for the Programme were defined in Speed and Coverage Templates (SCTs) developed by Local Bodies based on the Open Market Review. The template identifies those premises that are not expected to receive superfast coverage under the commercial plans of network providers (white postcodes) and are therefore eligible for subsidised coverage.

These templates are completed by network providers as part of the tendering process, where they set out which premises will be upgraded as part of the proposed network build (the build plan). Premises on 64,000 postcodes were included in the build plans of Phase 3 contracts (four percent of the postcodes in the UK). Premises on 54,000 postcodes were identified as eligible for the programme but were not included in the build plans of Phase 3 contracts.

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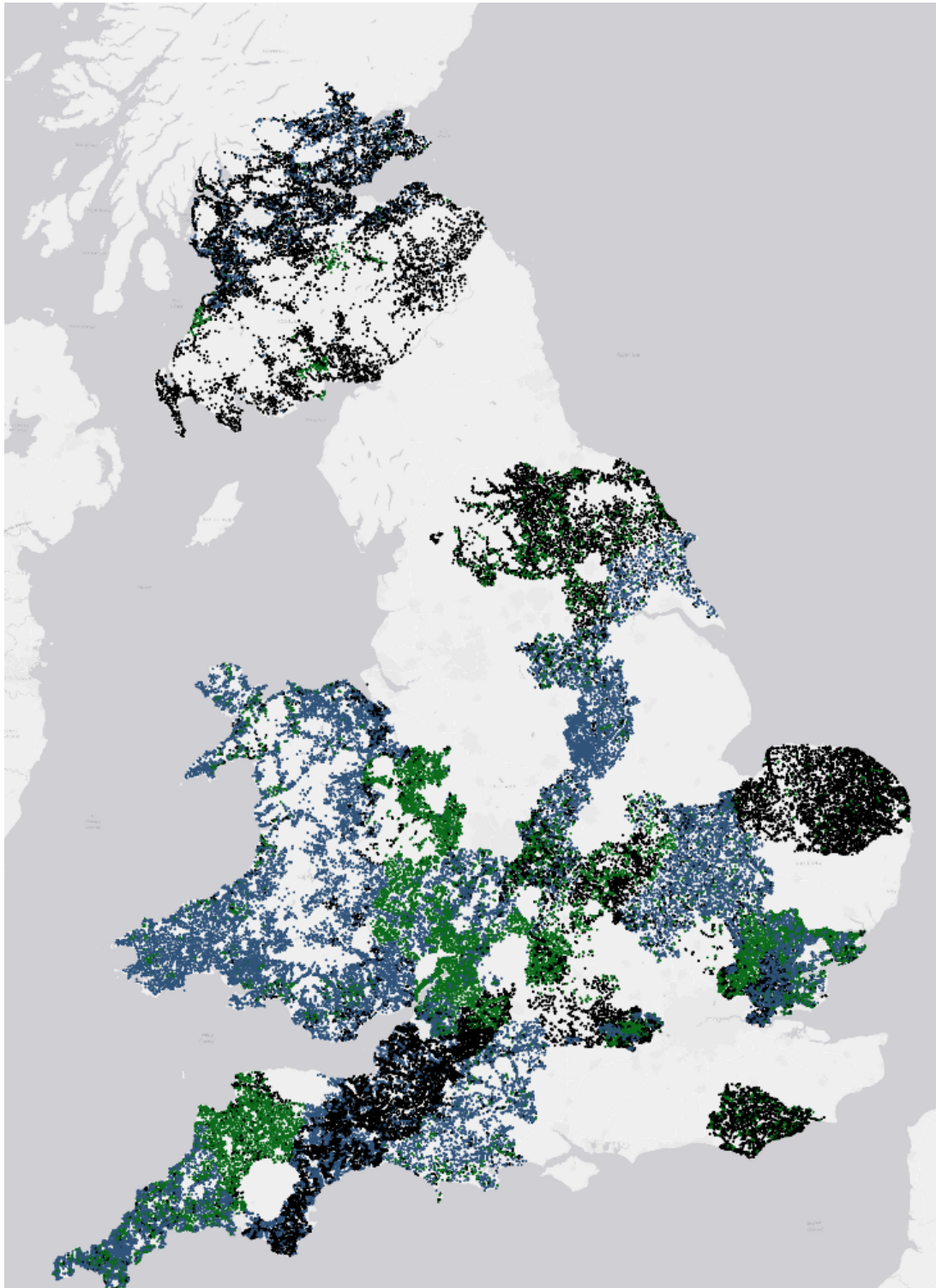
<sup>47</sup> <https://www.ispreview.co.uk/index.php/2021/09/rivals-sigh-as-ofcom-clear-openreach-ftp-broadband-price-cut.html>

<sup>48</sup> [https://www.ofcom.org.uk/data/assets/pdf\\_file/0032/222989/Equinox-condoc.pdf](https://www.ofcom.org.uk/data/assets/pdf_file/0032/222989/Equinox-condoc.pdf)

<sup>49</sup> <https://www.ispreview.co.uk/index.php/2021/09/rivals-sigh-as-ofcom-clear-openreach-ftp-broadband-price-cut.html>

<sup>50</sup> [https://www.ofcom.org.uk/data/assets/pdf\\_file/0032/222989/Equinox-condoc.pdf](https://www.ofcom.org.uk/data/assets/pdf_file/0032/222989/Equinox-condoc.pdf)

<sup>51</sup> <https://telecoms.com/512541/cityfibre-challenges-ofcom-ruling-on-openreach-ftp-pricing/>

**Figure 2.2: Eligible postcodes inside and outside of the build plans of Phase 3**

Source: SCT templates, C3 Reports, Ipsos analysis; green denotes built to as of September 2022, black is in build plans to be delivered to and blue are other white postcodes

It should be noted that the SCTs do not provide a complete record of white, grey, and black premises across the UK. SCTs were only available for those areas for which contracts were awarded. Additionally, the premises listed in Phase 3 SCTs only provided partial coverage of the territory covered by the relevant Local Body.

The postcodes included in the build plans of Phase 3 contracts were linked to other datasets to obtain information on their characteristics before the Programme began. An overview of their key features in relation to other white postcodes that did not benefit from the Programme is provided in the Table 2.1. The table highlights that those postcodes included in the build plans of local schemes differed in several ways from other postcodes eligible for investment through the programme:

- **Availability & coverage:** Superfast broadband penetration was lower in postcodes included in Phase 3 build plans than in other white postcodes that were eligible for investment (in both 2012 and 2016). This is also reflected in measures of take up, including the average and maximum speeds of connections and the number of superfast connections taken by consumers located on the postcode.
- **Network characteristics:** Areas in the build plans covered by Phase 3 contracts were also more likely to exhibit characteristics that would increase the costs of deployment or reduce commercial viability. Premises included in the build plans of Phase 3 contracts were characterised by longer line lengths to the serving cabinet - which are more expensive to upgrade as copper lines from the serving cabinet are less able to deliver at least superfast speeds, requiring additional investment in fibre. Demand density was also lower – with lower numbers of delivery points per exchange/cabinet and lower population and premises density. This reduces the number of customers that can potentially be served and the potential revenues that can be earned. BDUK modelling completed in 2014 also suggested that the estimated cost of upgrading the serving cabinet would be higher.
- **Area characteristics:** Postcodes included in the build plans of Phase 3 contracts were more likely to be rural in nature (74 percent of postcodes compared to 64 percent of postcodes eligible but not included in build plans). Employment and unemployment rates in the local authorities were similar across groups, though average wages were lower in those areas included in Phase 3 build plans than in areas not included in build plans.

This indicates network providers selected premises that were costlier to upgrade and were characterised by weaker demand side characteristics. This is the reverse of the patterns observed for Phase 1 and Phase 2<sup>52</sup> of the Programme. This may be related to the comparatively high levels of penetration in white postcodes that were not included in the build plans of Phase 3 contracts. Where existing levels of penetration is high, the remaining unserved premises may be concentrated in relatively small pockets. It may not be cost effective to build out networks to fill these gaps in provision. Network providers may have targeted communities with low levels of existing penetration to maximise the size of the local markets that could be addressed.

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<sup>52</sup> BDUK (2018) Superfast Broadband Programme Evaluation: Annex A – Reducing the Digital Divide.

**Table 2.1: Characteristics of postcodes included in Phase 3 build plans**

Characteristics	Postcodes in Phase 3 build plans	Postcodes receiving subsidised coverage by Sep. 2021	White postcodes not included in Phase 3 build plans
<b>Broadband availability and take-up in 2012</b>			
% of postcodes with Next Generation Access	14.9	14.3	39.6
Average maximum download speed (Mbit/s) of connections <sup>53</sup>	9.3	10.0	13.4
Average download speeds (Mbit/s) of connections	6.2	9.7	13.9
<b>Broadband availability and take-up in 2016</b>			
% of postcodes with Next Generation Access	70.4	72.4	79.8
% of postcodes with superfast (30Mbit/s) access	25.2	25.2	55.6
Average number of premises on postcode with superfast connections <sup>54</sup>	1.7	5.1	8.1
<b>Network characteristics in 2013</b>			
Length of line from exchange to premises (m)	3,588	3,050	2,165
Share of premises with exchange only lines (%)	22.3	13.0	4.5
Delivery points at serving exchange	6,231	10,765	17,601
Delivery points at serving cabinet	242.7	300.5	381.0
% of postcodes in Virgin Media footprint	0.7	14.7	48.4
Number of residential delivery points	11.1	14.9	19.6
Number of non-residential delivery points	1.0	1.1	0.7
Estimated cost to upgrade serving cabinet (£)	65,549	63,939	61,834
Estimate upgrade cost per premises upgraded (£)	325.5	307.9	179.3
<b>Area characteristics in 2013</b>			
% of postcodes in rural areas	74	54	64
Working age population (in Output Area)	170	195	200
Population aged 65+ (in Output Area)	62	55	50
Population density in OA (population per square km)	634	1,659	4,412
Premises density in OA (premises per square km)	402	988	2569
Gross weekly earnings in LA (£)	465	537	519
Employment rate in LA (%)	71.8	74.4	71.1
Unemployment rate in LA (%)	6.1	7.1	8.2

Source: Ipsos Analysis

#### 2.4.2 Delivery of Phase 3 contracts

Delivery of the Programme began in 2016 and analysis of C3 reports provided by BDUK indicated that around 292,618 premises received subsidised coverage by September 2021 (over 37,000 postcodes). It should be noted that most coverage was towards the latter stages of the time horizon for this evaluation.

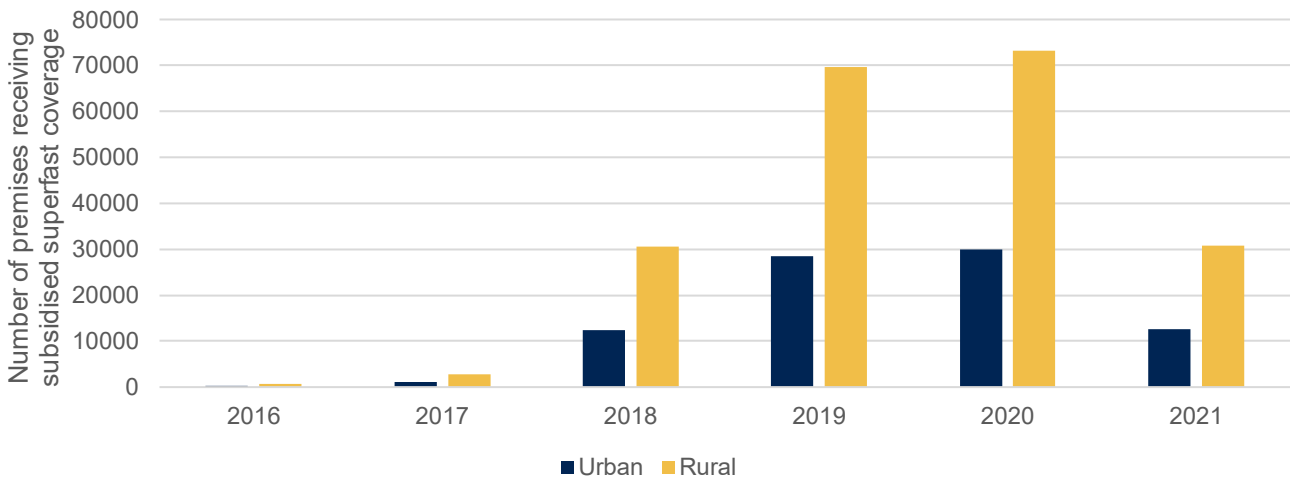
<sup>53</sup> Note that this does not factor in the number of premises on a postcode able to reach a certain maximum download speed

<sup>54</sup> There were around 11.3 premises per postcode on postcodes in the build plans of Phase 3 schemes.

Additionally, unlike prior Phases of the programme, Phase 3 contracts prioritised gigabit capable technologies with the majority of premises passed by FTTP (rather than Fibre-to-the-Cabinet).

As take-up of superfast broadband services will follow deployment, it should be noted that the estimates of the impact of the programme presented in this paper are likely to understate the eventual impact of the programme on take-up.

**Figure 2.3: Number of premises receiving superfast (30Mbit/s<sup>55</sup>) coverage subsidised by BDUK, areas for which Phase 3 SCTs are available, 2016 to 2021**



Source: C3 reports, Ipsos analysis.

<sup>55</sup> 24Mbits for Phase 1 and Phase 2



## 3 Effectiveness

This section provides an assessment of the effectiveness of Phase 3 of the Superfast Broadband Programme in bringing forward NGA, superfast and FTTP coverage and its effects on speeds available and take-up. This section seeks to address the following questions set out in the State aid evaluation plan:

- Question 1: To what extent has the aid resulted in increased access to an NGA network being deployed in 'white' NGA areas?
- Question 2: To what extent has the target of the intervention been used and what speeds are available?

This section draws on an analysis of management data held by BDUK describing the delivery of the programme, econometric analyses exploring the net impacts of the programme on NGA and superfast coverage, and qualitative findings from research undertaken with network providers and internet service providers. The findings of qualitative research were cross-referenced against available management information, secondary data sources where available and validated with officials within BDUK. Technical details of the econometric analysis are provided in Technical Appendix 1.

### 3.1 Key outcomes

The key outcomes of interest for the following analysis are summarised in the following table. The outcomes cover a mix of supply and demand side variables.

**Table 3.1: Key outcomes**

Outcome	Overview
NGA coverage	The percentage of premises able to access broadband through NGA technologies – wireless, FTTC, FTTP and Wireless. This is the primary outcome measure defined for the evaluation in the State aid evaluation plan agreed between DCMS and the European Commission.
Superfast coverage	The percentage of premises able to access speeds of 30Mbit/s. NGA technologies are capable of delivering superfast speeds but will not always do so (for example, if the premises is too far from the cabinet). This measure more closely aligns with the objectives of the programme.
FTTP coverage/Gigabit capable coverage <sup>56</sup>	Phase 3 of the programme prioritised technologies capable of delivering gigabit speeds which has concentrated investment in FTTP delivery.  Connected Nations data for 2020 and 2021 provided information on gigabit capable coverage, while in prior years it provided details on FTTP coverage. This broader measure includes non-FTTP technologies capable of gigabit speeds. Consultation with BDUK and Ofcom indicated that Virgin Media gigabit capable coverage accounted for much of the difference between the FTTP coverage and gigabit capable coverage (and the roll-out of Virgin Media coverage did not begin in large volumes until 2020). As such, an assumption has been made that FTTP and gigabit capable coverage were equivalent before 2020.
Number of connections of 30Mbit/s or higher	The number of households or businesses taking up a 30Mbit/s connection is a primary outcome measure defined in the State aid evaluation plan agreed between DCMS and the European Commission.

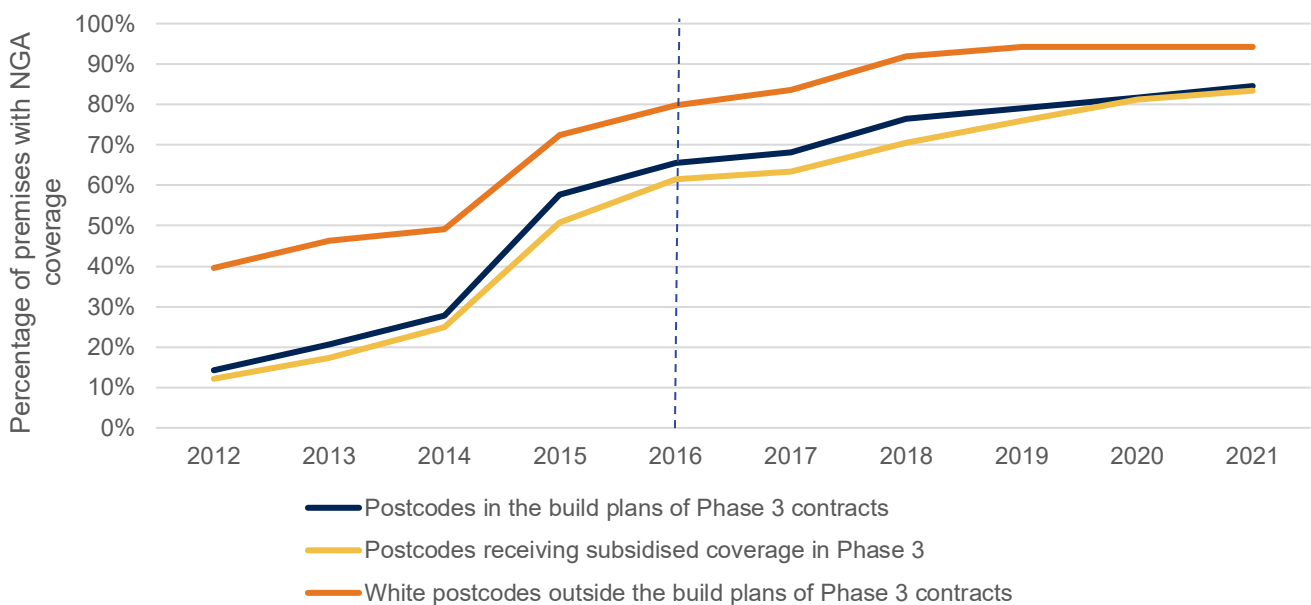
<sup>56</sup> A request for information on Virgin Media gigabit capable coverage in 2019 has been submitted to check our understanding.

