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Appeal on behalf of the applicant **MBNL** (for and on behalf of Three UK Ltd.) against the decision of **Manchester City Council** refusing a prior approval for

Telecommunications mast and equipment/power cabinets - the installation of an 18.0m column supporting 6 no antennas, together with 2 no. ground-based equipment cabinets 1 no. power cabinet and ancillary development thereto.

at

Footway of Lapwing Lane, Didsbury, Manchester, M20 6UR (NGR: E: 384400, N: 392097)

PLANNING APPEAL STATEMENT

Appellant's Ref: MAN284

LPA's Ref: 134901/TEL/2022

March 2023

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1. INTRODUCTION

1.1 Clarke Telecom Limited (Clarke Telecom) has been instructed by Mobile Broadband Network Limited (MBNL) to make this planning appeal for and on behalf of H3G UK Limited (commonly known as Three) against the decision of Manchester City Council refusing prior approval for '*Telecommunications mast and equipment/power cabinets - the installation of an 18.0m column supporting 6 no antennas, together with 2 no. ground-based equipment cabinets 1 no. power cabinet and ancillary development thereto.'* on land at Footway of Lapwing Lane, Didsbury, Manchester, M20 6UR.

1.2 It is noted that the site address on the application form differs from the one used by the Council in the decision notice. The appellant does not question this, but to avoid delays in appeal validation, uses the address from the application form throughout this appeal statement.

1.3 MBNL is a joint-venture company set up by EE (UK) Ltd. and H3G (UK) Ltd. (commonly known as Three) in 2007, with the responsibility for the upgrade, roll-out and management of a network of shared electronic communications radio base stations in the UK for the two electronic communications code operators.

1.4 In April 2018 Ofcom announced the outcome of its first part of 5G spectrum licence auction and EE and Three were both successful with their bids for 5G licences. Since then, through its appointed partners and agents MBNL has been upgrading EE and Three's existing base stations to 5G and also proposing new installations where needed to support the expansion of 5G services across the UK. Moreover, as part of the Government's Levelling Up White Paper from February 2022 (see **Appendix A**), 5G coverage for the majority of the population by 2030 is one of the missions.

'Mission four is focused on improving digital connectivity: By 2030, the UK will have nationwide gigabit-capable broadband and 4G coverage, with 5G coverage for the majority of the population.' [Chapter 3 Policy Programme, page 183]

As such, the operators, including Three and EE, are under pressure to deploy their networks quickly and effectively across the country.

1.5 With regards to Manchester, Three and EE are working together to bring 5G service to every part of the City for their customers. The proposal at the appeal site forms part of a wider rollout programme to support the Government's 'levelling up' agenda so no household and business miss out on vital digital connectivity. The Centre for Policy Studies (CPS) has warned in its report titled *Upwardly Mobile: How the UK can gain the full benefits of the 5G revolution*[1], that delays to the delivery of 5G infrastructure could lead to the UK could missing its 2025 deadline for gigabit connectivity and 2027 target for 5G coverage, putting the potential economic gains at risk.

1.6 Finally, EE has taken over all of the emergency services requirements on their network. The operator has been selected by the Home Office to build the new critical 4G voice and data network for Britain's Emergency Services. Over 300,000 emergency services users, including Police, Fire & Rescue and Ambulance, will use the 4G voice and data services provided by the Emergency Services Network (ESN). It will also be used by government agencies and other first responders like Immigration Enforcement and inshore rescue services.

[1] https://cps.org.uk/wp-content/uploads/2021/07/201102153926-UpwardlyMobileFINAL.pdf

1.7 This all resulted in a number of customers subscribing to EE and Three's networks growing significantly. To cater for that additional demand the operators made some changes to their network and upgraded the existing installation at the appeal site but that base station has now reached its capacity limits and needs an urgent upgrade.

1.8 The upgrade works will introduce 4G coverage for two operators and the scope for 5G service from a single installation to the area whilst maintaining the existing telecommunications network. It will involve the installation of a different type of a monopole that can support multi-technology antennas on site. The column has to be taller and wider than the existing mast in order to support the new antennas as well as feeder cables that run down the centre of the monopole. Both the new antennas and cables are larger and heavier than those used for previous technologies.

1.9 The specific design parameters of the mast will enable the operators to enhance the mobile digital connectivity in the area and to concentrate on utilising a grass verge already characterised by telecommunications infrastructure in the general vicinity, as per the NPPF which seeks to minimise the number of new telecommunications sites and for sites to be shared between operators where possible.

1.10 The use of the mobile networks is one which goes unnoticed by the majority of the public but if it is lost then all who use the digital communication networks are affected. The expectation is that a mobile signal is functional and reliable in any given urban area but there is a large amount of work that is involved in upgrading and replacing existing infrastructure, testing and finally integrating the new equipment prior to switching it over to ensure this is a reality. Over the last two year there has been unprecedented demand upon the appellant's network, and while people are returning to offices, there is a recognised tendency for a hybrid style of working with more days as 'working from home' than pre-COVID 19. As such the appellant considers it is their priority to support communities - to ensure continued connectivity to support their on-line activities.

1.11 In early 2022 Clarke Telecom were instructed by MBNL to seek permission from Manchester City Council for the enhanced 4G/future 5G upgrade of the existing base station located at the western side of Palatine Road to the north of Lapwing Lane. Following a detailed review, it was determined that as part of the upgrade works, the location of the site would need to be moved to avoid interference with the adjacent existing telecommunications site by Cornerstone (serving both Vodafone and o2). Full details would be discussed later on but as part of Introduction it is worth noting that: a) is not possible to install a replacement monopole directly on the bridge above the railway line as there is nothing solid to support it (the root of the column is approx. 1.8 deep); b) the footways along both Palatine Road and Lapwing Lane are too narrow – there will not be enough room left for pedestrians; c) the location at the south eastern corner of Palatine Road/Lapwing Lane was attempted in 2021 but failed on appeal. Consequently, the site at the north eastern corner of Palatine Road/Lapwing Lane was pursued with a prior approval application submitted to the Council on 01/09/2022 and registered under LPA ref. 134901/TEL/2022.

1.12 This prior approval application was refused by the Council under delegated powers for the following reason:

> *'1) The City Council is not satisfied that this development has been sited and designed to minimise the impact upon the visual amenity of the area. The proposed telecommunication installation by reason of its height, siting and appearance would form a visually intrusive and dominant feature which would be harmful to the visual amenity of the area in particular the appearance of the street-scene and fails to*

preserve or enhance the character and appearance of the Ballbrook Conservation Area. As such, the proposed installation is considered contrary to saved policies DC17.1 and DC18.1 of the Unitary Development Plan for the City of Manchester, policies DM1, EN3 and SP1 of the Manchester Core Strategy and the National Planning Policy Framework (NPPF).'

1.13 Following the receipt of the decision notice, the proposal was reviewed and the reason for refusal assessed against the arguments contained in the delegated report. The proposed upgrade works are considered to be in line with the NPPF as they will bring the 4G service to both Three and EE while also opening possibility for the latest 5G technology to the area. In doing so, they will not lead to an increase in a number of base stations in an area and will maintain the shared character of the site between two independent operators: Three and EE. While the proposal involves the move of the installation into the Ballbrook Conservation Area, there are no feasible options outside this heritage asset that would satisfy the technical and operations constraints of the operator's network. It is acknowledged that the proposal will lead to an installation of a higher and bulkier monopole but the proposed height and amount of apparatus is the absolute minimum to cater for the growing demand for digital mobile connectivity in the area. Finally, any additional visual impact on the streetscene and wider visual amenity is considered to be outweighed by the public benefits of the proposal. In light of the above, it was decided that appealing the Council's refusal is the most reasonable approach in this instance.

1.14 It is the Council's refusal by its decision notice dated 21 October 2022, that is the subject of this this appeal.

1.15 The grounds for this appeal are highlighted below and it will be demonstrated that:

- There is an identified need for an enhanced mobile digital connectivity in the area which includes improvement to the 4G service and the provision of 5G technology.
- In recognition of the benefits that mobile digital connectivity brings to communities and businesses, the improvements to telecommunications infrastructure which brings 5G forms part of the Government agenda and is supported by the NPPF and the Levelling Up agenda. Access to the latest superfast mobile technology in the form of 5G coverage is a strong material consideration in the determination of this appeal.
- The upgraded base station will continue to be shared between Three and EE.
- It is not possible to retain the installation at the north western corner of the junction of Palatine Road and Lapwing Lane, i.e. outside the conservation area, for technical reasons.
- The proposed location is the only option within a target area for the improved mobile telecommunications service that is not impacted by underground services, will not restrict the width of the footways for pedestrians, will benefit from a solid ground underneath to support the monopole and its root in a stable vertical position, and has no appeal dismissed for a similar scheme.
- The impact of the proposal on streetscene and wider visual amenity including impact on the character and appearance of Bellbrook Conservation Area needs to be considered against the significant public benefits of enhanced mobile digital connectivity that the appeal proposal will bring into a residential area of Didsbury.
- The visual impact of the proposal on the streetscene is not considered to amount to harm and the impact on the character and appearance of the Bellbrook Conservation Area is considered as less than substantial. This harm is considered to be outweighed by the significant public benefits of the proposal.
- The relevant national and local policies have been reviewed and the scheme is considered to comply with their criteria as far as technically and operationally possible.

- The proposal complies with the criteria of Part 16 GPDO as amended in April 2022. The scheme meets the requirements for permitted development requiring a prior approval from the Council for the siting and appearance.

2. THE APPEAL SITE, EXISTING AND PROPOSED DEVELOPMENT INCLUDING RELEVANT PLANNING HISTORY

2.1 The appeal site is located on the north eastern side of the Palatine Rad/Lapwing Lane junction (**Figure 1**). The location falls within the most westerly point of the Ballbrook Conservation Area and is adjacent to Blackburn Park Conservation Area to the south west along Lapwing Lane (see **Appendix B** for maps of Ballbrook Conservation Area and Blackburn Park Conservation Area). The footway is wide and contains a number of street paraphernalia (bike stands, bins, planters, telephone box, road signs, traffic lights, and lighting columns) and mature trees. To the rear of the site there is a three-story building. Please see photo in **Figure 2** for the appeal site photo.

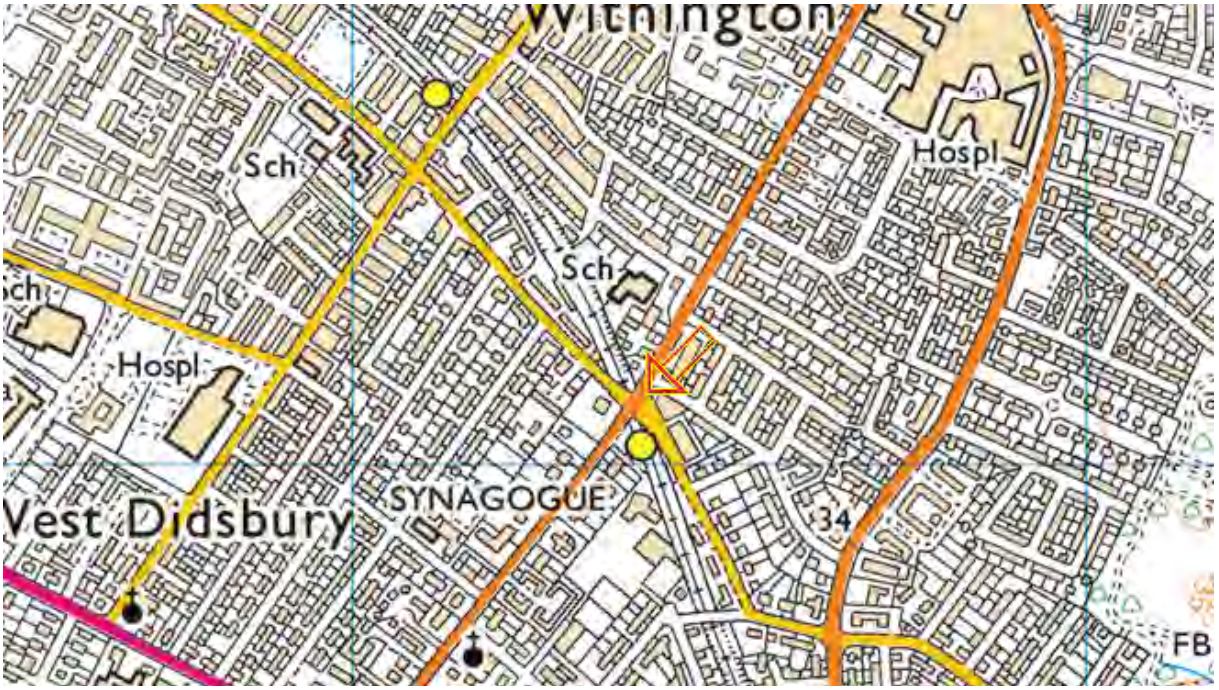


Figure 1: The 1:25000 OS extract showing the appeal site on the eastern side of Palatine Road within the grassed area of the Lime Tree Grove Roundabout. [source: streetmap]



Figure 2: The appeal site at the north eastern corner of the junction with 3 storey building and mature trees. [source: appellant's own photo]

2.2 The surrounding area of the appeal site is dominated by a busy junction of Palatine Road and Lapwing Lane with its associated paraphernalia. The nearby buildings are 2-3 storey height and are of mixed commercial use. As already mentioned, the appeal site is located within a conservation area with another conservation area on the opposite side of Lapwing Lane by the Metrolink station. The nearest listed building is located approx. 40m to the north along Palatine Road. No. 99 Palatine Road is designated as Grade 2 Listed Building for its resemblance to Tudor design.

2.3 On the opposite side of Lapwing Lane, there is West Didsbury Metrolink stop. The footway by the entrance is also wide but more open as there are no trees. This is where the adjacent Blackburn Park Conservation area starts.



Figure 3: The south eastern corner of Palatine Road/Lapwing Lane junction by the entrance to West Didsbury Metrolink stop. [source: Google streetview]

2.4 The south western side of the junction (Figure 4 below) is dominated by a former pub building at no. 108 Palatine Road. The footway is narrow with lampposts, traffic lights and safety barriers.



Figure 4: The south western corner of Palatine Road/Lapwing Lane with the building of no. 108 Palatine Road [source: Google streetview]

2.5 The north western corner of the junction is dominated by the railway bridge over West Didsbury Metrolink. This is the location of two existing telecommunications sites. The first

one is subject to this upgrade proposal and consists of an 11.5m monopole with ground based cabinets, positioned at the back of the footway by the brick wall. The monopole is slimline and has one antenna at the top to give 360 degree coverage to the area. The style of the monopole in situ allows 3G service for both EE and Three but only 4G technology for one operator to be deployed, in this case EE. The antenna is restricted to the restricted to the 1800/2100 MHz frequency bands which limits the capacity of the base station. The style of the monopole suggests the installation was built in early 2000 and still contains the original monopole.

2.6 The second one belongs to Cornerstone. The monopole is 12.5m high and positioned approx. 6m into the footway while the cabs are aligned with the other cabinets. This base station provides 3G/4G service to the customers of Vodafone and o2 in the area. The image in **Figure 5** shows these two existing installations. As can be seen, the appellant's monopole has a very different appearance than a monopole by the other operators, it is much slimmer without the wider upper section.

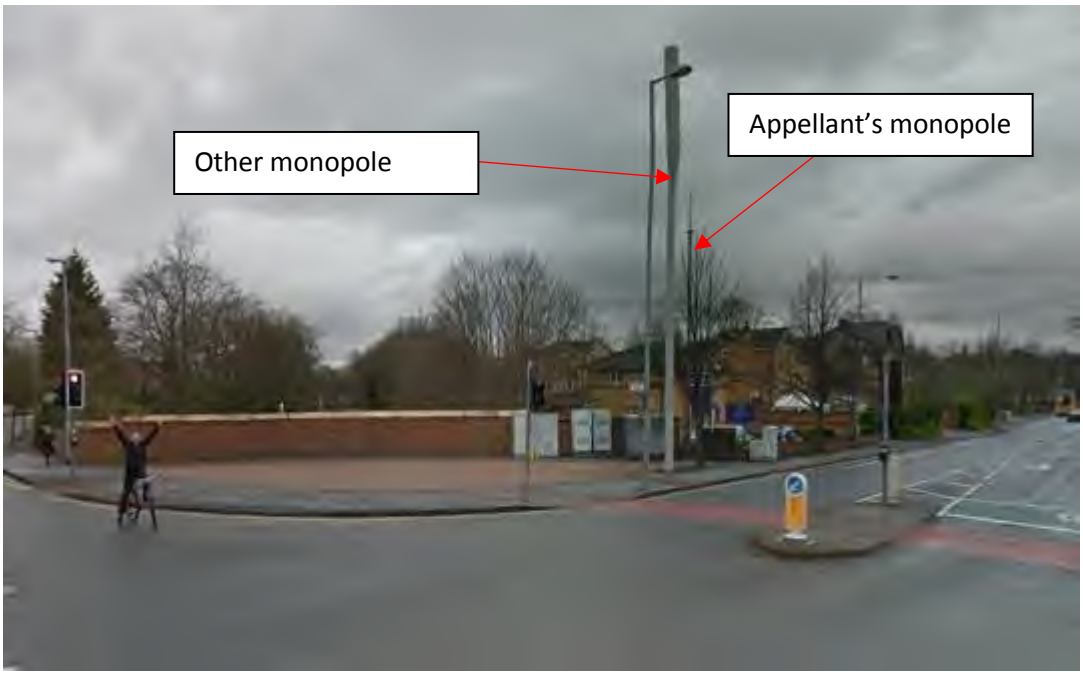


Figure 5: Two existing installation at the north western side of the junction. The existing installation by MBNL comprises an 11.5m monopole and cabinets while the existing installation by Cornerstone comprises a 12.5m monopole and cabinets. [source: google street view]

2.7 The installation by Cornerstone was first installed in 2001/2002 following a prior approval application LPA ref. 063275/FO/SOUTH1/01. It has been subject to multiple technological upgrades over the years as evident in the planning records on the Council website. This includes two prior approvals from 2004 and 2005 for a 15m replacement monopole which do not appear to be implemented (LPA ref. 073187/TEL/2004/S2 and 077195/TEL/2005/S2). It must therefore be accepted that a 15m monopole at Pipe Bridge is considered acceptable by the Council. Please see **Appendix C** for planning history records relating to the installation by Cornerstone (please note that o2 used to trade under BT Cellnet before it was rebranded into o2 hence the original proposal is under the BT Cellnet brand).

2.8 The appeal proposal is not the first attempt by the appellant to bring 5G service to the local area. It was originally proposed to install a new installation on the south east corner of the junction by the West Didsbury Metrolink stop in addition to the existing base station (for application form, drawings, officer's report, decision notice and appeal decision please see

Appendix D). The application LPA ref. 130969/TEL/2021 for a 15m monopole with ground based cabinets was however refused on the 24th September 2021 on grounds of harm to visual amenity, impact on conservation area and impact on pedestrian movement due to footway narrowing:

'1) The City Council is not satisfied that this development has been sited and designed to minimise the impact upon visual amenity of the area. The proposed telecommunication installation by reason of its height, siting and appearance would form a visually intrusive and dominant feature which would be harmful to the visual amenity of the area in particular the appearance of the street-scene and fails to preserve or enhance the character and appearance of the Blackburn Park Conservation Area. As such, the proposed installation is considered contrary to saved policies DC17.1 and DC18.1 of the Unitary Development Plan for the City of Manchester, policies DM1, EN3 and SP1 of the Manchester Core Strategy and the National Planning Policy Framework (NPPF).
2) The proposed development, due to its siting and size, would result in the existing footway serving the West Didsbury Metrolink Stop being reduced in width which would have detrimental impact on pedestrian movement. The proposal would therefore have an unacceptable impact on highway and pedestrian safety. As such, the proposed installation is considered contrary to policies DM1 and SP1 of the Manchester Core Strategy (2012), saved policy DC17.1 of the Unitary Development Plan for the City'

2.9 The scheme was appealed but the appeal was dismissed. The Inspector stated that '*the proposal would have a harmful effect upon the character and appearance of the area and would not preserve or enhance the CA'* (para 15 of the appeal decision). The argument behind this was that the monopole *'would stand out as a dominant feature because of the open nature of the immediate surrounding area'* (para 10). The reason relating to highway and pedestrian safety was not upheld because *'the installation would not compromise the ease or safety of use of the pavement for pedestrians or other users of the footway'* (para 17 of the appeal decision). The decision came with the following conclusion:

'25. Although I have found that the scheme would be acceptable in terms of highway and pedestrian safety, it would have a harmful effect upon the character and appearance of the area and would not preserve or enhance the CA. The harm I have identified is not outweighed by the benefits of the scheme or the need for the installation to be sited as proposed.'

2.10 Following this, the area was reviewed again and the proposal changed. Instead of a separate installation by the Metrolink, an upgrade of the existing installation was proposed. The existing monopole cannot be re-used because it cannot support any more antennas. The modern multi-technology antennas are heavy weighing approx. 22.5kg each. The monopole is not strong enough to support such a weight. It is designed to support a single antenna which is substantially smaller and lighter. As such, the existing monopole needs to be removed and replaced with a new one that can cater for all the modern technologies.

