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| Part III.8 - Supplementary Information Sheet for the notification of an evaluation plan  |

*Member States must use this sheet for the notification of an evaluation plan pursuant to Art. 1(2)(a) of Regulation (EU) No 651/2014[[1]](#footnote-1) and in the case of a notified aid scheme subject to an evaluation as provided in the relevant Commission guidelines.*

*Please refer to the Commission Staff Working Document "Common methodology for State aid evaluation"[[2]](#footnote-2) for guidance on the drafting of an evaluation plan.*

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| Identification of the aid scheme to be evaluated |

1. Title of the aid scheme:

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| National Broadband scheme for the UK - Broadband Delivery UK (BDUK) |

1. Does the evaluation plan concern:
2. ☐ a scheme subject to evaluation pursuant to Article 1(2)(a) of Regulation (EU) No 651/2014?
3. ☒ a scheme notified to the Commission pursuant to Article 108(3) TFEU?
4. Reference of the scheme (to be completed by the Commission):

[...]

1. Please list any existing *ex-ante* evaluations or impact assessments for the aid scheme and ex-post evaluations or studies conducted in the past on predecessors of the aid scheme or on similar schemes. For each of those studies, please provide the following information: (a) a brief description of the study's objectives, methodologies used, results and conclusions, and (b) specific challenges that the evaluations and studies might have faced from a methodological point of view, for example data availability that are relevant for the assessment of the current evaluation plan. If appropriate, please identify relevant areas or topics not covered by previous evaluation plans that should be the subject of the current evaluation. Please provide the summaries of such evaluations and studies in annex and, when available, the internet links to the documents concerned:

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| The following references are of relevance in assessing the impact of broadband, and of broadband interventions, and have been reviewed to help inform our choice of methodologies for this State Aid evaluation plan and for BDUK’s evaluation of wider outcomes. The summaries are attached as an Annex.

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| Objectives of the aid scheme to be evaluated[[3]](#footnote-3) |

* 1. Please provide a description of the aid scheme specifying the needs and problems the scheme intends to address and the intended categories of beneficiaries, for example size, sectors, location, indicative number:

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| The problem the scheme intends to addressThe notified measure is designed to bring broadband connectivity to areas where current networks do not satisfy the connectivity needs of citizens and businesses and there is no prospect for improvement through commercial investments in the near future (i.e. the next three years). The measure will address the digital divide present in ‘white’ ‘rural’ NGA areas of the UK. The UK expects these areas to persist in the absence of Government (State aid) intervention. Scheme beneficiariesDirect beneficiaries of the aid will be electronic communications operators offering broadband services. In cases where alternative ownership structures are used, direct beneficiaries could also include community bodies[[4]](#footnote-4) or local authorities, on behalf of communities, where they decide to own the subsidised infrastructure. If the broadband network is owned and operated (at wholesale level) by a public authority (or in-house company) then the publicly owned network operator (1) must limit its activities to within the pre-defined target area(s) and must not expand to other commercially attractive locations; (2) will limit its activity to maintaining and granting access to the passive infrastructure, but shall not engage in competition at the retail level with commercial operators; and (3) will have accounting separation between the funds used for the operation of the networks and the other funds at the disposal of the public authority.[[5]](#footnote-5) BDUK anticipates that the scheme will have between 10 and 20 direct beneficiaries with the final number depending on the outcome of open competition and how the market evolves over the scheme period (including the capacity of smaller suppliers[[6]](#footnote-6) and appetite to bid for projects in the more remote regions of the country). Under the 2012 NBS there were 10 aid beneficiaries. BDUK anticipates that there will be approximately 50 different procurements (or procurement lots) under the 2016 NBS. This estimate is based on that assumption that interventions will be smaller than the 44 previously identified under the 2012 NBS. BDUK anticipates that contracts will be procured through the entire operating period of the Decision, meaning that many public-funded networks will be fully implemented by the expiry of the scheme, while deployment of others will continue after the Decision has expired, potentially until 2023. Indirect beneficiaries will be communications providers obtaining wholesale access to the State-subsidised network in order to offer retail services to end-users. |

* 1. Please indicate the objectives of the scheme and the expected impact, both at the level of the intended beneficiaries and as far as the objective of common interest is concerned:

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| The 2016 NBS is designed to provide access to NGA infrastructure capable of delivering superfast broadband speeds to as many homes and businesses as possible in each relevant ‘NGA white’ intervention area in the UK. Ensuring the delivery of these services, at affordable prices, is a common interest objectives identified by the European Commission in its Digital Agenda for Europe. |

* 1. Please indicate possible negative effects, on the aid beneficiaries or on the wider economy, that might be directly or indirectly associated with the aid scheme[[7]](#footnote-7):

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| Possible negative arising from the scheme might be as follows:Direct effects* Incumbency advantages (e.g. economies of scale) may benefit BT(or other suppliers) in bidding for contracts and that advantage may be locked in for a proportion of the remaining white NGA areas.

Indirect effects* Winning bidders could crowd out investment by other potential industry participants in ‘white’ intervention areas.

Wider economy effects* A number of untried business models/technologies could fail to deliver/prove high cost. It is likely that the UK will need to meet the costs related to these interventions in one form or another and to ensure that service is supplied regardless of the market conditions. The economy as a whole will need to pick up the cost of doing so.
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* 1. Please indicate (a) the annual budget planned under the scheme, (b) the intended duration of the scheme[[8]](#footnote-8), (c) the aid instrument or instruments and (d) the eligible costs:

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| The UK expects to commit up to £500 million of additional public funding to achieve the objective of the measure. This budget will allow for the procurement of projects using funding already committed by BDUK and local bodies, as well as providing scope for some further funding. The scheme period will be up to the end of 2020. |

* 1. Please provide a summary of the eligibility criteria and the methods for selecting the aid beneficiaries. In particular, please describe the following: (a) the methods used for selecting beneficiaries (e.g. such as scoring), (b) the indicative budget available for each group of beneficiaries, (c) the likelihood of the budget being exhausted for certain groups of beneficiaries, (d) the scoring rules, if they are used in the scheme, (e) the aid intensity thresholds and (f) the criteria the authority granting the aid will take into account when assessing applications:

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| Any credible supplier (either pre-existing communications provider, or new entrant) using qualifying NGA technologies is eligible to bid for State aid to deliver the objectives of the scheme in the identified ‘white’ intervention area. When selecting the supplier of broadband infrastructure in the NGA ‘white’ intervention areas, procurements will need to meet the requirements set out in the *Procurement & Evaluation Guidance* (Annex A above). This document also provides detail regarding scoring of bids.The UK would expect that the full budget would need to be used to deliver to the hardest to reach parts of the UK (or some identified portion of them).The aid intensity will depend on the outcome of the open tender processes and thus will vary from project to project. The UK expects the aid intensities for broadband projects to vary across the country. While the UK expects the majority of projects to require an aid intensity of less than 100%, given historic network deployment decisions, extreme topography, network re-configuration and very low densities, there will be cases that we expect will require 100% aid funding. |

* 1. Please mention specific constraints or risks that might affect the implementation of the scheme, its expected impacts and the achievement of its objectives:

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| The most significant risk to the 2016 NBS is that the increases in access requirements mean that some projects are not able to attract any viable bidders, or materially increase public funding requirements. This could result in reduced coverage outcomes or lead to a procurement being re-run or abandoned. BDUK efforts to develop the market, and the proposed cascading procurement approach should help mitigate this risk. Commercial sustainability is also a risk. If a network is built in the intervention area with public funds but is unable to secure sufficient revenues to sustain the network costs then the project may fail. BDUK’s procurement evaluation criteria specifically considers the sustainability of networks in the selection of a supplier.  |

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| Evaluation questions |

* 1. Please indicate the specific questions that the evaluation should address by providing quantitative evidence of the impact of aid. Please distinguish between (a) questions related to the direct impact of the aid on the beneficiaries, (b) questions related to the indirect impacts and (c) questions related to the proportionality and appropriateness of the aid. Please explain how the evaluation questions relate to the objectives of the scheme:

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| *BDUK Evaluation Framework*BDUK has developed a cross-programme evaluation framework. This will evaluate all BDUK programmes and projects, including the projects under the 2016 NBS. The framework will ensure BDUK:* Delivers a single, coherent approach to evaluation.
* Meets UK Government and European Commission expectations for reporting outcomes and impacts.
* Measures outcomes and impacts of BDUK programmes to the UK, including impacts on the market and the consumer.
* Provides opportunities to improve future policy development.
* Builds on evaluation work already completed.

Within the framework, BDUK will work to evaluate:* Benefits stated in UK Government business cases and the 2012 UK Broadband Impact Study[[9]](#footnote-9).
* Other impacts and outcomes which have emerged through the delivery of BDUK programmes.
* The impact of BDUK interventions on the market.
* The delivery of BDUK programmes, identifying areas of best practice and lessons learnt.

This is summarised in the summary diagram below which indicates the different types of outcomes and impacts BDUK will consider in more detailed evaluation planning[[10]](#footnote-10).For the 2016 National Broadband Scheme for the UK, BDUK will:* Answer the impact evaluation and validation questions listed below (which address the evaluation questions posed in the Commission’s ‘Common methodology for State aid evaluation’)
* Evaluate the wider outcomes and impacts of the programme, such as productivity, employment and public value. Outputs from this work will be shared with the Commission.
* Undertake evaluations of the processes used to deploy the scheme, including a study on the first three procurements under the new cascade approach. Again, outputs from this work will be shared with the Commission.