Outcome	Overview
Average download speed of connections	The average download speed of connections is a secondary outcome measure describing the effect of the programme on actual speeds used by households and businesses.
Maximum download speed of connections	This describes the maximum capacity of the connection taken by households or businesses and is a secondary outcome measure describing how the connectivity made available through the programme is used.
Average upload speed of connections	The average upload speed of connections is a secondary outcome measure describing the effect of the programme on actual speeds used by households and businesses.

### 3.2 Changes in coverage

The following figure shows changes in availability of Next Generation Access (NGA) broadband (FTTC, FTTP/Gigabit capable, Wireless or Cable) between 2012 and 2021 on white postcodes included and excluded from the build plans of Phase 3 contracts. The percentage of postcodes included in the build plans of Phase 3 contracts with NGA coverage rose from 66 percent to 85 percent between June 2016 and September 2021. NGA coverage was persistently higher on white postcodes outside of Phase 3 build plans (rising from 80 percent to 94 percent over the same period).

**Figure 3.1: Changes in Next Generation Access (NGA) coverage – areas in Phase 3 build plans and other white postcodes, 2012 to 2021**



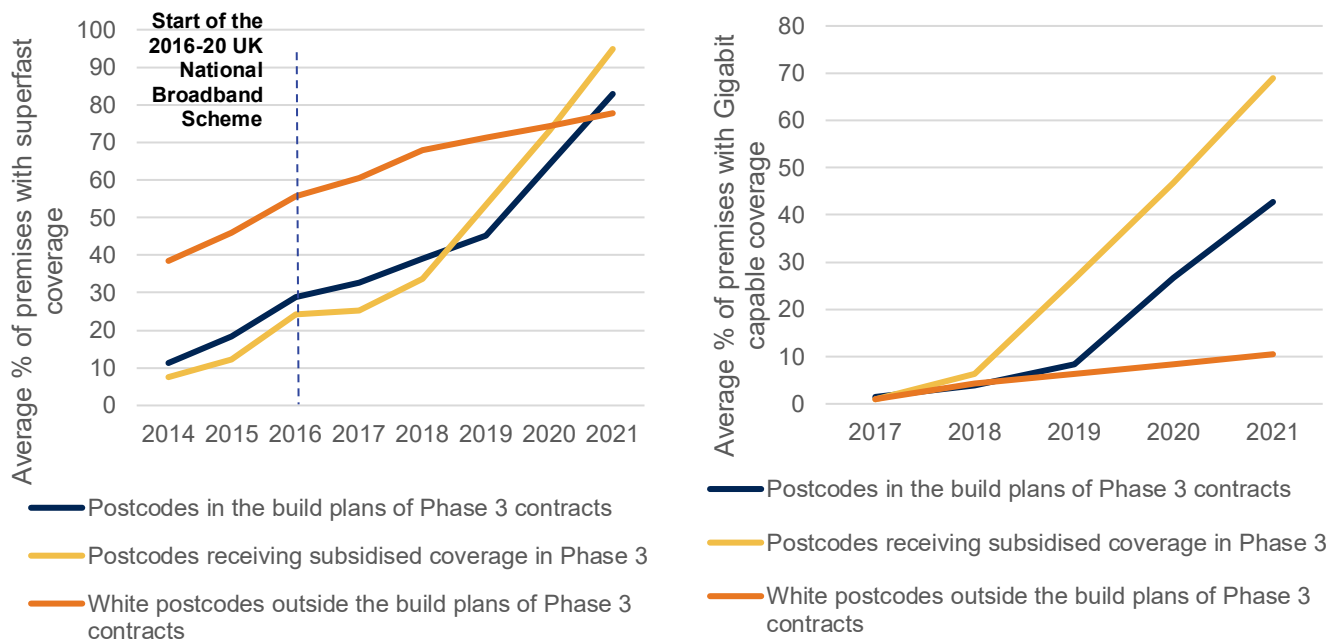
Source: C3 reports, Ofcom Connected Nations, Ipsos analysis.

Superfast broadband coverage rose at similar rates in areas covered by Phase 3 build plans and other white postcodes between 2016 and September 2019 (from 29 to 45 percent and from 55 to 71 percent respectively). However, in line with the delivery profile, areas within Phase 3 build plans saw coverage expand much more rapidly between 2019 and 2021, rising from 45 percent to over 80 percent of premises



over the period. FTTP/Gigabit capable coverage also rose more rapidly in the programme area than on other white postcodes.

**Figure 3.2: Changes in superfast broadband (at least 30Mbit/s) and Gigabit capable coverage (% of premises), areas in Phase 3 build plans and other white postcodes, 2014 to 2021**



Source: C3 reports, Ofcom Connected Nations, Ipsos analysis. Note data on FTTP coverage is only available from 2017 onwards.

### 3.3 Impact on NGA and Superfast coverage

An assessment of the impacts of Phase 3 contracts on NGA, superfast and FTTP coverage was completed using the methods defined in the State aid evaluation plan, using Connected Nations data between 2016 and 2021. These included:

- Difference-in-differences:** The most straightforward approach adopted involved comparing changes in the NGA, superfast and FTTP coverage on postcodes that received subsidised coverage between 2016 and 2021 to postcodes that were eligible for but did not receive BDUK investment. This approach is robust to unobserved differences between the two groups of postcodes that do not change over time, although no attempt was made in these analyses to control for observed differences.
- Matching:** The above approach did not control for observable differences between those postcodes that received upgrades and areas that were eligible for subsidies but were not included in the build plans of Phase 3 schemes. As highlighted above, there were systematic differences between the two groups of areas which could bias the findings of difference-in-difference models. To address this issue, postcodes receiving subsidised coverage by 2021 were matched with other eligible postcodes where they shared similar characteristics – such as historic superfast broadband penetration, population density, and features of local broadband networks. Difference-in-difference models were then applied to the matched samples to reach estimates of the impact of the programme.
- Panel methods:** The analyses described above focused on overall changes in NGA and superfast coverage between 2016 and 2021. However, as annual data was available, it was also possible to better account for the timing of the upgrade and its effect on broadband availability by applying ‘fixed

effects' models. These models examined the relationship between broadband availability and the timing of subsidised upgrades. Like difference-in-difference models, these approaches are robust to unobserved differences between postcodes that do not change with the time. However, they were also adapted to account for unobserved 'shocks' affecting all areas (such as influential regulatory changes). Estimates of the impacts of the programme derived from these models can be considered the most robust.

- **Prediction based on the comparison group:** The final approach developed a statistical model to describe the evolution of NGA, superfast and FTTP coverage on eligible postcodes that were not included in the build plans of Phase 3 schemes between 2016 and 2021, based on the characteristics of the postcode. The model was then applied to postcodes that did receive subsidised coverage to predict how NGA, superfast and FTTP coverage would have changed had the programme not been funded. It should be noted that these models did not account for unobserved differences between the two groups of postcodes and estimates of impact derived from these models can be considered the least robust.

The results of these analyses have the potential to be distorted by the delivery of parallel programmes seeking to increase superfast broadband availability. Data was obtained on the delivery of the Gigabit Connectivity Voucher Scheme and the fibre networks being deployed as part of Wave One of the Local Full Fibre Network programme to help control for the possibility that the analyses mistakenly attributed the effects of these parallel programmes to Phase 3 delivery.

The table below provides a summary of the estimated impact of the Programme on areas benefitting from subsidised coverage under Phase 3 of the Programme by September 2021 (note that these do not include the results of the panel models as these provide a direct estimate of additionality as discussed below). The models provided a consistent view on the effects of the programme.

Subsidised coverage through Phase 3 of the Programme led to significant positive impact on the availability of superfast and gigabit capable broadband services by the end of September 2021. Subsidised coverage increased the share of premises in the programme area able to access superfast speeds by 41 to 47 percentage points, and the share of premises with gigabit capable coverage by 43 to 56 percentage points. The impact of the programme on NGA availability was relatively small, however, indicating that in its absence, most premises would have benefitted from some form of enhanced connectivity (albeit via technologies less able to deliver download speeds of 30Mbit/s or higher). These findings are consistent with prior research into the impacts of the programme on broadband coverage.

**Table 3.2: Estimated broadband availability impact of Phase 3 on areas benefitting from subsidised coverage by September 2021**

Outcome	Difference-in-Differences	Propensity Score Matching with Difference in Differences	Control group regression
NGA availability (% of premises)	3.2 to 7.5	4.4	3.5
Superfast availability (% of premises)	45.8 to 46.6	43.5	40.9
Gigabit capable availability (% of premises)	52.2 to 56.2	50.2	43.2

Source: Ipsos analysis

### 3.3.2 Additionality of subsidised broadband infrastructure

Estimates of the overall number of additional premises benefitting from NGA, superfast and FTTP/Gigabit capable availability by September 2021 have been derived by multiplying the estimated impact of the programme on the share of premises with enhanced broadband by the number of premises on the postcode:

- NGA coverage:** The Programme is also estimated to have led to 17,000 to 40,000 additional premises with NGA coverage. Additionality (i.e. the share of premises benefitting from superfast coverage that would not have in the absence of the programme) is estimated at between 6 and 14 percent, with most estimates towards the lower end of this range. This implies that to a large degree, premises benefitting from the programme would have received some form of NGA coverage in its absence, though any improvements in local connectivity would not have delivered the significant improvements in available speeds achieved through the programme.
- Superfast availability:** The Programme is estimated to have increased the number of premises that can access at least superfast broadband services (30Mbit/s or above) by 202,000 to 247,000 by the end of September 2021. The associated rate of additionality ranges from 69 percent to 85 percent. This indicated that while many premises may have received NGA coverage in the absence of the Programme, these premises would not have been able to access at least superfast speeds (indicating the programme has been highly effective in delivering against its primary objective).
- FTTP/Gigabit capable coverage:** Subsidised coverage is estimated to have led to 193,000 to 298,000 additional premises with FTTP/Gigabit capable coverage. The rate of additionality ranges from 66 percent to 102 percent (with most estimates in the region of 90 percent). This indicates that the programme has also been highly effective in bringing gigabit capable technologies to rural areas, and these areas were highly unlikely to have benefitted from commercial deployments over the time horizons considered in this evaluation.

### 3.4 Take-up of subsidised coverage

Take-up of superfast broadband coverage also rose rapidly in the programme area relative to other white postcodes by September 2021:

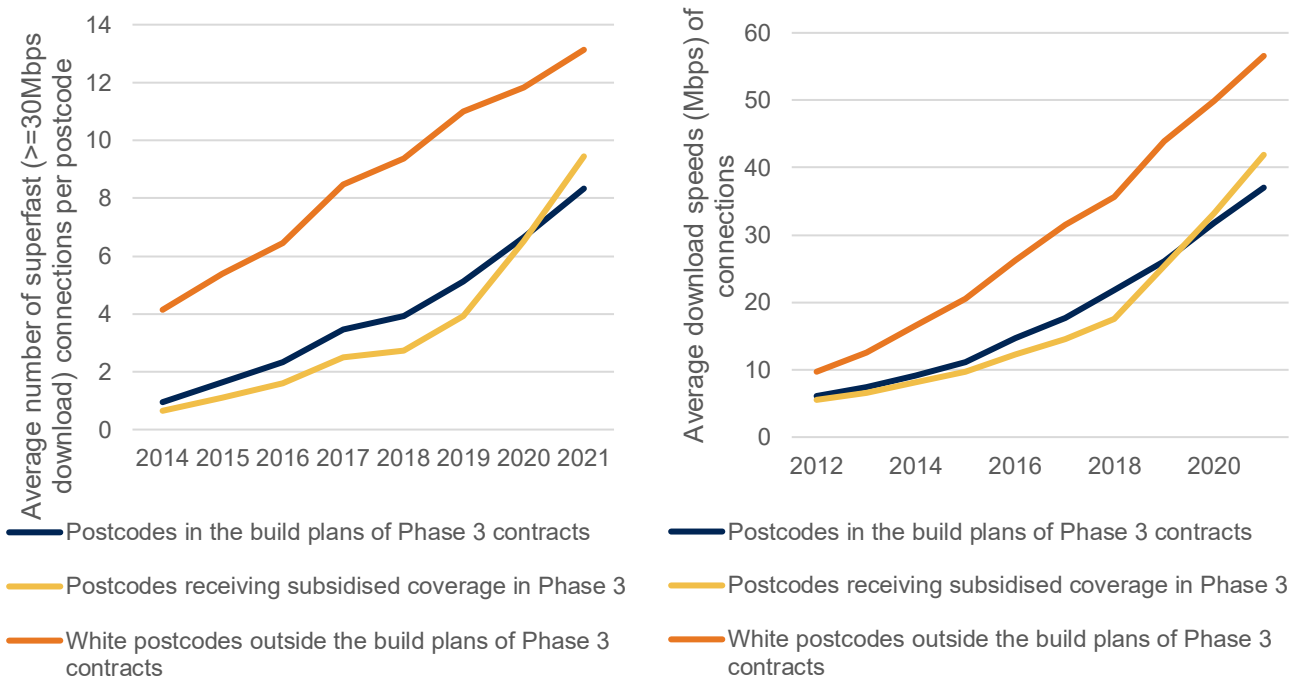
- Number of superfast (30Mbit/s) connections:** The average number of superfast connections on postcodes in the build plans of Phase 3 schemes grew from 2.3 in 2016 to 8.3 in 2021. Connections

on postcodes receiving subsidised coverage rose even more rapidly, from 1.6 in 2016 to 9.4 in 2021. The number of superfast connections rose at a lower rate on other white postcodes not included in the build plans of Phase 3 schemes.

- **Average download speeds:** The average download speeds of connections on postcodes included in the build plans of Phase 3 contracts rose from 15 Mbit/s to 37 Mbit/s between 2016 and 2021 (152 percent). Growth in average download speeds was even more rapid on postcodes receiving subsidised coverage by September 2021 (rising to 42 Mbit/s). However, average download speeds remained lower than across other white postcodes that were not covered by the programme over the period.

As in 2020, there were more marked differences in the maximum download speeds of connections (shown in Figure 3.3). Maximum downloads speeds on the postcodes included in the build plans of Phase 3 schemes rose at a faster rate to those on other white postcodes. Maximum download speeds again rose most rapidly in those areas that had received subsidised coverage. Areas receiving coverage by September 2021 saw average maximum download speeds reach 124Mbit/s. This is indicative of users taking advantage of the faster speeds made available through FTTP (the availability of which was more widespread in these areas in 2021).

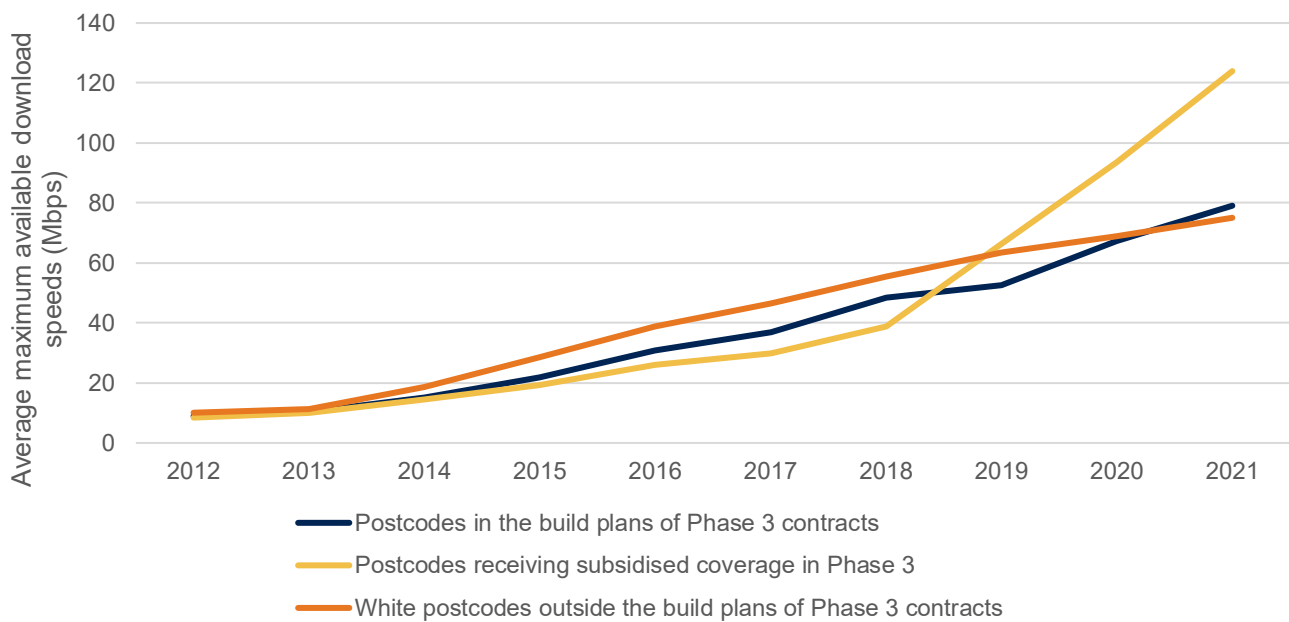
**Figure 3.3: Number of superfast (30Mbit/s) connections and average download speeds of connections – areas in Phase 3 build plans and other white postcodes, 2014 & 2012 to 2021**



Source: C3 reports, Ofcom Connected Nations, Ipsos analysis<sup>57</sup>.