2.11 The existing monopole is placed in a tight space in between cabinets. The replacement monopole is not only wider but also comes with a wider and deeper root to keep it in a stable vertical position. There is simply not enough space in between the cabinets for the modern monopole. The remaining space is directly over the railway bridge and there is nothing solid to install the root. The footways along Palatine Road and Lapwing Lane are narrow with evidence of substantial scarring suggesting presence of underground services. No element of a base station can be installed above any cables or pipes as it might damage them or restrict access to them for repair. It is noted there are two existing cabinets along Palatine Road. They were fitted in a small space free from the underground services and placed so they do not obscure the signage. The remaining space in between these cabinets and a tree is congested with services and was discounted for this reason.

2.12 In light of the above, the appellant had no choice but to move the installation onto the opposite side of Palatine Road as part of the required upgrade works. The pre-application consultations were undertaken with local community and their representatives following which an application for a prior approval was submitted to the Council on 1st September 2022. The application was registered under LPA ref. 134901/TEL/2022 and validated on 8th September when the fee payment has cleared. The scheme was later refused by the Council on 21st October 2022 and is now subject of this appeal.

2.13 It needs to also be noted that mast sharing with o2/Vodafone was discounted. The existing monopole is not big enough or structurally capable of supporting the apparatus of all 4 operators. As such it would need to be radically redesigned to a lattice tower or a more traditional monopole with an open antenna headframe as presented in **Figure 6**. This would also involve a secure compound, typically 10mx10 to fit all the necessary ground based equipment. There is no space for such a development which would also look much more prominent than two separate installations at the junction.

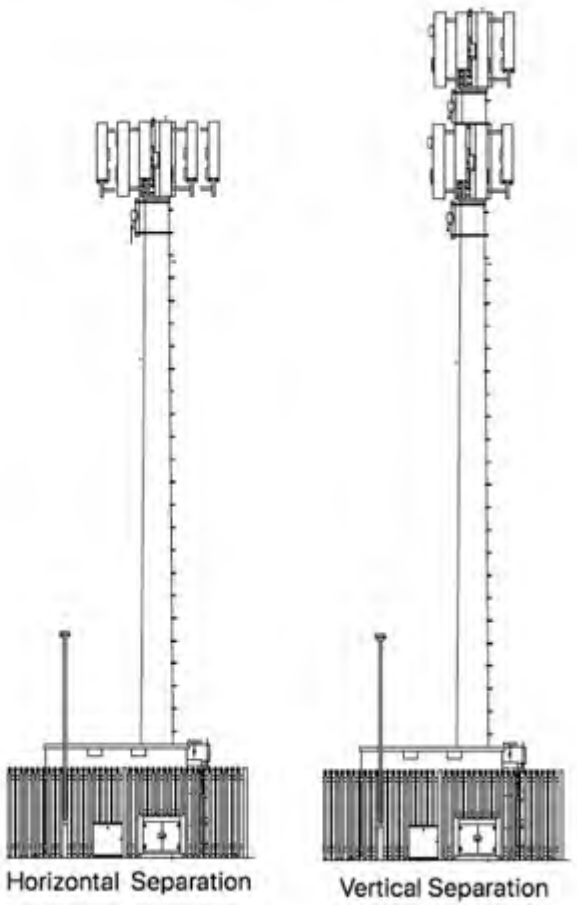


Figure 6: Example of a monopole design incorporating antenna separations between operators.

2.14 The appeal proposal is to upgrade the well-established existing base station by replacing of the existing 11.5m monopole with 18m monopole, installation of 2no. cabinets and 1no. meter cabinet. As part of the upgrade works the location of the existing installation will change from the north western side of the junction to the north eastern side of the junction.

2.15 The works at the appeal site are needed because additional 800MHz, 1400MHz, 2600MHz and 3500MHz bands are now available but these bands have different physical antenna requirements; the proposed upgrade will enable usage of these additional bands

to increase coverage and capacity for better 3G user experience and to enable 4G for both EE and Three and scope for 5G technology.

2.16 The existing monopole is at its full capacity in terms of a number of antennas it can accommodate. The antennas in situ are not compatible with 4G and 5G. There are no new antennas that could be fitted and still provide 3G/4G/5G service to the area. On top of that, the height of the existing monopole does not meet the ICNIRP guidance for 5G technology. The 5G antennas use very high frequency and must be placed significantly higher to work effectively and comply with ICNIRP standards.

2.17 As such, the proposed works involve the installation of a replacement column which will be 18m high with individual sector antennas positioned at different levels (3 x 120 degree sector antennas per level). The antennas in the lower two levels provide 3G/4G coverage in the 800MHz, 1400MHz, 1800MHz, 2100MHz and 2600MHz Bands. These antennas provide a mixture of voice, data and text to mobile phone users. The antennas in the upper level provide 5G coverage in the 3500MHz band. These antennas provide 5G high speed/ low latency packet data (for applications such as HD videos, Home Broadband and Machine to Machine communications). The 3500MHz band has the poorest radio propagation characteristics of all the presently available bands- this issue is somewhat mitigated by positioning them at the top of the antenna array. Some vertical separation is required between antennas to prevent adjacent antennas interfering with each other.

2.18 There are 2no. equipment cabinets and 1no. meter cabinet on site positioned by the bridge to the east of the monopole. They can be clearly seen on the Existing Site Plan (drawing number 100). They will be all removed as part of the upgrade works (with Porter cabinet relocated to the new position) and 3no. replacement cabinets installed plus a meter cabinet. In addition, the new pole will have a wrap-around cabinet at the base. This type of cabinet allows multiple base station services to be funnelled into a single feeder cable that runs up the tower to the antennas. Those services can then be split away from that one cable directly beneath the antennas to further reduce the need for additional cabinets.

2.19 It is worth noting that the GPDO requires that telecommunications equipment erected as permitted development (such as the existing base station) will be required to be removed when no longer required. The GPDO imposes a condition A.2-(2) (a) and (b) that "any electronic communications apparatus provided in accordance with *that permission is removed from the land or building on which it is situated…… as soon as reasonably practicable after it is no longer required for electronic communications purposes….. and; such land or building restored to its condition before the development took place*….". This would therefore apply to the existing base station.

2.20 In terms of the external finish, the monopole will be painted in light grey colour (RAL7035) and the cabinets in dark green colour (RAL6009). However, they can be finished in any other colour the Council or Inspector find more appropriate. It is recognised that the GPDO does not allow any additional conditions to be imposed and it is therefore not possible for the Inspector to secure specific colour by the condition but the appellant will accommodate the Council's request to alter the finish if the appeal is allowed.

2.21 The height and girth of the proposed mast is the absolute minimum capable of providing the technological improvements sought and to ensure compliance with ICNIRP requirements. The existing pole is unable to accommodate the equipment or meet these requirements. Meeting the increased demand for mobile services by local residents as well as road user and visitors to the area is a requirement of this upgrade. There is also a need to increase the capacity of the shared base station and 'future-proof' against further upgrades for the foreseeable future.

3. CASE FOR THE APPELLANT

3.1 In its decision notice refusing approval of the development, the Council states:

> *'1) The City Council is not satisfied that this development has been sited and designed to minimise the impact upon the visual amenity of the area. The proposed telecommunication installation by reason of its height, siting and appearance would form a visually intrusive and dominant feature which would be harmful to the visual amenity of the area in particular the appearance of the street-scene and fails to preserve or enhance the character and appearance of the Ballbrook Conservation Area. As such, the proposed installation is considered contrary to saved policies DC17.1 and DC18.1 of the Unitary Development Plan for the City of Manchester, policies DM1, EN3 and SP1 of the Manchester Core Strategy and the National Planning Policy Framework (NPPF).'*

3.2 To support its decision, the Council prepared a report which is available in **Appendix E**. The report includes a description of the area and proposed development, a summary of relevant planning history and third party comments, list of the NPPF and local policies, and assessment of identified issues around siting and appearance, pedestrian and highway safety and other matters.

3.3 It needs to be noted that this appeal relates to a refusal of a prior approval application under Class a of Part 16 of Schedule 2 of the GPDO. Within certain limits the Order grants permission for the development of telecommunications equipment subject to a prior approval procedure. The relevant issues when assessing applications of this type are the siting and appearance of the proposal. There is no requirement to determine such applications in accordance with the development plan or the National Planning Policy Framework (the Framework) but only to have regard to these documents in so far as they are relevant to matters of siting and appearance.

3.4 The above means that the main issues for this appeal are the effect of the siting and appearance of the proposal on (i) the immediate context, (ii) wider visual amenity, and (iii) character and appearance of the Ballbrook Conservation Area. If this effect is found to amount to harm, then it needs to be assessed against the public benefits that would accrue from the provision of the 4G and 5G network to an area that is presently not satisfactorily covered by the appellant's telecommunication network. In this respect, it is noted that the wider public benefits of mobile digital connectivity were recognised by the grant of planning permission under Part 16 of the General Permitted Development Order in 2016 and re-confirmed in April 2022 when the most recent changes to permitted development rules came into force to specifically support the deployment of 5G and extend mobile coverage.

3.5 The officer report is not consistent regarding the proposal. At para 2 of the Description of Development section it states the existing monopole will be removed as part of the proposal.

> *'The applicants planning statement indicates that the proposed installation is to replace the existing mast located on the opposite side of the road junction, that existing pole is indicates as being removed once it becomes redundant. The proposal is for the upgrade of an existing site. As such, the new monopole needs to be located as close as possible to the existing in order to replicate the coverage and cover the same target coverage area. The existing pole will be removed as soon as reasonably practicable once it becomes redundant.'*

However, under para 4 of the Issues section, it suggest the proposal will add a new mast to the area where there are already 2no. existing masts on the opposite side of Palatine Road.

'The proposed siting would be read with other similar equipment and masts in close proximity on the opposite side of Palatine road. It is noted that two masts and associated equipment cabinets are located on the other side of Palatine Road form the application site. Both of these masts are capable of alterations under the amended General Permitted Development Order, Part 16 Class A. These existing sites lie outside of the Conservation Area and are long standing sites for telecommunications equipment as such the application proposals are considered to add to visual clutter in this area.'

3.6 The appellant has therefore concerns how the proposal was actually assessed by the Council – i.e. as a replacement mast or as a new mast in addition to the existing, and how this might have impacted the overall outcome of the application. This is particularly important in light of the dismissed appeal decision for a new installation on the south eastern corner of the junction (see **Appendix D** for the decision and plans).

3.7 Moreover, Class A of Part 16 of Schedule 2 of the GPDO as amended in April 2022, clearly distinguishes between the development that consists of the installation of a new mast (Class A.1(1)(c)) and the development that consists of the replacement or alternation of a mast (A.1(1)(d)). For developments on highway land or protected land, the height threshold is set to 25m.

3.8 The prior approval application criteria are set under the Conditions section and include the height and width criteria. Under A.2(3)(a), the Order states that proposals on protected land, such as conservation areas, are subject to a prior approval. Since the appeal site is within a conservation area, the scheme requires a prior approval. There are also further restrictions for the alternation or replacement of a mast on a highway. In terms of the width criteria, there are no specific for protected land but are set for proposals on a highway under (A.2(3)(d)(ii). The width of the existing mast at the widest point is up to 1m. The rules for such masts state that if the width of the replacement mast exceeds the width of the existing mast by more than two thirds, then a prior approval is required. In the case of the appeal proposal, the replacement mast is over two thirds wider than the existing one but overall located in the conservation area hence the proposed works require a prior approval.

3.9 To clarify this matter, the appeal proposal will not add an additional mast to the area around the junction. One of the 2no. existing masts will actually be removed and replaced with a mast on the north eastern corner of the junction as part of technological upgrade of the existing well established base station. As such a number of masts in the area will not increase. It is the location, the height and the bulk that will change. The scheme meets permitted development criteria for replacement masts on land which is both protected and on a highway.

3.10 In light of the above, the Inspector is asked to consider the appeal proposal as a replacement.

A: Response to the reason for refusal

3.11 With regards to the installation itself, the appellant will first address its siting and appearance and then discuss its visual effect including impact on the character and appearance of the Ballbrook Conservation Area. Finally, the appellant will present its case

on public benefits of the proposal and how they outweigh the perceived harm. To support arguments, the appellant has prepared a set of photomontages taken from 4 public vantage points in the area (**Appendix F**). The visualisations should give the Inspector a better understanding of how the modern multi-technology monopoles present themselves in a space and in a wider setting.

3.12 **Siting:** The siting of the proposed replacement installation cannot be considered in isolation but in the context the siting of the dismissed scheme at the south eastern corner of the junction (LPA ref. 130969/TEL/2021 in **Appendix D**). The siting of both sites is dominated by a busy junction of Palatine Road and Lapwing Lane with its associated paraphernalia. There are numerous evenly spaced streetlighting columns which will provide vertical context for the proposed monopole.

Moreover, both sites are located within a conservation area and their character and appearance forms part of the siting of the proposal. It is acknowledged that the existing installation is located outside any conservation area and ideally the replacement site should also be located outside. However, this is not possible in this instance. As already presented, the footways at the south western and north western corners are narrow and congested with underground services. Moreover, there is no sufficient space with solid ground at the north western corner for the root of the replacement monopole to be safely installed. With the appeal already dismissed for a mast at the south eastern corner, the only option left is the location at the appeal site. In terms of harm to the character and appearance of the Ballbrook Conservation Area, this is considered to be localised and classified as less than substantial due to the site location at the most westerly point of the Conservation Area.

The major difference in siting is the open character of the south eastern corner of the junction when compared with a build up character of the north eastern corner.

'By reason of the monopole's height, siting and appearance it would stand out as a dominant feature because of the open nature of the immediate surrounding area. The scheme would therefore appear as an obtrusive and incongruous addition to the local street scene.' [excerpt from para 10 of the appeal decision from **Appendix D**]

Moreover there are mature/semi-mature trees within the same footway as the appeal site. Both the 2-3 storey buildings and trees will soften the views of the mast and make it less exposed and apparent when compared with the proposal at the south eastern corner.

The screening/filtering/backdrop effect of trees and buildings can be seen in **Views 1-4** of the photomontages available in **Appendix F**. The longer distance views towards the site are not open but filtered through mature trees and buildings. This effect is achieved despite the mast being taller than its surrounding features. It is therefore considered that the siting of the proposal would not harm the local streetscene. For more images from within the area please see **Figures 7-11**.



Figure 7: Short distance view looking north east towards the appeal site. The monopole will be seen against a backdrop of trees. The light grey finish make it appear less apparent. The existing installations by the appellant and the Cornerstone can also be seen in this photo. [appellant's own photo]



Figure 8: Long distance view looking north east towards the appeal site along the footway at Palatine Road. The views of the monopole will be filtered through vegetation. [appellant's own photo]



Figure 9: View along Lapwing Lane looking east towards the appeal site. The proposed monopole will be seen against a backdrop of a 3 storey building and its upper section against the sky. [appellant's own photo]



Figure 10: View along Lapwing Lane looking north east towards the appeal site. The monopole will be seen among other vertical street furniture. [appellant's own photo]



Figure 11: View looking south west towards the appeal site along the footway at Palatine Road. The views of the proposed mast will be filtered by the mature tree that can be seen on the left hand side in this photo. [appellant's own photo]

The presence of the existing streetworks type installations at the junction has been long established. The planning history records indicate there were no viable alternatives and the same applies today. This is mainly because, the appeal proposal does not seek to introduce a new base station to the area but to upgrade the existing one, even if it involves the installation of a replacement monopole to remove the existing one and a change in location. As such any expectations, even indirect, to remove the base station from the area and move it somewhere else are totally unrealistic. This is because the people who live, work and travel in/through the area generate demand for the mobile digital connectivity. In line with the sequential approach to the site selection process, a new installation is always the last resort. Secondly, 5G technology operates on the highest radio frequencies of all currently available technologies. The operation of the network at higher bands of frequency helps to improve overall capacity for the increasing number of devices on the network as well as with latency, i.e. the wait time it takes between sending and receiving information. The downside of this is that 5G wavelengths have a range not even 2% of 4G's range. So to ensure a reliable 5G to the target area, it is not technically viable to move the site out of

the area as it will effectively mean placing it in a different 5G cell, even though it is about 150-250m away. This is an established site where the cell has been configured to link to the neighbouring cells, so that as a customer moves their mobile device continues to operate as the device links up to the neighbouring cells. This prevents dropped calls and buffering. If the radio base station were to be moved any significant distance from its existing location, then coverage holes would be created leading to a loss of service for existing customers. This is unacceptable for the operator and as such the new equipment has to stay close to the existing established site. The proposed change in location is minor as it places the replacement monopole some 30m from its current position.

It needs to be noted that there are technical and operational constraints associated with the position of a ground based installation and what might appear to be an ideal location from a planning point of view, quite often needs to be discounted.

First of all, the location must fit within the search area where there is an identified need for a base station. It must also be possible to clear the urban and natural clutter, otherwise the installation will not work effectively because the signal will not reach the target area. Then, the land must be either adopted or there must be an explicit consent from the landowner. The consent can also be obtained through the land tribunal under the Electronic Communications Code which is a lengthy process. The spot must be clear from underground services such as water and gas pipes and electrical cables. The ground conditions must be appropriate in that there is enough compact soil for the root specific to the type and height of the mast can be safely inserted. This excludes bridges and lands with underground structures such as culverts and tunnels. Similarly, there cannot be any overhead power lines. There also needs to be enough space for the installation without compromising visibility splays or reducing the footpath width so it affects the free flow of pedestrians.

Within the target area for the upgraded service, there are two existing base stations. One of them will be removed once the appeal proposal is fully operational, the other one by o2/Vodafone provides an excellent co-locating opportunity[2]. None of the existing monopoles can be utilised. The one by MBNL is too low for the 5G service and is not capable of supporting all the operators' latest technologies and needs to be removed anyway. The one by o2/Vodafone will need to be replaced with a much higher and robust structure to share it with two additional operators, i.e. EE and Three (see **Figures 6** above). This is because it would need to accommodate more antennas and provide sufficient separation between operators to avoid signal interference. A multi-operator mast normally takes a form of a lattice tower or a monopole with an open antenna headframe.

3.13 **Appearance (bulk, scale, design):** The column height of 18m is required to address the specific technology being installed, to avoid potential interference and to take into account of the topography and structures in the local area, as well as ensuring that ICNIRP requirements are complied with.

A key feature of the 5G technology is that it uses beam-forming technology, which allows for the signal to be focused to the region where it is needed (e.g. to a person using a mobile phone), rather than being spread out over a large area as with previous technologies. This allows, for example, the same signal to be sent to different users concurrently without interfering with one another, which increases communication rates because the frequency

[2] Co-location is where more than one mast is placed in close proximity on a single site. It represents a viable alternative to mast sharing.

band does not need to be 'shared'between the users. This however comes at a cost - the 5G antennas are much more sensitive to urban and natural clutter and in order for the signal to be reliable, they need to be a minimum of 1.5m above any obstacle. With the target area, not only for 5G but also 3G and 4G technologies, being on both sides of the bridge, it is imperative for the antennas to protrude above it and any associated vegetation. Moreover, any 5G site must meet the new ICNIRP standards. In 2020 ICNIRP made a number of changes to ensure that new technologies such as 5G will not be able to cause harm. This resulted in a need to increase the height of antennas above ground level so they comply with the new standards. This is why nearly every proposal for a 5G ground based mast involves a 17-25m high structure. This height range is typically required by all operators as part of the 5G rollout.

Furthermore, the proposed 18m height of the mast falls within what is allowed for the alteration or replacement of a mast under permitted development when located in a conservation area or on land which is on a highway. The legislation states that in the case of a replacement or alternation, the installation would not be permitted development if the mast would exceed a height of 25m above ground level on article 2(3) land or land which is on a highway[3] or 20m if the height of the proposed mast exceeds the height of the existing mast[4].

Finally, it needs to be noted that it is not for the Council or local residents to determine what height of the mast will meet technical requirements of a particular operator. The required height is determined by each operator independently based on the target area a proposed base station aims to cover taking into account buildings, trees and topography of the area which can all severally attenuate the signal. According to para 115 of the NPPF, account should be taken of '*the efficient operation of the network and providing reasonable capacity for future expansion'*. As such, any attempt to refuse a scheme because the height of a mast exceeds the height of the existing pieces of street furniture, buildings, trees or the height of other installations is simply against the NPPF and the concept of permitted development rights.

With regards to design, it needs to be recognised that the modern multi-technology masts do differ from the previous types of masts. This is because more equipment is needed to provide coverage and capacity. Also ICNIRP guidance has changed to facilitate 5G and this change has driven the height of the mast to increase. Due to all these, previous design solutions, such as replica flagpoles, telegraph poles, tree masts are not practicable or suitable. In these cases, simple designs with particular attention to colouration and finishes may help reduce visual impacts on a site-specific basis.

All the constraints associated with the installations that are designed to provide 5G and to enhance 4G signal by with additional frequencies are explained in the latest Code of Practice for Wireless Network Development in England from March 2022 (paras 64-72, the Code is available in **Appendix G**). The Code was published prior to the application being submitted and was referred to in the Supplementary Information Document that was submitted with the application. The Code, led by the DCMS, was issued to support the changes to the General Permitted Development Order regarding the provision of telecommunications infrastructure.

Even the NPPF recognised these constraints. According to para 115 of the NPPF, account should be taken of *'the efficient operation of the network and providing reasonable capacity for future expansion'*. Under the Framework, the operators are urged to share the installations and account for all the technologies to reduce a number of base stations. This

[3] Part 16 GPDO 2022, Class A, A.1(1)(d)(ii)
[4] Part 16 GPDO 2022, Class A, A.2(3)(d)(i)

approach however comes with a cost – the modern multi-technology masts that can be shared between the operators and are future proofed are substantially higher than the more traditional streetworks masts. This is because they need to accommodate more antennas, all of which need to protrude above the clutter.