*Impact evaluation** The impact evaluation will consider the evaluation questions posed in the Commission’s ‘Common methodology for State aid evaluation’.

**Effectiveness** * *Question 1. To what extent has the aid resulted in increased access to an NGA network in white NGA areas? This will indicate how many premises receive qualifying broadband services and over what time period have these been made available.*
* *Question 2. To what extent has the target of the intervention been used and what speeds are available? This will indicate take-up of NGA connections and provide a proxy for quality of service.*

**Direct impact of the aid on beneficiaries** * *Question 3. Has the aid had a significant incentive effect on the aid beneficiaries? This will indicate whether the aid beneficiaries would have invested in the network without subsidy. [[11]](#footnote-11)*

 * *Question 4. Has the aid had a material effect on the market position of the direct beneficiaries? This will indicate whether the market position of beneficiaries has changed at both a local and national level.*

**Indirect impact of the aid scheme*** *Question 5. Is there evidence of changes to parameters of competition arising from the aid? This will indicate whether there have been changes in the nature of competition in the intervention areas (e.g. number of competitors, technologies used).*

**Proportionality and appropriateness of the aid scheme*** *Question 6. Is the gap funding model efficient compared to alternative schemes? This will compare the average cost of delivery across different aid schemes[[12]](#footnote-12).*
* *Question 7. Did the aid lead to commercially sustainable networks? This will compare modelled and actual take-up rates, revenue per user (ARPU) and operating costs, and check whether this led to aid beneficiaries withdrawing from the area.*

*Validation* * The evaluation will confirm whether the projects have been implemented in line with the requirements of the 2013 Broadband Guidelines and the 2016 NBS. Specifically, the evaluator will be required to assure the information and data supplied by BDUK on each and every project as being compliant with the reference provisions.
* Should the “reduced access” conditions proceed, the procurement of the first three projects under the ”cascade procurement” approach will be subject to real time monitoring from the Case Team, as described the Notification. This will confirm that the projects are being procured as envisioned.
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| Result indicators |

* 1. Please use the following table to describe which indicators will be built to measure outcomes of the scheme, as well as the relevant control variables, including the sources of data, and how each result indicator corresponds to the evaluation questions. In particular, please mention (a) the relevant evaluation question, (b) the indicator, (c) the source of data, (d) the frequency of collection of data (for example, annual, monthly, etc.), (e) the level at which the data is collected (for example, firm level, establishment level, regional level, etc.), (f) the population covered in the data source (for example, aid beneficiaries, non-beneficiaries, all firms, etc.):

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| **Evaluation question** | **Indicator** | **Source** | **Frequency** | **Level** | **Population** |
|  Impact Evaluation |
| 1. To what extent has the aid resulted in increased access to an NGA network being deployed in white NGA areas? | Number of premises passed by NGA services | Ofcom | Data is collected annually at present, with data as at June available in the Autumn.Analysis will take place in late 2018 and late 2020 | Premise-level (from 2016) | All UK premises |
| 2. To what extent has the target of the intervention been used and what speeds are available? | Number of live NGA-delivered connectionsMean download speed of broadband connectionsMean upload speed of broadband connections | Ofcom | Data is collected annually at present, with data as at June available in the AutumnAnalysis will take place in late 2018 and late 2020 | Premise-level (from 2016) | All UK premises |
| 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 | The winning supplier for each procurement lot | Financial model projections are provided in each procurement process.Analysis towards the end of the scheme (late 2020) will compare actuals versus forecast | Procurement lot-level | Sample of 2016 NBS procurement lots, consisting of the ten largest contracts |
| 4. Has the aid had a material effect on the market position of the direct beneficiaries? | For each winning supplier:* The supplier’s market share of all active NGA lines within the relevant county/unitary local authority area(s) at end June 2020 versus end June 2016
* The supplier’s market share of all active NGA lines within the UK at end June 2020 versus end June 2016
 | Ofcom | Data is collected annually at present, with data as at June available in the Autumn Analysis will take place towards the end of the scheme in late 2020 | Premise-level (from 2016) | All UK premises |
| 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:* Take-up of NGA lines as a share of all broadband take-up
* Market share (of take-up) for each NGA technology (FTTC, FTTP, Cable, fixed wireless)
* Number of infrastructure providers offering NGA services
* Number of unique operators making use of the open access made available under the 2016 NBS
 | OfcomWinning suppliers (for information on open access users) | Data is collected annually at present, with data as at June available in the Autumn Analysis will take place towards the end of the scheme in late 2020 | Premise-level (from 2016) | All UK premises |
| 6. Is the gap funding model efficient compared to alternative schemes | Comparison of the BDUK gap-funded scheme against non-gap-funded UK and EU comparator schemes in terms of:* Public funding per covered premise (using the maximum in-life coverage for closed schemes)
* Public funding per live end user connection to the network (using the maximum in-life take-up for closed schemes)
* Public funding per live end-user connection-years
 | BDUKThe relevant authorities for the UK comparator schemesThe relevant authorities for the EU comparator schemes | One-off analysis towards the end of the scheme (late 2020)  | Programme-level | All 2016 NBS procurement lotsSelected UK and EU comparator schemes |
| 7. Did the aid lead to commercially sustainable networks?  | For each winning supplier, their actual versus original forecast:* Annual cashflow (before subsidy)
* Take-up volumes
* Average revenue per user
* Average operational costs per user

For the interventions funded by the 2016 NBS:* 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
* 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)
 | The winning supplier for each procurement lot | One-off analysis towards the end of the scheme (late 2020)  | Procurement lot-level | All 2016 NBS procurement lots |
| Validation of NBS compliance |
| *To what extent has the operation of the 2016 NBS**been compliant with State aid requirements?* | Assurance check of compliance with 2013 Broadband Guidelines[[13]](#footnote-13), as well as the 2016 NBS Decision. Compliance check(s) used to inform/supplement Commission monitoring | Specified monitoring requirements (compatibility conditions) detailed in any State aid decision, which will be made conditions of State aid contracts  | Project start and end dates, with defined intermediate milestones (certain value for money metrics operating on a quarterly basis) | Programmatic and project level, which includes firm specific data | All projects |

Please explain why the chosen indicators are the most relevant for measuring the expected impact of the scheme:

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| The above indicators have been chosen to be the most meaningful metrics relevant to their respective evaluation questions, within the constraints of the data that we expect to be available. |

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| Envisaged methods to conduct the evaluation |

* 1. In light of the evaluation questions, please describe the envisaged methods to be used in the evaluation to identify the causal impact of the aid on the beneficiaries and to assess other indirect impacts. In particular, please explain the reasons for choosing those methods and for rejecting other methods (for example, reasons related to the design of the scheme)[[14]](#footnote-14):

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| **Methods per evaluation question*****1. To what extent has the aid resulted in increased access to an NGA network being deployed in white NGA areas?***To answer this question, we envisage that the evaluators will use two methods:* simple difference-in-difference (DID)
* control group regression to predict counterfactual treatment group coverage.

Note that *postcode*-level observations are considered sufficient for the proposed initial difference-in-difference analyses of the two groups, as this focuses on differences in overall coverage levels. *Premise*-level observations are preferred for the more demanding regression analyses proposed, as this will involve regression techniques to estimate models for the counterfactual coverage, and the larger number of observations and more detailed information available at premise-level should help to improve the accuracy of these models.*Simple difference-in-difference*In late 2018, the evaluators will conduct a difference in difference analysis over the period June 2016 to June 2018 between Postcode Control Group 2018 and Postcode Treatment Group 2018 (see section 5.2 for a description of these). Note that this initial analysis is intended to provide descriptive information on the differences between these two groups in terms of the changes in coverage over that period, in order to set the context for the second method (which uses regression techniques in order to estimate the *causal* effect of intervention). The before-and-after weighted mean NGA % coverage[[15]](#footnote-15) (*nga*) for these two groups will be compared (weighted by total premises per postcode), to give the change in % coverage in NGA white areas due to intervention:$$∆nga\_{intervention1618}=\left(nga\_{T18}-nga\_{T16}\right)-(nga\_{C18}-nga\_{C16})$$(where T subscript denotes the Treatment Group, and the C subscript denotes the Control Group). That change in % coverage will then be applied to the total number of premises in the Postcode Treatment Group 2018 to provide an estimate of the net additional premises covered by NGA attributable to intervention over that period:$$∆prems\_{intervention1618}= prems\_{T18} \frac{×∆nga\_{intervention1618}}{100}$$The analysis will be repeated in late 2020, for the period June 2016 to June 2020, with Postcode Treatment Group 2020 and Postcode Control Group 2020, in order to provide an estimate of the net additional premises covered by NGA attributable to intervention over that period – provided that there is still a reasonably-sized control group remaining in 2020 (i.e. white postcodes yet to be included in any intervention contract):$$∆nga\_{intervention1620}=\left(nga\_{T20}-nga\_{T16}\right)-\left(nga\_{C20}-nga\_{C16}\right)$$$$∆prems\_{intervention1620}= prems\_{T20} \frac{×∆nga\_{intervention1620}}{100}$$This simple DID approach has the benefit of being relatively straightforward to do and interpret, while controlling for changes due to unobserved variables affecting both groups (such as macroeconomic conditions). It also controls for potential crowding-out (of commercial investment in areas with confirmed intervention plans, but no coverage yet) by excluding any in-contract postcodes from the control group (see section 5.2). Undertaking the assessment at the interim stage of mid 2018 leaves scope for there to be a reasonably substantial remaining control group available. However, the results estimated through this method may suffer from selection bias:* The control group is likely to be less commercially attractive, on average, than the treatment group (as each local intervention will go to those areas that maximise the premises covered for the given funds). This will lead to the levels of additional coverage attributable to intervention being *overstated* through this method.
* Procurement phasings could potentially lead to treatment vs control differences being skewed by geography. This would probably lead to the levels of additional coverage attributable to intervention being *overstated* through this method (if the local bodies with the most difficult coverage problems complete their procurements later than those with less difficult coverage challenges). However, it is also possible that the additional coverage could be understated (if the local bodies with the less difficult problems choose to delay their further procurements).
* If local bodies deliberately exclude some NGA white postcodes from their procurements on the grounds that they anticipate commercial coverage happening (notwithstanding the OMR process failing to confirm such plans at those postcodes), then the levels of additional coverage attributable to intervention could potentially be *understated* through this method, if those postcodes are not excluded from the control group.