<sup>57</sup> Data on superfast connections only available from 2014 onwards in Ofcom Connected Nations data

**Figure 3.4: Maximum download speeds of connections, areas in Phase 3 build plans and other white postcodes, 2016 to 2021**



Source: C3 reports, Ofcom Connected Nations, Ipsos analysis.

### 3.5 Impact on take-up of subsidised coverage

An assessment of the impacts of Phase 3 contracts on download speeds was completed using the same methods as described in Section 3.3, using Connected Nations data between 2016 and 2021.

The table below provides a summary of the estimated impact of the Programme on areas benefitting from subsidised coverage under Phase 3 of the Programme by September 2021. The models provided a consistent view on the effects of the programme.

Subsidised coverage led to a significant increase in the maximum download speeds of connections taken by households and/or businesses by September 2021 (34 to 60 Mbit/s). However, the impacts of the programme on average download speeds were relatively small. This indicates that ‘early adopters’ have taken advantage of the enhanced broadband connectivity enabled by the Programme. However, the Programme had not led to widespread take-up of faster broadband services by September 2021. It should be noted that most subsidised coverage was delivered in 2019 and 2020. As take-up will lag deployment, it is premature to draw any firm conclusions on the impact of the programme on take-up of faster internet services. Again, this is consistent with prior research into the impacts of the programme on take-up.

**Table 3.3: Estimated download / upload speed impact of Phase 3 on areas benefitting from subsidised coverage by September 2021**

Outcome	Difference-in-Differences	Propensity Score Matching with Difference in Differences	Control group regression
Maximum download speeds of connections (Mbps)	34.7 to 59.2	52.6	33.7
Average upload speeds of connections (Mbps)	5.8 to 6.3	4.4	0.9

Outcome	Difference-in-Differences	Propensity Score Matching with Difference in Differences	Control group regression
Number of connections with download speed of 30Mbps+	0.8 to 1.2	3.9	-1.0

Source: Ipsos analysis

## 4 Direct impact on aid beneficiaries

This section of the report provides evidence to answer the third and fourth State aid evaluation questions as set out in the NBS evaluation plan:

- Question 3: Has the aid had a significant incentive effect on the aid beneficiaries?
- Question 4: Has the aid had a material effect on the market position of the direct beneficiaries?

The evidence set out in this section is based on modelling of the expected profitability of contracts awarded under Phase 3 based – as far as possible – on observed costs and take-up. Full details of this modelling are provided in Technical Appendix 2, [redacted]. This section also provides evidence on the market share of those awarded contracts under Phase 3, based on data compiled by Thinkbroadband. Where relevant, additional information is provided from the qualitative interviews to help contextualise and interpret results.

### 4.1 Incentive effect of the State aid on programme beneficiaries

This section examines the strength of the incentive effect of State aid provided by the Superfast Broadband Programme. The aim of the analysis is to explore whether public subsidies were needed to provide an incentive to network providers to extend superfast networks to the areas targeted by the programme.

The motivation for this analysis stems from the results of classical economic theory that suggests the private sector will maximise profits by implementing all projects that generate a rate of return that at least equal their cost of capital. The rationale for the programme is underpinned by an assumption that there are some areas of the UK where investments in superfast broadband infrastructure will not generate a rate of return that exceeds the cost of capital. These investments would not be commercially viable, leaving some areas at risk of being excluded from superfast broadband coverage (producing a 'digital divide'). The programme seeks to provide the minimum subsidy that would be required to make these investments commercially viable (i.e. the subsidy that would equalise the expected returns associated with the investment and the cost of capital faced by the network provider).

However, it is not feasible for the public sector to perfectly observe the expected costs and revenues associated with potential investments in superfast coverage before it awards subsidies. Network providers also have an incentive to seek subsidies for investments that would have been commercially viable in the absence of public support to maximise profitability and minimise risk exposure. The design of the programme anticipates this risk through the implementation of an Open Market Review process designed to encourage network providers to reveal their investment plans and to ensure that subsidies are directed towards premises that would not be covered by commercial deployments. The contracts are also designed to protect the public sector from the risk that the subsidy exceeds the minimum needed for the project to go forward (for example, if costs prove less significant than originally expected or if revenues exceed original expectations).

This section examines the effectiveness of these arrangements by comparing the expected rate of return on the contracts awarded (the Internal Rate of Return<sup>58</sup> or IRR) to the network providers' Weighted

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<sup>58</sup> The discount rate that sets the present value of an income stream to zero.



Average Cost of Capital (WACC), also called the discount rate<sup>59</sup>. As highlighted in the State aid evaluation plan, if the actual IRR earned on the investments made exceeds the discount rate before the subsidy was awarded, this would call into question the strength of the incentive effect provided by the subsidies. It should be noted that this may not hold true where there are market failures (e.g. a dominant supplier with market power may not be incentivised to implement an investment project if it earns a marginal rate of return).

#### 4.1.1 Competition for Phase 3 contracts

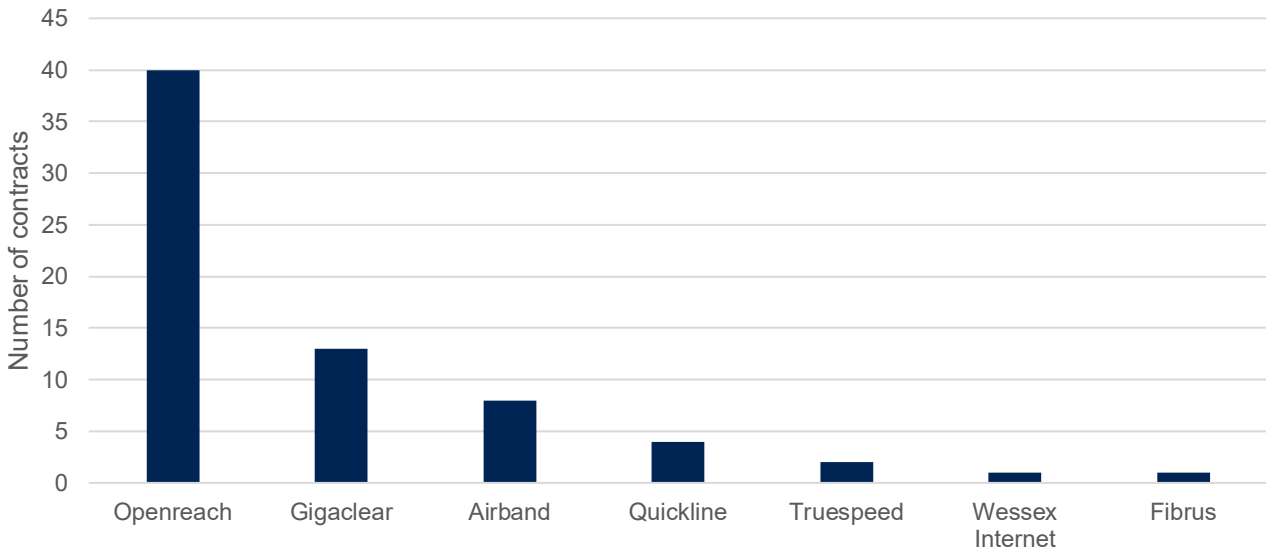
The programme is based on a gap funding model that aims to provide the minimum level of subsidy required to make the project commercially viable. The level of gap funding to be provided is determined by the set of assumptions put forward by the tenderer in terms of the build cost, take-up, average revenue per user and operational costs. The tenderer can potentially use this process to transfer risk to the public sector by either assuming low levels of future take-up or overstating expected build costs – which will increase the level of gap funding required to make the project viable. This strategy is less feasible in the presence of competition, as it will reduce the value for money associated with the tender and increase the probability of not being awarded the contract.

In Phases 1 and 2, Local Bodies predominantly used the BDUK framework to procure the providers' services to deliver the infrastructure. This approach restricted the number of possible bidders to two (one of which did not engage for any tenders). In Phase 3, as required by the State aid judgement under which the programme was approved, procurements published through the OJEU were used by Local Bodies to target specific areas and/or clusters with the ability to target faster connection speeds (although the areas targeted remained where premises do not have or are not planned to receive a broadband service of at least 30 Mbps), but the main benefits were expected to come from increased competition.

Data was not available on the number of bids received in response to the OJEU procurements to evaluate its effectiveness directly in generating larger numbers of bids. However, Local Bodies consulted in the previous evaluation highlighted a good degree of engagement from providers to Phase 3 procurement exercises with several bodies receiving five or six Expressions of Interest (EOIs). These translated into fewer responses to the full tender (between one and three). The figure below sets out the number of contracts awarded by supplier with Openreach holding the majority with 58 percent.

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<sup>59</sup> For the purposes of this analysis, an average comparison between IRR and the network provider WACC has been made. A comparison to the marginal cost of capital would be preferable approach and may therefore produce different results from average rates.

**Figure 4.1: Number of contracts awarded by beneficiary**

Source: Superfast Status Report, November 2022

**Table 4.1: Superfast Broadband Programme budget by phase**

	Phase 3 contracts
Average premises	7,696
Average contract value (£m)	£20.2

Source: Superfast Status Report, November 2022. Note: actual spend not available for this iteration of the evaluation.

#### 4.1.2 Methodology for modelling future IRRs

The aim of this analysis is to compare an updated estimate of IRRs earned by suppliers against their discount rate. This involves two key challenges:

- **Data:** Suppliers have a contractual obligation to provide Local Bodies with information on the actual costs of the network build and the share of premises passed and connected. However, suppliers are not required to provide information on on-going operational costs or revenues earned (i.e. pricing), and these cannot be observed directly.
- **Time horizons:** the IRR associated with the network build is determined over a long time period (20 years), which requires certain assumptions over future patterns of delivery and take-up, even if the deployment phase has been completed.

In light of this, a modelling exercise was conducted to project future costs and revenues, and subsequently the IRR over the contract period. This meant that actual data (up to Q4 21/22) was used to estimate future trends, replicating as closely as possible the assumptions made by the suppliers at bidding stage. In certain cases (e.g. lack of actual data, delays to deployment), additional assumptions were made to obtain an estimate of future cash flows. The expected future cash flows were then used to determine the IRR.

A comprehensive overview of the methodology and data sources used is included in the Technical Appendix 2. However, the following limitations should be borne in mind:

- **Contract sample:** The analysis concerns a sample of 27 contracts **[redacted]**. These were contracts for which roll-out had started by the time the analysis was carried out, and copies of PFMs, Finance Trackers, and WSS/C3 reports were held by BDUK. For the WSS/C3 reports, the analysis considers the latest available report for all contracts (in general up to Q4 21/22).
- **Delays to deployment:** In addition to considerations around data availability, it should be noted that there are known delays to deployment of the contracts under Phase 3. Reasons for the delays are not entirely known, although potential reasons were mentioned during the course of interviews with suppliers and BDUK:
  - Supply chain delays;
  - Labour shortages, caused by increasing competition from market entrants and limited supply of qualified staff;
  - Difficulties in the build;
  - Wayleave issues;
  - Value-for-money challenges;
  - Project management challenges and planning amendments proposed by suppliers.

This means that the deployment timeline of most contracts might have changed compared to expectations at PFM stage. Based on the expected end of deployment date contained in the Status Report, it appears that closed contracts are delayed on average by slightly more than five quarters. Information on the revised expected rate of premises passed which could be used to determine future build capex (Capital expenditure – expenditure to buy/maintain/improve fixed assets) beyond the end of the actual data is not available. In order to correct for under-estimation of build capex where deployment is still ongoing, assumptions have been made regarding future trends in build capex. Similarly, actual public funding is accounted for alongside future public funding, which is derived from the PFM. Further details of this treatment can be found in Technical Annex 2.

- **Take-up clawback:** Lastly, regarding take-up clawback, based on discussions with BDUK, it is assumed that take-up review points occur in year 2, 4, 6, and 7 after the end of the deployment phase (with year 7 being the 'checkpoint F', marking contract closure). To this end, the deployment phase considered is that of the PFM.

#### 4.1.3 Internal Rates of Return at the tendering stage

The expected rate of return on the contracts before and after subsidy are provided in the Project Financial Model completed by network providers as part of the tendering process. At the baseline, network provider projections suggested that:

- **Commercial viability without subsidy:** On average, the expected IRR associated with the contracts in scope (**[redacted]**) is substantially lower than the supplier's discount rate (**[redacted]**) and are mostly negative. This means that in the supplier's predictions, contracts would have been loss making in the absence of public funding.
- **Commercial viability with subsidy:** For the contracts in scope, IRR2 (factoring in subsidy payments) was **[redacted]** on average.

#### 4.1.4 Expected and actual costs

At the bidding stage, the expected qualifying costs associated with the network build for the contracts in scope were estimated by the supplier to be approximately £203m, although these predictions are likely to be exceeded in the medium term. Analysis of information and actual costs to date suggests:

- The total capex build cost will exceed £267m;
- The suppliers are expected to incur additional costs of over £64m by FY 24/25 (when all build is expected to be completed) compared to what was originally planned;
- Some of the variation may be due to differences in the number of contracted premises and any change requests that have been subsequently agreed with relevant Local Bodies (e.g. switching some FTTC connections to FTTP, which is more expensive);
- Some exogenous factors responsible for project delays (as evidenced by lower-than-expected capex in the early years) might have eventually led to higher prices, for example in case of heightened competition in the industry for resources in short supply (e.g. skilled workers, components).

#### 4.1.5 Actual and predicted take-up

Take-up levels represent the number of premises connected to the network as a percentage of the total premises passed. Actual connections are used to forecast trends in opex and revenue, as well as any relevant clawback, and ultimately the IRR. Figure 4.2 below compares the take-up level expected by the suppliers at the PFM stage compared to actual (to date) and modelled (future) take-up. The key findings are listed below:

- **Expected take-up:** predictions of take-up at PFM stage ranged from [redacted] to [redacted].
- **Actual take-up:** after some delays in the initial quarters of deployment, where PFM take-up is higher than actual take-up, the level of take-up reached in FY 21/22 is [redacted].
- **Future take-up:** Two scenarios of future take up have been modelled. In the first scenario, it has been assumed that, beyond FY 21/22, take-up is expected to further increase up to [redacted]<sup>60</sup>, reaching over [redacted] premises across the 27 contracts. In the second scenario, it has been assumed that take-up will reach [redacted] in the long term<sup>61</sup>, reaching around [redacted] premises.

#### Figure 4.2: Predicted and actual/modelled take-up

[Redacted]

Source: Ipsos' analysis based on WSS/C3 reports.

#### 4.1.6 Expected and forecast revenue and operational costs

The take-up projections were used to estimate expected revenues and operational costs (based on the average revenue per user assumptions put forward by the tenderer and the estimated operational cost per

<sup>60</sup> This assumption utilises the actual information on take-up provided by the programme beneficiaries and their assumptions at the bidding stage. This assumption was agreed with BDUK.

<sup>61</sup> This assumption is based around the predicted copper 'switch off' in 2030, with the majority of premises moving onto the fibre network provided by the programme beneficiary. It is assumed that as the area was commercial unviable for the Superfast Broadband Programme, it will remain unviable, and the beneficiary will have a local monopoly in the market, meaning a higher take-up rate. This assumption was agreed with BDUK.

user inferred from their financial projections). Figure 4.3 below presents the modelled revenue against the network provider predictions at the tendering stage using a [redacted] assumption around future take-up, and Figure 4.4 presents the modelled revenue using the [redacted] take-up assumption. This highlights that the costs of Phase 3 network deployment have been assessed to [redacted], and total revenues are expected to [redacted] than expected under both take-up scenarios.

**Figure 4.3: Network provider predictions of revenue against modelled data (using [redacted] take-up assumption)**

[Redacted]

Source: Ipsos' analysis based on PFM, Finance Tracker, and WSS/C3 reports data.

**Figure 4.4: Network provider predictions of revenue against modelled data (using [redacted] take-up assumption)**

[Redacted]

Source: Ipsos' analysis based on PFM, Finance Tracker, and WSS/C3 reports data.

Similarly, Figures 4.5 and 4.6 below present modelled operating costs under the two take-up scenarios. Modelled operating costs in Phase 3 include network and wholesale connection operating expenditure, deployment closure costs, ongoing contractual reporting, wholesale cessation costs and wholesale migration costs. It appears that in the [redacted] take-up scenario there is [redacted]. [Redacted]. In the [redacted] take-up scenario, [redacted]. Costs (and revenues) may also be affected by the inflationary context in which the contracts have been delivered (though no adjustments for this have been made in the modelling process).

**Figure 4.5: Baseline operating cost projections against modelled revenue for Phase 3 contracts (in scope) (using [redacted] take-up assumption)**

[Redacted]

Source: Ipsos' analysis based on PFM, Finance Tracker, and C3 reports data

**Figure 4.6: Baseline operating cost projections against modelled revenue for Phase 3 contracts (in scope) (using [redacted] take-up assumption)**

[Redacted]

Source: Ipsos' analysis based on PFM, Finance Tracker, and C3 reports data

#### 4.1.7 Internal Rates of Return based on projected take-up, revenues and operational costs

Based on the updated revenue and cost projections set out in the preceding sections, the modelling indicated that:

- **Commercial viability without subsidy:** Without subsidy, most contracts would have been expected to be loss-making (IRR3), with an average rate of return of between [redacted] and [redacted] (depending on the take-up assumption used). Comparing these results to ex-ante expectations [redacted], IRR1), this suggests that higher capital costs are expected to reduce the profitability of the contracts.
- **Commercial viability with subsidy:** With subsidies, the average estimated IRR is estimated to be between [redacted] and [redacted] (depending on the take-up assumption used). This remains

lower than the supplier's discount rate ([redacted], see Table 4.2), and it is anticipated that the supplier will earn economic losses on its investments. As highlighted above, this does not account for potential profits earned beyond the lifetime of contracts. However, while this appears to indicate that BDUK have avoided providing potentially distortionary subsidies, there are also possible questions regarding the sufficiency of the subsidies (as they are not expected to allow the supplier to earn a normal economic return).