In order to reduce the bulk of the upper section of the mast, the antennas are arranged at different levels, 3no. at each level. Given the compact and organised appearance of the antennas at the top of the proposed mast, it would still be a relatively slim vertical structure. The bulk has also been commonly found acceptable by Inspectors on appeal as will be presented below.

The size and amount of the proposed equipment cabinets is standard for a multi-technology site shared between two independent operators. Each of the cabinets host specific radio and transmission equipment required to provide enhanced mobile digital connectivity to the area as well as cooling system and batteries. The installation must also be powered hence a meter cabinet is also proposed on site. When possible, a single bigger cabinet is proposed instead of multiple smaller cabinets. This helps to reduce street clutter.

3.14 **Visual impact**: The appeal proposal will clearly impact the area but this impact does not necessary has to be negative. For example, it will affect the overall experience of digital services accessible via mobile devices such as phones, tablets, smart-watches, in built sat nav systems. Improved connectivity is something which positively contributes to the living and working conditions of people in the area and the overall experience of the area. The same proposal will also have visual impact, mainly due to the additional height of the new mast which is required. This impact might be perceived as negative and in accordance with the provisions of the Town and Country Planning Act as well as planning policies, it is required to balance that perceived negative impact with the positive one (benefits).

The Council claims that the proposed mast will harm the overall character of the local area This is because the mast *'would be taller than the existing street furniture in the area including adjacent buildings and would be visible from various vantage points because this section of the pavement is wide and generally open; would stand out as a dominant feature because of the open nature of the immediate surrounding area; would be read with other similar equipment and masts in close proximity on the opposite side of Palatine road; would dominate the existing street furniture (i.e. existing street lighting columns) and would dwarf nearby structures and buildings'.* [paras 3-5 of the Issues section of the officer's report from **Appendix E**]

It is the appellant's view the case officer based the report on the report relating to the proposal at south eastern corner of the junction (LPA ref. 130969/TEL/2021) without making all the required changes specific to the revised siting. While the pavement at the north eastern corner of the junction is wide, the setting of the proposed location is not open. This is due to the presence of the 2-3 story buildings and mature/semi-mature trees. As presented in the photomontages, these features, depending on the viewpoint, will actually obscure the views of the installation, serve as a backdrop or filter the views. It also needs to be noted that one of the two existing masts at the north western corner of the junction will be removed as part of the proposal. As such, on the contrary to the case officer's findings, the replacement installation will only be read in the context of one of the existing mast.

The need for the height and position at the junction has been robustly explained by the appellant with supporting evidence when appropriate. In this respect, the appellant expanded the details that were provided with the application and further justified why the installation needs to be located where it is proposed, explained why the height cannot be

reduced and provided images of as-built installations to assist in presenting the visual impact of the modern multi-technology mast. This was then supported with the assessment of visual impact from various public vantage points in the area and photomontages (**Appendix F**). In this respect the appellant does not question the visual impact of the installation would increase. This is inevitable due to the additional height of the proposed mast. However, the appellant argues that despite the additional height, the installation will not dominate the views in the area. This is because the proposal will not be seen in isolation but in the context of other vertical features of the streetscrene and against a backdrop of either buildings or trees which will also filter and obscure the views. While the upper section of the mast will protrude above these features, this is essential as otherwise the antennas will not be able to send a signal within the already established area. The mast will be a static structure and its visual effect is reasonable considering its height and topography of the area.

As presented by photomontages, when viewed along Lapwing Lane looking north west (Viewpoint 1), the monopole will have similar visual impact to the existing monopole by Cornerstone on the opposite side of the junction. It will appear as a slimline static vertical feature of the streetscene, the external finish of which will match other street furniture. Viewpoint 2 looking north east along Palatine Road shows the level of visual impact when viewed from shorter distance. Even then, the proposed monopole looks in proportion with the existing installation on the opposite side of Palatine Road despite it being of a greater height. From Viewpoint 3 (along Lapwing Lane looking south east), the mast is seen against a backdrop of buildings on the entrance to the Conservation Area. While the monopole protrudes above to rooflines, the same effect can be seen when it comes to the existing street lighting columns, the upper section of which is seen against the sky. Even though the trees are lower than the actual proposed monopole, they also offer effective screening as presented in Viewpoint 4 (along Palatine Road looking south west).

In order to reduce the height, the antennas will need to be placed at the same level. This will lead to a much more substantial structure which a bulky headframe at the top as presented in **Figure 12 below**. There is no possibility to improve on it. This is primarily because the monopole must be strong enough to support the load of the antennas, feeders and other apparatus that needs to be located on the monopole and to absorb wind forces. The appellant is unable to visually justify such a solution at the appeal site, even if it means a lower structure.

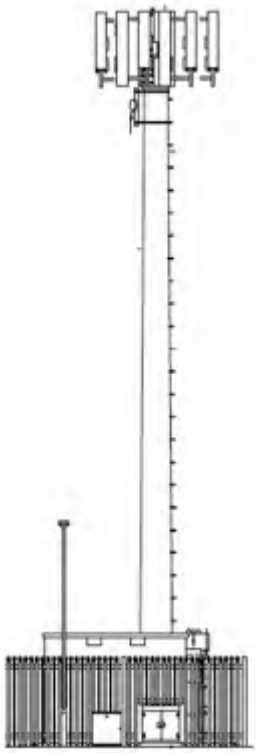


Figure 12 – Sketch of a monopole with an open antenna headframe. This type of a headframe allows all the antennas to be at the same level.

The whole target area for the replacement installation is focused on the junction of Palatine Road and Lapwing Lane with the Metrolink stop (for target area please see **Figure 13** below). It is noted it is the eastern side of the junction that falls either within Ballbrook Conservation Area or Blackburn Park Conservation Area. The western side where the existing installation is located is free from this historic constraint. The appellant is confident that they fully explored the possibility of retaining the site outside any conservation area. Unfortunately either the footways are too narrow and congested with underground services or there is nothing solid to support the root of the modern monopole. As such, it is not possible to avoid placing the upgraded installation within the conservation area. As already explained the south eastern corner by the entrance to Metrolink has failed on appeal and the current location is the only option left around the junction. The character of the most western tip of the Blackburn Conservation Area is characterised by the busy junction and 2-3 storey buildings which vary in style and materials. Their use is primarily commercial. There will be visual connection between these buildings and the appeal site because they will offer immediate backdrop and screening from all directions. Further north past the junction with Ballbrook Avenue, there is a Grade 2 Listed Building at 99 Palatine Road. It is located some 50m from the appeal site and has limited visual connection with it due to the distance and its secluded location. The only vantage point from which the two would be seen together is the south western corner of the junction. It is however considered the setting of the building will not be impacted to any greater degree than the impact caused by a lamppost. Both a monopole and a streetlighting column are simple vertical structures with slim profile not obscuring any special characteristics of this historic asset which was given the listed status for its *'distinctive and striking Tudor Revival design'*.

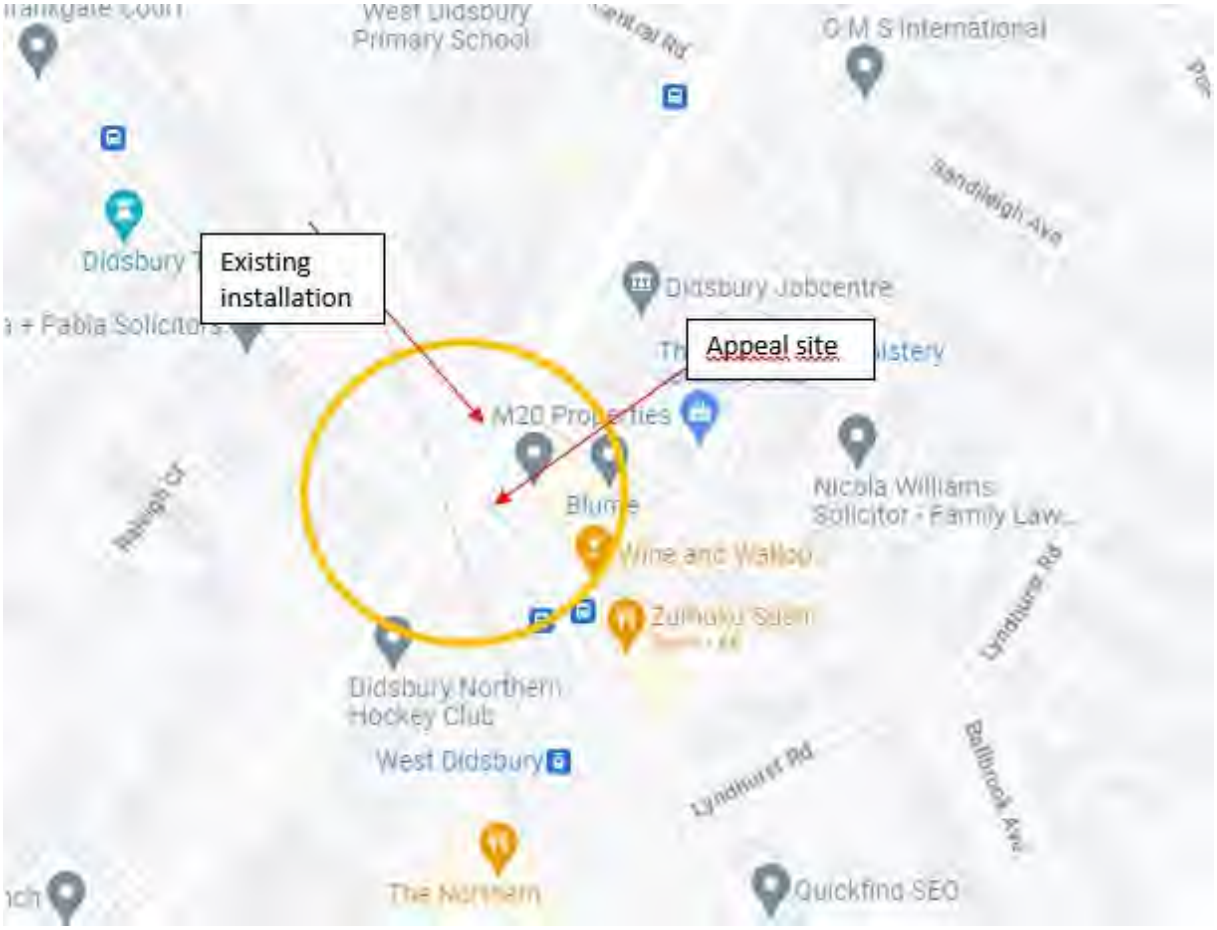


Figure 13: The location of the existing installation and appeal site against the map of the target area for coverage and capacity improvements.

The appellant considers that all the supporting information provided with this appeal is sufficient to state that there is an unquestionable technical need for the installation to be placed at the appeal site and to be of the specified height. If there was a scope to reduce the height of the mast or improve on its siting, the appellant would have done so instead of going through the second costly and timely appeal process.

These days, the telecommunication masts and cabinets are as essential as traffic lights or lampposts and have become common features of built-up areas even if their height exceeds everything else. This has been reinforced on appeal against a decision by Tameside Metropolitan Borough Council refusing a prior approval for a 17.5m monopole (for the appeal decision and associated plans please see **Appendix H**). At paragraph 4 of that decision Inspector Baxter describes the character of the area:

'The area surrounding the appeal site is characterised predominantly by residential properties of traditional design and sizes as well as some commercial buildings and a day nursery which is adjacent to the site. The site is located within close proximity to a number of highway junctions including the roads of Town Lane, Bates Street, Foundry Street and Crescent Road. The area has common street furniture paraphernalia including street lighting, road signs, bus stops, trees, bollards and an existing monopole telecommunications mast with associated equipment cabinets.'

Then at paragraphs 5-7, the Inspector deals with the height of the monopole, its visibility and ability to assimilate with existing features of the streetscene as well as equipment cabinets:

'5. The proposal would be taller than the majority of structures and buildings in the area. However, telecommunication structures are common features in built up areas and the proposal, whilst being visible, would not necessarily be highly noticeable as it would blend in with similar structures such as street lighting and the existing monopole mast.

6. The proposed monopole structure would be taller and thicker, including exposed antennas, dishes and RRUs, compared to the existing street lighting and existing monopole structure in the area. The proposed monopole would not be a bulky structure though and would assimilate well with the existing high structures in the area when viewed against the surrounding skyline. The antennas, dishes and RRUs would be slim line features and not protrude significantly from the main monopole structure. The proposal including the antennas, dishes and RRUs would not have a cluttered appearance or be visually intrusive to the surrounding area.

7. The proposed equipment cabinets, including the monopole structure, would be positioned to the rear of the footpath and there would be minimal opportunity for them to be screened by vegetation. Nevertheless, these types of equipment cabinets are not uncommon features on public footpaths and would be similar in nature to existing cabinets in the area including the cabinets associated with the existing monopole. The scale and design of the equipment cabinets are modest, they would be in keeping with similar structures in the area and would not have a detrimental effect on the appearance of the street scene. Due to positioning of the equipment cabinets and the monopole, there would be sufficient space on the footpath to ensure that they do not become an adverse obstruction to pedestrians.'

The expected level of impact from an installation significantly higher than anything else in the immediate locality has been acknowledged on appeal for a similar proposal by MBNL at Belmont Circle in Harrow. In paragraph 7 of the appeal decision (**Appendix I)**, Inspector Sturgess stated:

'7. Whilst a degree of increased visual impact over and above the existing masts is inevitable due to the increase in height of the proposed mast, it is nevertheless the minimum height and girth capable of providing the improved services and introducing 5G technologies to the area, whilst also satisfying ICNIRP standards. It is also set away from residential development'

Despite the height, the proposal was found to have low impact on the character and appearance of the area.

'8. I find that the impact of the proposed mast on the character and appearance of the area, despite its height, would be low. I base this assessment on the siting of the proposed mast, adjacent to existing telecommunications equipment, against the backdrop of a petrol filling station and surrounded by other street furniture such as streetlights and street signage associated with the roundabout and cycle track. This is an urban location where there is already street paraphernalia so it will not appear out of place or especially obvious in that context. Additionally, when the site is viewed from the opposite side of Belmont Circle the intervening vegetation on the roundabout and the change in levels would break up the outline of the mast and help to reduce its prominence. I therefore consider that the proposal accords with the Policies of the LP. Its siting minimises its effect on the character and appearance of the area within which it is located, and it is not detrimental to local

character and appearance, given the street furniture already present in the locality, the local topography and the vegetation on the roundabout.

In another appeal for a 20m monopole at Melbourne Avenue in Rochdale **(Appendix J),** Inspector Wilkinson allowed the appeal despite far reaching views of the mast.

7. The mast would be visible for quite a distance when travelling along Oldham Road. However, it would be mainly the top section that would be visible until in relatively close proximity, due to the screening effect of the buildings fronting onto the road and the nearby trees. From most viewpoints along this road, the mast would be viewed in conjunction with other vertical components and so would not be seen as an isolated vertical structure. The light grey colour proposed would help to reduce its contrast with the sky.'

B: The need, public benefits and planning balance

3.15 The upgraded installation at the appeal site will enhance mobile digital connectivity of Three and EE, two of the successful bidders in the Ofcom organised auction for 'fifth generation' Spectrum Licences to provide high-speed mobile broadband services to the public. Three and EE are Electronic Communications Code Operators for the purposes of Part 16 of the GPDO, evidence of the Government's recognition that they are providing electronic communications networks in the public interest.

3.16 While public benefits of digital mobile connectivity are recognised as part of the grant of planning permission for developments which meet permitted development criteria, the Government's expectations towards the availability of 5G signal are constantly growing. It transpires in a number of the Government lead initiatives/projects to boost connectivity across the country and levelling up any digital gaps. Without a suitable infrastructure (i.e. masts, cabinets, antennas, dishes), the community of Didsbury will not have access to this latest technology and thus unable to benefit from it.

3.17 The upgraded installation will bring next generation technology to Didsbury. The full extent of benefits of 5G technology is still unknown. However the possibilities seem endless. If allowed, residents and visitors of the area will benefit from:

- Much faster download/upload speed and latency
- Improved network capacity in congested areas. (Network capacity is the amount of traffic that a network can handle at any given time. This includes the number of simultaneous voice calls and maximum data speeds. Capacity varies by area with the busiest areas being around transport hubs, shopping streets, sport/entertainment venues, educational institutions and business parks.)
- Improved home working (5G would rival the speed of fibre broadband, allowing even construction workers to operate excavators and cranes from thousands of miles away, doctors to consult with patients and paramedics from afar, and surgeons to even control surgical robots remotely).
- The Internet of Things (it encompasses all the 'smart' and connected devices we're starting to see in homes and beyond, from smart light bulbs and thermostats, to connected kettles, security cameras and more, most of which can be controlled by an app on a mobile phone, or by voice when paired with an AI Assistant like Amazon Alexa. In some cases they can even be automated, with lights for example turning on when entering a room and turning off when leaving it. They do this in part by communicating with each other. For example, motion sensors at a room entrance could tell the lights when a person has entered.)
- Smart Cities (This takes the Internet of Things beyond homes and out into the world to make cities smarter. Examples include traffic lights that can adapt automatically based on traffic flow, automatic deployment of road repair vehicles when potholes are

detected, smart power distribution, so buildings are not being lit when they are empty, and rubbish bins that know when they need emptying and alert the relevant people, all leading to cleaner, safer, more efficient cities, and all with minimal human oversight.)

- Cars of the future (When connected to 5G, the cars would communicate and share data with other vehicles and connected infrastructure, avoiding accidents and traffic as a result, and telling smart cities where traffic is building up, so routes for other vehicles can be adjusted. This will also play a large role in self-driving cars, with its speed and reliability key to them rapidly sending and receiving information about the road and other vehicles.)

3.18 Upgrading digital telecommunications is a key Government priority. This is set out in detail in the NPPF and is also summarised in the joint DDCMS and MHLG statement (**Appendix K**) and also in the DDCMS Connected Growth Manual (**Appendix L**). This document notes that improved digital infrastructure lowers barriers to social and economic participation and boosts productivity and earning power (p6) and the Minister emphasises that the digital sector is central to the nation's economic future (see, for example, the Secretary of State's Foreword to the Manual, p3).

3.19 Furthermore, the Government wants to ensure that 95% of the UK has good 4G coverage, the UK to be a world leader in 5G with the majority of the UK population to have access to a 5G signal by 2027. Critical to achieving this is the ability of operators to deploy appropriate infrastructure.

'The Government would like to see nationwide full fibre coverage by 2033. We would also like the UK to be a world leader in 5G, with the majority of the population covered by a 5G signal by 2027. We are writing to ask for your help in supporting the investment necessary to achieve these objectives.' [page 1 of Collaborating for digital connectivity]

'Good quality broadband and mobile coverage has become a modern necessity, both at home and work.' [page 37 of Connected Growth]

'We need to create the market and policy conditions necessary to support the large-scale commercial investment required to extend and future-proof digital connectivity. A key part of this is making it easier for operators to deploy infrastructure.' [page 1 of Collaborating for digital connectivity]

3.20 The proposed site is designed to provide 5G as well as improve the existing 4G service in the area. The Local Authorities are asked to cooperate with the digital communications industry and to have policies and procedures in place that promote effective engagement and minimise barriers to deployment.

3.21 The operators' license obligations requires them to meet customers 'reasonable demand'. Reasonable demand would be to provide the latest technologies including 5G as customers expect to be able to use their smart 5G enabled devices wherever they are located whether that is indoors or outside. The operators also have a market driven requirement to provide a high quality service as well as a license obligation to provide indoor 3G/4G and 5G services.

3.22 Public benefits could be anything that delivers economic, social or environmental objectives but should flow from the proposed development. They should be of a nature or scale to be of benefit to the public at large and not just be a private benefit. With regards to benefits associated with mobile technology, this type of technology plays a multi-layered role in how we live, work and play, with access to technology differentiated by age, culture,

location and social standing. Getting the right technological infrastructure in place at the right time is fundamental to well-planned and successful communities.

3.23 The social benefits of mobile connectivity and innovation can help people to stay in touch be it by voice or video calling which can help improve social wellbeing. As heightened during the coronavirus pandemic, mobile connectivity enables lifestyle choices and interests as people can access social networking sites and applications to keep them entertained. It also provides personal security, 24/7 access to personal information, ease of access to online services and an essential way to contact the emergency services. Mobile connectivity helps promote smarter, productive, and more sustainable ways of working which in turn can have knock on benefits. For example, home working makes for a better work and home life balance. It reduces commuting times and the need to travel, which as well as helping productivity also means less vehicle pollutants and so environmental benefits.

3.24 In November 2020 the HM Treasury published the National Infrastructure Strategy[5] which includes a section specifically for Digital Connectivity with references throughout to 5G which the installation at the appeal site aims to deliver to Didsbury in future. The infrastructure is seen as a way to unite and level up the UK where no community of business is left behind. Digital connectivity including mobile and 5G in particular has an important role to play. *'This Strategy also puts innovation and new technology at the heart of the government's approach. Every infrastructure sector could face transformative technological change over the next twenty years. From electric vehicles, to hydrogen heating systems, to 5G and its successors, new technologies have enormous potential to improve the environment and the daily lives of people across the UK. This Strategy will ensure the UK is at the forefront of this technological revolution.'*

3.25 In December 2022 Ofcom produced its annual report - Connected Nations 2022 (**Appendix M**) - which measures progress in broadband and mobile services in the UK and highlights the work Ofcom is doing, alongside UK and devolved governments and communications companies, to improve the availability of these services. Ofcom has aspirations for people in the UK to be able to easily access good broadband and mobile connections wherever they live, work and travel. To achieve that, Ofcom's objectives include supporting investment in strong and secure networks, and getting everyone across the UK connected. It reports that the four mobile network operators (EE, O2, Three and Vodafone) each estimate they provide 4G outdoor coverage to c.99% of premises and that the 5G rollout has rapidly increased with a number of 5G sites almost double when compared to last year.