For such reasons, we envisage that a more advanced method, involving non-linear regressions, will also be used. We discuss this below. *Control group regression to predict counterfactual treatment group coverage*In late 2018, the evaluators will conduct a regression analysis over the period June 2016 to June 2018, using the Premise Control Group 2018 and the Premise Treatment Group 2018.The premise-level datasets for these groups will be constructed in cross-section (rather than panel) format.Using the control group dataset, the evaluators will estimate a model for the NGA coverage[[16]](#footnote-16) per premise in 2018 (*nga18*, a binary dependent variable, taking the values 0 or 1). The model takes the general form:$$nga18\_{i}=β\_{0}+βx\_{i}+ϵ\_{i}$$In this equation the i subscript denotes observation number i, $β\_{0}$ is a constant, $x\_{i}$is a vector ofexplanatory variables which are believed to influence the level of commercial NGA coverage in an area (see section 5.2), $β$ is a vector of the regression coefficients for those explanatory variables, and $ϵ\_{i}$ is an error term. In order to avoid the model predicting *nga18* values (for some premises) less than 0 or greater than 1 (which would be possible with a linear regression estimate for this model), the **logistic regression** method will be used. This fits values using S-shaped logistic curves (rather than straight lines) to depict how the dependent variable varies with the explanatory variables. The resulting prediction for *nga18* falls between 0 and 1, and can be interpreted as the *probability* of a specific premise being covered as of 2018, given its explanatory variables. Through running logistic regressions with various combinations of explanatory variables, the evaluators will use their professional judgement in order to determine the model (i.e. combination of coefficients and explanatory variables) that best fits the observed levels of 2018 NGA coverage in the control group. The same best-fit model (using the coefficients from the control group regression) will be applied to the treatment group to predict the counterfactual probability of NGA coverage per premise, and hence the total counterfactual % NGA coverage in the treatment group. This counterfactual % NGA coverage will be subtracted from the actual % NGA coverage, in order to estimate the additional % NGA coverage (and hence the additional number of premises covered) attributable to intervention over the period June 2016 to June 2018. The analysis will be repeated in late 2020, for the period June 2016 to June 2020, with Premise Treatment Group 2020 and Premise Control Group 2020, in order to provide an estimate of the net additional premises covered by NGA attributable to intervention over that period – provided that there is still a reasonably-sized control group remaining in 2020 (i.e. premises in postcodes which were NGA white at end June 2016, and yet to be included in any intervention contract as of June 2020). For this later analysis, the dependent variable will be *nga20 (*a binary dependent variable, taking the values 0 or 1), and the model takes the general form[[17]](#footnote-17):$$nga20\_{i}=β\_{0}+βx\_{i}+ϵ\_{i}$$***2. To what extent has the target of the intervention been used, and what speeds are available?***The methods for evaluating this question will be similar to those used for question 1. *Simple difference-in-difference*In late 2018, the evaluators will conduct a difference in difference analysis over the period June 2016 to June 2018 between Postcode Control Group 2018 and Postcode Treatment Group 2018.The before-and-after weighted mean NGA % takeup (*ngatu*) for these two groups will be compared (weighted by total premises per postcode), to give the change in NGA % takeup in NGA white areas due to intervention:$$∆ngatu\_{intervention1618}=\left(ngatu\_{T18}-ngatu\_{T16}\right)-(ngatu\_{C18}-ngatu\_{C16})$$(where T subscript denotes the Treatment Group, and the C subscript denotes the Control Group). That change in % take-up will then be applied to the total number of premises in the Postcode Treatment Group 2018 to provide an estimate of the net additional take-up of NGA attributable to intervention over that period:$$∆premstu\_{intervention1618}= prems\_{T18} \frac{×∆ngatu\_{intervention1618}}{100}$$The analysis will be repeated in late 2020, for the period June 2016 to June 2020, with Postcode Treatment Group 2020 and Postcode Control Group 2020, in order to provide an estimate of the net additional premises taking up by NGA attributable to intervention over that period – provided that there is still a reasonably-sized control group remaining in 2020 (i.e. white postcodes yet to be included in any intervention contract):$$∆ngatu\_{intervention1620}=\left(ngatu\_{T20}-ngatu\_{T16}\right)-\left(ngatu\_{C20}-ngatu\_{C16}\right)$$$$∆premstu\_{intervention1620}= premstu\_{T20} \frac{×∆ngatu\_{intervention1620}}{100}$$The same difference-in-difference analysis will also be applied to two other dependent variables of interest[[18]](#footnote-18):* weighted mean download speeds in 2018 and 2020 (*dl18* and *dl20*)
* weighted mean upload speeds in 2018 and 2020 (*ul18* and *ul20*).

*Control group regression to predict counterfactual treatment group take-up and speeds*As per the discussion for Question 1, the simple difference-in-difference approach may be subject to selection bias, so a complementary regression approach will also be used, to control for differences between the treatment and control groups. In late 2018, the evaluators will conduct a regression analysis over the period June 2016 to June 2018, using the Premise Control Group 2018 and the Premise Treatment Group 2018.Using the control group dataset, the evaluators will estimate a model for the NGA takeup per premise in 2018 (*ngatu18*, a binary dependent variable, taking the values 0 or 1). The model takes the general form:$$ngatu18\_{i}=β\_{0}+βx\_{i}+ϵ\_{i}$$Where the i subscript denotes observation number i, $β\_{0}$ is a constant, $x\_{i}$is a vector ofexplanatory variables which are believed to influence the level of NGA coverage and take-up in an area (see section 5.2), $β$ is a vector of the regression coefficients for those explanatory variables, and $ϵ\_{i}$ is an error term. In order to avoid the model predicting *ngatu18* values (for some premises) less than 0 or greater than 1 (which would be possible with a linear regression estimate for this model), the **logistic regression** method will again be used. Through running logistic regressions with various combinations of explanatory variables, the evaluators will use their professional judgement in order to determine the model (i.e. combination of coefficients and explanatory variables) that best fits the observed levels of 2018 NGA take-up in the control group. The same best-fit model (using the coefficients from the control group regression) will be applied to the treatment group to predict the counterfactual probability of NGA takeup per premise, and hence the total counterfactual % NGA takeup in the treatment group. This counterfactual % NGA takeup will be subtracted from the actual % NGA takeup, in order to estimate the additional % NGA takeup (and hence the additional number of premises taking up NGA services) attributable to intervention over the period June 2016 to June 2018. The analysis will be repeated in late 2020, for the period June 2016 to June 2020, with Premise Treatment Group 2020 and Premise Control Group 2020, in order to provide an estimate of the net additional premises taking up NGA attributable to intervention over that period – provided that there is still a reasonably-sized control group remaining in 2020 (i.e. premises in postcodes which were NGA white at end June 2016, and yet to be included in any intervention contract as of June 2020). For this later analysis, the dependent variable will be *ngatu20 (*a binary dependent variable, taking the values 0 or 1), and the model takes the general form:$$ngatu20\_{i}=β\_{0}+βx\_{i}+ϵ\_{i}$$For the mean download and upload speeds, the dependent variables are continuous (rather than binary), and so linear regression is more appropriate than logistic regression. Otherwise, the regression approach is as per that for takeup, described above.***3. Has the aid had a significant incentive effect on the aid beneficiaries?***We anticipate that the evaluation of this question will focus on an assessment of the winning suppliers’ financial models – both before intervention (using the projected values) and after intervention (using actual values to date, and estimates for the remainder of the appraisal period).In late 2020 the evaluators will obtain, for a sample consisting of the ten largest contracts under the scheme (by value of total public funding): * the financial model for the intervention area submitted as part of the winning supplier’s bid, including the expected Internal Rate of Return (IRR) before subsidy and the expected IRR after subsidy
* data on actual annual capital expenditure, operating expenditure, take-up, revenues, subsidy payments and any clawback sums in the intervention area.