#### 4.1.8 Internal rates of return after implementation and take-up clawback

To reduce risk that suppliers earn excess returns, two types of clawback mechanisms are in-built in contractual arrangements, as described below:

- **Implementation clawback:** If suppliers underestimate build cost assumptions, or if unexpected cost savings are made during the deployment phase, the overall supplier's investment remains unaltered, whilst public funding is reduced accordingly. As such all underspend is recouped.
- **Take-up clawback:** Where final take-up is higher than expected for any type of technology deployed, a portion of the extra profit made by the supplier is shared with the local body up to seven years after the contract closure date.

Estimates of clawback have been made based on the assumptions detailed in Technical Annex 2. In particular, assumptions were made around the timing of the end of the deployment phase for each contract. As take-up is expected to exceed PFM expectations within the lifetime of contracts, based on the assumptions made in agreement with BDUK on the timing of take-up review points, most contracts are subject to take-up clawback. Additionally, while no contract is expected to underspend on its capital costs, some contracts have been reduced in scale in ways that were not fully reflected in the available documentation. In these cases, reductions in the levels of public funding were accounted for via implementation clawback. The take-up clawback mechanism is expected to reduce the supplier's return further from [redacted] to between [redacted] and [redacted] on average (depending on the take-up assumption used). This is substantially [redacted] than the discount rate stipulated by the supplier at PFM stage and suggests the supplier will make an economic loss on the contracts.

#### 4.1.9 Summary of results

The estimated IRRs are set out in the table below. The findings indicate:

- **Incentive effect:** Delivery of Phase 3 contracts were expected to be commercially challenging, with network providers projecting an average IRR of [redacted] in the absence of subsidies at the tendering stage. Actual build costs have exceeded expectations (with investments now expected to generate an average IRR of between [redacted] and [redacted]). This highlights that subsidies would almost certainly be needed to stimulate investments in gigabit capable network deployment in these areas. This is also consistent with the high rates of additionality associated with gigabit capable networks described in the preceding chapter (i.e. network providers were highly unlikely to roll out similar investments in the absence of public subsidies).
- **Economy:** The expected IRR was [redacted] with subsidies for suppliers when they submitted their tender and are projected to fall to between [redacted] and [redacted] based on evidence on current information on actual build costs and take-up. These rates of return are lower than the network providers discount rate, indicating that BDUK has avoided the risk of providing excess subsidies to network providers (as for Phases 1 and 2 of the programme). This also suggests that contracts would be unprofitable even with public funding. This could be explained if the network provider considered



future profitability beyond the clawback period (from which all profits made would be retainable by the supplier), which would have raised longer-term returns. [Redacted].

- **Clawback mechanism:** The clawback mechanism helped prevent network providers earning excess returns and limited the public contribution to the minimum needed to ensure the commercial viability of network deployments in Phases 1 and 2. However, in the case of Phase 3 contracts, the clawback mechanisms has reduced the expected IRRs further to between [redacted] and [redacted] (increasing the size of the economic losses earned by network provider). It is possible that the level of subsidies provided were insufficient, and while the network providers are not expected to see accounting losses on the investments, there are questions regarding the commercial sustainability of the network build (though as noted, it is likely that these economic losses will be offset by profits earned by deployments elsewhere).

#### Table 4.2: Internal Rates of Return – Phase 3 contracts

[Redacted]

### 4.2 Effects on market position of direct beneficiaries

This section examines the degree to which the network providers benefitting from the programme have gained a material advantage over competitors. This assessment is based on descriptive analysis of changes in the market share of each network provider awarded contracts through the programme, based on speed test data provided by Thinkbroadband. The analysis here describes the market position at the national level, the level of individual Phase 3 contract areas and at the level of all Phase 3 contracts delivered by the same network provider.

This analysis differs slightly from that outlined in the State aid evaluation plan of analysing the market position at a local authority level and the contract level. The change in the analysis was to identify the impact of Phase 3 contracts on the market position rather than the impact of the programme as a whole (which analysis at a local authority level would show). Additionally, the sample sizes available from the Thinkbroadband data would not support a robust analysis of beneficiary market position at the individual contract level. As this analysis is based on speed test data, there are some potential irregularities in the data, which are highlighted in Section 2 of the report. These should be taken into account when interpreting these findings – particularly at the smaller geographic levels.

Thinkbroadband is an independent organisation which collects information and data about internet coverage in the UK. It also runs an online ‘speed test’ function, where individuals can provide a limited amount of data about their broadband package and test the connection speed that they receive. The information provided and collected through individuals completing a speed test has been compiled into a dataset. It should be noted that the speed test data does not include all ISPs offering services in an area, or the number of ISPs with customers in each area. It measures the number of ISPs where customers have completed speed tests and there could be biases in this data. Additionally, there are a number of contracts with low numbers of speed tests completed, and the analysis for these areas lacks robustness.

To assess the market position of each beneficiary of the programme, the ISPs which utilised each beneficiary was mapped. This information was collected from a web search of the ISP’s website, the Openreach website (which lists ISPs which utilise their wholesale products) and the Thinkbroadband website. A complete list of ISPs included in the dataset and the network providers they have been mapped to is included in Annex A.



#### 4.2.1 UK market shares of network providers

The market share for network providers has been estimated from the proportion of speed tests completed for ISPs which were mapped to the network provider. The market share of all NGA connections (FTTC, FTTP, cable, wireless and satellite connections) for network providers has been estimated by the proportion of speed tests completed for ISPs which were mapped to the network provider that utilised these technologies.

- **Openreach:** At a UK level, total broadband connections supplied through the Openreach network dominate the market, with between 70 and 80 percent of take-up of all broadband connections in all years being made through the Openreach network (including Sky and TalkTalk, as these retailers utilise the Openreach network). Openreach has a less dominant position in relation to NGA connections, although its market share rises from 61 to 67 percent.
- **Programme beneficiaries:** Between 2016 and 2022, the market share of total broadband connections for the beneficiaries decreased, driven by a decrease of the market share for Openreach (via Sky and TalkTalk). However, the market share of the NGA market has increased – due to the increase in NGA services offered through the Openreach network. For the smaller network providers, the market share of total broadband connections has increased from close to zero in 2016 to just under one percent in 2022, and to just over one percent of the NGA market (see Table 4.3 below).

**Table 4.3: Market share of the total broadband market for Superfast Broadband beneficiaries (percentage of total number of broadband connections)**

Network provider	Total broadband market			NGA market		
	2016	2020	2022	2016	2020	2022
<i>Openreach (including Sky and TalkTalk)</i>	78.08%	75.16%	71.03%	60.46%	67.23%	65.99%
Airband	0.01%	0.09%	0.06%	0.12%	0.12%	0.08%
Gigaclear	0.08%	0.18%	0.35%	0.15%	0.25%	0.43%
Callflow	0.02%	0.02%	0.01%	0.02%	0.02%	0.01%
Relish	0.00%	0.01%	0.01%	0.00%	0.02%	0.02%
Fibrus	0.00%	0.00%	0.09%	0.00%	0.00%	0.11%
Quickline	0.02%	0.04%	0.06%	0.06%	0.07%	0.08%
Wessex	0.05%	0.09%	0.30%	0.16%	0.18%	0.36%
<b>Total programme participants</b>	<b>78.26%</b>	<b>75.59%</b>	<b>71.93%</b>	<b>60.97%</b>	<b>67.89%</b>	<b>67.07%</b>
<i>Virgin Media</i>	19.86%	17.10%	20.64%	36.90%	23.30%	24.84%
<i>Other providers</i>	1.88%	7.31%	7.43%	2.13%	8.81%	8.09%

Source: Thinkbroadband data

#### 4.2.2 Overall market shares across Superfast Broadband contract areas

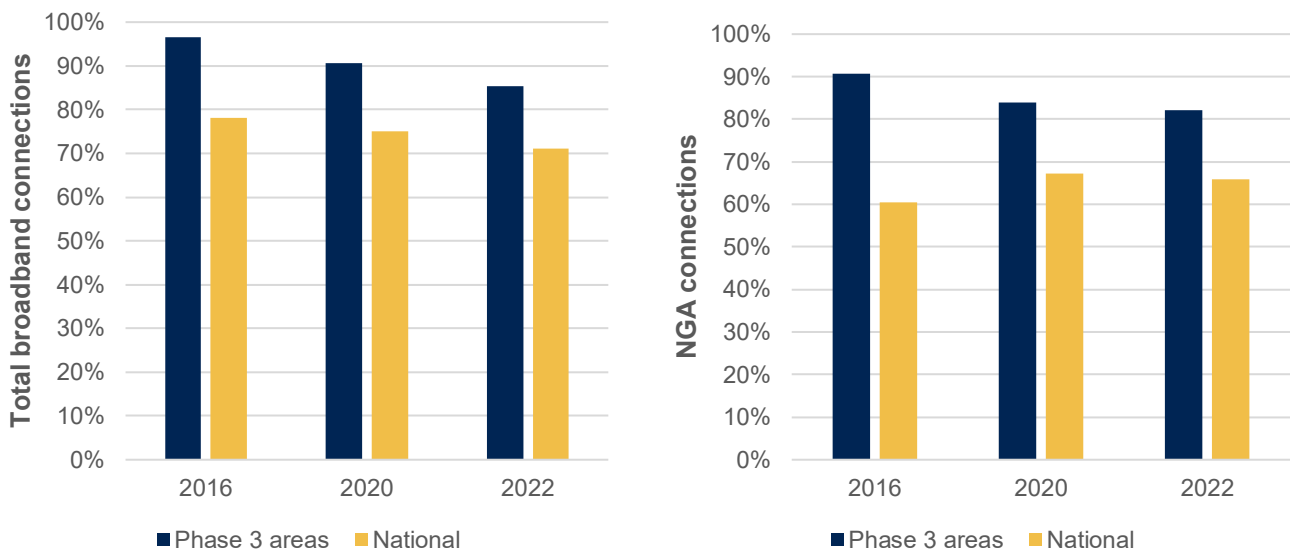
The market share of the broadband market for the network providers across the areas that the Superfast Broadband Programme has or is currently operating in for Phase 3 of the Programme (postcodes which the Superfast Broadband Programme has provided enhanced connectivity to)<sup>62</sup> was analysed using the

<sup>62</sup> These areas were identified from the C3 reports of suppliers.

same approach. This approach was taken instead of examining the impact at a local authority level as at the local authority level it would not be possible to distinguish the impact of contracts awarded in different phases of the programme.

The market share for Openreach (including Sky and TalkTalk) across these areas declined between 2016 and 2022, from around 97 to 85 percent of all broadband connections. While this is higher than the national average (between 70 and 80 percent), the decline in market share aligns with the national trends for Openreach. In terms of NGA connections, the pattern in Phase 3 areas remains the same, with a decrease in Openreach’s market share in the Phase 3 areas (91 to 82 percent of all NGA connections), but this is not matched by the national trends, where there is no clear pattern for Openreach’s market share (see Figures below).

**Figure 4.7: Openreach market share in Phase 3 contract areas and nationally, for total broadband connections and NGA connections, 2016 - 2022**

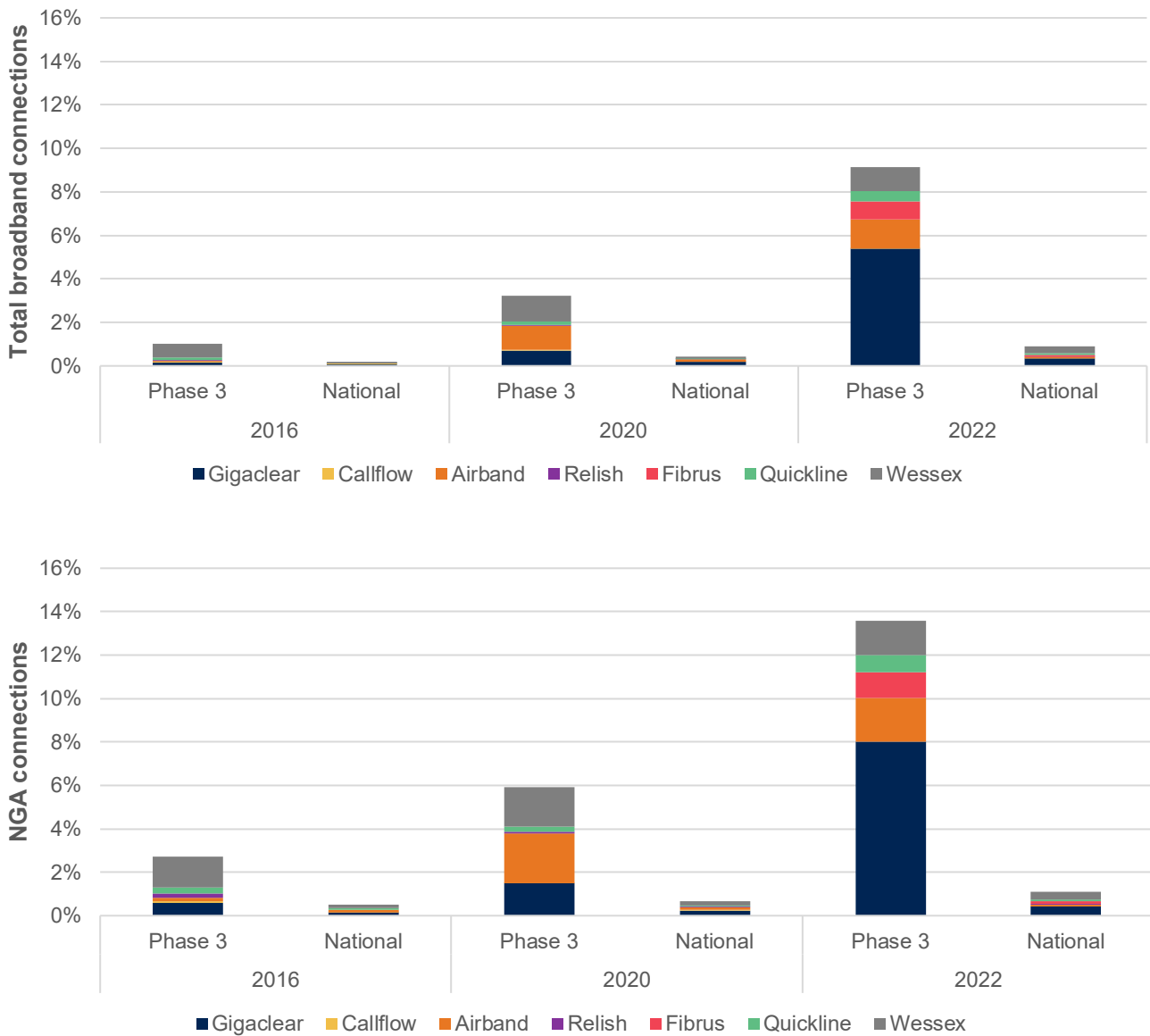


Source: Thinkbroadband speed test data

The market share for all broadband connections and NGA connections for all other network providers awarded contracts through the Superfast Broadband Programme is presented in the figure below. This shows that the market share of these network providers rose faster between 2016 and 2022 in Phase 3 contract areas than nationally.

Airband and Gigaclear – who have been awarded more contracts – saw larger increases in market share in the Superfast Broadband delivery areas. Similar patterns are seen in terms of their share of NGA connections. However, the overall market share of these network providers is still relatively low even at the local level, with no network provider having more than five percent of the total broadband market in 2022 in the areas the Programme has delivered connections.

**Figure 4.8: Other beneficiaries market share in Phase 3 contract areas and nationally, for total broadband connections and NGA connections, 2016 - 2022**



Source: Thinkbroadband speed test data. NOTE: The scale of the market share in the figure is from 0 to 5 percent of the total market – caution when comparing to figure 4.5

### 4.2.3 Market shares within Superfast Broadband contract areas

Further analysis was completed to look at changes in market share in the specific contract areas in which beneficiaries were operating (aggregated across all contract areas due to the small sample sizes available for individual areas). This analysis showed:

- **[Redacted]:** In Phase 3 contract areas where [redacted] delivers the project, the market share of [redacted] declined between 2016 and 2022 for [redacted]. As [redacted], this does not suggest that [redacted] acquired a substantial competitive advantage as a result of the aid it received from the Superfast Broadband Programme.
- **[Redacted]:** In areas where [redacted] deliver the Phase 3 local project, its market share of total broadband connections [redacted] between 2016 and 2022. This increase in market share appears to have been taken from [redacted] – whose market share [redacted] over the period.

- **[Redacted]:** This pattern is repeated for areas where **[redacted]** have been contracted to deliver Superfast Broadband projects. The market share **[redacted]** between 2016 and 2022. Again, this appears to have been achieved at the expense of **[redacted]** – which saw its market share **[redacted]** in 2016 to **[redacted]** in 2022 in these areas.

## 5 Indirect impacts

This section presents the evidence collected and analysed to answer State aid evaluation question 5 – i.e. how far is there evidence of changes to parameters of competition arising from the aid (including third parties operating in the relevant intervention areas)? As set out in the State aid evaluation plan, this question is addressed by examining the following parameters of competition: changes in NGA take-up as a proportion of total take-up; the share of take-up by NGA technology; the number of network providers offering NGA services; and the number of unique Internet Service Providers making use of the open access made available.<sup>63</sup>

### 5.1 Parameters assessed and approach

The table below describes the analytical approach that has been used to provide evidence to answer the State aid evaluation question.