3.26 Online Nation 2022 report was produced by Ofcom to look at what people in the UK are doing online and industry trends. Amongst other things it was found there is an increasing importance placed on mobile connectivity – 'For most people in the UK, being online is a major part of daily life.' The use of smartphones for the connection is unquestionable 73% of time spent online was done on a smartphone; one in five people only use a smartphone to go online, compared to one in ten last year. It is cited in the report that most internet users use online messaging and calling (voice/video) services. The summary of the report can be found in **Appendix N**.

3.27 The Queen's Speech from May 2022 announced the Telecommunications Infrastructure Bill to extend 5G mobile coverage and introduce new safety standards for digital devices. The proposed partial replacement installation at the appeal site will not only boost 4G service but also enable 5G signal in the area.

[5] https://www.gov.uk/government/publications/national-infrastructure-strategy

3.28 The coronavirus pandemic has impacted on mobile networks, in which operators have seen a shift in usage from town and city centres to residential areas as more people were working from home due to COVID-19 restrictions. This has led to a change in working practices going forward even now restrictions have been lifted more people continue to work from home and hold meetings remotely with companies more accepting of this as a new way of working. Also, with the likes of online shopping and streaming platforms all accessible on mobile devices this has created added pressures on the mobile networks.

3.29 People who live and work in Didsbury or travel through it are fully entitled to experience the benefits of enhanced 4G service and the latest 5G technology that the appeal proposal is looking to delivery. The availability of improved digital connectivity needs to be balanced against the impact on visual amenity. In this case, the Council claims that the benefits of enhanced technology would not outweigh the identified harm.

3.30 In their response to the reason for refusal the appellant presented that the appeal proposal will have a modest visual impact which will be fairly local despite the site's location within a conservation area. This needs to be balanced against the public benefits of mobile digital connectivity, including the Government's support for the 5G rollout which is evident in NPPF and the overall 'levelling up' agenda.

3.31 At an appeal site at Stansfeld Road in Newham (**Appendix O**), MBNL proposed a 20m mast as part of their 5G rollout, Inspector Cryan stated under a Planning balance section of the decision notice:

'10. The proposed development would upgrade existing infrastructure to provide additional network coverage and capacity for two network operators, including the introduction of new 5G services. There are significant benefits to the public at large from being able to access high quality mobile communications, which in my view carry considerable weight in favour of the proposal.
11. The appellant has stated that the existing mast on the site is not tall enough to provide an acceptable 5G service to the surrounding area, nor would it in any case be capable of bearing the load of the antennas necessary to provide the full range of 2G, 3G, 4G and 5G services for two operators. The proposed siting of the new mast and other equipment slightly to the south of the existing installation has been dictated by the presence of various underground services and the need to avoid interference with the other base station further north on Stansfeld Road. Possible alternative sites in the vicinity have been assessed by the appellant and discounted as unsuitable for various reasons, and I note that the Council has not disputed the appellant's conclusions in this regard, nor has it suggested any other alternatives itself. I acknowledge also that the existing mast on the site will be removed and there will therefore be no overall increase in the number of masts or sites as a result of this proposal.
12. I therefore find that whilst there would be limited harm to the character and appearance of the area the benefits which would arise from the proposed development, as well as the fact that there would be no increase in the number of mobile communication masts in the area, are sufficient to outweigh this harm. Accordingly, I find that material considerations indicate that the appeal should be determined other than in accordance with the development plan in this case.'

3.32 In Didsbury, there is an established base station which already fits into the operators' network. From a technical perspective there is no opportunity to deviate from the site in question as it would have knock-on impacts on the wider network and not fulfil the operator's technical requirements. It would also leave a coverage hole for the existing technologies in this area that customers have become accustomed to. An upgrade to an existing installation should not make the existing coverage worse than before the works were carried out, moving the site any significant distance away would lead to a poorer user

experience and thus fail its design brief. As the existing mast cannot accommodate the new antennas, it requires to be replaced, therefore, it is clear that the appellant has taken a sequential approach to site selection by initially seeking to upgrade their own existing base station. Considering all the above, the challenges faced by the appellant is always to try and balance the technical necessity for connectivity with the constraints and environmental factors of the specific area, that influence a scheme's siting and appearance so far as practicable. Inevitably, there will always be some degree of visibility and so potential environmental harm associated with any form of development that can be seen within the public realm. Nevertheless, when harm is identified, it should be determined as to whether that harm would be outweighed by other material considerations.

3.33 Interestingly, not all upgrade proposal are found cause harm. In particular at Coleshill Road, Birmingham, also by MBNL, Inspector Williamson considered it was acceptable to upgrade the exiting base station by installing the 8m higher replacement monopole without causing any harm to the streetscene or character and appearance of the area (**Appendix P).**

'I appreciate that the proposed monopole would be around 8 m higher than the existing pole and, following the removal of existing equipment, that there would be more cabinets than currently exists. However, except for views one would have when close to the pole, when viewed from most of the surrounding vantage points and approaches to the roundabout, the proposal would be perceived as appropriate within its context. Therefore, I conclude that the proposed development would not harm the street scene or character and appearance of the area, with particular regard to siting and size.'

3.34 Similarly, the issue of whether it is possible for the installation to be designed so it has lesser impact was also dealt with on appeal in a decision by Inspector MacLeod for a site in Winchester (**Appendix Q**):

'12. The question then arises could a development with a lesser impact reasonably be provided on the site other than that proposed? The appellant has demonstrated that the pole's height would be necessary to clear obstructions to signal from trees and buildings. Its width would be the minimum necessary to support the antennae at the top of the pole. The cylindrical shroud to contain the antennae would be the widest part of the structure, but would nonetheless have a compact form, sufficient to meet operational requirements. Furthermore, it would also have the benefit of supporting the networks of two mobile phone companies. Such mast sharing is consistent with the Government's aim to keep the number of sites for such installations to a minimum consistent with the needs of consumers.'

3.35 On balance and taking all factors together, the perceived harm to the streetscene and wider area would be outweighed by the need to cater for the growing demand by improving the capacity of the site and provision of high speed mobile connectivity. Reasonable consideration needs to be taken of the proposal in the context of it being of a modest scale where a precedent for a telecommunications base stations has already been established. The appellant therefore finds that the benefits of the shared installation outweigh any harm to the streetscene and wider visual amenity.

4. PLANNING POLICY

4.1 The reason for refusal identify that the proposal would be contrary to:

- National Planning Policy Framework (NPPF),
- Saved Polices DC17.1 and DC18.1 of the of the Unitary Development Plan for the City of Manchester,

- Policies DM1, EN3 and SP1 of the Manchester Core Strategy.

4.2 The application at the appeal site was for a determination under the GPDO Schedule 2, Part 16, condition A.3(4) which states: *'(3) Before beginning the development describe in paragraph A.2(3), the developer must apply to the local planning authority for a determination as to whether the prior approval of the authority will be required as to the siting and appearance of the development'*.

4.3 The application was not an application for planning permission; it was for a written determination if the Council as a Local Planning Authority wished to approve the details of the development and if so whether it approved or refused those submitted details. Planning permission is already granted by section 60 of the Act and Article 3 of the Order, as permitted development, and this means that the provisions of the development plan have very limited applicability to such a prior approval application. In particular, development plan policies, which seek to prevent or restrict the installation of the proposed installation other than for siting and appearance reasons are of no relevance to the consideration of the prior approval application.

4.4 As the equivalent of outline planning permission has already been granted for the development, the sole purpose of the prior approval application is therefore to agree the optimal location and design for the radio base station at the already selected location. Indeed, the Part 16 two-stage prior approval application approach provides: first, a determination whether or not the council wishes to even consider the details of the development. If it does then it issues a determination that prior approval is required. Secondly, if prior approval is required, whether the submitted details are approved or refused by the council, was specifically designed to provide, if necessary, for a period of negotiation between the council's first and second determinations to allow for the identification of the optimal siting and appearance. The option of not having a radio base station to meet the need for the system or coverage is totally constrained.

National Planning Policy Framework

4.5 While the Council states the proposal will be contrary to the National Planning Policy Framework, it actually does not specify the actual policies. This is not only unhelpful as the Framework is a substantial document but does not appear to be in line with Article 35 of DMPO 2015, which states that when refusing planning permission, local planning authorities are required to list all policies and proposals in the development plan which are relevant to the decision. It is accepted that technically this Article applies to planning applications or applications for approval of reserved matters only and in this case, a planning permission is already granted subject to the submission and approval of siting and appearance (matters outstanding as they would be in an outline submission). Nevertheless, since the Council went into detail listing local policies, it is expected that the same level of granularity should be applied to national policies.

4.6 The delegated report is more specific and quotes various paragraph from Section 2, 10 and 16 of the NPPF.

4.7 <u>Section 2 Achieving Sustainable Development</u> - At the centre of the planning system is sustainable development to the achievement of which it is supposed to contribute. The upgraded installation at the appeal site is sustainable, and moreover it supports other sustainable development. It supports better lives for us; it supports economic growth, choice and is part of the new technology the Government wishes to encourage and support. Importantly, it also reduces the need to travel, particularly at peak-periods, and allows working from home to take place.

4.8 The proposed installation meets all three objectives of sustainable development economic, social and environmental. It is therefore vital that the most up-to-date shared mobile service with the required coverage and capacity is available to this part of the Manchester City Council's area in the public interest, by allowing the current proposal.

4.9 Mobile communication plays a significant role in sustainable development. Being able to access the Internet via a mobile device allows people to access a wide range of central and local government services, buy groceries, manage finances, apply for jobs/university, and carry out school projects, send emails, download applications, send and receive instant messages, streaming and downloading data to name just a few of the benefits of being able to use an internet enabled handheld device. It also allows people to work from home or on the move without needing to return to the office. This reduces travel time, carbon emissions and increases the speed in which information is processed/shared. The proposal therefore fully complies with Section 2 of the NPPF.

4.10 Section 10 Supporting High Quality Communications - In line with guidance contained within this section of NPPF, the proposed radio base station in this location will enable fast, reliable, secure internet accessibility wherever the user is located. An upgraded installation in this location would fully meet the operators' coverage and capacity requirements for 4G and 5G provision for junction of Palatine Road and Lapwing Lane in Didsbury. This would be wholly in line with the Government's latest aspirations to strongly support advanced, high quality and reliable communications infrastructure, essential for economic growth and social well-being. It is vital that the most up-to-date shared mobile service with the required coverage and capacity is available to this part of the Manchester City Council's area in the public interest. This can be achieved by allowing the current proposal.

4.11 In response to Para 115 which advises that the re-use of existing masts and buildings should be encouraged and equipment should be well designed/camouflaged where possible, the appeal proposal is for an important investment in upgrading the communications infrastructure in Didsbury. Full consideration has been given to alternatives, including the existing mast and the proposal is considered to provide the best option in terms of meeting the technical requirements in a location with limited local impacts. This paragraph also accounts for technical and operational limitations that the operators face during the process. The appellant agrees that the re-use of the existing telecommunications site is the most sensible approach. However, this cannot be achieved here and the whole base station needs to be relocated. The new mast cannot be any lower because the lower set of antennas will be obscured restricting the signal reaching the target area. It cannot also have any less antennas because it will not be able to cater for all the technologies and the growing demand for the service. Overall, the new mast is as low key as is possible to provide the necessary improvement to coverage and capacity to the target area, including the provision of 5G in future.

4.12 Paragraph 116, among other things, seeks to prevent the Council from imposing a ban on telecommunications installations in certain areas or insisting on a minimum distance between the installation and other development.

4.13 At paragraph 117 the Framework lists the necessary evidence that needs to be submitted with each application, including applications for prior approval, to justify the proposed development: (1) pre-application consultation evidence, (2) for an addition to an existing mast or base station, statement that the cumulative exposure will not exceed International Commission guidelines on non-ionising radiation protection, (3) for a new mast or base station, evidence of exploring the possibility of utilising existing

base stations/buildings/structures and a statement that International Commission guidelines will be met.

4.14 In response to the first criteria, the application documents lists the pre-application consultation that was undertaken with various stakeholders. With regards to the second criteria, this is not applicable. In this respect of the third criteria, the relevant ICNIRP certificate for the mast has been provided to confirm that the relevant guidelines on non-ionising radiation will be met. Before considering the current proposals, the applicant considered a number of alternative options, utilising a sequential approach. These are referred to in this appeal statement at paras 2.8-2.13.

4.15 The first option was to consider accommodating the new equipment on the existing monopole. However, the existing monopole is (1) incapable of accommodating the required technologies and antennas to cater for the additional demand for the service and (2) of insufficient height to avoid interference with trees and meet the most recent ICNIRP standards for installations that have capability of 5G technology.

4.16 Apart from the existing installation by MBNL, there is one more base station in the search area which cannot be used either (for the reasons as set out in para 2.13 above). As such the second option was to remove the existing MBNL mast and replace it with a new one as close as possible. Consequently, the surrounding area was searched with a view to find the best location. The area is flat and dominated by the junction with associated highway infrastructure. Each corner of the junction was fully investigated. This includes a scheme at the south eastern corner which was dismissed on appeal and detailed consideration of the western side of the junction which is outside any conservation area.

4.17 Accordingly, the current proposal comprises an 18m mast with associated cabinets at the north eastern corner of the junction which will upgrade the existing service provision to the area by providing enhanced 4G and future 5G services for the appellant, with the existing base station being removed. Use of the junction area for telecommunications purposes is long established. While the replacement mast will be higher and bulkier, it is of the only viable height and scale. It is a simple, vertical structure, designed to assimilate with other street furniture, including the o2/Vodafone mast. The antennas are still tightly packed not spread out like in a more traditional monopole design (see **Figure 6**), a design that has become an accepted item of street furniture in many urban areas up and down the country.

4.18 The removal of the existing base station will ensure that the number of base stations in the area remains the same, whilst at the same time ensuring that the important upgrade to 4G and 5G technology is facilitated. Furthermore, the base station will be shared by two otherwise competing network operators further mitigating visual impacts through avoiding the unnecessary proliferation of base stations and telecommunications masts.

4.19 The appellants have therefore fully considered potential alternatives, but none are suitable or capable of accommodating the proposed upgrade for the required area of coverage. The site choice has taken into account the arguments contained in the dismissed appeal LPA ref. 130969/TEL/2021, the presence of underground utilities, the structural feasibility of locating a site on the bridge, the character of two conservation areas, the proximity to the Grade 2 Listed Building, and height of the

trees/buildings for the signal to reach the target area as well as other constraints listed under the Sitting subsection of this appeal statement.

4.20 Section 16 Conserving and Enhancing the Historic Environment – This section states that account should be taken to the desirability of sustaining and enhancing the significance of the heritage asset and that great weight should be given to the assets conservation. Where potential harm to designated heritage assets is identified by the Council, it needs to be categorised as either less than substantial harm or substantial harm (which includes total loss) in order to identify which policies in the NPPF apply.

4.21 The appeal proposal is located on the western boundary of Ballbrook Conservation Area which adjoins Blackburn Park Conservation Area. This part of the conservation area is dominated by a busy road junction with its associated paraphernalia.

4.22 In its delegated report the officer states the proposal will lead to less than substantial harm to the character and appearance of the conservation area and that the harm would not be outweighed by the public benefit that could be derived from the proposal.

4.23 The NPPF, as a material consideration, states that account should be taken of the desirability of sustaining and enhancing the significance of the heritage asset and that great weight should be given to the assets conservation. As explained above the proposal will lead to less than substantial harm in the context of NPPF para 202 and in such cases, this harm should be weighed against the public benefits of the proposal as presented in section 3B of this appeal statement. In this respect, by positioning the site on the verge of the conservation area, away from the majority of its key features listed in the Appraisal, is acceptable.

4.24 In line with guidance contained within the NPPF, the proposed radio base station in this location will enable fast, reliable, secure internet accessibility wherever the user is located. An upgraded installation in this location would fully meet the operators' coverage and capacity requirements for 3G, 4G and 5G provision for the junction of Palatine Road and Lapwing Lane with the Metrolink station. This would be wholly in line with the Government's latest aspirations to strongly support advanced, high quality and reliable communications infrastructure, essential for economic growth and social well-being while causing as little harm as possible to the heritage assets. It is vital that the most up-to-date shared mobile service with the required coverage and capacity is available to this part of the Manchester City Council's area in the public interest. This can be achieved by allowing the current proposal.

Local policies

4.25 The reason for refusal refers to two saved policies from the of the Unitary Development Plan for the City of Manchester DC17.1 and DC18.1 and to three polices from the Manchester Core Strategy DM1, EN3 and SP1.

Policy DC17.1 (Telecommunications) – in response to this policy, in line with the sequential approach to the site selection process, the appellant opted to upgrade the existing telecommunications site instead of a completely new installation in the locality. However, as part of the upgrade works, the location will change onto the opposite side of Palatine Road. Although there is a lot of space by the existing installation, the area is dominated by the bridge with nothing solid underneath its span to support the modern multi-technology mast in a vertical position. The surrounding buildings were not designed with telecommunications equipment in

mind and their roofs and walls are not structurally sound to take the load of the required apparatus. As part of the proposed upgrade works, the existing monopole and cabinets will be removed and a new ones installed on the opposite side of the road. The proposed installation will retain its shared character between EE and Three. In terms of impact on the surrounding area, the installation is placed within a wide footway against a backdrop of 2-3 storey buildings. There are numerous streetligting columns which will provide vertical context for the installation. There are also trees that will soften the views of the mast from various public vantage points as presented in the photomontages.

Policy DC18.1 (Conservation Areas) and Policy EN3 (Heritage) – They both seek to preserve or enhance the conservation area. Consequently any development within a conservation area will be assessed against a number of considerations listed in these policies.

For a number of years an installation of a ground based mast in a conservation area was not possible under prior approval and a full planning permission was needed. To recognise the importance of mobile phone technology and its benefits as well as to make it easier to provide the service to residents and businesses based in conservation areas, the Government made changes to Class a Part 16 GPDO in 2016 allowing ground based masts in conservation area to follow the prior approval process.

Under Class a Part 16 of GPDO, installation of a new mast or replacement up to 25m in a conservation area is permitted development subject to a prior approval of siting and appearance. The same applies to ground based cabinets. The proposed 18m monopole and associated cabinets fully meet the permitted development criteria. While it would be higher than any other street furniture in the area, thanks to its slim line appearance, and position on the verge of the Conservation Area where it would benefit from some backdrop/screening effect from buildings and trees, it would preserve the character of the western tip of Ballbrook Conservation Area.

Policy DM1 (Development Management) and Policy SP1 (Spatial Principles) – both policies promote the principles of urban design to help create quality places. They are general and not specifically related to telecommunications. With regards to this, designs associated with mobile telecommunications infrastructure are limited. As indicated in the latest Code of Best Practice, the characteristics of 5G technology make it impossible to use the smaller structures and the only way to minimise their visual impact is via the appropriate siting among other vertical features and appropriate colouring. Design of the proposed mast and cabinets is functional and fit for purpose. Considering the amount of apparatus that is needed for two operators, there is no technical and operational possibility to improve on this. The telecommunication column has been designed to resemble streetlighting columns, as far as it is practicable. The height of the mast must protrude above the nearby trees, street furniture and buildings as otherwise the antennas will be blocked and will not work.

Regional policies – London Plan

4.26 There are a number of strategies addressing the benefits of digital infrastructure at regional (Greater Manchester) level. They include Greater Manchester Digital Blueprint, Greater Manchester Local Industrial Strategy, the Greater Manchester Infrastructure Framework 2040

Greater Manchester Digital Blueprint (April 2020)

4.27 This document (**Appendix R**) supports the Local Industrial Strategy and the Greater Manchester Strategy which are discussed later on. One of the digital priorities set up in this document is for region to have *'the digital infrastructure it needs to be a world*

class digital city region.' This includes delivery of *'ubiquitous high speed digital connectivity over full fibre and 4G & 5G mobile across the whole city region by 2025'*.

4.28 It basically recognises the need for infrastructure that underpins digital connectivity. Without masts, antennas, dishes and cabinets, the mobile devices will not work. The region also aims to lead the way on 5G. This is to be achieved by being *'at the forefront of 5G rollout in the UK through collaboration with telecoms partners, local authorities and the main property holders.'*

4.29 The proposed base station at the appeal site is a piece of infrastructure that will support the aspirations contained in the Digital Blueprint. As part of the rollout programme for Three and EE, it will bring enhanced 4G signal for both operators and 5G technology to the area in the future.

Greater Manchester Local Industrial Strategy (June 2019)

4.30 4.76 According to this document (**Appendix S**), the aim of the Greater Manchester region is to become a *'leading European digital city-region'*. The Strategy acknowledges that Greater Manchester will aim to become one of the best digitally connected city-regions in the UK. It also fully supports the development of 5G networks.