For each of the winning unique suppliers of these contracts, the evaluators will establish an estimate of the Weighted Average Cost of Capital (WACC) as of the bid year, noting that this may be based on information provided by the supplier.Using the supplier’s financial model for each contract, the evaluators will then develop updated estimates for the likely IRR (over the same appraisal period originally used for the bid), in the light of the annual actuals to date. The evaluators will then compare, for each contract, the supplier’s estimated WACC versus:* the original IRR *before* subsidy
* the updated estimate of IRR *before* subsidy and clawback
* the original IRR *after* subsidy
* the updated estimate of IRR *after* subsidy and clawback.

The assessment of whether the aid has had a significant incentive effect on the aid beneficiaries will be informed by how these IRRs (before and after subsidy/clawback) compare with the supplier’s WACC: in particular, if the updated estimate of IRR before subsidy/clawback turns out to be above the supplier’s WACC then that would call into question the extent of the incentive effect. ***4. Has the aid had a material effect on the market position of the direct beneficiaries?***The evaluation of this question will consider the suppliers’ local and national market shares. We envisage that the evaluators will use a descriptive approach, rather than econometric techniques, for this analysis, given that suppliers’ market shares will primarily be driven by factors (other than the intervention) which are unobservable in practice, including quality of management, level of advertising spend, brand awareness, quality of service, and quality of customer service. *Local market share analysis*For each supplier awarded a contract under the scheme, the evaluators will compare the supplier’s market share of all active (i.e. connected) NGA lines within the relevant county/unitary local authority areas (i.e. those areas in which the supplier was subsidised) at end June 2020 versus end June 2016.In order to assess the effect of the intervention on local market share, the evaluators will calculate the supplier’s NGA take-up within the subsidised postcodes as a proportion of the total (all suppliers) NGA take-up per county/unitary local authority area as at June 2020.*National market share analysis*For each supplier awarded a contract under the scheme, the evaluators will also compare the supplier’s market share of all active NGA lines within the UK at end June 2020 versus end June 2016.In order to assess the effect of the intervention on national market share, the evaluators will calculate the supplier’s NGA take-up within subsidised postcodes as a proportion of the total (all suppliers) NGA take-up in the UK as at June 2020. ***5. Is there evidence of changes to parameters of competition arising from the aid? (Including third parties operating in the relevant intervention area(s))?***Again, this question will be evaluated at local and national levels, using a descriptive approach.*Local market analysis*For each local body involved in the scheme, the evaluators will compare the June 2020 versus June 2016 situations across the relevant county/unitary local authority area(s) (i.e. not just the intervention area) in terms of:* NGA take-up as a share of all broadband take-up
* market share (of take-up) for each NGA technology (FTTC, FTTP, Cable, fixed wireless)
* number of infrastructure providers offering NGA services
* number of unique operators making use of the open access made available under the 2016 NBS.

Assuming, for the purposes of this market share analysis, that the intervention area NGA coverage is entirely additional, the evaluators will assess the extent to which the above parameters have been affected by the intervention.*National market analysis*Across the UK, the evaluators will compare the June 2020 versus June 2016 situations in terms of:* NGA take-up as a share of all broadband take-up
* market share (of take-up) for each NGA technology (FTTC, FTTP, Cable, fixed wireless)
* number of infrastructure providers offering NGA services
* number of unique operators making use of the open access made available under the 2016 NBS.

Assuming, for the purposes of this market share analysis, that the intervention’s NGA coverage is entirely additional, the evaluators will assess the extent to which the above parameters have been affected by the intervention.***6. Is the gap funding model efficient compared to alternative schemes?***The evaluation of this question will compare the 2016 NBS against alternative schemes in the UK, and against selected schemes in EU member states (if data is available). We do not envisage being able to undertake meaningful econometric comparisons of the efficiencies of different funding models, given the very different time periods and geographies involved in different schemes. However, it should be possible to develop descriptive comparisons which may inform the design of future interventions. *Comparison versus alternative schemes in the UK*BDUK will identify relevant UK interventions targeting rural areas with alternative publicly-funded (non gap-funded) models over the last several years, such as:* the Connected Communities scheme in the Outer Hebrides
* the Shetland Telecom project
* FibreSpeed in Wales
* the Digital Region scheme in South Yorkshire
* any significant non-gap funded NGA schemes that emerge in the UK between 2016 and 2020.

In 2020, the evaluators will compare the 2016 NBS against the above comparators[[19]](#footnote-19) (in 2020 prices) in terms of:* public funding per covered premise (using the maximum in-life coverage for closed schemes)
* public funding per live end user connection to the network (using the maximum in-life take-up for closed schemes)
* public funding per live end-user connection-years (summed over the period to 2020).

The evaluators will put these quantitative indicators into context, with descriptive statistics on the geographies covered by these comparators and by the 2016 NBS, and concise qualitative descriptions of the histories of the comparators (such as speeds offered, retail ISPs, sustainability, operating costs, and long term risks/liabilities assumed by the public sector etc.).*Comparison versus alternative schemes in other countries* For this, BDUK will look to the EC to identify relevant interventions in EU member states targeting rural areas with alternative publicly-funded (non gap-funded) models over the 2016 to 2020 period.In 2020, the evaluators will compare the BDUK gap-funded scheme against these international comparators (in 2020 prices), to the extent that data is available, in terms of:* public funding per covered premise (using the maximum in-life coverage for closed schemes)
* public funding per live end user connection to the network (using the maximum in-life take-up for closed schemes)
* public funding per live end-user connection-years.

Again, the evaluators will put these quantitative indicators into context, with descriptive statistics on the geographies covered by these comparators and by the 2016 NBS, and concise qualitative descriptions of the histories of the comparators (such as speeds offered, retail ISPs, sustainability, operating costs, and long term risks/liabilities assumed by the public sector etc.).We note, however, that a comprehensive meta-evaluation of broadband schemes around Europe is clearly beyond the scope of BDUK’s evaluation for the 2016 NBS. The amount of resource devoted to this exercise will need to be proportionate, and it will be dependent on the EC facilitating cooperation with EU member states.***7. Did the aid lead to commercially sustainable networks?*** This question will be evaluated by assessing the commercial performance of subsidised networks, and by a review of any projects from which services have been withdrawn.*Commercial performance of subsidised networks*For each contract (currently anticipated to be c. 50 contracts) the evaluators will assess the likelihood of the project being commercially sustainable post 2020, by comparing, as of June 2020, their actual versus original forecast:* annual cashflow (before subsidy)
* take-up volumes
* average revenue per user
* average operational costs per user.

An analysis across the contracts will identify any common factors for those projects which are most likely to be commercially sustainable, and for those which appear least likely to be commercially sustainable.*Assessment of any projects from which services have been withdrawn*For the interventions funded by the 2016 NBS, the evaluators will also assess, as of mid 2020:* 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
* the % share of the overall 2016 NBS accounted for by such projects (in terms of number of projects, public funding, premises covered, and take-up volumes).

**Other methods considered**Various other methods have been assessed, and rejected in favour of the methods described above. These include the following:* ***Randomised experiment***: randomising the postcodes selected for inclusion in the 2016 NBS intervention, and comparing the NGA coverage, take-up and download/upload speeds for the treatment and control groups (e.g. in 2018 and 2020). While this may be considered to be the purest form of evaluation, it was rejected on the grounds that it would lead to lower coverage than would otherwise be possible, and because it would be unacceptable at national and local levels for broadband availability to be randomly allocated at a postcode level.
* ***International coverage comparisons***: in 2020, comparing the time series of % NGA coverage (over the period 2010 to 2019) by country for several developed countries, and for the countries with the closest fit to the UK’s NGA coverage time series over the period 2010 to 2015, assess the difference-in-differences over the period 2015 to 2019. This was rejected as the comparison would be confounded by interventions already underway in the UK and other countries, and by new interventions in the comparator countries. We note, however, that the EC might like to consider undertaking a meta-evaluation at European level, to draw out and compare the learning points from the various broadband schemes.
* ***Regression Discontinuity Design***: this technique exploits spatial or other discontinuities associated with interventions, and compares the performance of treatment group and control group observations close to the discontinuity (see Ahlfeldt et al (2016) for example). In the broadband context, there is some scope for using this technique in BDUK’s evaluation of wider outcomes (e.g. comparing the performance of businesses just inside versus just outside a coverage area). However, we have not been able to identify any well-defined discontinuity/boundary that could be used for this State Aid evaluation (for which the key question is around the additionality of the coverage provided).
* ***Panel dataset difference in difference regression***: constructing a panel dataset at premise level, with values at e.g. 2016 and 2018 for each explanatory variable (as well as the dependent variables: coverage, take-up and speeds), and undertaking a panel logistic regression of the dependent variable on the explanatory variables plus dummies *post* (1 for the latter year) and *treat* (1 if the premise is in the intervention area), and the interaction term *post* x *treat*. The coefficient on the interaction term *post* x *treat* would be used to infer the causal effect of treatment. This approach was carefully considered, but eventually rejected on the grounds that some of the key explanatory variables (important for controlling for systematic differences between the treatment and control groups) would be endogenous over time due to reverse causality. In particular, a flag for whether a premise is served by an Exchange Only line is a critical determinant of its likelihood of receiving NGA coverage, but this would typically be changed to zero if (commercial or subsidised) NGA coverage was subsequently provided by a FTTC solution (i.e. *eo\_flag* is endogenous in a panel model for *nga*, because an FTTC provider would install a cabinet in order to provide NGA service to premises which were previously served by Exchange Only lines). Also, the number of premises in a postcode (and hence premise density) may also be influenced over time by the availability of NGA coverage, if house-builders have a higher likelihood of developing homes in areas with NGA coverage[[20]](#footnote-20). This approach also has the disadvantages of being more resource-intensive (in constructing the dataset), more complicated, and more prone to risks of inappropriate interpretation of the results than our preferred methods.
* ***Comparison of suppliers’ subsidised versus unsubsidised financial models***: assessing whether the overall IRR before subsidy for the intervention area is below the IRR for a sample of unsubsidised areas, and whether the overall IRR after subsidy for the intervention area is above the IRR for the unsubsidised areas, in order to assess the extent of the incentive effect provided by the aid for that supplier. This was rejected on the grounds that it would impose an unreasonable additional burden on bidders, and also because of the considerable scope for the financials for unsubsidised areas to be manipulated through the sample selection and the apportionment of shared costs.
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* 1. Please describe precisely the identification strategy for the evaluation of the causal impact of the aid and the assumptions on which the strategy relies. Please describe in detail the composition and the significance of the control group:

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| We envisage that the evaluation will use econometric approaches for assessing the causal impact of the aid for questions 1 and 2, while descriptive analysis will be used for questions 3 to 7 (but note that the findings for questions 1 and 2 clearly have a direct bearing on the levels of additionality associated with the intervention, for questions 3 and 7). **Control and treatment groups**Focusing on the methods for questions 1 and 2, then, the identification strategies use treatment and control groups, at postcode- and premise-levels at two different points in time (June 2018 and June 2020). The treatment and control groups are broadly similar in that both are within the final few percent of the UK postcodes/premises yet to obtain NGA coverage. Remaining systematic differences between the control/treatment group pairs will be controlled for through the regression approach described above. *Postcode-level groups (for the simple difference in difference analyses):*We propose the following two pairs of postcode-level treatment/control groups for the simple difference-in-difference analysis:* Postcode Control Group 2018 is a postcode-level set of observations (expected to be [xxxx] postcodes), consisting of those postcodes which were NGA white at end June 2016 (excluding those NGA white postcodes in cities in which BDUK and the local bodies have chosen not to intervene at all), and which had not been included in any 2016 NBS contract as at end June 2018
* Postcode Treatment Group 2018 is a postcode-level set of observations (expected to be [xxxx] postcodes), consisting of those postcodes in which at least 1 premise has been covered by NGA[[21]](#footnote-21) through 2016 NBS intervention, by end June 2018
* Postcode Control Group 2020 is a postcode-level set of observations (expected to be [xxxx] postcodes), consisting of those postcodes which were NGA white at end June 2016 (excluding those NGA white postcodes in cities in which BDUK and the local bodies have chosen not to intervene at all), and which had not been included in any 2016 NBS contract as at end June 2020
* Postcode Treatment Group 2020 is a postcode-level set of observations (expected to be [xxxx] postcodes), consisting of those postcodes in which at least 1 premise has been covered by NGA through 2016 NBS intervention, by end June 2020.

Note that the Open Market Reviews (OMRs) and procurement processes for 2016 NBS will be undertaken at different points in time for different areas, so we anticipate that the evaluators will need to approximate ‘those postcodes which were NGA white at end June 2016 (excluding those NGA white postcodes in cities in which BDUK and the local bodies have chosen not to intervene at all)’ for the control groups as being:* for those areas in which an OMR for 2016 NBS closed within three months of June 2016, those postcodes identified as addressable NGA white postcodes in the relevant public consultation[[22]](#footnote-22)
* for all other areas, those postcodes with 0% NGA coverage at June 2016 according to the Ofcom Connected Nations data[[23]](#footnote-23), but excluding:
* local authority areas for which no OMR/public consultation process has been completed under 2016 NBS as of end June 2018 (for the 2018 control group, or end June 2020 for the 2020 control group)
* any postcodes included in previous BDUK-funded interventions (i.e. where the roll-out had not yet been completed as of June 2016)
* any postcodes identified as having planned commercial coverage (whether complete or partial) through OMRs closed within the three years prior to end June 2016
* postcodes identified as NGA white in an OMR process for 2016 NBS, but which have been excluded from intervention in the relevant public consultation (for example, in city centres).

With OMRs taking place at different times in different places, the approach for identifying the premise-level control groups will follow that set out above for the postcode-level control groups. *Premise-level groups (for control group regressions to establish the treatment group counterfactual):*We propose the following two pairs of premise-level treatment/control groups for the regression analysis:* Premise Control Group 2018 is a premise-level set of observations (expected to be [xxxx] premises), consisting of those premises in postcodes which were NGA white at end June 2016 (excluding those premises in NGA white postcodes in cities in which BDUK and the local bodies have chosen not to intervene at all), and which had not been included in any 2016 NBS contract as at end June 2018
* Premise Treatment Group 2018 is a premise-level set of observations (expected to be [xxxx] premises), consisting of those premises that have been covered by NGA through 2016 NBS intervention, by end June 2018
* Premise Control Group 2020 is a premise-level set of observations (expected to be [xxxx] premises), consisting of those premises in postcodes which were NGA white at end June 2016 (excluding those premises in NGA white postcodes in cities in which BDUK and the local bodies have chosen not to intervene at all), and which had not been included in any 2016 NBS contract as at end June 2020
* Premise Treatment Group 2020 is a premise-level set of observations (expected to be [xxxx] premises), consisting of those premises that have been covered by NGA through 2016 NBS intervention, by end June 2020.

**Explanatory variables**The key identification strategy for the causal effect of the aid is to develop an estimate of the counterfactual NGA coverage (or take-up or speed) for the treatment group, by regressing the relevant dependent variable on a vector of explanatory variables for the control group, and then applying that estimated model to the treatment group to predict the situation in the absence of intervention. Under the (premise-level) regression analyses proposed, we envisage that the vector of explanatory variables will include the following: * number of residential premises in the postcode in 2016 (*res*)
* residential premises as a proportion of total premises in the postcode in 2016 (*resshare*)
* premises density of the Output Area (OA) in which the postcode sits in 2016 (*premdens*)
* straight line distance from premise to serving BT local exchange (*dist\_le*)
* total premises in the local exchange area in 2016 (*le\_size*)
* straight line distance from premise to the nearest Virgin Media (VM) served postcode at June 2016 (*dist\_vm*)
* whether the premise was served by an Exchange Only (EO) line at June 2016 (*eo\_flag*)
* maximum available predicted download speed for the premise at June 2016 (*mxdl16*)
* average household size in the premise’s Output Area, as of Census 2011 (*hh\_size*)
* % of the population aged 65+ in the premise’s Output Area, as of Census 2011 (*65plus*)
* % of the population aged 16 to 64 in the premise’s Output Area, as of Census 2011 (*wap*)
* average % of people aged 16 to 64 who were in employment in the district/unitary local authority area in the 12 months to June 2016 (*employ*)
* median weekly wage per employee in the district/unitary local authority area in 2016 (*wage*)

Note that:* some of the explanatory variables may be transformed in order to provide a better fit to the data, for example through the use of natural logarithms (e.g. for premises density and exchange size), and/or the inclusion of the squares of some variables (if the relationship between the dependent variable and that explanatory variable appears to be best represented by a ‘quadratic’)
* the evaluators will need to be careful not to include combinations of variables between which there is perfect collinearity (for example, given that the number of business premises in the postcode can be derived from *res* and *resshare*, it would be incorrect also to include the number of business premises in the postcode as an additional explanatory variable in the regression)
* it may be that the evaluators consider that other explanatory variables (beyond those listed above) should be added into the dataset and the model, in order to better fit the data; in particular cabinet-level variables (such as distance from the serving cabinet to the serving exchange, distance from the cabinet to the premise, and number of premises per cabinet) may be included if a suitable approach can be developed for EO premises (which do not have a serving cabinet), and if that improves the model’s fit to the control group data
* data availability will determine the spatial level used for each variable (e.g. median wage at local authority level, versus available download speeds at premise level).

**Potential spillover effects**A further consideration affecting the identification of causal impact is that the intervention could potentially lead to spillover additional coverage in the control group areas (for example, if a supplier finds that it becomes commercially feasible to extend their service into a neighbouring unsubsidised area, thanks to the infrastructure subsidised in the intervention area). In such a case the control group regression could potentially overstate the counterfactual NGA coverage, and hence understate the impact of the aid. At this stage, though, we consider that this effect is likely to be small, given that the periods analysed (2016 to 2018, and 2016 to 2020) will be in the early years of the contracts, and given that it will be in the suppliers’ interests to include as many white postcodes/premises as possible in their original bids (as bids which maximise coverage for the available funding will be favoured). Nonetheless, the evaluators will need to be aware of this potential effect, and any coverage in the control group will need to be analysed to assess whether proximity to the intervention area may have played a part. If there is a significant correlation between NGA coverage of premises in the control group and proximity to the intervention area, then it may be necessary to redefine the treatment group such that it includes an appropriate ‘buffer zone’ around the directly subsidised postcodes/premises.  |

* 1. Please explain how the envisaged methods address potential selection bias. Can it be claimed with sufficient certainty that observed differences in the outcomes for the aid beneficiaries are due to the aid?