**Table 5.1: Analysis used to provide answers to the State aid evaluation questions**

Analysis	Evaluation question
Analysis of broadband take-up by technology. The market share of seven different types of broadband connection has been calculated. These are FTTP, FTTC, GFast, Cable, Fixed wireless / satellite connections, ADSL and other connections.	Question 5: <ul style="list-style-type: none"> <li>Take-up of NGA lines as a % of all broadband take-up</li> </ul>
The market share by type of technology. Analysed at three levels: a UK national level; for all areas where the Superfast Broadband Programme has been delivered (portfolio level); and at an individual contract level. The market share has been calculated for each of these for 2016 and 2020.	Question 5: <ul style="list-style-type: none"> <li>Market share (of take-up) for each NGA technology</li> </ul>
The number of network providers operating in the areas that the Superfast Broadband Programme has been delivered.	Question 5: <ul style="list-style-type: none"> <li>Number of infrastructure providers offering NGA services</li> </ul>
The number of ISPs operating in an area. The number of ISPs operating has been estimated at a national, for all areas where the Superfast Broadband Programme has been delivered (portfolio level) and individual contract level for 2016 and 2022. It should be noted that the speed test data does not include all ISPs offering services in an area, or the number of ISPs with customers in each area. It measures the number of ISPs where customers have completed speed tests. Therefore, there could be inaccuracies in this data. <sup>64</sup> Additionally, there are a number of contracts with low numbers of speed tests completed, therefore the analysis for these areas lacks robustness.	Question 5: <ul style="list-style-type: none"> <li><i>Number of unique operators making use of the open access made available under the 2016 NBS<sup>65</sup></i></li> </ul>

*Outcome measures that do not align with the State aid evaluation plan have been italicised.*

<sup>63</sup> As noted in Section 2, due to data restrictions it was not possible to assess the number of ISPs utilising the networks through the Open Access Agreements, as this data has not been collected. Therefore, this report explores the number of ISPs operating in the areas the programme has delivered to as a proxy of this indicator.

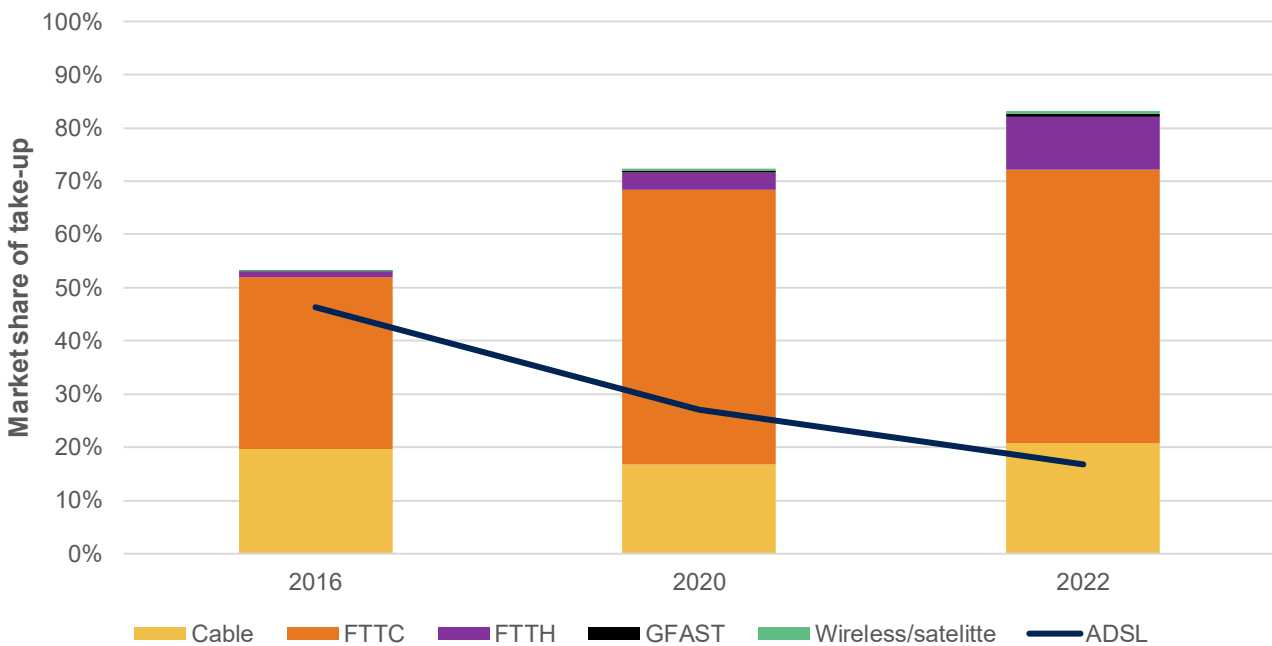
<sup>64</sup> It is not possible to estimate the degree to which the data may be inaccurate. However, the data is likely to become less accurate when analysing smaller geographic areas, and this should be taken account of when interpreting the results.

<sup>65</sup> Data has not been collected which shows the number of unique ISPs which have accessed networks through the open access made available under the 2016 NBS. Therefore, a proxy measure of the number of ISPs providing services in the areas where the Phase 3 contracts have been delivered has been analysed.

## 5.2 Take-up of NGA lines as a percentage of all broadband take-up and Market share for each NGA technology

At a UK level, the share of NGA broadband take-up as a proportion of total broadband take-up has increased markedly since 2016. The figure below shows that take-up of NGA connections represented just over half of all broadband connections in 2016, but this has grown to 80 percent of internet connections in 2022. FTTC connections represented the largest proportion of NGA connections in both 2016 and 2020 (around a third of broadband connections in 2016 and just over a half in 2020 and 2022). FTTP connections have grown to represent 10 percent of the market in 2022 (up from three percent in 2020), with the proportion of wireless/satellite connections remaining steady at around one percent in all years.

**Figure 5.1: Market share of broadband take-up for NGA and ADSL connections**

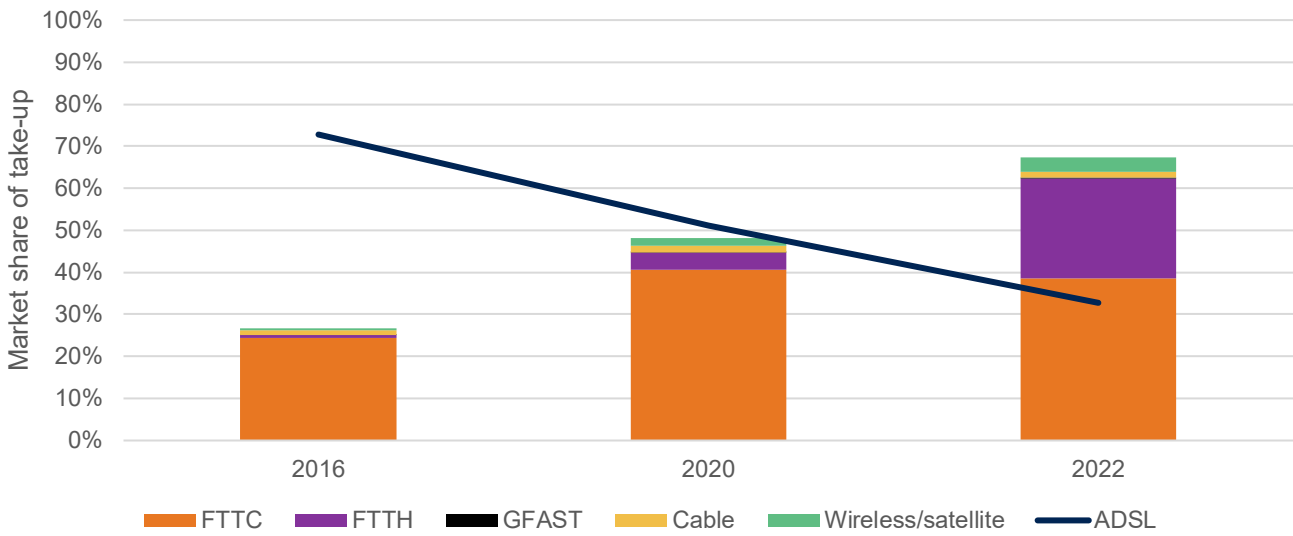


Source: Thinkbroadband data

### 5.2.1 Superfast Broadband delivery area analysis

This analysis was undertaken separately for the delivery areas for Phase 3 of the Superfast Broadband Programme as illustrated in the figure below. This found that between 2016 and 2022, there was an increase in NGA take-up in Phase 3 contract areas of 40 percentage points. As with the national pattern, FTTC is the dominant technology for NGA connections, representing most of the connections in Phase 3 areas – however, this percentage is lower than the national average (around 40 percent in 2022 in Phase 3 areas compared to 50 percent nationally). FTTP connections represent a higher proportion of the market in Phase 3 areas than nationally in 2022 (24 percent in 2022 compared to 10 percent nationally). This suggests that the take-up of FTTP connections nationally is lower than take-up in Phase 3 areas – which would be expected given that the Phase 3 Superfast Broadband contracts are required to provide gigabit capable networks, and the majority of contracts are doing this through FTTP technologies.

**Figure 5.2: Market share of broadband take-up in Superfast Broadband Phase 3 areas, 2016 to 2022**



Source: Thinkbroadband

### 5.3 Number of infrastructure providers offering NGA services

The figure below shows the change in the number of network providers<sup>66</sup> operating in postcodes that had received subsidised coverage under Phase 3 contracts between 2016 and 2022. In 2016, there were a total of 13 broadband providers operating in the areas covered by Phase 3, which had risen to 38 by 2022. This is below the national total and the total of network providers operating in areas covered by Phase 1 and Phase 2 of the Programme (75 in Phase 1 areas and 58 in Phase 2 areas). The number of FTTP providers and wireless network providers has also increased between 2016 and 2022 (from five to 27 FTTP providers and four to 12 wireless providers). This may indicate that the programme has helped promote greater competition in these areas.

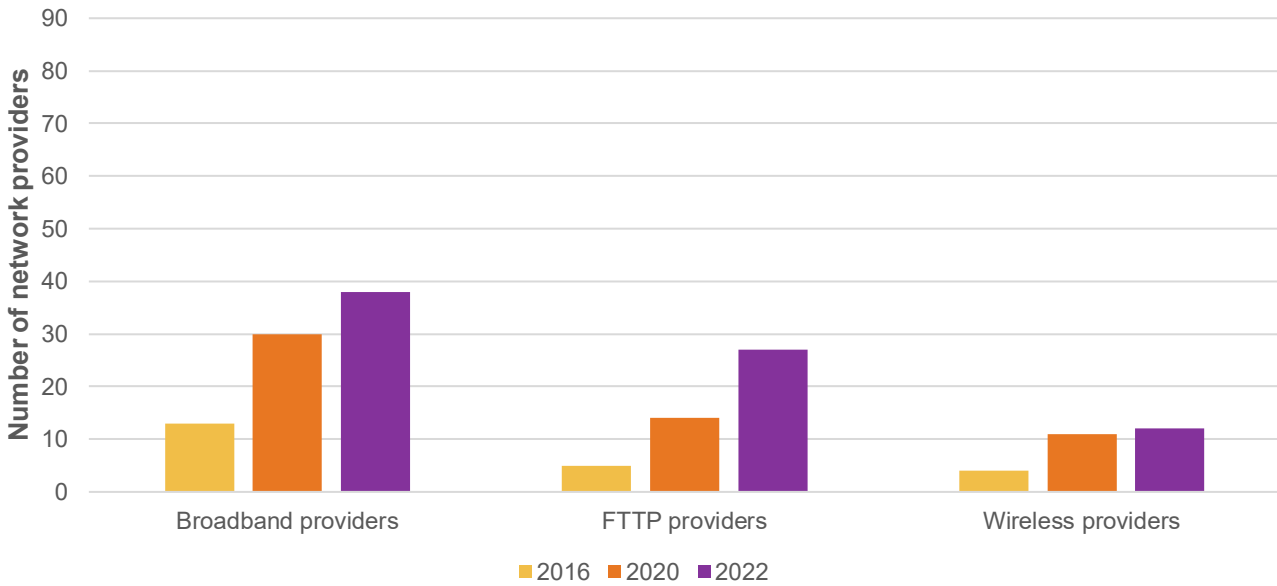
However, most non-beneficiary network providers tended to provide services to only a small number of postcodes within the Superfast Broadband project areas. Non-beneficiaries had a maximum coverage of nine percent of the delivery areas in Phase 1 contracts, 12 percent in Phase 2 contracts and three percent in Phase 3 contracts (all [redacted]), and below three percent for [redacted] in all phases (with the highest levels of coverage among wireless network providers). This suggests there is not a large degree of overbuild in Superfast Broadband Programme areas.

Therefore, it was expected that the programme areas have seen an increase in the number of network providers operating in the delivery areas, but equally it is expected that these other network providers only cover the Superfast Broadband Programme delivery areas at the fringes. It also demonstrates that there is no evidence that the programme crowded out infrastructure investment, in aggregate, in Phase 3 areas.

<sup>66</sup> Data included network providers owning and operating their own networks (not including ISPs) regardless of whether or not they provided a superfast network.



**Figure 5.3: Total number of network providers in Phase 3 Superfast Broadband treatment areas**



Source: Thinkbroadband

**Table 5.2: Coverage of non-beneficiaries in Superfast Broadband delivery areas, 2022**

[Redacted]

Source: Thinkbroadband coverage dataset

### 5.4 Number of unique operators offering services in Phase 3 contract areas

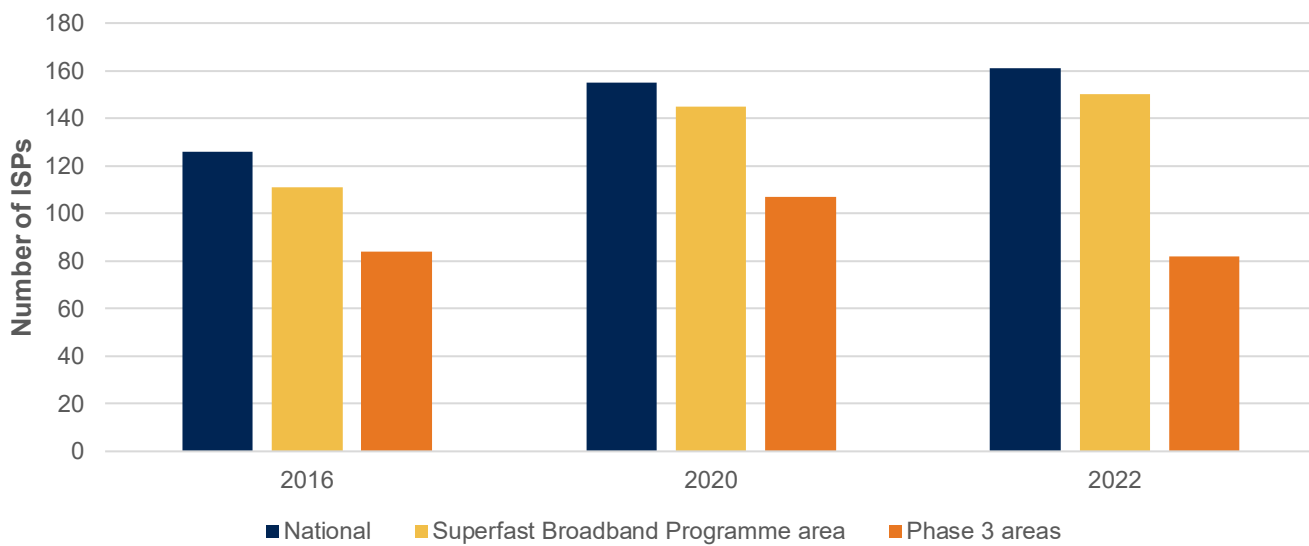
The number of ISPs with customers in the UK (proxied as the number of ISPs where customers have completed a speed test on the Thinkbroadband website) has increased over time. In 2020, over 150 ISPs had customers in the UK (see figure below), and this had grown to over 160 by 2022.<sup>67</sup>

In both 2020 and 2022, all ISPs provided NGA services to at least one customer in the UK. However, there were changes between 2016 and 2022 in the proportion of customers which were utilising NGA connections between ISPs. In 2016, around 70 percent of ISPs had over half of their customer base using NGA connections – in 2020 and 2022 this had grown to over 90 percent of ISPs.

A similar pattern to that seen nationally is observed in the Superfast Broadband delivery areas. There has been an increase in the number of ISPs with customers between 2016 and 2022. However, this pattern is not observed in Phase 3 contract areas – where there is a rise in ISPs between 2016 and 2020 but a decrease by 2022. This pattern for Phase 3 contracts is observed across all beneficiary contract areas, with a decrease in the number of ISPs between 2020 and 2022, following an increase up to 2020. This is unlikely to be due to ISPs stopping providing services to a particular area but continuing elsewhere, and could be a function of a small intervention area where individuals are satisfied with their internet connection, and therefore do not undertake a speed test.