4.31 The strategy has a specific section relating to infrastructure and acknowledges its importance. There is no doubt that improvements to digital infrastructure are needed *'to meet national targets of nationwide full fibre coverage by 2033 and roll-out of 5G technologies for most people by 2027' (page 14-15)*. This will accelerate market investment and '*attract private sector investment, create further opportunities to develop 5G networks and test beds, and capitalise on over 500,000 mapped street furniture items that have the potential to provide high bandwidth, low latency 5G networks' (page 74-75).*

4.32 The infrastructure proposed as part of this appeal comes from the 5G rollout programme for EE and Three. It seeks to make this service available in the area of Didsbury. Each approved, built and integrated 5G site brings the aim of this technology being available for most people by 2027 closer.

Greater Manchester Infrastructure Framework 2040 (GMCA)

4.33 The aim of this document (**Appendix T**) is to focus on developing infrastructure which ultimately improves the lives of all those living and working within Greater Manchester.

4.34 The Infrastructure Framework acknowledges a number of key challenges, one of which is digital and the need to provide pervasive, affordable, resilient digital connectivity. The Framework notes that '*Digital technology is increasingly the backbone of the major industries and our daily lives*' (page 5). The Framework goes on to state that *'approaching 2040, Greater Manchester will need to be a Smart and digitally ready City Region. To achieve this, and support on-going digitalisation, the region will require resilient fixed connectivity (through fixed fibre) supported by 5G (and subsequent technologies).'* It will also need to *'streamline the process for installation of new infrastructure within the street space'* (page 6).

4.35 The Framework acknowledges that the vision of moving to a smart and digitally-ready city-region requires future digital infrastructure to be strong fixed resilient connectivity, supported by 5G (and beyond), big data systems and other nascent

technologies such as Artificial Intelligence and machine learning. Without connectivity it is acknowledged that processing the sheer volumes of data necessary to create a network of communicating devices will be impossible. As such, the Framework states that big improvements are required to increase the provision of wired and wireless (through 5G or subsequent technologies and Wi-Fi provision) across GM. Without the more basic technology solutions (such as passive fibre connectivity and 5G) the smart-region solutions and value-added outcomes will struggle to be brought to fruition.

4.36 After several trials and international standards for ICNIRP safety being confirmed, the UK operators started rolling out 5G in late 2019. According to the Connected Nations 2022 report (**Appendix M**), there are so far approx. 12000 5G installations in the UK, almost double reported by Ofcom a year earlier. The appeal proposal, if allowed, will add to the growing number of such installations, especially in the Greater Manchester region. This is an important piece of infrastructure without which the digital connectivity in the region for EE and Three will be compromised.

5. CONCLUSION

5.1 This appeal concerns the refusal of a prior approval by Manchester City Council for the upgrade to the existing installation at Palatine Road, Manchester. The proposed development would upgrade the overall level of mobile digital connectivity for the customers of Three and EE that live in the residential properties nearby, work in the commercial properties nearby or travel through the area. This statement has shown that:

- The proposal provides an important upgrade to the digital telecommunications in Didsbury allowing for additional coverage and capacity, including the introduction of 5G technology to the locality.
- Provision of 5G technology is a key Government aim which will support enhanced economic growth and social inclusion and well-being.
- It is not possible to re-use the existing monopole or share the installation with additional two operators. As such the existing monopole needs replacing and as part of the works it will be re-located onto the opposite side of Palatine Road for technical reasons.
- The number of base stations at the junction will not increase as part of the appeal proposal.
- The design incorporates the most up to date technologies available and the proposed mast is the minimum height and girth, with the minimum number of antennas and associated cabinets, capable of introducing advanced telecommunications services of the nature proposed, whilst also satisfying ICNIRP standards, for two operators. This will help to secure the economic future of the area and should enable more people to work from home.
- In line with the provisions of Part 16 GPDO, the proposal involves the replacement of the existing monopole and cabinets and not the installation of a new monopole and cabinets.
- The principle of a 25m monopole on land which is within a conservation area is permitted development under Part 16 of the Town and Country Planning (General Permitted Development) (England) Order 2022. The proposed replacement mast will be 18m high and requires a prior approval from the Local Planning Authority.

- The proposed cabinets meet permitted development requirements (their volume does not exceed 2.5 cubic metres) and their installation on their own does not require even a prior approval.
- The level of visual impact the upgraded installation will have on the character of the streetscene and the wider area including Ballbrook Conservation Area will be of modest scale. The level of impact will be outweighed by the significant public benefits of the proposal.

5.2 The proposal strongly supports and is supported by the NPPF 2021 (Part 10 in particular). With regards to local policies, it is considered the siting and appearance of the proposal meets most of criteria of these policies. With regard to the remaining policy criteria the appeal proposal might appear to be in conflict with, the appellant successfully demonstrated that the other material consideration (i.e. public benefits associated with the improved digital connectivity) work in favour of the proposal.

5.3 The Inspector is therefore requested to allow the appeal and grant the prior approval for the upgrade of the existing installation involving the erection '*Telecommunications mast and equipment/power cabinets - the installation of an 18.0m column supporting 6 no antennas, together with 2 no. ground-based equipment cabinets 1 no. power cabinet and ancillary development thereto.'* on land at Footway of Lapwing Lane, Didsbury, Manchester, M20 6UR, in accordance with the details submitted with the prior approval application LPA reference 134901/TEL/2022.

HM Government



Levelling Up the United Kingdom

3.2.4 By 2030, the UK will have nationwide gigabit-capable broadband and 4G coverage, with 5G coverage for the majority of the population[405]

This mission is focused on improving digital connectivity.

Digital connectivity

The case for action

The COVID-19 pandemic demonstrated the importance of digital infrastructure right across society, from ensuring business continuity to reducing isolation. Improved digital connectivity has the potential to drive growth and productivity across the UK and widen job opportunities through remote working. However, there are significant spatial disparities in the quality of broadband and mobile networks, with rural areas likely to experience worse digital connectivity than urban areas. Infrastructure is only part of the picture: economic benefits will only materialise if businesses and workers have the skills to take advantage of improved infrastructure.

More broadly, high quality digital infrastructure can deepen local labour markets through remote working, making it more attractive for both workers and companies to locate regionally. It also allows for the development of high-value sectoral clusters, which can drive growth and jobs in new areas. Existing specialisms in the UK regions have the potential to generate strong tech clusters, such as fintech in Scotland and Wales, e-Commerce in the North West and Northern Ireland, and Agri-Tech in Yorkshire and the Humber. The sector also provides opportunities for raising living standards – median earnings for the sector are 50% higher than the UK average.

> **“The COVID-19 pandemic demonstrated the importance of digital infrastructure right across society, from ensuring business continuity to reducing isolation”**

The policy programme

In 2020, the UK Government published the National Infrastructure Strategy, committing to providing £5bn in public funding to roll out **gigabit broadband** to at least 85% of the country by 2025, and subsequently to as close to 100% as possible, working with the private sector.

Public investment will target premises that are hardest to reach and which would otherwise not be provided for by the private sector, ensuring no areas are left behind. Gigabit coverage has increased from 10% to over 60% in less than two years. Since 2019, coverage has improved across the UK, and the UK Government anticipates the following additional improvements to be delivered as a minimum by 2025, as set out in Figure 3.1.[406]

405 Where nationwide means 95% of the UK for 4G, and at least 99% of premises for gigabit-capable broadband.

406 Forecasts show existing coverage and estimated future commercial build. Data sources: Ofcom Connected Nations, ThinkBroadband and DCMS estimates.

MANCHESTER CITY COUNCIL

Ballbrook Conservation Area Boundary Map

Key

Listed Building

Conservation Area Boundary

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MANCHESTER CITY COUNCIL

Blackburn Park Conservation Area Boundary Map

Key

Listed Building

Conservation Area Boundary

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MANCHESTER CITY COUNCIL

Planning

Growth & Neighbourhoods Directorate

Register of Applications

Application Reference

063275/FO/SOUTH1/01

Date Registered

25 Sep 2001

Applicant's Name & Address

BT Cellnet Ltd.,
Parkside Court, Furness Quay, Salford M5 2XZ

Agent's Name & Address (where applicable)

Spectrasite Transco,
10/11, Metropolitan House, 20, Brinley Road, City Business Park, Manchester M16 9HQ

Location

Site adj to 104, Palatine Rd., Didsbury

Proposal

Installaltion of telecommunication street furniture, consisting of 1 - 12.5 metre high pole and 2 cabinets

Ward(s)

Barlow Moor Ward

Decision

Not Development

Date of Decision

03 Oct 2001

MANCHESTER CITY COUNCIL

Planning

Growth & Neighbourhoods Directorate

Register of Applications

Application Reference

077195/TEL/2005/S2

Date Registered

06 Oct 2005

Applicant's Name & Address

02 (UK) Limited
260 Bath Road Slough SL1 4DX

Agent's Name & Address (where applicable)

Pentland Chartered Surveyors Ltd
Cloister House Riverside New Bailey Street Manchester M3 5AG

Location

Pipe Bridge Adjacent To 106 Palatine Road Didsbury

Proposal

PRIOR APPROVAL for the installation of 15 metre high telecommunications mast with associated equipment cabin, following removal of existing telecommunications mast and equipment cabin

Ward(s)

Didsbury West Ward

Decision

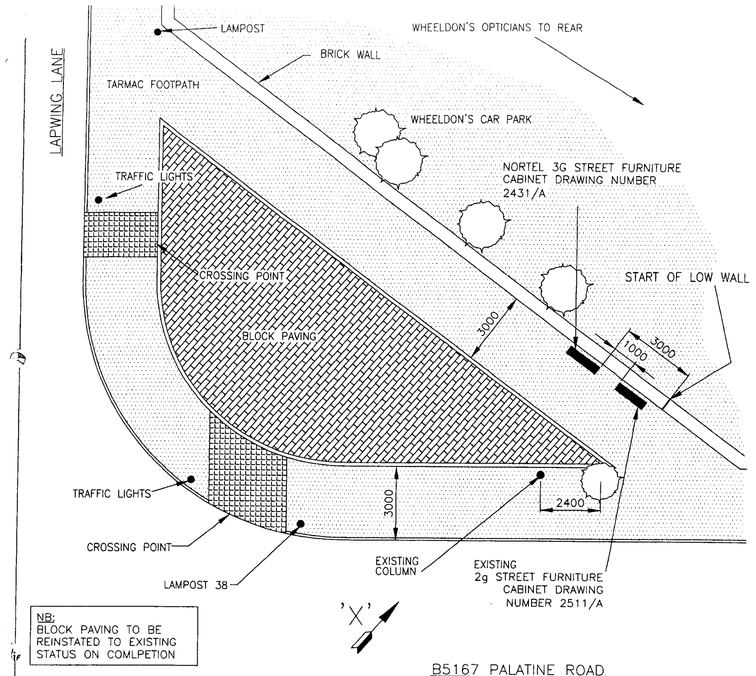
Approved

Date of Decision

28 Nov 2005

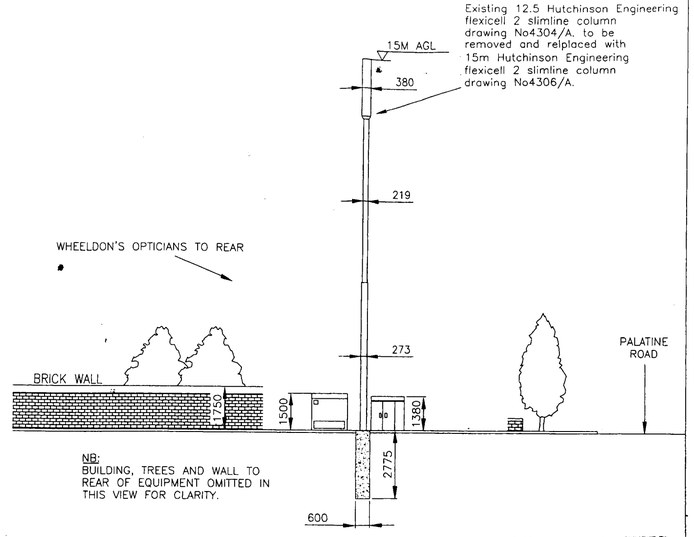
Conditions and Reasons:

1) The City Council is satisfied that this development has been sited and designed to minimise the impact on residential amenity and the visual amenity of the surrounding area. Accordingly, the proposal complies with Policy DC17 of the Unitary Development Plan for the City of Manchester. Therefore consent is herby granted in accordance with the information accompanying application 077195/TEL/2005/S2 stamped and received on the 6th October 2005.



NB:
BLOCK PAVING TO BE REINSTATED TO EXISTING STATUS ON COMLPETION

PLAN VIEW OF SITE LOCATION



NB:
BUILDING, TREES AND WALL TO REAR OF EQUIPMENT OMITTED IN THIS VIEW FOR CLARITY.

ELEVATION ON ARROW 'X'

- 6 OCT 2005

NOTES

1) ANTENNA ORIENTATIONS ARE:
   SECTOR 1 = 60°
   SECTOR 2 = 180°
   SECTOR 3 = 300°

2)a) CABINETS TO BE GREEN (BS 12 C 39).
   b) COLUMN TO BE GREEN (BS 12 C 39)

3) ACCESS DOORS OF BOTH CABINETS TO FACE TOWARDS THE JUNCTION.

4) CABINETS TO BE PLACED AS CLOSE TO WALL AS POSSIBLE.

DRAWN BY:	M.SLATER
DATE:	14/9/01
SCALE:	1:150 @ A3
CHECKED:	A.CLAGUE
APPROVED:	A.CLAGUE
DRAWING No:	11891 001

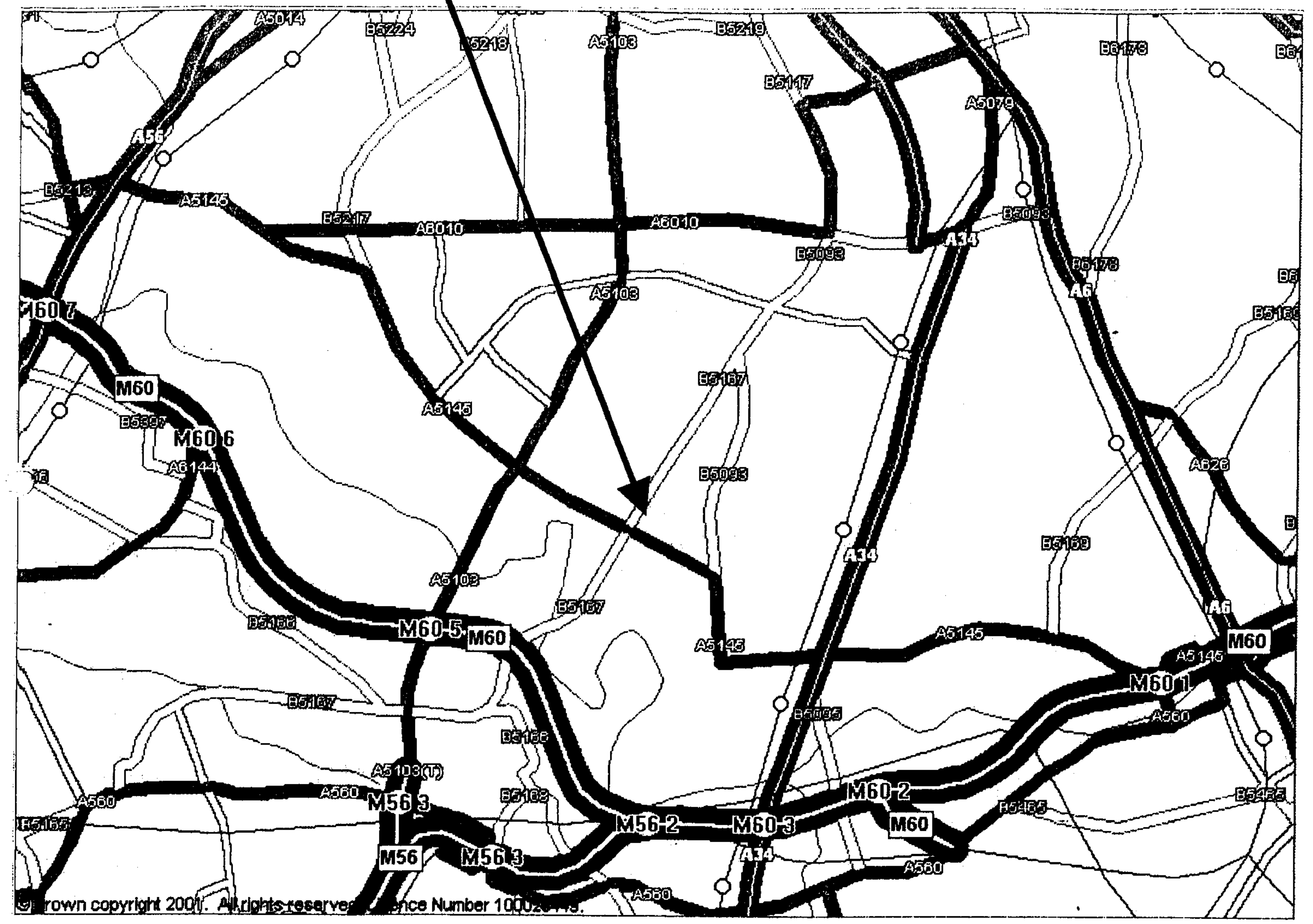
REV.	DATE	DESCRIPTION
P1	14/9/01	ISSUED FOR APPROVAL
P2	25/7/03	COLUMN RELOCATED
P3	28/7/03	STRUCTURE TYPE AMENDED
P4	29/3/04	AS BUILT
P5	23/7/04	EXISTING COLUMN UPGRADE

SITE ADDRESS:

JCT OF LAPWING LANE/PALATINE RD.,
DIDSBURY,
MANCHESTER.
M20 6UR.

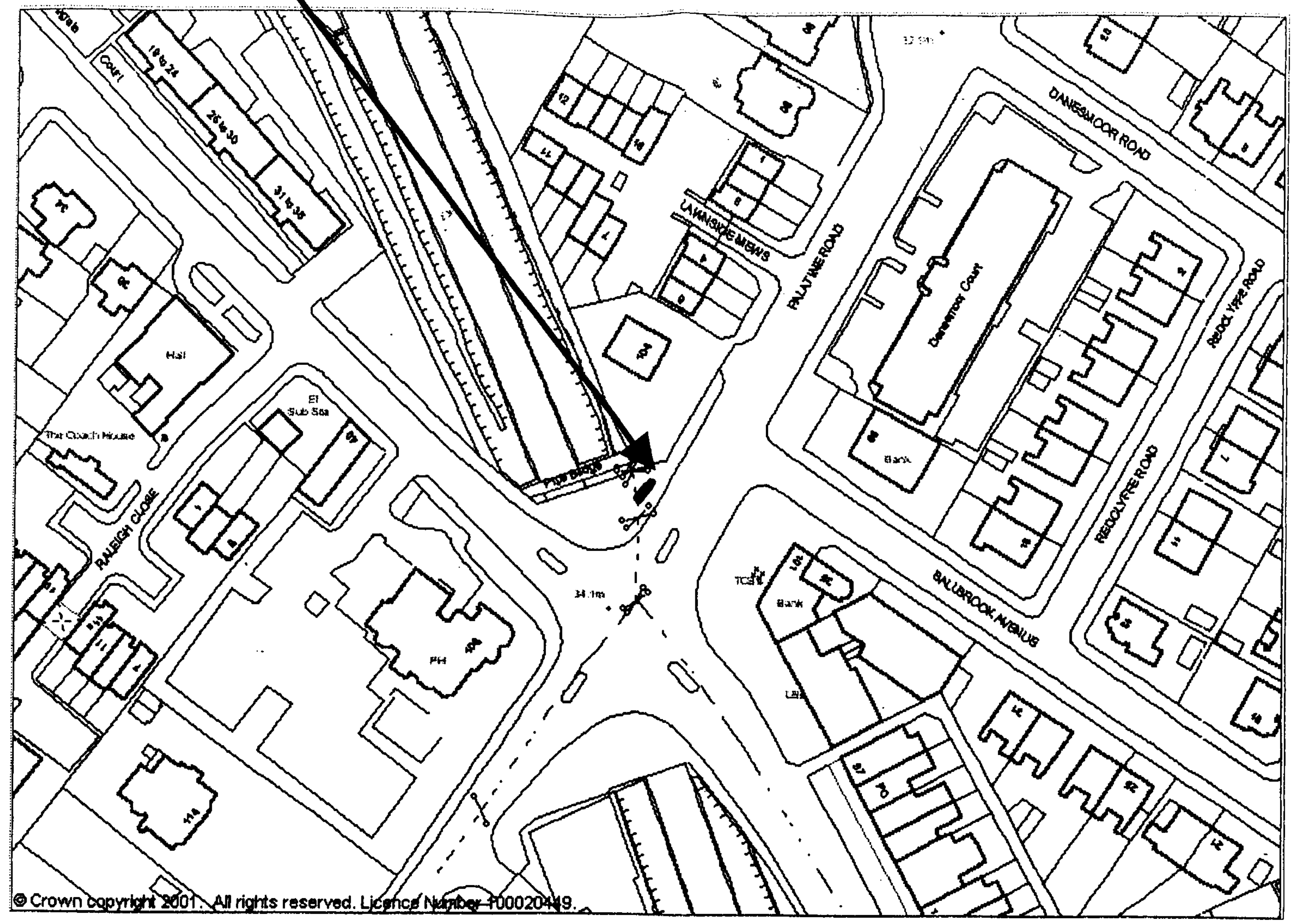
JOB NUMBER	CELL ID NUMBER	CELL NAME	REV.
C10129	11891	DIDSBURY NORTH	P5

Site Location



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Equipment Location



Reproduced from the **(year of publication)**. Ordnance Survey 1 : 1250 scale Landline® map with permission of the controller of Her Majesty's Stationery Office, © Crown copyright Alchem (Widnes) Ltd. AL 100026077.