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| As discussed in section 5.1, the simple DID approach controls for potential crowding-out (of commercial investment in areas with confirmed intervention plans, but no coverage yet) by excluding any in-contract postcodes from the control group. However, there are further potential sources of selection bias in this method, and we are therefore proposing also to undertake a more advanced approach involving non-linear regression, which will control for various differences between the control and treatment groups using the explanatory variables set out in section 5.2.Careful consideration has been made of potential endogeneity problems which can lead to biased estimates: where one or more of the explanatory variables is correlated with the error term in the model, for example through reverse causality (e.g. the Exchange Only line issue discussed in section 5.1, re an alternative panel dataset approach). We have minimised the risks of this, by ensuring that the anticipated set of explanatory variables (in section 5.2) describe the situation *before* intervention, as of June 2016 or earlier. With the regression approach described for questions 1 and 2, therefore, we can be reasonably confident that the analysis will be able to identify the causal impact of the aid on NGA coverage, NGA take-up and speeds. The level of aid additionality determined for these questions has a direct bearing on the descriptive analysis findings for questions 3 to 7.  |

* 1. If relevant, please explain how the envisaged methods intend to address specific challenges related to complex schemes, for example schemes that are implemented in a differentiated manner at regional level and schemes that use several aid instruments:

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| Not applicable: we consider that the envisaged methods are equally applicable across all BDUK projects funded under the 2016 NBS. |

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| Data collection  |

* 1. Please provide information on the mechanisms and sources for collecting and processing data about the aid beneficiaries and about the envisaged counterfactual.[[24]](#footnote-24) Please provide a description of all the relevant information that relates to the selection phase: data collected on aid applicants, data submitted by applicants and selection outcomes. Please also explain any potential issue as regards data availability:

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| The data sources, mechanisms and timings are described for each question below.***1. To what extent has the aid resulted in increased access to an NGA network being deployed in white NGA areas?***The data used for this analysis will include the following:* **Ofcom’s Connected Nations data**, which is UK-wide information collected from the main telcos and from a number of altnet providers. Currently collected on an annual basis (as a snapshot of the position as at the end of June each year), Ofcom is seeking to obtain the raw data from operators at premise-level from 2016 onwards (previously it was at postcode level). This data will include information on coverage per premise (and per postcode) of NGA and superfast services, per supplier. BDUK is currently seeking confirmation from Ofcom’s lawyers that we will be able to access the premise-level data for the purposes of this evaluation (if not, or if analysis at the premise level proves impractical, then the evaluation will need to rely on the postcode-level data instead, which is published). The evaluation’s analysis will draw on the Ofcom datasets as of June 2016, June 2018 and June 2020.
* **Open Market Review** data provided to BDUK by the funded projects, identifying the white NGA areas. This data will be collated by BDUK as and when each area completes their Open Market Review analysis.
* **Intervention area definitions** provided to BDUK by the funded projects, identifying those postcodes within the scope of the contracts. This data will be collected by BDUK at the conclusion of each procurement.
* **BDUK data** (sourced from operators, and updated annually) on Exchange Only lines, the locations of BT exchanges, and the serving exchange per postcode.
* **Actual intervention coverage data** provided to BDUK by the funded projects, identifying the individual premises provided with NGA coverage through the intervention and the date from which coverage was available. This data will be collected by BDUK on completion of each implementation milestone.
* **Codepoint/postcode address file** data on total residential and business premises per postcode (as at mid 2016, mid 2018, and mid 2020). Codepoint is a commercially available dataset.
* **Census 2011 data** for England & Wales, Scotland and Northern Ireland on average household size, and proportion of the population of working age, by Output Area.
* **Annual Population Survey** data on % of people aged 16 to 64 in employment, by district/unitary local authority area, in the 12 months to June 2016.
* **Annual Survey of Hours and Employment** data on the median weekly wage per employee per district/unitary local authority area in 2016.
* **Lookup tables** for spatial geographies, matching postcodes to Output Areas to district/unitary local authority areas.
* **Census area shapefiles**, giving the area in hectares per Output Area (for the premises density calculations).

***2. To what extent has the target of the intervention been used, and what speeds are available?***In addition to the data described above for Question 1, this analysis will draw on the fields in Ofcom’s Connected Nations dataset related to NGA take-up, actual download speed and actual upload speed per premise – again drawing on the datasets as of June 2016, June 2018 and June 2020.***3. Has the aid had a significant incentive effect on the aid beneficiaries?***The data used for this analysis will include the following:* **The intervention area financial models** from each winning supplier, provided to BDUK by the projects on conclusion of the procurements. This will include projected revenues, capital expenditure, operational expenditure, subsidy, the discount rate used, and the projected NPV and IRR over the appraisal period.
* **Actual annual financial data** on actual take-up, revenues, capital expenditure, operational expenditure and subsidy, for each project. This will be provided by the winning suppliers to BDUK, via the local bodies, an annual basis.
* **Basic financial data on each winning supplier**, in order to inform estimates of WACC.

***4. Has the aid had a material effect on the market position of the direct beneficiaries?***The data used for this analysis will include the following (also used for Questions 1 and 2):* **Ofcom’s Connected Nations data**, on take-up per premise (and per postcode) of NGA and superfast services, per supplier[[25]](#footnote-25). For this question, the analysis will draw on the datasets as of June 2016 and June 2020.
* **Actual intervention coverage data** provided to BDUK by the funded projects, identifying the individual premises provided with NGA coverage through the intervention and the date from which coverage was available.

***5. Is there evidence of changes to parameters of competition arising from the aid? (Including third parties operating in the relevant intervention area(s))?***In addition to the data described above for Question 4, this analysis will draw on: * the fields in Ofcom’s Connected Nations dataset related to the **coverage and take-up by type of technology[[26]](#footnote-26)** (e.g. FTTP, FTTC, cable, fixed wireless) – again drawing on the datasets as of June 2016 and June 2020
* information on the **use of Open Access**, which will be provided by the winning suppliers to BDUK (via the local bodies) on an annual basis.

***6. Is the gap funding model efficient compared to alternative schemes?***The data used for this analysis will be collated in 2020 (or sooner, for comparator schemes which have ceased to operate), and will include the following:* **BDUK aggregate data** on public funding, coverage and take-up for the 2016 NBS.
* **Operational and financial data** **from local councils/agencies** on the comparator UK schemes.
* **Socio-economic data** from ONS etc. for descriptive statistics on the comparator UK schemes versus the 2016 NBS areas.
* **Operational, socio-economic and financial data on the comparator schemes in other European countries** from the relevant government departments/ councils/agencies in EU member states.

***7. Did the aid lead to commercially sustainable networks?*** In addition to the data used for the evaluation of Question 3 (described above), this analysis will draw on BDUK data (on coverage, take-up, funding, and costs of recovery) on any projects from which services have been withdrawn, provided to BDUK by the relevant local bodies. |

* 1. Please provide information on the frequency of the data collection relevant for the evaluation. Are observations available on a sufficiently disaggregated level, that is to say at the level of individual undertakings?

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| See section 6.1 for notes on the timing/frequency of data collection from the various sources.The observations will be at the most detailed level for which reliable data is available for the relevant Question: down to premise level for the regression analyses of Questions 1 and 2. |

* 1. Please indicate whether the access to the necessary data for conducting the evaluation might be hindered by laws and regulations governing confidentiality of data and how those issues would be addressed. Please mention other possible challenges related to data collection and how they would be overcome:

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| The UK does not consider that the data protection laws are likely to have any impact on the analysis that is undertaken. However, to the extent that any personal data is used in the assessment this will need to be treated appropriately, in line with the requirements of the relevant UK/EU law.BDUK is currently seeking confirmation from Ofcom’s lawyers that we will be able to access the premise-level data from the Connected Nations datasets for the purposes of this evaluation (if not, then the evaluation will need to rely on the postcode-level data instead, which is published). Note also that Ofcom has not previously collected premise-level information from suppliers, and this is likely to entail significant challenges (for Ofcom) in cleaning and matching data, which may lead to imperfections/gaps in the premise-level data, especially in 2016.For any winning suppliers that are not included in the scope of Ofcom’s data collection for the Connected Nations dataset in 2016 and beyond, the evaluation will need to seek information direct from those suppliers on their local and national coverage and take-up as of the relevant points in time. The UK’s contracts with beneficiaries will include reporting requirements and audit rights that will oblige the supplier to provide information specific to the publicly funded network and relevant to delivery of the project. The contracts will also include a general obligation on the supplier to support the evaluation; however, the UK would not otherwise have legal powers to seek additional information from beneficiaries. The UK would be reliant on ‘goodwill’ of suppliers and informal sanctions (i.e. risk of reputational damage) as a basis for obtaining any additional, reliable information.  |

* 1. Please indicate whether surveys of aid beneficiaries or of other undertakings are foreseen and whether complementary sources of information are intended to be used:

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| At this stage, we do not envisage surveying the direct aid beneficiaries for the purposes of this State Aid evaluation. However, it is likely that such methods will be part of the mix in the wider evaluation of BDUK’s programmes in order to identify learning points from the interventions. It is also likely that there will be surveys of indirect beneficiaries (such as households and businesses) to complement and/or inform econometric analyses of the wider outcomes and impacts.See section 6.1 for the sources of information intended to be used for this State Aid evaluation.   |

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| Proposed timeline of the evaluation |

* 1. Please indicate the proposed timeline of the evaluation, including milestones for data collection, interim reports and involvement of stakeholders. If relevant, please provide an annex detailing the proposed timeline:

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| The UK expects the timing of the evaluation to comprise three distinct phases:Phase I: Preparatory Phase: scoping study that provides relevant counterfactual(s) for the evaluation and a detailed methodology for each evaluation question. The scoping study will also provide a literature review of relevant evaluation reports. The scoping study will be commissioned in co-operation with the Commission in April 2016; with results in September 2016.Phase II: In Life EvaluationFollowing completion of the scoping study the UK will:* Validate existing data sets, identify data gaps and commence collection of new data sets (post June 2016)
* Undertake evaluation work for new procurements as part of the BDUK Evaluation Framework - end 2016 onwards. This includes the study on the first three procurements under the new cascade approach.