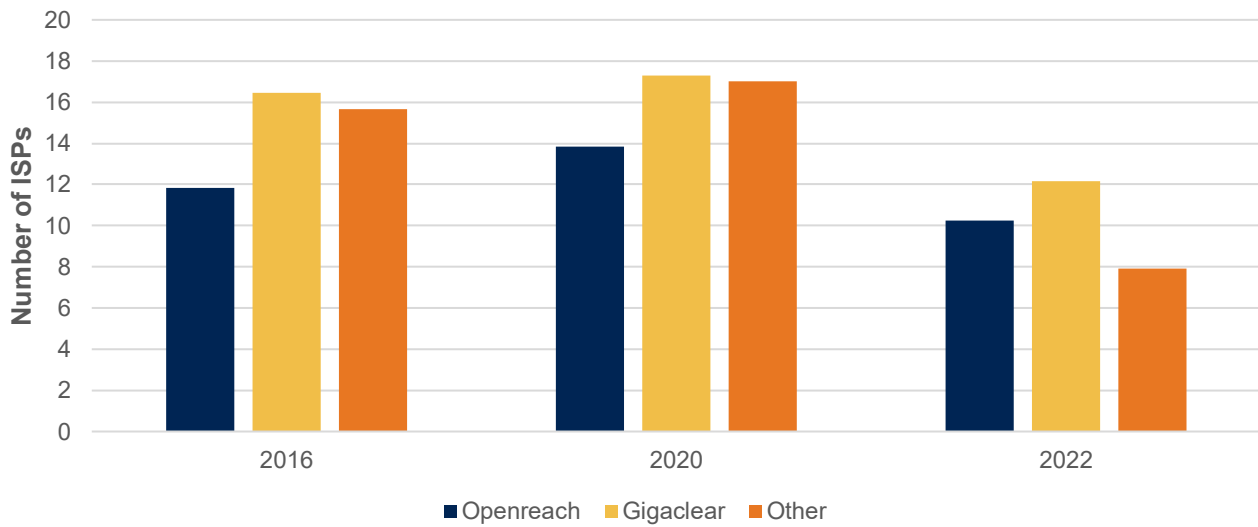
<sup>67</sup> This includes both ISPs which own their network (for example Virgin Media) and ISPs which utilise wholesale network products.

**Figure 5.4: Total number of ISPs operating in the UK, in Superfast Broadband Programme areas and Phase 3 areas, 2016 to 2022**



Source: Thinkbroadband

**Figure 5.5: Average number of ISPs offering services in the Superfast Broadband project Phase 3 areas and beneficiary, 2016 to 2022**



Source: Thinkbroadband

## 6 Economic impacts

This section of the report summarises the results of a series of econometric analyses exploring the economic and social impacts of Phase 3, and provides a cost-benefit analysis of the Superfast Broadband Programme Phase 3. Full details of these analyses are provided in Technical Appendix 3.

Estimates of the impacts of the programme have been obtained by linking records of the delivery of the programme to a wide range of administrative and secondary data sources providing annual data on a variety of economic and social impacts of interest (e.g. the productivity of firms located in the areas served by the programme). Statistical analyses focused on comparisons between individuals, firms or properties that benefitted from the programme at different points in time, with those receiving coverage used as a counterfactual for those benefitting earlier.

### 6.1 Costs

BDUK monitoring data gave details of 67 contracts that had been signed as part of the Superfast Broadband programme under Phase 3 of the programme. The gross contract value of the public funding associated with these contracts was over £1bn at the point of award (in nominal terms), providing funding for the capital costs associated with upgrading network infrastructure in the programme area<sup>68</sup>.

This total does not reflect the actual costs of delivery and includes expected costs associated with the future delivery of contracts. Additionally, this does not allow for possible reductions in costs to the public sector arising from the clawback mechanisms integrated in the contracts which require suppliers to return resources to the public sector in the event the delivery cost of the project was lower than expected (implementation clawback) or if the project was more profitable than expected (take-up clawback). Estimates of the net costs associated with delivery of contracts by the end of March 2021/22 were estimated on the following basis:

- **Actual costs:** Observations of the actual costs to the public sector by the end of March 2021/22 were taken from BDUK monitoring information (Finance Trackers) for the 35 of the 67 Phase 3 for which this information was available. In 27 cases where this information was not available, an estimate of actual costs to the public sector was derived by adjusting expected delivery costs (as derived from the Project Financial Model) by the ratio of actual to contracted premises upgraded by the end of March 2021/22. This implies an assumption that the unit cost of delivery will align with expectations at the time the contract was signed. As illustrated in Technical Appendix 2, costs of delivery have generally exceeded expectations and this approach may lead to an understatement of the net costs to the public sector. In five cases, no Project Financial Model was available, and the costs of these contracts are not included in the estimates below.
- **Clawback:** In addition, there was sufficient information available in relation to 27 contracts to enable a modelling exercise in which projections were developed to estimate levels of take-up clawback based on projections of future take-up. As described in Technical Appendix 2, implementation clawback was also included to account for reductions in the scale of contracts. Details of these analyses are set out in Technical Appendix 2. As the focus on this analysis is on premises upgraded

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<sup>68</sup> This comprises all sources of public funding, not just funding provided by BDUK.

by the end of 2021/22, estimates of future take-up clawback were scaled in line with the share of contracted premises that had been delivered by the end of March 2022.

No adjustments were made for clawback for the remaining 33 projects included in the analysis. **[Redacted]**.

The resultant estimates of costs to the end of March 2022 are set out in Table 6.1. The value of actual public spending associated with Phase 3 contracts by the end of March 2022 was estimated at £273.3m (with a present value of £239.2m in 2016/17). These contracts were expected to return £27.5m to £7.8m to the public sector via clawback (with a present value of £21.6m to 28.9m). This gives an estimated net cost to the public sector of £236.0m to £245.8m (with a present value of £210.2m to £217.5m). In addition to the caveats outlined above, it should be noted that these estimates do not include administrative costs to BDUK, Local Bodies, or network providers.

**Table 6.1: Expected net public sector costs (£m, 2019 prices)**

Data available	Number of contracts	Forecast public funding (£m)		Forecast take-up clawback (£m)		Net cost to the public sector (£m)	
		Nom.	PV	Nom.	PV	Nom.	PV
Full information (subject to IRR modelling)	29	111.4	98.0	-27.5 to -37.8	-21.6 to -28.9	74.1 to 83.9	69.1 to 76.3
Actual costs of delivery (Finance Tracker)	6	6.6	5.6	0	0	6.6	5.6
Expected costs only (PFM)	27	155.3	135.6	0	0	155.3	135.6
No cost information	5	0	0	0	0	0	0
<b>Total</b>	<b>67</b>	<b>273.3</b>	<b>239.2</b>	<b>-27.5 to -37.8</b>	<b>-21.6 to -28.9</b>	<b>236.0 to 245.8</b>	<b>210.2 to 217.5</b>

Source: BDUK, Ipsos UK analysis

## 6.2 Additionality

The economic impacts set out in Technical Appendix 3 explore the impacts of subsidised coverage. However, the results do not factor in the possibility that some coverage may have been brought forward through commercial deployments in the absence of the programme. Estimates of the additionality of the coverage funded through the programme are taken from Technical Appendix 1, which examined the share of the premises involved that would not have been upgraded in the absence of the programme (and how this evolved with time). These findings suggested that:

- **Superfast vs gigabit availability:** The level of additionality associated with gigabit coverage was higher than for superfast availability. This implies that while many households would not have benefitted from gigabit infrastructure in the absence of the programme, some may have benefitted from upgrades that enabled superfast broadband services. Average levels of additionality across the two technological standards were used for the purposes of this analysis (reflecting an assumption of diminishing returns to speeds).
- **Evolution over time:** The level of additionality was estimated to peak in the year after the premises was upgraded (at 81 percent). Additionality was estimated to decay to 49 percent in the fourth-year

post-installation (an average rate of decay of 16 percent per annum). This aligns with patterns observed for prior Phases of the programme. However, the estimated level of additionality associated with Phase 3 was notably higher than for prior Phases<sup>69</sup>, indicating that the areas concerned were substantially less likely to benefit from commercial deployments without public sector support. This is reinforced by the findings set out in Technical Appendix 2, which show that the rates of return associated with Phase 3 contracts are likely to fall below network providers' cost of capital in many cases (even with public subsidies).

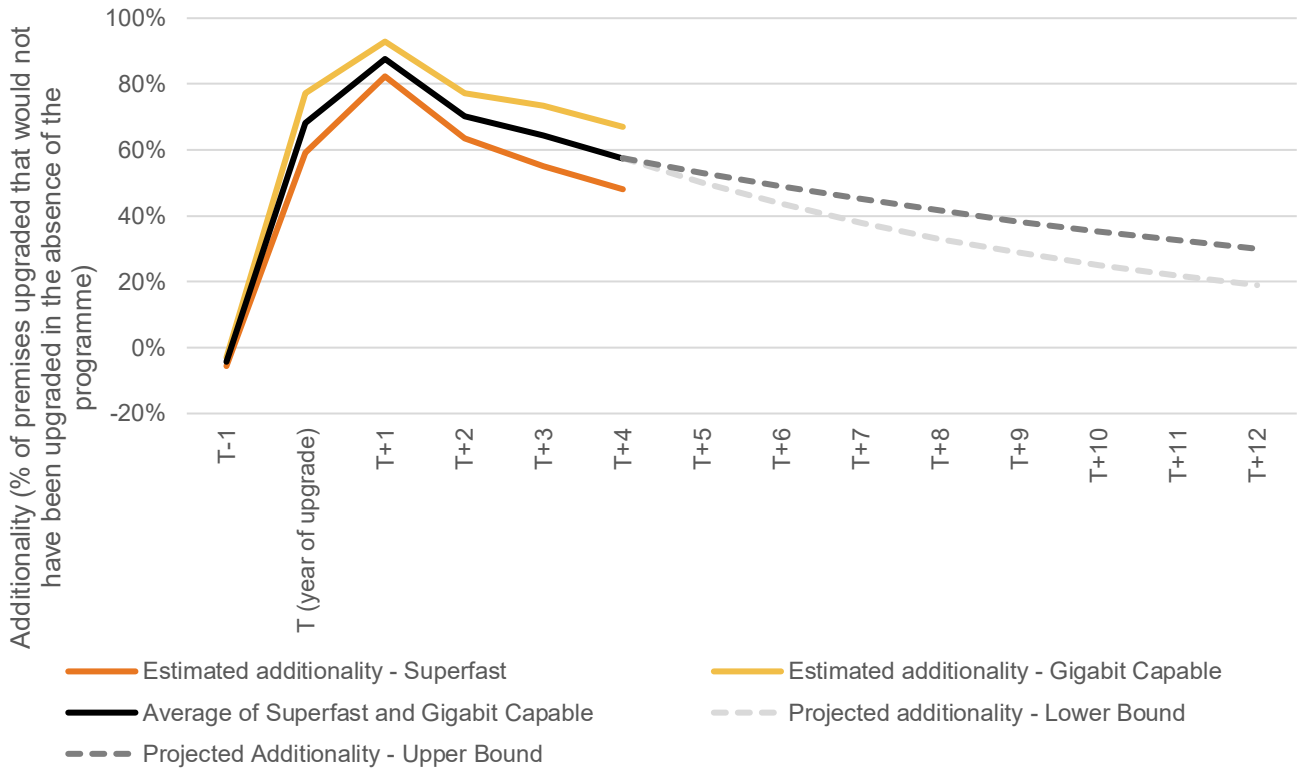
- **Projected additionality:** Projections of additionality to 2029/30 were developed on the following basis:
  - **Lower bound estimate:** A lower bound estimate was developed by extrapolating these results over the duration of the appraisal period (i.e. at a rate of 16 percent per annum). This assumption implies that additionality would fall to 12 percent twelve years post-installation, capturing a scenario in which 88 percent of premises upgraded eventually benefit from enhanced broadband coverage.
  - **Upper bound estimate:** The lower bound projection appears potentially pessimistic given parallel findings in relation to the commercial viability of investments in FTTP in areas covered by Phase 3 contracts. While commercial deployments of FTTP have expanded rapidly since 2020, it might be expected that some areas will never be covered by commercial deployments without substantial technical innovations to reduce deployment costs (or if network providers are able to subsidise such deployments with profits earned from investments in commercially viable areas). An upper bound scenario, in which additionality decays at a slower rate to 30 percent in 2029/30 was adopted to capture this possibility.
- **Delaying effect:** The evidence also suggested that seven percent of premises upgraded would have otherwise received superfast coverage one year earlier in the absence of the programme. This is consistent with evidence from qualitative research with network providers as part of the 2020 State aid evaluation that suggested that the OMR process could lead to some postcodes being marked as eligible for investment where commercial deployment plans were insufficiently developed or certain. The likelihood that a subsidised competitor would emerge would discourage investment in these areas. This delaying effect will have negative economic and social costs in the short-term and this is modelled using a negative value for additionality in the year prior to the upgrade.

The figure below displays the assumed additionality profile over time under the two scenarios.

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<sup>69</sup> See Technical Annex 1 from the State aid evaluation report 2020. Available at: <https://www.gov.uk/government/publications/superfast-broadband-programme-state-aid-evaluation-report-2020>.

**Figure 6.1: Additionality profile over time**



Source: Ipsos UK analysis

The table below provides the estimated number of premises upgraded by March 2020 that would not have had enhanced broadband connectivity in the absence of the programme (in 2021/22 and 2028/29) under the two scenarios for future additionality. The gross number of premises passed is based on C3 reports provided by BDUK. The number of additional premises passed in 2021/22 is estimated at 192,700. This is estimated to fall to between 58,300 and 102,600 by 2029/30 based on the scenarios described above.

**Table 6.2: Estimated number of additional premises passed, 2012/13 to 2029/30**

Year of upgrade	Gross number of premises passed	Estimated number of additional premises passed		
		2021/22	Low	High
2017/18	4,868	2,400	600	1,500
2018/19	38,624	21,800	5,700	12,300
2019/20	72,559	45,700	12,600	24,500
2020/21	74,608	60,800	15,400	26,800
2021/22	98,404	62,000	24,100	37,500
<b>Total</b>	<b>289,063</b>	<b>192,700</b>	<b>58,300</b>	<b>102,600</b>

Source: BDUK, Ipsos UK analysis. Estimates have been rounded to the nearest 100.

### 6.3 Economic and social benefits

#### 6.3.1 Local economic impacts between 2016 and 2021

A series of econometric analyses linking records of the postcodes benefitting from Phase 3 subsidised coverage to a variety of administrative and secondary datasets were used to explore the local economic



impacts of the programme. These results are set out in detail in Technical Appendix 3 and provide estimates of the effect of the programme on the areas that have benefitted from subsidised coverage. It is important to note that while most of these findings account for the possibility that businesses benefitting from the programme may have claimed market share from local competitors, **they should not be interpreted as net economic impacts at the national level**. The key results included:

- **Local employment impacts:** Subsidised coverage from Phase 3 was estimated to have increased employment in the areas benefitting from the programme by 0.88 percent, leading to the creation of 6,261 local jobs by March 2021. The programme as a whole was estimated to have led to 23,700 more local jobs up to March 2021.
- **Turnover:** Subsidised coverage also increased the turnover of firms located in the areas benefitting from Phase 3 of the programme by 1.6 percent by 2021, increasing the annual turnover of local businesses by £827m per annum. Estimates for the whole programme suggested that turnover of firms in areas benefitting from coverage increased by 1.4 percent (equating to around £2.6bn).
- **Number of firms:** The evidence indicated that a share of these local economic impacts were driven by the relocation of firms to the programme area. The evidence indicated that subsidised coverage increased the number of businesses located in the areas benefitting by around 0.5 percent – suggesting the programme may have encouraged the ‘disagglomeration’ of economic activity to rural areas.
- **Turnover per worker:** There were also signals of efficiency gains - turnover per worker of firms in the areas benefitting from Phase 3 coverage rose by 0.42 percent in response to subsidised coverage. This was not solely driven by more productive businesses moving into areas with improved broadband infrastructure. Firms that did not relocate over the period also saw their turnover per worker rise by 0.17 percent by 2021, indicating that subsidised coverage has also raised the efficiency of firms. It should be noted that while subsidised coverage had a stable effect on turnover, impacts on employment increased with time. This led to the strength of the gains in turnover per worker appearing to decay with time.
- **Wages:** The impacts of the programme were also visible in wages. Employees working for firms located in the areas benefitting from subsidised coverage saw their hourly earnings increase by between 0.6 and 0.8 percent in response to the upgrade. This gives greater confidence that the programme led to an increase in productivity.
- **Unemployment:** Local job creation also appeared to translate into reduced unemployment, with the number of unemployed claimants falling by 9.8 for every 10,000 premises upgraded.

### 6.3.2 Productivity gains

The evaluation produced a variety of evidence to show that the programme has led to important economic impacts at the local level. This was visible in estimates of the impact of the programme on employment, unemployment, and wages. However, in line with the HM Treasury Green Book, it is assumed that the local economic impact of the programme will largely be neutralised by offsetting effects elsewhere in the economy (displacement). While businesses located in areas receiving subsidised coverage have expanded their sales, this will have come at the expense of loss of market share for competing firms (who may be located locally or elsewhere in the UK).

The findings also suggested that relocation of economic activity was an important driver of the effects observed. Assuming these activities would have otherwise been relocated elsewhere in the UK it is likely that much of the job creation impacts described above would have been realised in other locations. Even if firms expanded without directly displacing the activities of domestic competitors, increased demand for workers and other inputs can be expected to have placed additional pressure on prices, resulting in reductions in output and employment elsewhere.

As such – and in line with the principles of the HM Treasury Green Book - only the effects of the programme in terms of raising productivity are considered to qualify as economic benefits at the national level. The evaluation provided a range of results to indicate that the programme has supported improvements in productivity – including raising the turnover of per worker and wages of employees of firms located in areas benefiting from subsidised coverage under Phase 3 (which rose by 0.6 and 0.8 percent respectively in response to the upgrades).

### GVA based measure of economic benefits

An increase in productivity will increase overall economic output (GVA) as resources are used more efficiently. However, it is important to note that turnover per worker may rise at the local level both because firms become more efficient, and because more productive firms relocate to the area (a displacement effect that would not lead to improvements in productivity at the national level). To address this issue, the economic benefits of the programme have been estimated based on its effects on firms that did not relocate (i.e. spatially stable firms) over the period of interest, as follows:

- **Impact on turnover per premises upgraded:** The estimated impact of the programme on the turnover per worker of spatially stable firms was estimated at 0.002 percent per premises upgraded in Output Areas benefitting from Phase 3 contracts. The average turnover per worker of spatially stable firms benefitting from Phase 3 contracts was approximately £95,372. This result implies that turnover per worker in spatially stable firms rose by around £2 per premises upgraded under Phase 3. The average level of employment amongst spatially stable firms in these areas was 32 employees per output area. This gives a total effect on turnover driven by apparent efficiency gains of £63 per premises upgraded.