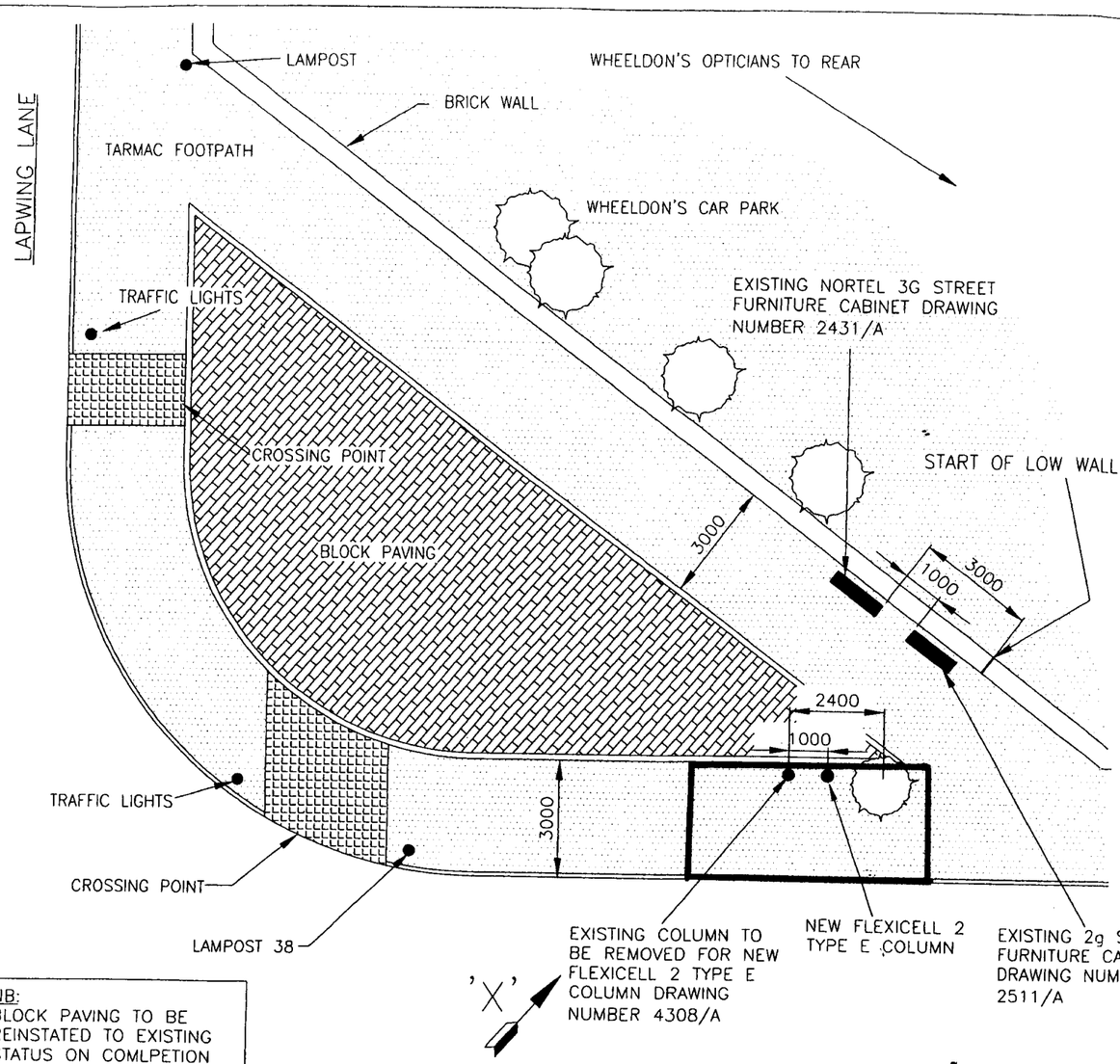
EASTING: 384384 NORTHING: 392117

O2

Site Address: Palatine Road.
Outside Wheeldon Opticians.
Didsbury.
Manchester.

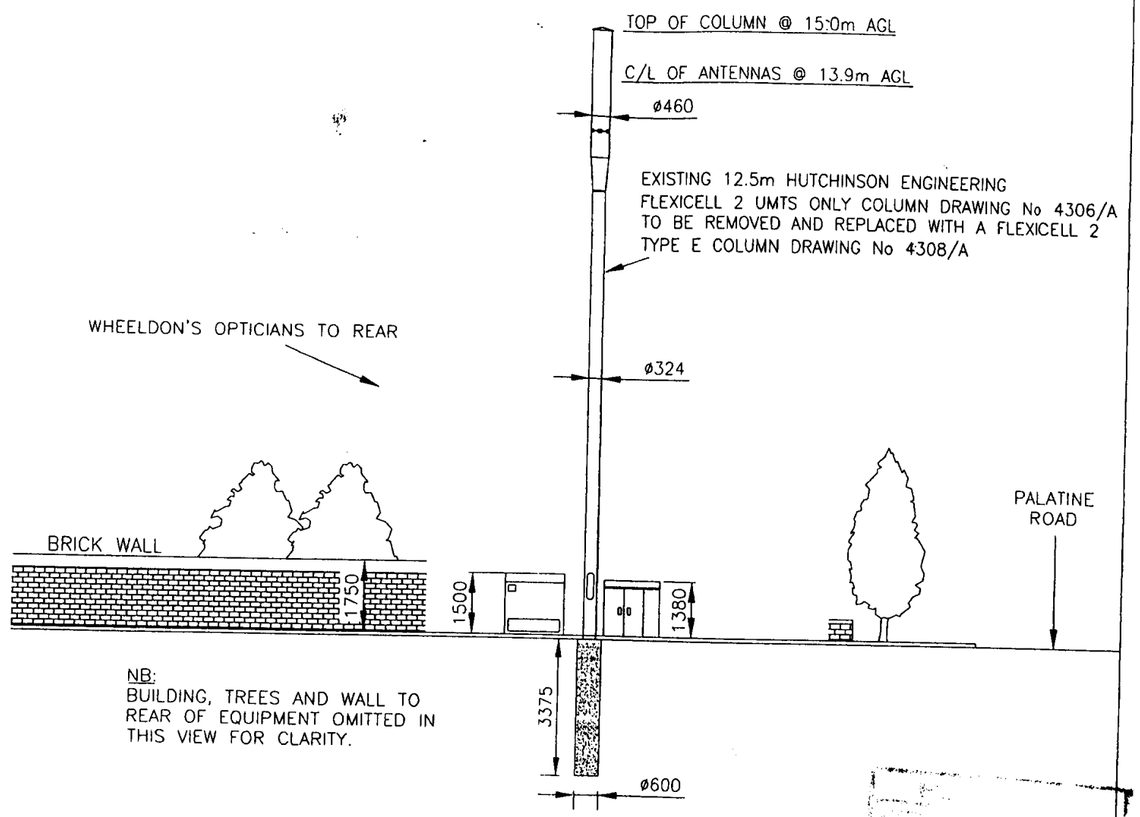
CELLULAR SYSTEMS LTD

Approved By: M. Slater				
Drawn By: S. Brunka		Date: 14/09/01	Job No: C10129	Cell ID No: 11891
Drawing No: C10129 A01	Rev: A			



NB:
BLOCK PAVING TO BE REINSTATED TO EXISTING STATUS ON COMLPETION

PLAN VIEW OF SITE LOCATION



NB:
BUILDING, TREES AND WALL TO REAR OF EQUIPMENT OMITTED IN THIS VIEW FOR CLARITY.

ELEVATION ON ARROW 'X'

NOTES

1) ANTENNA ORIENTATIONS ARE:
   SECTOR 1 = 60°
   SECTOR 2 = 180°
   SECTOR 3 = 300°

2)a) CABINETS TO BE GREY (BS 00 A 09).
   b) COLUMN TO BE GREY (BS 00 A 09).

3) ACCESS DOORS OF BOTH CABINETS TO FACE TOWARDS THE JUNCTION.

4) CABINETS TO BE PLACED AS CLOSE TO WALL AS POSSIBLE.

DRAWN BY:	M.SLATER
DATE:	14/9/01
SCALE:	1:150 @ A3
CHECKED:	A.CLAGUE
APPROVED:	A.CLAGUE
DRAWING No:	11891 001

REV.	DATE	DESCRIPTION
P1	14/9/01	ISSUED FOR APPROVAL
P2	25/7/03	COLUMN RELOCATED
P3	28/7/03	STRUCTURE TYPE AMENDED
P4	29/3/04	AS BUILT
P5	23/7/04	EXISTING COLUMN UPGRADE
P6	18/10/04	EQUIPMENT COLOUR AMENDED
P7	27/09/05	2G UPGRADE

SITE ADDRESS:
JCT OF LAPWING LANE/PALATINE RD.,
DIDSBURY,
MANCHESTER.
M20 6UR.

JOB NUMBER	CELL ID NUMBER	CELL NAME	REV.
C10129	11891	DIDSBURY NORTH	P7

O2

SUPPLEMENTARY INFORMATION

1. Site details

Site Name	SF Palatine Rd	Site Address	Adopted Highway / Pavement Palatine Rd, Manchester, M20
NGR	384384 / 392117		
Site Ref Number	CSR 11891	Site Type[1]	Streetfurniture Upgrade Site

2. Pre Application Check list

Site selection

Was an LPA mast register used to check for suitable sites by the operator or the LPA?	yes	
if no explain why		
Was the industry site database checked for suitable sites by the operator?	yes	
if no explain why		

Annual roll out consultation with LPA

Date of last annual rollout information/ submission to LPA	Each October
Name of LPA contact	unknown
Comments	

Pre-application consultation with LPA

Date of written offer of pre-application consultation with LPA	29 September 2005	
Was there pre-application contact with the LPA	yes	
Date of pre-application contact with LPA	3 October 2005	
Name of LPA contact	Louise Snook	
Outcome - The planning officer advised that a formal application would be required to increase the diameter of the support column. A minor amendment would not be accepted.		

[1] Macro or micro

O2

10 Commitments Consultation

Rating of Site under Traffic Light Model	Green		
Outline Consultation carried out – Letter and discussion with the local planning officer.			
Outcome – A formal GPDO application must be made to the council.			

Schools

Location of site in relation to school – There is one school approx. 75m from the existing telecommunications site. Ewing School, Central Road, Manchester, M20 4ZA.
Outline of consultation carried out with schools (if relevant). – A letter has been sent to the school explaining that O2 (UK) Limited wish to upgrade their existing telecommunications site without having to find a further site in the cell area. (include evidence of consultation) See attached letter.
Outcome – N/A

Civil Aviation Authority/Secretary of State for the Defence/Aerodrome Operator consultation (only required for an application for prior approval)

Will the structure be within 3km of an aerodrome or airfield?		No
Has the Civil Aviation Authority/Secretary of State for the Defence/Aerodrome Operator been notified		No
Details of response		

Developer's Notice
(only required for an application for prior approval)

Copy of Developer's Notice enclosed	Yes	
Date served	05/10/05	

O2

3. Proposed Development

The proposed site
The proposal is to remove the existing telecommunications column and install an upgrade column 1m to the south. The upgraded column will allow the 2g antennas to be optimised so that another telecommunications installation within the cell area will not be required.

Area of Search Enclose map showing the cell centre, area of search and adjoining existing sites
The search map has not been attached as the upgrade will utilise the existing telecommunications site.

Type of Structure (e.g. tower, mast, etc):	
Description – the Hutchinson Flexicell 2 will not remain in use but a Flexicell 2 Type E will be installed. The column has a single diameter of 324mm and the shroud has a diameter of 460mm to enable the antennas to be tilted to optimise their capacity.	
Overall Height	
Height of existing building (where applicable)	15metres
Equipment Housing	
Length	N/A metres
Width	N/A metres
Height	N/A Metres
Materials (as applicable)	
Tower/mast etc – type of material and external colour	Painted to match the existing street furniture.
Equipment housing – type of material and external colour	As existing.

Reasons for choice of design
The existing equipment cabinets will be used with the proposed upgraded column.

4. Technical information

ICNIRP Declaration attached	Yes	

Frequency	900 – 1800 GSM 2100 UMTS
Modulation characteristics[2]	GSM & UMTS
Power output	100 watts per channel
Height of antenna (m above ground level)	12.6m

5. Technical Justification

Enclose predictive coverage plots, drive trials or capacity figures

Reason(s) why site required e.g. coverage, upgrade, capacity (map attached if required)
Plots to be forwarded.

[2] The modulation method employed in GSM is GMSK (Gaussian Minimum Shift Keying) which is a form of Phase Modulation.
The modulation method employed in UMTS is QPSK (Quad Phase Shift Keying) which is another form of Phase Modulation.

O2

6. Site selection process – alternative sites considered and not chosen

Enclose map highlighting all alternatives considered

Site[3]	Site Name and address	NGR	Reason for not choosing[4]

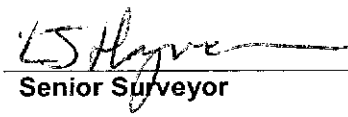
If no alternative site options have been investigated, please explain why
No alternative sites have been investigated as this is an existing telecommunications column that can be amended to give the required 2g coverage without the need to find further telecommunications sites within the cell area.

[3] ETS - Existing Telecomm site, ES - Existing Structure, RT - Roof Top, GF - Greenfield
[4] SP - Site Provider, RD - Redevelopment Not Possible, T - Technical Difficulties, P – Planning
O – Other

O2

Additional relevant information

Contact Details

Name	Kevan Hargreaves	Telephone	0870 950 9825
Operator	O2 (UK) Limited	Fax no	0870 950 9811
Address	260 Bath Road Slough Berkshire SL1 4DX	Email address	k.hargreaves@manchester.pentlandltd.co.uk
Signed		Date	05/10/05
Position	Senior Surveyor	Company (on behalf of the above operator)	Pentland Limited

Declaration of Conformity with ICNIRP Public Exposure Guidelines ("ICNIRP Declaration")

O2 (UK) Limited
260 Bath Road
Slough
SL1 4DX

Certifies that the proposed equipment and installation as detailed in the attached Licence Notification / Minor Amendment / Full Planning / GPDO application at:

Street Furniture on Palatine Road
Outside Wheeldon Opticians
Didsbury
Manchester

is designed to be in full compliance with the requirements of the radio frequency (RF) public exposure guidelines of the International Commission on Non-Ionising Radiation Protection (ICNIRP), as expressed in EU Council recommendation of 12 July 1999 * "on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)".

* Reference: 1999/519/EC

Date: 28/09/05

Signed: .....

Name: GLENN SIDDALL

Position: IMPLEMENTATION MANAGER

Form DN

DEVELOPMENT NOTICE

To be completed and sent to each owner/agricultural tenant

Town and Country Planning (General Permitted Development) Order 1995 - Part 24

Proposed development at (a) the adopted highway / pavement, Palatine Road, Manchester, M1.

I give notice that (b) O2 (UK) Limited

is applying to Manchester City Council for a determination as to whether prior approval of details is required for the siting and appearance of **(c) the removal of the existing telecommunication column and the installation of a 15m Flexicell column.**

A copy of the application is available for inspection at the Council Offices, Monday-Thursday (9.00am to 5.00pm) and Friday (9.00am to 4.45pm). Any owner* of the land, tenant** or interested person who wishes to make representations about this application should write to the Council at Manchester City Council, Environment & Development, Planning Division, Town Hall, PO Box 463, Manchester, M60 3NY.

by **(d) 2 November 2005**

* "owner" means a person having a freehold interest or a leasehold interest the un-expired term of which is not less than 7 years.
** "tenant" means a tenant of an agricultural holding any part of which is comprised in the land.

Signed .....**Agent** **Date** ...05/10/05

Insert
(a) address or location of the proposed development
(b) name of developer
(c) description of the proposed development including the siting, appearance and height of any mast.
(d) a date not less than 14 days from the date of this notice

Name	Address	owner or tenant
Manchester City Council	Highways Department, Hooper Street, Manchester, M60.	Owner

I confirm that a Development Notice (Form DN) has been served on the above owners* and agricultural tenants of the land to which the application relates.

*** "owner" means a person having a freehold interest or a leasehold interest the un-expired term of which is not less than 7 years.**

Signed .....**Agent** **Date** ...05/10/05

Dear

Head Teacher
Chair of School Governors

MOBILE TELECOMMUNICATIONS PLANNING APPLICATION
O2 (UK) Limited wishes to upgrade their existing telecommunications installation at the pavement on Palatine Road, Manchester, M20 – CSR 11891 – Didsbury North – NGR 384384 / 392117.

O2 is committed to improving consultation with local communities, and the purpose of this letter is to provide you with information as to the proposal and the opportunity for you to seek further detailed information about the site from us, should you wish to do so.

This consultation is being carried out in line with Government Guidance (Planning Policy Guidance Note 8 – Telecommunications August 2001 – Paragraph 62), which advises that mobile telecommunications operators should notify the Chair of Governors/Head Teacher of any proposal to install a telecommunication site where it is near to a school.

Mobile phones are now intrinsic to our personal and professional lives and people expect to be able to use their mobiles when and where they need them. The only reason O2 seeks to place a base station anywhere is to improve the service to its 11 million customers.

Base stations are low power radio frequency transmitters. They must be close to where customers need coverage because without sufficient base stations in the right locations, mobile phones will not work. Locations for mobile phone base stations are identified by monitoring the growth in calls in each cell and also from known 'holes' in the coverage.

Radio planners use this information to define a broad geographical search area for base stations. The search area identified varies in size depending on many factors: the geography of the area; the number of buildings; the number of people living in the area and the demand for mobile services. A survey then identifies all potential sites, looking specifically for existing radio towers or other structures on which the necessary antennas can be mounted; around 70% of O2's cell sites are on existing structures. If no existing structures are suitable, a green field site offering a good degree of natural screening is sought. The aim is to identify a site that will offer the best possible coverage whilst minimising the environmental impact.

In this instance, O2's radio planner has identified the need to upgrade the existing base station to provide coverage in this cell area.
The application to the local planning department will be for an increased column diameter to support an increased diameter shroud that contains the antennas.

The Government has stated that emissions from radio base stations should meet the International Commission on Non-Ionising Radiation Protection (ICNIRP) Guidelines for public exposure adopted in the UK. I confirm that the installation proposed above will comply with these Guidelines. In fact, because of the very low power utilized by telecommunications sites, the emissions will be many times lower than the ICNIRP threshold.

In its report, the Stewart Group concluded that: "the balance of evidence indicates that there is no general risk to the health of people living near to base stations on the basis that exposures are expected to be small fractions of the Guidelines". The World Health Organisation supports this view, stating that: "Radio frequency field levels around base stations are not considered a health risk". Please find enclosed leaflets that give further information on health and safety in relation to mobile phones and base stations.

We would value your comments on this proposal. This will help us to address any queries or comments you may have. Please let us have your views no later than 14 days from receipt of this letter. For general queries, kindly call O2's Group Acquisitions Department on 01753 564306. They will be happy to help. For specific queries in relation to this application, please contact Kevan Hargreaves on 0870 950 9810.

Yours sincerely

Enc O2 Health & Safety Information Leaflet
Site Location Drawings
Existing approved drawings along with the proposed.

MANCHESTER CITY COUNCIL

Planning

Growth & Neighbourhoods Directorate

Register of Applications

Application Reference

073187/TEL/2004/S2

Date Registered

07 Sep 2004

Applicant's Name & Address

O2 UK Ltd

Agent's Name & Address (where applicable)

Mono Consultants Limited
Victoria Building 1-7 Princess Street Manchester M2 4DF

Location

Footpath At Junction Of Palatine Road And Lapwing Lane Didsbury

Proposal

PRIOR APPROVAL for the erection of a 15m high telecommunications pole with associated equipment cabin, to replace existing telecommunications pole.

Ward(s)

Didsbury West Ward

Decision

Approved

Date of Decision

02 Nov 2004

The Planning Inspectorate

Appeal Decision

Site visit made on 31 January 2022

by L Wilson BA (Hons) MA MRTPI

an Inspector appointed by the Secretary of State

Decision date: 10 February 2022

Appeal Ref: APP/B4215/W/21/3285778
Palatine Road, West Didsbury, Manchester, Greater Manchester M20 6UT

- The appeal is made under section 78 of the Town and Country Planning Act 1990 against a refusal to grant approval required under Article 3(1) and Schedule 2, Part 16, Class A of the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended).
- The appeal is made by CK Hutchison Networks (UK) Ltd against the decision of Manchester City Council.
- The application Ref 130969/TEL/2021, dated 25 June 2021, was refused by notice dated 24 September 2021.
- The development was originally described as proposed telecommunications installation: Proposed 20.0m Phase 8 Monopole C/W wraproundCabinet at base and associated ancillary works.

Decision

1. The appeal is dismissed.

Procedural Matters

2. The description of development in the heading above is taken from the application form. The scheme was amended during the application process and the height of the monopole was reduced to 15m. I have determined the appeal accordingly.

3. The provisions of the Town and Country Planning (General Permitted Development) (England) Order 2015 as amended (GPDO), under Article 3(1) and Schedule 2, Part 16, Class A, Paragraph A.3(4) require the local planning authority to assess the proposed development solely on the basis of its siting and appearance, taking into account any representations received. My determination of this appeal has been made on the same basis.

4. The principle of development is established by the GPDO and the provisions of Schedule 2, Part 16, Class A of the GPDO do not require regard be had to the development plan. I have had regard to the policies of the development plan[1] and the National Planning Policy Framework (the Framework) only in so far as they are a material consideration relevant to matters of siting and appearance.