The UK is open to sharing evaluation outputs with the Commission as they emerge.Phase III: Finalised Assessment to be completed by end of 2020[[27]](#footnote-27), providing an evaluation of scheme compliance (i.e. validation), and a meta-evaluation of the impact assessment undertaken as part of the in life evaluation work. . The meta- evaluation would be undertaken by an external independent body. The evaluator would review the in life evaluation work of the scheme, quality assuring the methodologies and data used in the component studies and aggregating the findings to provide an overall summary report. This would be used to inform a prolongation of the 2016 NBS. (The UK will submit this long term assessment to the Commission prior to any re-notification requesting an extension to the measure.)Where deployment of networks continues after the scheme (see Section 2.1 for further discussion of potential timescales), the UK may undertake an update of the indicators shown in Section 4.1. This will be carried out up 2 years after the final deployment is completed. |
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* 1. Please indicate the date by which the final evaluation report will be submitted to the Commission:

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| The Final Assessment will be submitted to the Commission before 31 December 2020. |

* 1. Please mention factors that might affect the envisaged timeline:

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| The 2016 NBS notification details the budgetary forecast and the duration of the aid. This budget will allow for the procurement of funding already committed by BDUK and Implementing Bodies, as well as providing scope for further funding. The timing of the funding allocation will affect the precise reporting dates. |

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| The body conducting the evaluation |

* 1. Please provide specific information on the body conducting the evaluation or, if not yet selected, on the timeline, procedure and criteria for its selection:

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| The UK considers it important that the evaluation of the impact of its National Broadband Scheme is objective, rigorous, impartial and transparent.[[28]](#footnote-28) This evaluation will be conducted within the wider BDUK Evaluation Framework, managed by the BDUK Evaluation Lead. Analysis under this framework will be conducted by:1. Analysts within the Department for Culture, Media and Sport’s (DCMS) central Evidence and Analysis Unit (EAU).
2. Independent bodies, appointed by competitive tender. Further detail regarding the selection criteria can be found in the response to Section 8.3.

The advantages of incorporating this evaluation into the wider BDUK Evaluation Framework include:* Work on evaluating the wider outcomes and impacts of both the Superfast programme and other BDUK programmes will be developed in tandem with this evaluation, allowing learning to be shared across across all evaluation work.
* Evaluation work will be ongoing throughout the life of the project. As such, information can be shared on an iterative basis, allowing the UK and the Commission to further refine the evaluation approach and identify additional value adding analysis.

The final assessment in 2020 will be undertaken by an independent body. This assessment is described further in Section 7.1.Independent bodies will be appointed following a fair and open competition. The experience requirements for these bodies is set out in Section 8.3. |

* 1. Please provide information on the independence of the body conducting the evaluation and on how possible conflict of interest will be excluded during the selection process:

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| DCMS will ensure that:* Persons and organisations undertaking the evaluation work will be functionally independent of BDUK.
* All evaluation work will be quality assured in line with relevant research standards.

Work undertaken in DCMS* Where work is undertaken within DCMS, this will be by staff in the central Evidence and Analysis Unit. These analysts report to the DCMS Chief Economist who reports to the Director General for Strategy and Performance. The BDUK Chief Executive reports separately to the Director General for Digital and Media. These Director Generals report independently to Ministers on policy matters, providing functional independence.
* Analysts within DCMS are regularly required to maintain independence from other parts of the department. For example, the production and publication of Official Statistics (statistics produced by government or other designated bodies) must comply with a code of practice to ensure that the statistics are managed impartially and objectively. There are strict rules around access to statistics in advance of publication:
* A small production team within DCMS has access to data to produce the statistics, but they cannot share them with anyone outside of the production team (including line managers, Senior Civil Servants or Ministers).
* 24hrs before publication, a small pre-agreed list of people get pre-release access to the statistics. These people cannot share the statistics with anyone else.
* Breaches of these rules are taken extremely seriously and have to be reported to the UK Statistics Authority, who publish the details on their website.

Work undertaken by external bodies* Where work is undertaken by an external body, the organisation conducting the evaluation will be independent of the relevant authorities. Specifically, where undertaking validation, it will not have provided advice to any of the projects undertaken under the 2016 NBS subject to the evaluation.
* Bidders will declare any potential conflict of interest in their ITT response (e.g. identifying current clients of the firm/consortium that are likely to directly benefit from State aid under the scheme. Similarly, they will identify any work being undertaken on related State aid issues). Where DCMS considers interests might prove prejudicial to their independence then it reserves the right to exclude the organisation from the tender.
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* 1. Please indicate the relevant experience and skills of the body conducting the evaluation or how those skills will be ensured during the selection process:

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| Evaluation work by DCMS’ central Evidence and Analysis Unit will be undertaken by analysts with experience of the evaluation of large infrastructure projects or policy interventions. Experience within this team includes the meta evaluation of the 2012 Olympic Games and an evaluation of the impact on business of the Gaming Machine Regulations 2015. All work will be reviewed by the Chief Economist. Where necessary, DCMS will supplement its expertise with independent external experts.Where DCMS contracts an independent external body to undertake evaluation work (e.g. for the final assessment in 2020), it will do this by competitive tender. In assessing the quality of the ITT response, DCMS will apply appropriate weighting to relevant criteria. One of the selection criteria will concern the experience and skills of team proposed by the organisation/consortium bidding for the work. DCMS will expect tenderers (including partner organisations) to demonstrate the experience and skills through relevant work/activities that make them suitable to deliver the requirements of the evaluation. For example, the team will need to demonstrate relevant elements of the following:* knowledge and experience of applied EU/UK telecommunications competition policy (i.e. State aid control, SMP regulation and competition law);
* experience of previous evaluations, particularly those directly related to public investments (including State aid);
* experience in economic and financial analysis used to support/inform State aid decisions;
* experience in the application evaluation methodologies (including econometric and statistical techniques, and qualitative analysis) to the evaluation of public policy interventions;
* experience of stakeholder engagement, including the use of workshops, consultations, and interviews; and
* experience of working with both UK/EU public and private sector clients, particularly in the field of telecommunications.

Tenderers will also be required to list the team (including the senior lead for the project with responsible for the overall delivery/quality assurance of the work) that the tenderer intends to use to deliver the requirements of this project, including a brief description of their roles, responsibilities and time allocations. Furthermore, for each team member listed they will be requested to provide details of their prior experience and its relevance to this project. |

* 1. Please indicate which arrangements the granting authority will make to manage and monitor the conduct of the evaluation:

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| As described in Section 3.1, this evaluation will form part of the wider BDUK Evaluation Framework. The framework is managed by the BDUK Evaluation Lead who will have responsibility for managing the delivery of the evaluation and ensuring work is fit for purpose, reporting to the DCMS Chief Economist.The BDUK Evaluation Framework is also subject to external review on a monthly basis through the BDUK Programme Assurance Board. Membership of the board includes two representatives from other government departments: 1) a member of the Senior Civil Service from an other government department[[29]](#footnote-29); and 2) a member of the Government Internal Audit Agency (an external body to DCMS). Both provide external challenge to BDUK.BDUK will ensure that both the data required for the evaluation is properly collected and maintained over the term of the scheme’s extension so that those undertaking the evaluation have all necessary data to conduct a robust assessment in line with the plan described here.  |

* 1. Please provide information, even if only of an indicative nature, on the necessary human and financial resources that will be made available for carrying out the evaluation:

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| Evaluations need to be proportional to the risks, scale and profile of the policy intervention and this has implications for the type and level of resources required.DCMS has a dedicated analytical function, EAU, that supports all evaluation work undertaken by the Department. EAU has clearly defined responsibilities for co-ordinating and monitoring evaluation activities, promoting quality evaluation and organisational learning. DCMS has made available dedicated resource tasked with delivering its project appraisal and evaluation work including for BDUK.DCMS will set aside a proportionate budget for pieces of external evaluation with an annual budget to be determined once the evaluation plan and details of the scheme are finalised. The budgetary allocation will reflect BDUK’s expectation that the priority for the Commission is to use quantitative and qualitative techniques to undertake the economic impact assessment. However, it will also reflect the scale of the validation, which could be more involved given: (a) a number of projects are likely to be small scale and potentially more numerous than under the 2012 NBS; (b) the types of potentially qualifying technologies may increase and therefore requiring detailed assessment of whether the solutions offered are NGA Networks or Basic broadband technologies; and (c) there will be more extensive use of both quantitative and qualitative techniques in the impact assessment. |