The overall effect on turnover per worker per premises upgraded was lower than estimated for prior Phases of the programme (as explored in the 2020 State aid evaluation report), and this decrease in impact is statistically significant. This is likely driven by an increasing share of residential upgrades under Phase 3 of the programme (which has focused addressing gaps in network deployment in largely residential areas, meaning that relatively smaller numbers of commercial enterprises have benefitted from subsidised coverage). Additionally, businesses located in areas benefitting from Phase 3 of the programme tended to be less productive and employed fewer workers than those benefitting from prior Phases. These features will also have limited the net economic impacts of subsidised coverage. However, as it is not possible to identify individual enterprises that have benefitted from subsidised coverage in the available data, it is also not possible to rule out the possibility that the relevant businesses have been less able to exploit enhanced connectivity to realise efficiency gains.

- **Short term impact on GVA per premises upgraded.** It is assumed that firms did not change the shares of labour and other inputs used in production in response to the subsidised coverage, and the effect on turnover per worker can be interpreted as an improvement in productivity. Applying the

average GVA as a percentage of turnover across the UK as whole over the 2016 to 2021 period (32 percent)<sup>70</sup>, this gives an effect on GVA per premises upgraded of £20 (per annum).

The assumptions were applied to the profile of additional premises upgraded set out in the preceding section. Summary results covering the 2016/17 to 2021/22 period (benefits to date) and the 2016/17 to 2029/30 period (including projected benefits) are set out in the table below. The present value of GVA benefits (with a baseline of 2012/13) are estimated at £8.4m by 2018/19 and between £20.8m and £23.1m by 2029/30.

This approach may understate the economic benefits of the programme. If spatially stable firms displace sales from less productive firms, then there will also be benefits associated with the transfer of output from less to more productive producers which are not captured in this analysis. The programme is also assumed not to lead to productivity gains for relocating firms (as the quality of their broadband access prior to the relocation is unknown). Additionally, the relocation of firms to the programme area may also produce agglomeration economies (e.g. resulting from knowledge spill-overs arising from greater opportunities for face-to-face interaction and collaboration) that could only be partly captured in the econometric analysis. However, it should be noted that these relocations will be accompanied by disagglomeration elsewhere and these effects may neutralise each other at the national level.

**Table 6.3: Additional GVA resulting from productivity gains (£m, 2019 prices, low – high range)**

Period	Undiscounted (£m)	Discounted (£m)
Productivity gains 2016/17 to 2021/22 (£m)	8.4	7.2
Productivity gains 2016/17 to 2029/30 (£m)	26.5 – 29.9	20.8 – 23.1

Source: BDUK, Ipsos UK analysis

### 6.3.3 Unemployment impacts

The results of the evaluation suggested that for every 10,000 premises upgraded there was a corresponding on-going reduction in the number of unemployed claimants of 34.3 claimants. The extent to which these effects might be understood as net economic benefits will be linked to how far the programme drew individuals out of (or helped them avoid) extended periods of involuntary worklessness in which they were not productively deployed (rather than short-term episodes of unemployment<sup>71</sup>).

The data available did not permit an analysis of the effects of the programme on long-term unemployment directly as claimant counts at the local level do not provide information on the duration of claims. However, a prior evaluation (using different data series<sup>72</sup>) suggested that for every individual taken out of unemployment by the programme, 0.29 individuals were taken out of long-term employment. Assuming this applies to the results obtained in this study, it is estimated that for every 10,000 premises upgraded, the number of long-term claimants fell by 9.8.

Assuming the effects on long-term unemployment represent the effect of the programme on the overall productive capacity of the economy, and valuing the output produced by those individuals at £15,480 per

<sup>70</sup> Source: Annual Business Survey, ONS

<sup>71</sup> Though some of these episodes will have otherwise evolved into long-term unemployment.

<sup>72</sup> DCMS (2018) Economic and Public Value Impacts of the Superfast Broadband programme.

annum<sup>73</sup>, it is estimated that these effects could have led to an additional £5.5m in national economic output (GVA) by 2022 (in present value terms). This effect is estimated to rise to between £15.7m to £17.4m in the longer term (though to the extent this is driven by relocation of economic activity, there may have been corresponding increases in long-term unemployment elsewhere).

**Table 6.4: Additional GVA resulting from reduction in long-term unemployment (£m, 2019 prices, low – high range)**

Period	Undiscounted (£m)	Discounted (£m)
GVA from the reduction in long-term unemployment 2016/17 to 2021/22 (£m)	6.3	5.5
GVA from the reduction in long-term unemployment 2016/17 to 2029/30 (£m)	20.0 – 22.6	15.7 – 17.4

Source: BDUK, Ipsos UK analysis

#### 6.3.4 Social benefits

The findings of the study suggested that the programme led to an average increase in house prices of between £1,900 and £4,900 suggesting that buyers were willing to pay a premium to obtain houses benefitting from subsidised upgrades. Based on hedonic pricing approaches, this can potentially be interpreted as a measure of the average gain in social welfare associated with access to superfast and gigabit capable broadband networks (i.e. on the basis that the maximum households are willing to pay should reflect the marginal gain in wellbeing derived from access to the technology). However, there are several issues of interpretation that create some complexities in this approach:

- **Expectations:** There are questions as to how consumers form expectations regarding the likely future availability of superfast broadband and build this into their willingness to pay. If households have perfect information on the deployment plans of network providers, the estimated effects of the programme show what households are willing to pay for housing with superfast broadband coverage over and above housing that will be upgraded in later years. If this is the case, then the results can be understood as the short-term gain in welfare associated with having access to superfast broadband services as opposed to coverage at some uncertain point in time in the future. As users will continue to derive benefits from the availability of superfast broadband beyond the point where it is available on a close to universal basis, the house price premium is also likely to understate the long-term social benefits of access to superfast networks.
- **Additionality:** Flowing from the above, the gross value of the price uplift was adjusted in light of estimates of short-term additionality (an average of 72 percent up to two years following the upgrade) to reflect the possibility that the premises would have otherwise received subsidised coverage in the absence of the programme at the time of purchase. However, the value of the price uplift was not adjusted further in the long term as it was assumed that the possibility that the property would have received superfast coverage in the future was factored into willingness to pay.
- **Estimated total land value uplift:** BDUK monitoring information indicated that 93 percent of the 289,000 premises upgraded were residential premises (269,000). Assuming the house price

<sup>73</sup> It is assumed that the productivity of the average worker avoiding long-term unemployment due to the programme is lower than the national average, and here we have assumed that workers would gross annual pay at the 25<sup>th</sup> percentile of all workers (based on the 2017 Annual Survey of Hours and Earnings).

premium provides a reasonable measure of the average gain in welfare across the programme, this gives an estimate of the present value of welfare benefits of £370m to £947m.

- **Representativeness of buyers:** The price of homes sold will reflect the value of the property to the marginal buyer. Buyers are likely to have different preferences to the average resident of the programme area and may place a particularly high value on the features of the property such as broadband capability. Existing residents would have moved into the area before superfast connectivity arrived. As such, it may not be possible to assume that the apparent price premium reflects improvements of the welfare of other residents of the areas concerned (who may place a lower value on superfast broadband).
- **Lower bound estimate:** A lower bound estimate was derived by assuming the house price premium only provided a reasonable approximation of the welfare gains associated with the programme in cases where houses were sold after the premises was upgraded (114,162). This gives a lower estimate of the total welfare gains of between £157m to £402m, although this is a highly conservative approach as it assumes that existing residents derive no value from enhanced broadband connectivity.
- **Uncertainty:** To the extent that house prices were driven by migration induced by the programme, these may not represent net benefits as there may be offsetting effects elsewhere. Additionally, there is a possibility that the house price uplift may be linked to the programme's effects in attracting additional economic activity to the area (in which case, there may be an element of double counting with the economic benefits). Further analysis will be completed as part of the final evaluation using alternative methods (e.g. wellbeing valuation) to provide further evidence on the social benefits of the programme.

The following table provides a summary of the results.

**Table 6.5: Land value uplift arising from impacts on house prices (£m, 2019 prices)**

	Low house price premium (0.78%)	High price premium (1.43%)
Welfare impacts confined to households purchasing homes		
Land value uplift (£m, present value)	370.3	946.9
Land value uplift (£m, only sold properties)	157.2	402.1

Source: BDUK, Ipsos UK analysis

## 6.4 Benefit to Cost Ratios

Drawing on the results above, low and high estimates of the Benefit to Cost Ratio (BCR) associated with the programme are developed using the estimates of the net cost of the programme set out in the Section 8.1. This gives a range for the BCR as follows:

- **Benefits from 2016 to 2022:** The short term BCR (based on benefits to date) is estimated at between £1.76 and £4.57 per £1 of net lifetime public sector costs. This assumes that the house price premium is a reasonable approximation of the average welfare gain associated with the programme (and the width of the range is driven largely by modelling uncertainty regarding the size of the house price premium associated with subsidised coverage).
- **Benefits from 2016 to 2030:** In the long run (allowing for future economic benefits), the BCR is estimated to rise to £1.87 to £4.70 per £1 of net public sector spending.

- **Lower bound estimates:** As noted above, it is possible that the house premium overstates the average welfare gain associated with enhanced broadband connectivity. Using the lower bound estimates of the social benefits of the programme outlined above, whereby the house price premium only provided a reasonable approximation of the welfare gains associated with the programme in cases where houses were sold after the premises was upgraded (114,162), the long-term BCR would fall to between £0.89 and £2.04. This will clearly understate the net benefits of the programme, as it assumes that existing residents derive no value from superfast broadband availability.
- **Comparisons with prior findings:** Previous analysis set out in the 2020 State aid evaluation report found that the Benefit Cost Ratio associated with the overall programme was substantially higher (£3.6 to £5.1 between 2012 and 2030<sup>74</sup>). The average benefit per premises upgraded for Phase 3 was in line with (if not higher than) estimates for prior Phases. However, unit cost of upgrades to the public sector was markedly higher for Phase 3 than for prior phases of the programme. The net cost per additional premises passed was by 2022/23 was estimated at £1,270 for Phase 3, versus £217 for all Phases of the programme. This increase in cost was driven by a change in technical focus to gigabit capable technologies (which are more costly to deploy) and a change in spatial focus to areas that are harder to reach. Contracts awarded under Phase 3 are also expected to generate substantially lower levels of implementation and take-up clawback than contracts awarded under Phase 1 (which were often commercially viable without subsidy).
- **Omitted benefits:** It should be noted that these results also do not factor in the value of some important potential benefits of the programme, particularly in terms of its impact in improving equity in access to broadband infrastructure. These types of benefit are likely to become more significant in the longer term, as new applications dependant on faster broadband speeds are brought to market (leading to greater risks of digital exclusion).

**Table 6.6: Benefit to Cost Ratios, 2016 to 2022 and 2016 to 2030**

Period	2016 to 2022		2016 to 2030	
	Low additionality / house price effects	High additionality / house price effects	Low additionality / house price effects	High additionality / house price effects
<b>Benefits</b>				
Productivity gains (£m)	7.3	7.3	20.8	23.1
Long term unemployment (£m)	5.5	5.5	15.7	17.4
House prices (£m)	370.3	946.9	370.3	946.9
<b>Total</b>	<b>383.1</b>	<b>959.8</b>	<b>407.0</b>	<b>987.7</b>
<b>Costs</b>				
<b>Lifetime cost (£m)</b>	210.2 to 217.5	210.2 to 217.5	210.2 to 217.5	210.2 to 217.5
<b>Benefit to cost ratio</b>	<b>1.76 to 1.82</b>	<b>4.41 to 4.57</b>	<b>1.87 to 1.94</b>	<b>4.54 to 4.70</b>
<i>Lower bound estimate of total benefits and costs</i>				

<sup>74</sup> Note that these should be compared with the lower bound estimates for consistency in approach.



Total benefits (£m, house premium applies to sold houses only)	170.0	414.9	237.5	442.1
Lifetime cost (£m)	210.2 to 217.5	210.2 to 217.5	210.2 to 217.5	210.2 to 217.5
<b>Lower bound BCR (£)</b>	<b>0.78 to 0.81</b>	<b>1.91 to 1.97</b>	<b>0.89 to 0.92</b>	<b>2.04 to 2.11</b>

Source: BDUK, Ipsos UK analysis



# 7 Proportionality and appropriateness

This section addresses the final questions defined in the State aid evaluation plan:

- Question 6: Is the gap funding model efficient compared to alternative schemes?
- Question 7: Did the aid lead to commercially sustainable networks?

The analyses in this section focus on the unit cost of delivery associated bringing forward the programme (in gross and net terms) and the degree to which the networks brought forward have proven commercially sustainable.

Review of the literature suggests that there are few evaluations from other EU countries providing ex-post quantitative estimates of the cost-effectiveness of comparable initiatives in bringing forward broadband coverage. As such, it has not been possible to robustly benchmark the scheme to explore issues relating to how far the programme design was optimal. Secondly, actual revenues and operational costs per user are not monitored by BDUK and consideration of those aspects of commercial sustainability are limited to the assumptions put forward by network providers in their tenders.

## 7.1 Gap funding model efficiency

This section provides answers to the State aid evaluation question 6: Is the gap funding model efficient compared to alternative schemes? It provides the key State aid evaluation metrics of the public funding per covered premises and a comparison of these values against comparator schemes. It has not been possible to provide the metric of public funding per live end user connection-years due to a lack of available data.

### 7.1.1 Initial expected public sector cost per covered premises

Data on the costs of delivering the Superfast Broadband Programme have been drawn from BDUK monitoring data and the outputs of the modelling exercise described in Section 6 (and used to support the cost-benefit analysis).

Over £1bn of public sector funding appears to have been committed across Phase 3 contracts with a total of 531,029 contracted premises passed. This equates to an ex-ante gross public sector cost per premises covered of £2,636<sup>75</sup>.

**Table 7.1: Contracted cost per premises passed in Phase 3**

Contract phase	Contracted public sector cost (£m)	Contracted premises passed	Gross public subsidy per gross premises passed (£)
Phase 3	1,400	531,029	2,636

Source: Ipsos UK analysis; Superfast Status Report, November 2022

<sup>75</sup> This figure is based on the Superfast Status Update (CORA) data

### 7.1.2 Current expected (actual) public sector cost per covered premises

The table below provides estimates of the current expected public funding per covered premise by March 2021/22. The expected gross public spend per premises passed is lower overall at £945 (rather than £2,636).

Factoring in the likelihood that some of those premises passed to date would otherwise have received coverage through commercial deployments, the table below also includes the estimated number of additional covered premises. The gross public sector cost (i.e. before clawback) per additional covered premises over three years was £1,418. After allowing for clawback, this will fall to £1,225 to £1,276 per premises passed (depending on whether take-up stabilises at 60 or 85 percent in the long-term).

**Table 7.2: Expected gross cost per premises and additional premises passed**

Contract phase	Expected public sector cost (£m)	Premises passed by March 2021/22	Additional covered premises to date	Expected Gross public subsidy per gross covered premises (£)	Expected Gross public subsidy per additional covered premises (£)
Phase 3 to date (before clawback)	273.3	289,063	192,700	945	1,418
Phase 3 to date (after clawback)	236.0 to 245.8	289,063	192,700	816 to 850	1,225 to 1,276

Source: Ipsos UK analysis; Superfast Status Report, November 2022

### 7.1.3 Benchmarking

Whilst an attempt has been made to compare the costs per connection outlined for the programme above, there remains little evidence on comparable interventions. There are very few studies that have sought to examine the cost-effectiveness of broadband programmes in the EU ex-post. This may in part be because of a relative lack of public programmes on the same scale as the Superfast Programme and a consequent lack of published evaluative work. However, there are some examples where the expected unit cost of premises passed has been estimated. It should be noted that these are projected public sector costs per gross premises passed, rather than observed costs. The estimated costs are:

- In Austria, the cost per premises passed was approximately £1,900 and £3,600 across two projects.
- In Germany, projects estimated the average of cost per premises passed was between £1,100 and £9,300.
- In Finland, the projected cost per premises passed was estimated to be between £1,300 and £5,800 across three projects.
- In Hungary there are multiple projects, and the average cost per premises passed was estimated to be between £200 and £660
- In Ireland, the estimated cost per premises passed was £4,900.
- In Italy, several projects estimated that the cost per premises passed was between £230 and £330.
- In Portugal there are several projects and the estimated cost per premises passed was estimated to be between £220 to £810.

It should be noted that the cost per premise passed for the programmes presented above will be dependent on the type of infrastructure investments made to reach premises, and this information was not available. However, the high level analysis shows that in most countries, the average cost per premises upgraded is higher than the cost observed in the Superfast Broadband Programme.

A recent study evaluating parts of the Superconnected Cities Programme (SCCP) in the UK did include a cost benefit analysis of the Connection Voucher Scheme element of that programme. This made vouchers up to a value of £3,000 available to small to medium sized businesses (SMEs) to put towards upgrading their internet connection. To be granted, the connection would need to provide at least superfast speeds but was technology agnostic. The study found the average cost of subsidised connections through this programme was £1,400, although this also varied substantially by technology type (ranging from £1,100 for FTTC connections to £2,800 for Fixed Wireless / Microwave connections). The cost per installation was estimated at £1,400, though each installation led to a further 4.7 additional connections per postcode. This equated to an estimated cost per additional connection of £290. However, this is not directly comparable to the values listed above as it focuses on the cost of connections rather than the cost of coverage.