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| Publicity of the evaluation |

* 1. Please provide information on the way the evaluation will be made public, that is to say, through the publication of the evaluation plan and the final evaluation report on a website:

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| The UK intends to publish the finalised evaluation plan, any consultation details and the final evaluation report These documents will be published on the UK Government website ([www.gov.uk](http://www.gov.uk)). In addition, BDUK will provide a dedicated webpage to its State evaluation activities. Stakeholders will be given an opportunity to sign-up to email alerts that will draw the signatories’ attention to updates when they occur.  |

* 1. Please indicate how the involvement of stakeholders will be ensured. Please indicate whether the organisation of public consultations or events related to the evaluation is envisaged:

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| BDUK intends to base its evaluation on quantitative analysis of data collected directly from: suppliers through their contracts; from Ofcom; and from Open Market Reviews and public consultations conducted at the beginning of each contract procurement. This information provides input from a range of stakeholders.Where this data needs supplementing, BDUK may require Implementing Bodies to conduct a final round of Open Market Reviews at the end of the period to help establish changes to the market through the contract period. It may also carry out some qualitative analysis, based on sample areas, to validate some if its underlying assumptions. |

* 1. Please specify how the evaluation results are intended to be used by the granting authority and other bodies, for example for the design of successors of the scheme or for similar schemes:

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| The UK will use the evaluation results to inform the scheme design of any future broadband interventions.  |

* 1. Please indicate whether and under which conditions data collected for the purpose or used for the evaluation will be made accessible for further studies and analysis:

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|  The UK supports the use of data to help develop policy including its use for further studies, or analysis. The UK will make data available whenever possible, recognising that commercial confidentiality may place restrictions on this.  |

* 1. Please indicate whether the evaluation plan contains confidential information that should not be disclosed by the Commission:

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| There is currently no confidential information contained within the evaluation plan. |

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| Other information |

* 1. Please indicate here any other information you consider relevant for the assessment of the evaluation plan:

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| No further information provided. |

* 1. Please list all documents attached to the notification and provide paper copies or direct internet links to the documents concerned:

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| Not applicable. |

1. Commission Regulation (EU) No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty (OJ L 187, 26.6.2014, p. 1). [↑](#footnote-ref-1)
2. SWD(2014)179 final of 28.5.2014. [↑](#footnote-ref-2)
3. Beyond providing a general description of the objectives and eligibility rules of the scheme, the aim of this section is to assess how the eligibility and exclusion rules of the scheme may be used to identify the effect of aid. In some cases, the precise eligibility rules may not be known in advance. In those cases the best available expectations should be provided. [↑](#footnote-ref-3)
4. “Community bodies” is a generic term to describe an organisation that can demonstrate that it is acting on behalf of an identified community or communities. Whilst not prescriptive, a Community body could take the form of a social and community enterprise, community interest company, community trusts, co-operative, charity or other formally constituted group. [↑](#footnote-ref-4)
5. In line with Commission decision in case N330/2010 Programme national Très Haut Débit, France [↑](#footnote-ref-5)
6. BDUK’s Market Test Pilot scheme was established to look at different ways to deliver superfast broadband in some of the UK’s most sparsely populated rural areas, and to test alternative technologies and commercial and operational models. This demonstrated that small suppliers are capable of delivering superfast broadband in these harder to reach areas. [↑](#footnote-ref-6)
7. Examples of negative effects are regional and sectorial biases or crowding out of private investments induced by the aid scheme. [↑](#footnote-ref-7)
8. Aid schemes defined in Article 1(2)(a) of Regulation (EU) No 651/2014 are excluded from the scope of the Regulation six months after their entry into force. After having assessed the evaluation plan, the Commission may decide to extend the application of the Regulation to such schemes for a longer period. Member States are invited to precisely indicate the intended duration of the scheme. [↑](#footnote-ref-8)
9. SQW (2013), *UK Broadband Impact Study: Impact Report*, November 2013 [↑](#footnote-ref-9)
10. In the diagram, Superfast is the Superfast Broadband Programme, SCCP is the Super-Connected Cities Programme, MIP is the Mobile Infrastructure Project, MTP are the Market Test Pilots and USC is the Universal Service Commitment. [↑](#footnote-ref-10)
11. The standard method of assessing the commercial rationale of a specific project is by measuring its Net Present Value (“NPV”). This is the sum of the expected net cash flows resulting from the project investment, appropriately discounted to their current value. The discount factor in an NPV calculation is the opportunity cost of capital (measured, for example, by the Weighted Average Cost of Capital (“WACC”) for the project under consideration. When the NPV of a given project is positive, this implies that the project has an Internal Rate of Return (“IRR”) that exceeds the required rate of return indicating that on a risk adjusted basis the project makes commercial sense to undertake. [↑](#footnote-ref-11)
12. This will be dependent on the use of alternative funding models in the UK, and data being available from other EU countries. [↑](#footnote-ref-12)
13. The assurance check will confirm, amongst other things, whether the State aid is an appropriate instrument i.e. State aid, as a form of policy intervention to meet a defined common interest objective, is the least distortive method of addressing the identified market failure or equity objective. [↑](#footnote-ref-13)
14. Please make reference to SWD(2014)179 final of 28.5.2014. [↑](#footnote-ref-14)
15. The same analysis could also be undertaken for superfast coverage (*sfb*) – using the Ofcom/EC definition of superfast as providing download speeds of 30Mbps+. [↑](#footnote-ref-15)
16. Again, the same analysis could also be undertaken for superfast coverage (*sfb*) as the dependent variable – using the Ofcom/EC definition of superfast as providing download speeds of 30Mbps+. [↑](#footnote-ref-16)
17. Note that the model will be re-estimated in 2020; the model coefficients will therefore be different to those estimated in the 2018 analysis. [↑](#footnote-ref-17)
18. The Ofcom postcode-level dataset includes both the ‘average’ (i.e. mean) download and upload speeds, and the median download and upload speeds per postcode. It should be noted here that intervention will boost the speeds achieved in some areas that do not obtain ‘superfast’ levels of service, as a spillover benefit from the roll-out of superfast services to neighbouring areas: for example, being able to obtain a 20Mbps service via FTTC when previously only, say, 2Mbps was available. [↑](#footnote-ref-18)
19. To the extent that such information is available for other projects [↑](#footnote-ref-19)
20. Noting that there is now a requirement for newly constructed buildings to be equipped with ‘high speed broadband ready infrastructure’, as a result of the adoption of the Broadband Cost Reduction Directive (2014/61/EU). [↑](#footnote-ref-20)
21. Note that this means coverage by an NGA network (i.e. a network capable of delivering 30Mbps+) – not necessarily coverage at superfast speeds in that specific location. This is because areas receiving sub-superfast NGA services as a result of intervention will still be benefiting to some extent, and should therefore be included in the treatment group. [↑](#footnote-ref-21)
22. Note that postcodes identified as having planned commercial coverage under *subsequent* OMRs (post September 2016) *would* be included in the control group, in order to reflect the possibility that similar areas in the treatment group may also have benefited from commercial coverage, in the absence of intervention. Excluding such postcodes would distort the control group, and make it less representative of what would have happened in the absence of intervention. [↑](#footnote-ref-22)
23. For simplicity and consistency, we propose that the Ofcom dataset should be considered the ‘master’ when matching with data from OMRs. For example, postcodes which appear in an OMR dataset but not in the Ofcom dataset (perhaps due to new postcodes for new build developments, or postcodes subsequently deleted due to re-developments/demolitions) will be ignored. [↑](#footnote-ref-23)
24. Please note that the evaluation might require sourcing of both historical data and data that will become progressively available

during the deployment of the aid scheme. Please identify the sources for both types of information. Both types of data should

preferably be collected from the same source as to guarantee consistency across time. [↑](#footnote-ref-24)
25. Note that if data sharing consent issues lead to the evaluation being restricted to using the published postcode-level datasets (which do not include breakdowns by individual supplier or by technology), then this will restrict the extent to which the evaluation can assess local and national market shares for the winning suppliers, unless those suppliers agree to provide information on their total NGA connections at the relevant points in time. [↑](#footnote-ref-25)
26. Again, if data sharing consent issues lead to the evaluation being restricted to using the published postcode-level datasets (which do not include breakdowns by individual supplier or by technology), then this will restrict the extent to which the evaluation can assess changes in the parameters of competition in terms of market share per technology. [↑](#footnote-ref-26)
27. The phasing of the assessment will be a function of the term structure of the intervention. [↑](#footnote-ref-27)
28. The UK intends to operate its evaluation in a manner consistent with relevant standards, including the *European Commission’s Common methodology for State aid evaluation (2004)* [↑](#footnote-ref-28)
29. This role is currently being recruited into, having been vacated in December 2015. [↑](#footnote-ref-29)