## 7.2 Commercial sustainability of networks

The NBS evaluation plan sets out the key indicators to be assessed to draw conclusions about whether the Superfast Broadband Programme has led to the development of commercially sustainable networks. These included an assessment of the actual versus original forecast annual cashflow (before subsidy), take-up volumes, average revenue per user, average operational costs per user for each winning network provider.

### 7.2.1 Withdrawn contracts

The evaluation plan also envisaged an assessment of the number of projects, if any, from which services have been withdrawn (e.g. due to corporate insolvency, or project losses), the number of premises covered by such projects, and the number of live connections for such projects, and percentage share of the overall 2016 NBS accounted for by such projects (in terms of number of projects, public funding, premises covered, take-up volumes).

For the interventions which have been funded under State aid SA. 40720 (2016/N) of the 67 contracts currently listed on the Superfast Broadband management system, none have had services withdrawn by the network provider. This means that there have been no premises which have not been upgraded as a result of a beneficiary withdrawing from the programme.

However, a total of six contracts which were awarded under State aid SA. 40720 (2016/N) have been terminated. All of these contracts were awarded and terminated by the same Local Body and were awarded to two beneficiaries. These contracts were terminated by the Local Body, rather than the beneficiary. The reason for the termination was the inability of the beneficiaries (and its supply chain) to deliver the network build outlined in their bids to the required quality within the specified timeframe of the contract.

The Superfast Broadband Programme has not collected data on the number of ISPs utilising the networks that have been funded by the programme. Therefore, it has not been possible to complete the assessment of commercially sustainable networks as set out in the NBS evaluation plan. Additionally, as many Phase 3 contracts have not been completed at the time of the evaluation, the beneficiaries are not yet at the post subsidy stage, meaning it is difficult to assess their position pre and post subsidy.

### 7.2.2 Actual vs expected take-up

The expected levels of take-up of Superfast connections by end users was included in beneficiaries' PFM submission, and included take-up by quarter and by technology type. The level and speed of take-up varied by contract, beneficiary and connection type.

The expected level of take-up presented in the PFMs by the beneficiaries was compared to the reported level of take-up by the beneficiaries to the Superfast Broadband Programme. After some delays in the initial quarters of deployment, where PFM take-up was higher than actual take-up, the level of take-up reached in FY 21/22 was **[redacted]**.

### 7.2.3 Original forecast average revenue / cost per user<sup>76</sup>

Beneficiaries reported the Average Revenue Price per Unit (ARPU) in the PFM. For the 27 contracts analysed for the incentive effect of the State aid, the ARPU is **[redacted]**. This was estimated using the contract level ARPU's presented in Technical Annex 2. The average monthly operational cost over the lifetime of the programme was estimated to be **[redacted]** (once a steady state of operational costs has been achieved). It can be seen that the estimated quarterly ARPU is higher than the quarterly Average Operational Cost per Unit, suggesting that the beneficiary expected the networks to be sustainable in the long run.

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<sup>76</sup> It was not possible to estimate the actual average revenue and actual average cost per connection, as this information is not collected from the programme beneficiaries.

## 8 Conclusions

This section provides a brief overview of the key findings from this report. These focus on the seven State aid evaluation questions, and the wider economic and social benefits of the programme.

### Question 1: To what extent has the aid resulted in increased access to an NGA network being deployed in 'white' NGA areas?

Subsidised coverage through Phase 3 of the Programme led to significant positive impact on the availability of superfast and gigabit capable broadband services by the end of September 2021. Subsidised coverage increased the share of premises in the programme area able to access superfast speeds by 44 to 48 percentage points, and the share of premises with gigabit capable coverage by 43 to 59 percentage points. The impact of the programme on NGA availability was relatively small, however, indicating that in its absence, most premises would have benefitted from some form of enhanced connectivity (albeit via technologies less able to deliver download speeds of 30Mbit/s or higher). These findings are consistent with prior research into the impacts of the programme on broadband coverage.

Estimates of the overall number of additional premises benefitting from NGA, superfast and FTTP/Gigabit capable availability by September 2021 showed that:

- **NGA coverage:** The programme is estimated to have led to 50,000 to 117,000 additional premises with NGA coverage (with a larger estimate of 117,000 premises derived from panel models considered implausibly large given the observed trends in NGA coverage). Additionality (i.e. the share of premises benefitting from superfast coverage that would not have in the absence of the programme) is estimated at between 7 and 17 percent, with most estimates towards the lower end of this range. This implies that to a large degree, premises benefitting from the Superfast Broadband Programme would have received some form of NGA coverage in its absence.
- **Superfast availability:** The Programme is estimated to have increased the number of premises that can access superfast broadband services (30Mbit/s or above) by 202,000 to 247,000 by the end of September 2021. The associated rate of additionality ranges from 69 percent to 85 percent. This indicated that while many premises may have received NGA coverage in the absence of the Programme, these premises would not have been able to access at least superfast speeds (indicating the programme has been highly effective in delivering against its primary objective).
- **FTTP/Gigabit capable coverage:** Subsidised coverage is estimated to have led to 193,000 to 298,000 additional premises with FTTP/Gigabit capable coverage. The rate of additionality ranges from 66 percent to 102 percent (with most estimates in the region of 90 percent). This indicates that the programme has also been highly effective in bringing gigabit capable technologies to rural areas, and these areas were highly unlikely to have benefitted from commercial deployments over the time horizons considered in this evaluation.

### Question 2: To what extent has the target of the intervention been used and what speeds are available?

The findings indicated that Phase 3 contracts led to a significant increase in the maximum download speeds of connections taken by households and/or businesses by September 2021 (34 to 60 Mbit/s). However, the impacts of the programme on average download speeds were relatively small. This indicates that 'early adopters' have taken advantage of the enhanced broadband connectivity enabled by the Programme. However, the Programme had not led to widespread take-up of faster broadband services by September 2021. It should be noted that most subsidised coverage was delivered in 2019 and 2020. As

take-up will lag deployment, it is premature to draw any firm conclusions on the impact of the programme on take-up of faster internet services. Again, this is consistent with prior research into the impacts of the programme on take-up.

### Question 3: Has the aid had a significant incentive effect on the aid beneficiaries?

Based on projections provided by network providers at the tendering stage, the proposed network build under Phase 3 contracts was expected to either generate losses or to deliver positive rates of return (Internal Rate of Return or IRR) that were substantially lower than the cost of capital faced by the network provider. Network providers project an average IRR of **[redacted]** in the absence of subsidies at the tendering stage, they are now expected to generate an average IRR of between **[redacted]** and **[redacted]**. This highlights that subsidies would almost certainly be needed to stimulate investments in gigabit capable network deployment in these areas. This is also consistent with the high rates of additionality associated with gigabit capable networks described in the preceding chapter (i.e. network providers were highly unlikely to roll out similar investments in the absence of public subsidies).

The expected IRR was **[redacted]** with subsidies at the tendering stage and are projected to fall to between **[redacted]** and **[redacted]** based on evidence on actual build costs and take-up. These rates of return are lower than the network provider's discount rate, indicating that BDUK has avoided the risk of providing excess subsidies to network providers (as for Phases 1 and 2 of the programme). This also suggests that contracts would be unprofitable even with public funding. This could be explained if the network provider considered future profitability beyond the clawback period (from which all profits made would be retainable by the supplier). **[Redacted]**.

The clawback mechanism helped prevent network providers earning excess returns and limited the public contribution to the minimum needed to ensure the commercial viability of network deployments in Phases 1 and 2. However, in the case of Phase 3 contracts, the clawback mechanisms has reduced the expected IRRs further to between **[redacted]** and **[redacted]** (increasing the size of the economic losses earned by network provider). This raises possible questions regarding the commercial sustainability of the network build, although revenues are expected to exceed to operating costs in the longer run.

### Question 4: Has the aid had a material effect on the market position of the direct beneficiaries?

At a UK level, there has not been significant changes in the market share of programme beneficiaries in the broadband market between 2016 and 2022. Openreach dominates the market, representing more than three quarters of the broadband market. The other beneficiaries of the Superfast Broadband Programme represented less than one percent of the market in all years.

The market share for Openreach across Superfast contract areas however declined between 2016 and 2022, from around 97 to 85 percent of all broadband connections. While this is higher than the national average (between 70 and 80 percent), the decline in market share aligns with the national trends for Openreach.

In areas where **[redacted]** have delivered contracts, they have maintained their market share between 2016 and 2022 in **[redacted]**. However, in areas where **[redacted]** have delivered contracts, the market share for **[redacted]** has fallen (particularly in areas where **[redacted]** have delivered contracts), with the market share of **[redacted]** increasing. This suggests that **[redacted]** are taking market share from **[redacted]** in these areas.



### Question 5: How far is there evidence of changes to parameters of competition arising from the aid?

At a UK level, the share of NGA broadband take-up as a proportion of total broadband take-up has increased markedly since 2016. NGA connections represented just over half of all broadband connections in 2016, but this has grown to over 80 percent of internet connections in 2022. Fibre to the Cabinet (FTTC) connections represented the largest proportion of NGA connections in all years (around a third of all broadband connections in 2016 and just over a half in 2020 and 2022). As with the national pattern, FTTC is the dominant technology for NGA connections, representing most of the connections in Phase 3 areas – however, this percentage is lower than the national average (around 40 percent in 2022 in Phase 3 areas compared to 50 percent nationally). FTTP connections represent a higher proportion of the market in Phase 3 areas than nationally in 2022 (24 percent in 2022 compared to 10 percent nationally). This suggests that the take-up of FTTP connections nationally is lower than take-up in Phase 3 areas – which would be expected given that the Phase 3 Superfast Broadband contracts are required to provide gigabit capable networks, and the majority of contracts are doing this through FTTP technologies.

The number of infrastructure providers operating on the postcodes benefitting from subsidised upgrades increased between 2016 and 2022. Although there has been an increase in the number of network providers offering services in Phase 3 areas, most non-beneficiary network providers tended to provide services to only a small number of postcodes within the Phase 3 project areas. This suggests there has not been a large degree of overbuild or crowding out of investment.

The number of ISPs operating in Phase 3 areas has increased between 2016 and 2020, but decreased by 2022. There are a higher number of ISPs with customers in Phase 1 contract areas than Phase 2 and Phase 3. This is unlikely to be due to ISPs stopping providing services to a particular area but continuing elsewhere, and could be a function of a small intervention area where individuals are satisfied with their internet connection, and therefore do not undertake a speed test.

### Question 6: Is the gap funding model efficient compared to alternative schemes?

The gross public sector cost per additional covered premises over three years was £1,418 for Phase 3 contracts. After allowing for clawback, this will fall to £1,225 to £1,276 per premises passed (depending on whether take-up stabilises at 60 or 80 percent in the long-term).

A review of the literature suggests that there are no evaluations providing quantitative estimates of the cost-effectiveness of comparable initiatives in bringing forward broadband coverage. As such, it has not been possible to benchmark the scheme to explore issues relating to how far the programme design was optimal. However, a study for the European Commission does provide estimates of the projected cost per covered premises, and it appears that the cost per premises covered for the Superfast Broadband Programme is lower than the projected costs for comparable schemes in the EU<sup>77</sup>. However, it should be noted that the cost per premise passed for these European programmes will be dependent on the type of infrastructure investments made to reach premises, and this information was not available.

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<sup>77</sup> European Commission (2020) The role of State aid for the rapid deployment of broadband networks in the EU; Available at: <https://ec.europa.eu/competition/publications/reports/kd0420461enn.pdf>



### Question 7: Did the aid lead to commercially sustainable networks?

None of the Phase 3 contracts currently listed on the Superfast Status Report have had services withdrawn by the network provider. This means that there have been no premises which have not been upgraded as a result of a beneficiary withdrawing from the programme.

However, a total of six contracts have been terminated. All of these contracts were awarded and terminated by the same Local Body and were awarded to two beneficiaries. These contracts were terminated by the Local Body, due to the inability of the beneficiaries (and its supply chain) to deliver the network build outlined in their bids to the required quality within the specified timeframe of the contract. These contracts were not terminated due to the commercial viability of the contract.

Analysis of Phase 3 contracts shows that take-up is now close to **[redacted]** and has caught up following a slow start to delivery.

### Wider economy effects

The present value of net public spending required to deliver the Superfast Broadband Programme over the lifetime of Phase 3 contracts was estimated to be £273m in nominal terms.

The findings of the evaluation indicate that the programme has led to a range of economic and social benefits in the areas benefitting from Phase 3 coverage between 2016 and 2021. The key results included:

- **Local employment impacts:** Subsidised coverage from Phase 3 was estimated to have increased employment in the areas benefitting from the programme by 0.88 percent, leading to the creation of 6,261 local jobs by March 2021. The programme as a whole was estimated to have led to 23,700 more local jobs up to March 2021.
- **Turnover:** Subsidised coverage also increased the turnover of firms located in the areas benefitting from Phase 3 of the programme by 1.6 percent by 2021, increasing the annual turnover of local businesses by £827m per annum. Estimates for the whole programme suggested that turnover of firms in areas benefitting from coverage increased by 1.4 percent (equating to around £2.6bn).
- **Number of firms:** The evidence indicated that a share of these local economic impacts were driven by the relocation of firms to the programme area. The evidence indicated that subsidised coverage increased the number of businesses located in the areas benefitting by around 0.5 percent – suggesting the programme may have encouraged the ‘disagglomeration’ of economic activity to rural areas.
- **Turnover per worker:** There were also signals of efficiency gains - turnover per worker of firms in the areas benefitting from Phase 3 coverage rose by 0.42 percent in response to subsidised coverage. This was not solely driven by more productive businesses moving into areas with improved broadband infrastructure. Firms that did not relocate over the period also saw their turnover per worker rise by 0.17 percent by 2021, indicating that subsidised coverage has also raised the efficiency of firms. It should be noted that while subsidised coverage had a stable effect on turnover, impacts on employment increased with time. This led to the strength of the gains in turnover per worker appearing to decay with time.
- **Wages:** The impacts of the programme were also visible in wages. Employees working for firms located in the areas benefitting from subsidised coverage saw their hourly earnings increase by

between 0.6 and 0.8 percent in response to the upgrade. This gives greater confidence that the programme led to an increase in productivity.

- **Unemployment:** Local job creation also appeared to translate into reduced unemployment, with the number of unemployed claimants falling by 9.8 for every 10,000 premises upgraded.
- **House prices:** The programme led to an increase in house prices (of between £1,900 and £4,900) suggesting that buyers valued the technology.

It is important to note that while most of these findings account for the possibility that businesses benefitting from the programme may have claimed market share from local competitors, they should not be interpreted as net economic impacts at the national level. At the national level, the programme is estimated to have resulted in:

- **Economic benefits:** Phase 3 is estimated to have led to a cumulative total of £7.2m in productivity gains between 2016/17 and 2021/22. This rises to between £20.8m and £23.1m over the 2016/17 to 2030 period. Additional economic benefits from the reduction in long-term unemployment is estimated to be £5.5m between 2016/17 and 2021/22, rising to between £15.7m and £17.4m over the 2016/17 to 2030 period
- **Social benefits:** Based on its impacts on house prices between 2016/17 and 2021/22, the programme is estimated to have led to social benefits valued at between £370.3m and £946.9m.

The estimated Benefit to Cost Ratio (BCR) was between £1.76 and £4.57 per £1 of net lifetime public sector costs based on its impacts between 2016/17 and 2021/22. This assumes that the house price premium is a reasonable approximation of the average welfare gain associated with the programme, and that the house price premium can be applied to all premises in the upgraded areas. The width of the range is driven largely by modelling uncertainty regarding the size of the house price premium associated with subsidised coverage. Allowing for future economic benefits to 2030, the BCR is estimated to rise to between £1.87 and £4.70 per £1 of net public sector spending.

However, it is possible that the house premium overstates the average welfare gain associated with enhanced broadband connectivity. Therefore, a lower bound of total benefits has been estimated, with a BCR between £0.78 and £1.97 per £1 of net lifetime public sector costs between 2016/17 and 2021/22, and between £0.89 and £2.11 per £1 of net public sector spending allowing for economic benefits to 2030.

# Our standards and accreditations

Ipsos' standards and accreditations provide our clients with the peace of mind that they can always depend on us to deliver reliable, sustainable findings. Our focus on quality and continuous improvement means we have embedded a "right first time" approach throughout our organisation.



## ISO 20252

This is the international market research specific standard that supersedes BS 7911/MRQSA and incorporates IQCS (Interviewer Quality Control Scheme). It covers the five stages of a Market Research project. Ipsos was the first company in the world to gain this accreditation.



## Market Research Society (MRS) Company Partnership

By being an MRS Company Partner, Ipsos endorses and supports the core MRS brand values of professionalism, research excellence and business effectiveness, and commits to comply with the MRS Code of Conduct throughout the organisation. We were the first company to sign up to the requirements and self-regulation of the MRS Code. More than 350 companies have followed our lead.



## ISO 9001

This is the international general company standard with a focus on continual improvement through quality management systems. In 1994, we became one of the early adopters of the ISO 9001 business standard.



## ISO 27001

This is the international standard for information security, designed to ensure the selection of adequate and proportionate security controls. Ipsos was the first research company in the UK to be awarded this in August 2008.



## The UK General Data Protection Regulation (GDPR) and the UK Data Protection Act (DPA) 2018

Ipsos is required to comply with the UK GDPR and the UK DPA. It covers the processing of personal data and the protection of privacy.



## HMG Cyber Essentials

This is a government-backed scheme and a key deliverable of the UK's National Cyber Security Programme. Ipsos was assessment-validated for Cyber Essentials certification in 2016. Cyber Essentials defines a set of controls which, when properly implemented, provide organisations with basic protection from the most prevalent forms of threat coming from the internet.



## Fair Data

Ipsos is signed up as a "Fair Data" company, agreeing to adhere to 10 core principles. The principles support and complement other standards such as ISOs, and the requirements of Data Protection legislation.

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