[1] Including Policies DM 1, EN 3 and SP 1 of the Manchester's Local Development Framework: Core Strategy Development Plan Document (2012) and Policies DC17.1 and DC18.1 of The Unitary Development Plan for the City of Manchester (1995)

Main Issues

5. The main issues are the effect of the siting and appearance of the proposed installation on:

   - the character and appearance of the area, having regard to the Blackburn Park Conservation Area (CA);
   - highway and pedestrian safety; and
   - if any harm would occur, whether this is outweighed by the need for the installation to be sited as proposed taking into account any suitable alternatives.

Reasons

Character and appearance

6. The proposed installation would be located towards the back edge of the footway close to the junction of Palatine Road and Lapwing Lane as well as West Didsbury Metrolink stop. Within the vicinity of the site is existing street furniture and buildings are mainly 2-3 storeys high.

7. The appeal site is located within the CA. From the evidence before me, the houses built along Palatine Road constituted the first phase of development in Blackburn Park. This section of the CA is characterised by primarily residential and commercial buildings as well as the busy junction and Metrolink. Buildings vary in style and materials.

8. The appellant asserts that the associated ancillary cabinets are within the size limits to be classified as permitted development and should not be considered as a reason for refusal. Nonetheless, the proposal before me relates to the whole installation.

9. The monopole would be taller than the existing street furniture, including trees and streetlights. I understand that the design of the monopole is dictated by technical considerations, and it is essential for the pole to be 15m high to enable local provision and clear surrounding buildings.

10. The scheme would be visible from various vantage points because this section of the pavement is wide and open. Although there are 3 storey buildings within the surrounding area, the monopole has limited visual connection with these buildings. By reason of the monopole's height, siting and appearance it would stand out as a dominant feature because of the open nature of the immediate surrounding area. The scheme would therefore appear as an obtrusive and incongruous addition to the local street scene.

11. Framework paragraph 199 states that when considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be). This is irrespective of whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance. Framework paragraph 200 states that any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification. Where there is less than substantial harm, this harm should be

weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use.

12. The harm arising to the CA would be localised and less than substantial, nevertheless it is of considerable importance and weight. Paragraph 114 of the Framework states that advanced, high quality and reliable communications infrastructure is essential for economic growth and social well-being. Furthermore, planning decisions should support the expansion of electronic communications networks. The need for the installation weighs in favour of the appeal and I acknowledge the benefits of the scheme including those set out in figure 3 of the appellant's appeal statement.

13. Whilst I do not dispute the benefits of enhancing connectivity, I observed on my site visit, and the Council and residents have highlighted, that other similar structures have been installed on the opposite side of the road. These are located outside of the CA. The Council has also provided a copy of a letter they have received (dated 5 October 2021) relating to a Regulation 5 notice and intention to utilise permitted development rights to upgrade the existing installation. The appellant has not commented on this letter.

14. I acknowledge that site D2 was discounted because of an existing monopole being situated in this location and siting the installation close to existing masts would cause interference. It is unclear from the appellant's submission whether this structure has been discounted as an option for upgrading and for what reason. Given that I am not convinced that the appellant has adequately explored whether there may be less harmful alternatives, it has not been demonstrated that the public benefits could not be achieved by siting the monopole elsewhere. This matter is dealt with in more detail below. Thus, based on the information presented, it is my overall view that the need for a new monopole does not in this case, outweigh the harm, having regard to paragraph 202 of the Framework.

15. Consequently, the proposal would have a harmful effect upon the character and appearance of the area and would not preserve or enhance the CA.

Highway and pedestrian safety

16. As set out above, the scheme would be situated towards the rear of the pavement and adjacent to the Metrolink stop. I acknowledge that the pavement is well used because of the nearby Metrolink stop. The existing street furniture, including bench, railings and street trees, already impact pedestrian movement.

17. The proposal is likely to impact pedestrian movement as it would result in a narrower gap between the installation and the tree due to the siting of the monopole and associated cabinets. The distance between the scheme and tree would be slightly below that recommended in the Council's Design for Access 2 (2003) document. Nevertheless, there would still be sufficient space between the existing street furniture and the scheme due to the width of the pavement. Therefore, the installation would not compromise the ease or safety of use of the pavement for pedestrians or other users of the footway.

18. Accordingly, the siting and appearance of the proposal would not have an unacceptable effect on highway and pedestrian safety.

Suitable alternatives

19. Paragraph 117 of the Framework sets out that applications, such as that proposed, should be supported by the necessary evidence to justify the proposed development. For a new mast or base station, this includes evidence that the applicant has explored the possibility of erecting antennas on an existing building, mast or other structure.

20. The appellant asserts that the cell search area is extremely constrained, and the only viable option has been put forward. I have had regard to the Site Specific Supplementary Information and the discounted options.

21. As set out above, there are other similar structures within the vicinity of the site which are located outside of the CA. It is unclear whether they have been discounted as an option for upgrading and for what reason. For example, whether mast sharing is not technically feasible. The Council did not suggest alternative sites during the pre-application consultation. Nonetheless, the Council and residents refer to the other masts and question the need for an additional telecommunications installation. The appellant has not clearly addressed this matter and has not explained why a further new mast is required in this location.

22. Consequently, based on the evidence presented, I am not satisfied that the appellant has conducted a thorough review of possible options within the search area or adequately explored whether there may be less harmful alternative sites. As such, the harm I have identified above is not outweighed by the need for the installation to be sited as proposed.

Other matters

23. I acknowledge the other matters highlighted including Future Telecoms Infrastructure Review, Letter to Chief Planning Officers: Planning for Growth and a condition relating to colouring of the equipment. However, these matters do not justify the harm identified above.

24. The appellant has referred to the former District Bank and the former Withington Town Hall which are listed buildings. The Council raise no concerns in respect of the effect of the development on the setting of those listed buildings, and I have no substantive reason to consider otherwise. Given the distance to these listed buildings and the intervening built development, I am satisfied that the proposal would not harm the significance of the designated heritage assets. This is a neutral consideration and does not weigh in favour of the appeal.

Conclusion

25. Although I have found that the scheme would be acceptable in terms of highway and pedestrian safety, it would have a harmful effect upon the character and appearance of the area and would not preserve or enhance the CA. The harm I have identified is not outweighed by the benefits of the scheme or the need for the installation to be sited as proposed.

26. For the reasons given above, I conclude that the appeal does not succeed.

L M Wilson

INSPECTOR

MANCHESTER CITY COUNCIL
Planning
Telephone: +44 (0)161 234 4516
planning@manchester.gov.uk
PO Box 532 Town Hall
Manchester M60 2LA

Application to determine if prior approval is required for a proposed: Development by or on behalf of an electronic communications code operator for the purpose of the operator's Electronic Communications Network in, on, over or under land controlled by that operator or in accordance with the electronic communications code.

The Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended) - Schedule 2, Part 16, Class A

Publication of applications on planning authority websites.

Please note that the information provided on this application form and in supporting documents may be published on the Authority's website. If you require any further clarification, please contact the Authority's planning department.

1. Site Address

Number	
Suffix	
Property name	Palatine Road
Address line 1	West Didsbury
Address line 2	Manchester
Address line 3	
Town/city	Greater Manchester
Postcode	M20 6UT

Description of site location must be completed if postcode is not known:

Easting (x)	384372
Northing (y)	392051

Description

Proposed telecommunications installation: Proposed 20.0m Phase 8 Monopole C/W wraproundCabinet at base and associated ancillary works.

2. Applicant Details

Title	
First name	
Surname	CK Hutchison Networks (UK) Ltd
Company name	CK Hutchison Networks (UK) Ltd
Address line 1	Great Brighams Mead
Address line 2	Vastern Road

2. Applicant Details

Address line 3	
Town/city	Reading
Country	
Postcode	RG1 8DJ

Are you an agent acting on behalf of the applicant? ◉ Yes ○ No

Primary number	
Secondary number	
Fax number	
Email address	

3. Agent Details

Title	
First name	Eve
Surname	Wyke
Company name	WHP Telecoms Limited
Address line 1	Troy Mills, Helena House
Address line 2	Troy Road
Address line 3	Horsforth
Town/city	Leeds
Country	
Postcode	LS18 5GN
Primary number	
Secondary number	
Fax number	
Email	

4. Telecommunications Apparatus

Please specify the type of apparatus to be installed or altered (e.g. call box, mast)

Proposed telecommunications installation: Proposed 20.0m Phase 8 Monopole C/W wrapround Cabinet at base and associated ancillary works.

Please provide further details of the apparatus (e.g. height, size, colour etc)

Please refer to the enclosed drawings

Are you replacing an existing installation? ○ Yes ◉ No

Are you submitting a declaration confirming that the apparatus is in full compliance with the requirements of the radio frequency (RF) public exposure guidelines of the International Commission on Non-Ionizing Radiation Protection (ICNIRP)? The emissions from all mobile phone network operators' equipment on the site must be taken into account when determining compliance. ◉ Yes ○ No

5. Supplementary Information

Are you also providing a completed Supplementary Information Template (as set out in Appendix D of the Code of Best Practice on Mobile Phone Network Development in England)? ◉ Yes ○ No

6. Neighbour and Community Consultation

Have you consulted your neighbours or the local community about the proposal? ○ Yes ◉ No

7. Site Visit

Can the site be seen from a public road, public footpath, bridleway or other public land? ◉ Yes ○ No

If the planning authority needs to make an appointment to carry out a site visit, whom should they contact?

- ◉ The agent
- ○ The applicant
- ○ Other person

8. Pre-application Advice

Has assistance or prior advice been sought from the local authority about this application? ○ Yes ◉ No

9. Declaration

I/we hereby apply for planning permission/consent as described in this form and the accompanying plans/drawings and additional information. I/we confirm that, to the best of my/our knowledge, any facts stated are true and accurate and any opinions given are the genuine opinions of the person(s) giving them. ☑

Date (cannot be pre-application) 25/06/2021

MANCHESTER CITY COUNCIL

Planning

Robert Griffin
Telephone: 0161 234 4527
robert.griffin@manchester.gov.uk

P O Box 532 Town Hall
Manchester M60 2LA

Eve Wyke
WHP Telecoms Limited
Troy Mills
Helena House
Troy Road
Horsforth
Leeds
LS18 5GN

Date: 24 September 2021

Dear Sir/Madam,

Town & Country Planning (General Permitted Development Order) (England) 2015 (as amended) Schedule 2, Part 16
Application No: 130969/TEL/2021
Proposed telecommunications installation of 15m Monopole with wraparound cabinet at base and associated ancillary works at Palatine Road , West Didsbury, Manchester, M20 6UT,

I write with reference to the above application and advise you that prior approval will be required for the siting and appearance of the proposed apparatus.

In this case, prior approval is **refused** for the following reason(s):

1) The City Council is not satisfied that this development has been sited and designed to minimise the impact upon visual amenity of the area. The proposed telecommunication installation by reason of its height, siting and appearance would form a visually intrusive and dominant feature which would be harmful to the visual amenity of the area in particular the appearance of the street-scene and fails to preserve or enhance the character and appearance of the Blackburn Park Conservation Area. As such, the proposed installation is considered contrary to saved policies DC17.1 and DC18.1 of the Unitary Development Plan for the City of Manchester, policies DM1, EN3 and SP1 of the Manchester Core Strategy and the National Planning Policy Framework (NPPF).

2) The proposed development, due to its siting and size, would result in the existing footway serving the West Didsbury Metrolink Stop being reduced in width which would have a detrimental impact on pedestrian movement. The proposal would therefore have an unacceptable impact on highway and pedestrian safety. As such, the proposed installation is considered contrary to policies DM1 and SP1 of the Manchester Core Strategy (2012), saved policy DC17.1 of the Unitary Development Plan for the City of Manchester (1995) and the National Planning Policy Framework (NPPF).

Should you wish to discuss this matter any further please contact Robert Griffin.

Yours faithfully,



Julie Roscoe
Director of Planning, Building Control & Licensing

V 1.8

SITE LOCATION



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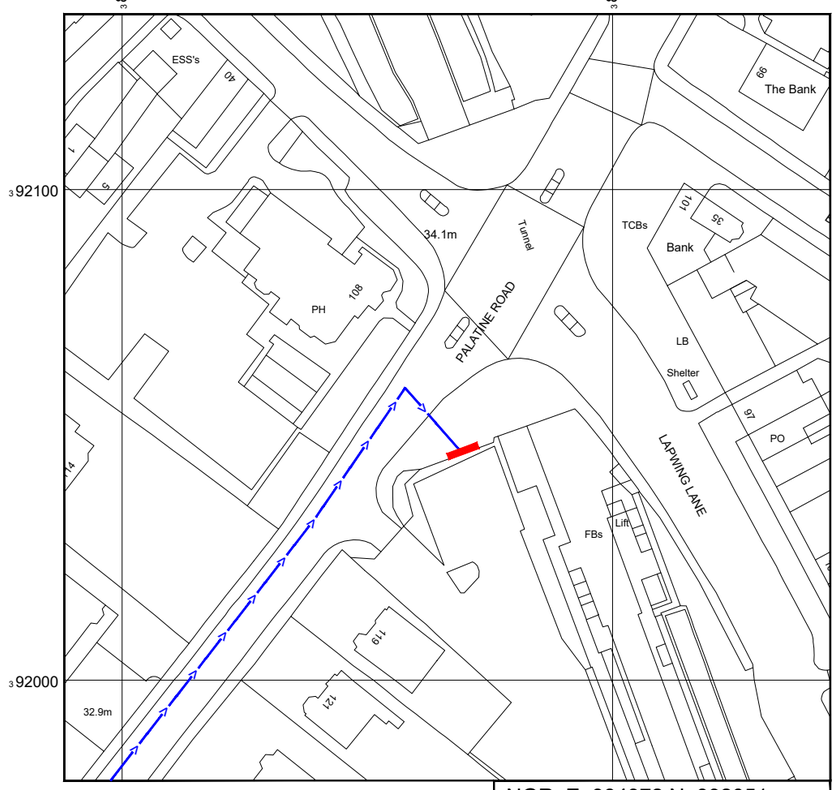
SITE AREA PLAN

0 1:50,000 1km 2



SITE PHOTOGRAPH

N



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NGR E: 384372 N: 392051

SITE LOCATION PLAN

0 1:1250 25m 50

GOOGLE MAPS QR CODE

GOOGLE MAPS - https://goo.gl/maps/Fa1JKj844jKDcmfn8

GOOGLE STREETVIEW - https://goo.gl/maps/oRqzUziC5Pgx9qL3A

NOTES:

1. ALL DIMENSIONS IN MM UNLESS OTHERWISE NOTED.

DIRECTIONS TO SITE:
Head north on M56. Keep right at the fork to stay on M56. Continue onto Princess Pkwy/A5103. Take the exit towards Northenden/Sale Moor/B5166. Turn right onto Wythenshawe Rd/B5167. Follow Palatine Road and site location is on the right hand side.

Site Provider's Property Boundary:

Access Route To Site:

Access Route:

Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M002	MBNL	5G UNILATERAL	Planning	B
Date:	27/08/2021	Revision / Upgrade Description:		
Drawn:	CDN	Pole height reduces to 15m		
Checked:	DH			
Approved:	SD			
Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M001	MBNL	5G UNILATERAL	Planning	A
Date:	21/06/2021	Revision / Upgrade Description:		
Drawn:	CDN	First Issue - Site nomination dated: TBC		
Checked:	DH			
Approved:	SD			

CK Hutchison Networks (UK) Limited
Great Brighams Mead,
Vastern Road, Reading,
Berkshire, England,
RG1 8DJ

Design Consultant & Principal Contractor:
WHP Telecoms
Unit 1 Maple Park,
Low Fields Avenue, Leeds
LS12 6HH

Tel: 01133023550
e-mail: info@whptelecoms.com

Site Name:
PALATINE ROAD STREETWORKS

Site ID:
MAN18387

Address:
PALATINE ROAD, WEST DIDSBURY, MANCHESTER, GREATER MANCHESTER, NORTH WEST ENGLAND, ENGLAND, M20 3ZA

Title:
002 SITE LOCATION PLAN

Project:
5G UNILATERAL

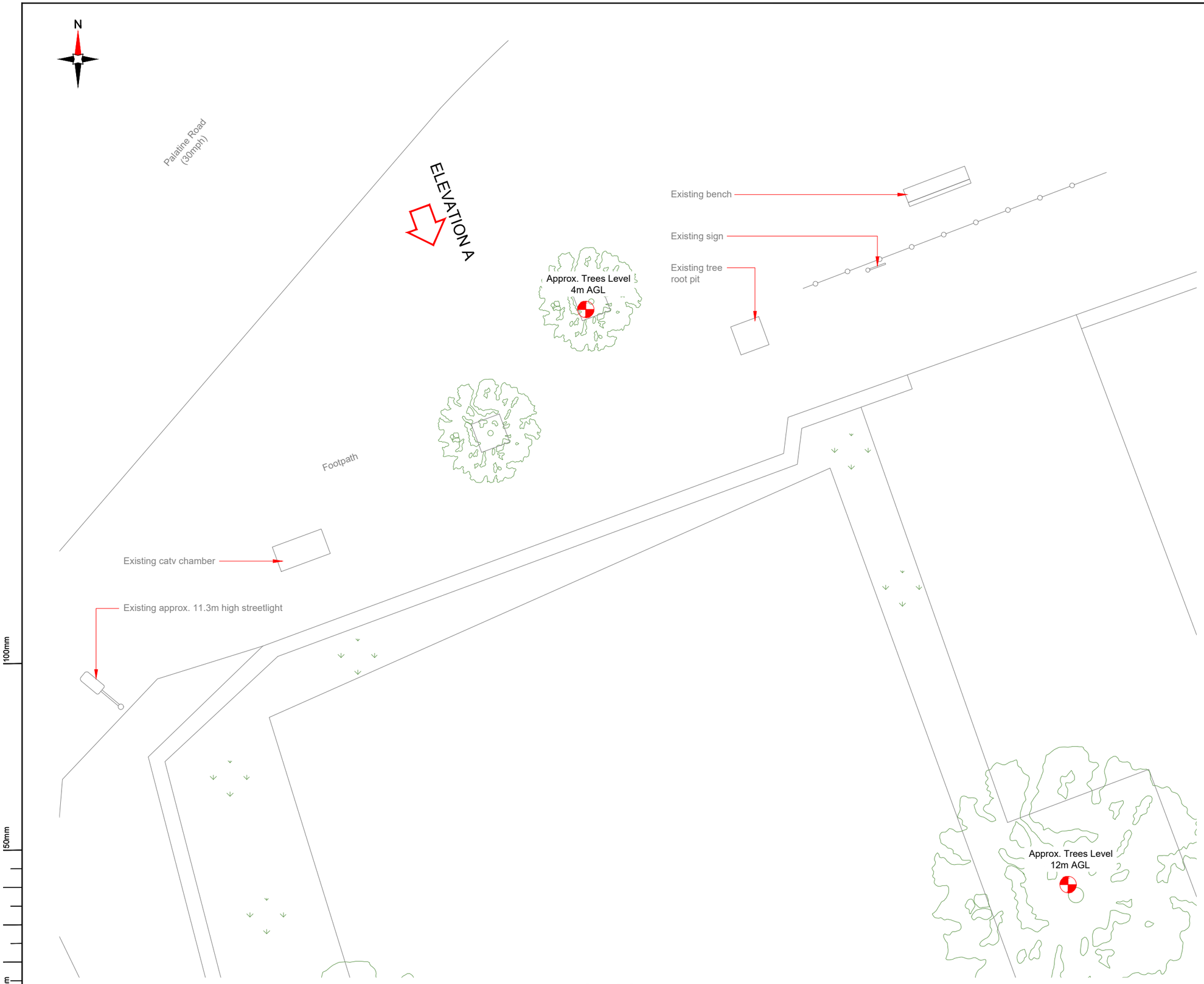
Purpose of Issue:
PLANNING

EE Cell ID:	MBNL Cell ID:	Cell ID:
N/A	N/A	N/A

Master Drawing No: MAN18387_M002 Issue: B

100mm
50mm
10mm

V 1.8



EXISTING SITE PLAN

0 1:100 2m 4

NOTES:

1. ALL DIMENSIONS IN MM UNLESS OTHERWISE NOTED.

Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M002	MBNL	5G UNILATERAL	Planning	B

Date:	27/08/2021
Drawn:	CDN
Checked:	DH
Approved:	SD

Revision / Upgrade Description: Pole height reduces to 15m

Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M001	MBNL	5G UNILATERAL	Planning	A

Date:	21/06/2021
Drawn:	CDN
Checked:	DH
Approved:	SD

Revision / Upgrade Description: First Issue - Site nomination dated: TBC

CK Hutchison Networks (UK) Limited
Great Brighams Mead,
Vastern Road, Reading,
Berkshire, England,
RG1 8DJ

Design Consultant & Principal Contractor:

WHP Telecoms
Unit 1 Maple Park,
Low Fields Avenue, Leeds
LS12 6HH

Tel: 01133023550
e-mail: info@whptelecoms.com

Site Name: PALATINE ROAD STREETWORKS

Site ID: MAN18387

Address: PALATINE ROAD, WEST DIDSBURY, MANCHESTER, GREATER MANCHESTER, NORTH WEST ENGLAND, ENGLAND, M20 3ZA

Title: 100 EXISTING SITE PLAN

Project: 5G UNILATERAL

Purpose of Issue: PLANNING

EE Cell ID:	MBNL Cell ID:	Cell ID:
N/A	N/A	N/A

Master Drawing No:	Issue:
MAN18387_M002	B

V 1.8



EXISTING ELEVATION A

0 1:100 2m 4

100mm
50mm
10mm

NOTES:

1. ALL DIMENSIONS IN MM UNLESS OTHERWISE NOTED.

Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M002	MBNL	5G UNILATERAL	Planning	B
Date:	27/08/2021	Revision / Upgrade Description:		
Drawn:	CDN	Pole height reduces to 15m		
Checked:	DH			
Approved:	SD			

Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M001	MBNL	5G UNILATERAL	Planning	A
Date:	21/06/2021	Revision / Upgrade Description:		
Drawn:	CDN	First Issue - Site nomination dated: TBC		
Checked:	DH			
Approved:	SD			

CK Hutchison Networks (UK) Limited
Great Brighams Mead,
Vastern Road, Reading,
Berkshire, England,
RG1 8DJ

Design Consultant & Principal Contractor:

WHP Telecoms
Unit 1 Maple Park,
Low Fields Avenue, Leeds
LS12 6HH

Tel: 01133023550
e-mail: info@whptelecoms.com

Site Name:
PALATINE ROAD STREETWORKS

Site ID:
MAN18387

Address:
PALATINE ROAD, WEST DIDSBURY, MANCHESTER, GREATER MANCHESTER, NORTH WEST ENGLAND, ENGLAND, M20 3ZA

Title:
150 EXISTING ELEVATION A

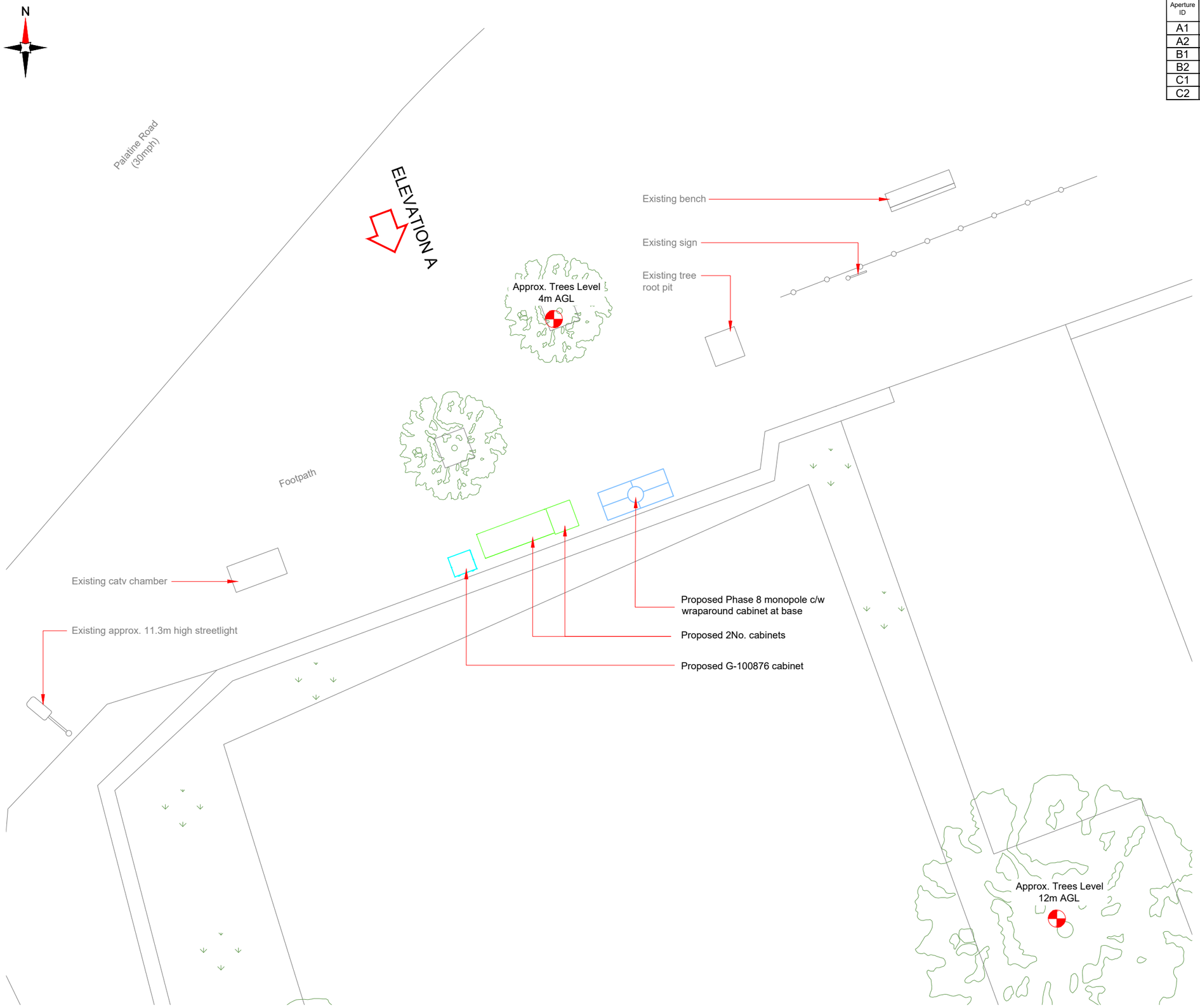
Project:
5G UNILATERAL

Purpose of Issue:
PLANNING

EE Cell ID:	MBNL Cell ID:	Cell ID:
N/A	N/A	N/A

Master Drawing No:	Issue:
MAN18387_M002	B

V 1.8



PROPOSED SITE PLAN

0 1:100 2m 4

Antenna Aperture ID	Proposed 4G/5G Bearing
A1	0°
A2	0°
B1	120°
B2	120°
C1	240°
C2	240°

NOTES:

1. ALL DIMENSIONS IN MM UNLESS OTHERWISE NOTED.

Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M002	MBNL	5G UNILATERAL	Planning	B

Date:	27/08/2021
Drawn:	CDN
Checked:	DH
Approved:	SD

Revision / Upgrade Description: Pole height reduces to 15m

Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M001	MBNL	5G UNILATERAL	Planning	A

Date:	21/06/2021
Drawn:	CDN
Checked:	DH
Approved:	SD

Revision / Upgrade Description: First Issue - Site nomination dated: TBC

CK Hutchison Networks (UK) Limited
Great Brighams Mead,
Vastern Road, Reading,
Berkshire, England,
RG1 8DJ

Design Consultant & Principal Contractor:

WHP Telecoms
Unit 1 Maple Park,
Low Fields Avenue, Leeds
LS12 6HH

Tel: 01133023550
e-mail: info@whptelecoms.com

Site Name: PALATINE ROAD STREETWORKS

Site ID: MAN18387

Address: PALATINE ROAD, WEST DIDSBURY, MANCHESTER, GREATER MANCHESTER, NORTH WEST ENGLAND, ENGLAND, M20 3ZA

Title: 210 PROPOSED SITE PLAN

Project: 5G UNILATERAL

Purpose of Issue: PLANNING

EE Cell ID:	MBNL Cell ID:	Cell ID:
N/A	N/A	N/A

Master Drawing No: MAN18387_M002

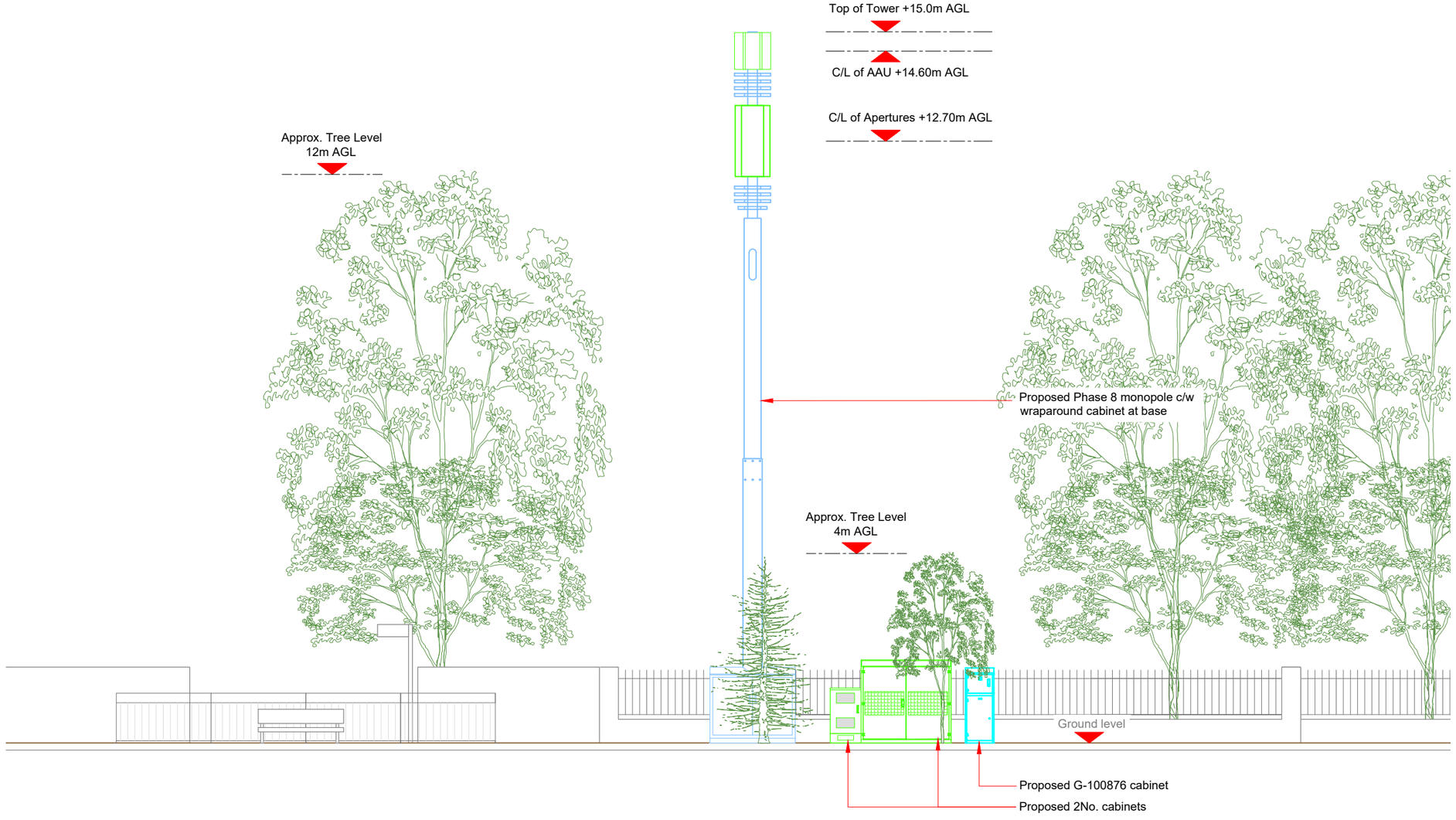
Issue: B

V 1.8

Antenna Aperture ID	Proposed 4G/5G Bearing
A1	0°
A2	0°
B1	120°
B2	120°
C1	240°
C2	240°

NOTES:

1. ALL DIMENSIONS IN MM UNLESS OTHERWISE NOTED.



PROPOSED ELEVATION

0 1:100 2m 4

100mm 50mm 10mm

Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M002	MBNL	5G UNILATERAL	Planning	B

Date:	27/08/2021
Drawn:	CDN
Checked:	DH
Approved:	SD

Revision / Upgrade Description: Pole height reduces to 15m

Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M001	MBNL	5G UNILATERAL	Planning	A

Date:	21/06/2021
Drawn:	CDN
Checked:	DH
Approved:	SD

Revision / Upgrade Description: First Issue - Site nomination dated: TBC

CK Hutchison Networks (UK) Limited
Great Brighams Mead,
Vastern Road, Reading,
Berkshire, England,
RG1 8DJ

Design Consultant & Principal Contractor:

WHP Telecoms
Unit 1 Maple Park,
Low Fields Avenue, Leeds
LS12 6HH

Tel: 01133023550
e-mail: info@whptelecoms.com

Site Name: PALATINE ROAD STREETWORKS

Site ID: MAN18387

Address: PALATINE ROAD, WEST DIDSBURY, MANCHESTER, GREATER MANCHESTER, NORTH WEST ENGLAND, ENGLAND, M20 3ZA

Title: 260 PROPOSED ELEVATION

Project: 5G UNILATERAL

Purpose of Issue: PLANNING

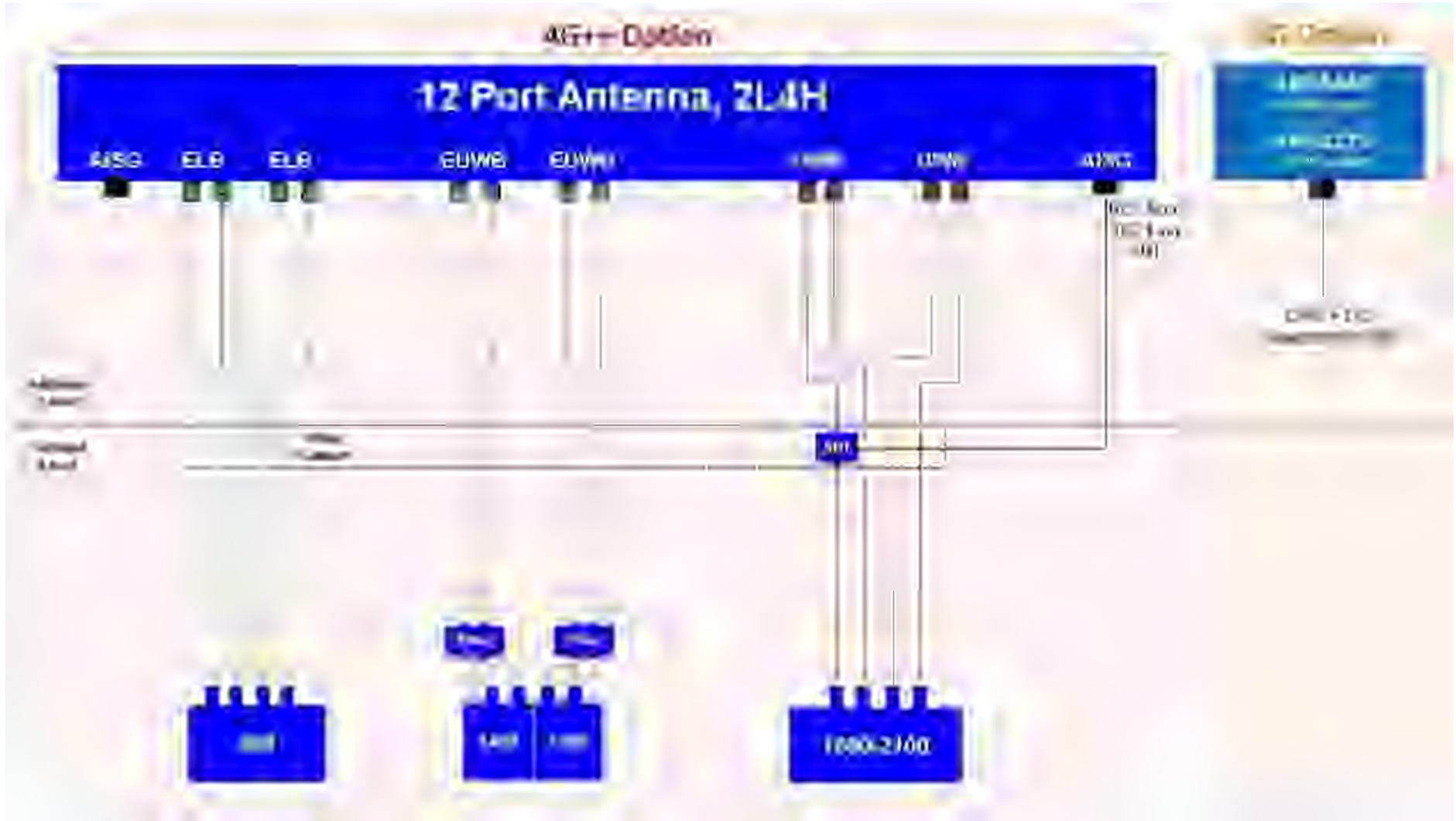
EE Cell ID:	MBNL Cell ID:	Cell ID:
N/A	N/A	N/A

Master Drawing No: MAN18387_M002 Issue: B

V 1.8

Proposed Antenna Aperture Schedule & RF Equipment Capacity

Antenna Aperture ID	Antenna Aperture Size (Length x Width x Depth)	Aperture Height C/L	Aperture Max Weight (kg)	Proposed 4G/5G Bearing	Tech: 4G/5G	Operator:	Antenna Aperture Coordinates		RRU No. Max Size & Weight L=520mm W=400mm D=150mm Weight=25kg	MHA No. Max Size & Weight L=300mm W=300mm D=150mm Weight=10kg	Main Feeder			BOB Max Size & Weight (300x300x250mm & 5kg)		Active Router No. Max Size & Weight (370x260x150mm & 10kg)	Passive Router No. Max Size & Weight (350x220x150mm & 10kg)
							Eastings	Northings			Size	Length	No.	No. Top	No. Bottom		
A1	778x403x268mm	14.60m	43.4kg	0°	5G	-	-	-	0	0	TBC	TBC	4	1	1	1	1
A2	1499x498x197mm	12.70m	31.8kg	0°	4G	-	-	-	3	0	TBC	TBC	4	1	1	1	1
B1	778x403x268mm	14.60m	43.4kg	120°	5G	-	-	-	0	0	TBC	TBC	4	1	1	1	1
B2	1499x498x197mm	12.70m	31.8kg	120°	4G	-	-	-	3	0	TBC	TBC	4	1	1	1	1
C1	778x403x268mm	14.60m	43.4kg	240°	5G	-	-	-	0	0	TBC	TBC	4	1	1	1	1
C2	1499x498x197mm	12.70m	31.8kg	240°	4G	-	-	-	3	0	TBC	TBC	4	1	1	1	1



STATUS KEY:

Installed:	Existing
Retain:	Existing and to remain
Relocate:	Existing and to be relocated
Remove:	Existing to be removed from site
Proposed:	New on site

Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M002	MBNL	5G UNILATERAL	Planning	B
Date:	27/08/2021	Revision / Upgrade Description:		
Drawn:	CDN	Pole height reduces to 15m		
Checked:	DH			
Approved:	SD			
Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M001	MBNL	5G UNILATERAL	Planning	A
Date:	21/06/2021	Revision / Upgrade Description:		
Drawn:	CDN	First Issue - Site nomination dated: TBC		
Checked:	DH			
Approved:	SD			

CK Hutchison Networks (UK) Limited
Great Brighams Mead,
Vastern Road, Reading,
Berkshire, England,
RG1 8DJ

Design Consultant & Principal Contractor:

WHP Telecoms
Unit 1 Maple Park,
Low Fields Avenue, Leeds
LS12 6HH

Tel: 01133023550
e-mail: info@whptelecoms.com

Site Name: PALATINE ROAD STREETWORKS

Site ID: MAN18387

Address: PALATINE ROAD, WEST DIDSBURY, MANCHESTER, GREATER MANCHESTER, NORTH WEST ENGLAND, ENGLAND, M20 3ZA

Title: 303 PROPOSED ANTENNA SCHEDULE & LINE CONFIGURATION

Project: 5G UNILATERAL

Purpose of Issue: PLANNING

EE Cell ID:	MBNL Cell ID:	Cell ID:
N/A	N/A	N/A

Master Drawing No: MAN18387_M002 | Issue: B

100mm
50mm
10mm

V 1.8

Support Structure Schedule

Structure ID	Status	Equipment Description / Type	Structure Manufacturer	Height AGL (m)	Colour (RAL Colour)	Headframe Details	Foundation / Support Grillage / Host Structure Details	Support Bolt Details	MBNL Ref:	Comments
ST1	Proposed	Phase 8	Valmont	15.0m	Galvanised	-	Root Foundation	-	-	

Equipment Schedule

Equipment ID	Quantity	Status	Equipment Description / Type	Equipment Manufacturer	Dimensions (W x D x H)	Weight (kg)	Colour (RAL Colour)	Material	Location	Power	Power cable length (m)	MBNL Ref:	Comments
CAB1	1	Proposed	Commscope - Bowler	-	1900x600x1752	-	Grey	Steel	Outdoor	-	-	-	
CAB2	1	Proposed	Ericsson - 6130	-	650x700x950	-	Grey	Steel	Outdoor	-	-	-	
CAB3	1	Proposed	G-100876	-	600x520x1585	-	Grey	Steel	Outdoor	-	-	-	
CAB4	1	Proposed	Diplexer Cabinet	-	1800x750x1600	-	Grey	Steel	Outdoor	-	-	-	

STATUS KEY:

Installed: Existing
Retain: Existing and to remain
Relocate: Existing and to be relocated
Remove: Existing to be removed from site
Proposed: New on site

LOCATION KEY:

Outdoor: Located outside
Indoor: Located within an equipment cabin or equipment room
Internal: located inside a cabinet or item of equipment

Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M002	MBNL	5G UNILATERAL	Planning	B
Date:	27/08/2021	Revision / Upgrade Description:		
Drawn:	CDN	Pole height reduces to 15m		
Checked:	DH			
Approved:	SD			
Master:	MBNL / EE:	Project:	Purpose of Issue:	Issue:
M001	MBNL	5G UNILATERAL	Planning	A
Date:	21/06/2021	Revision / Upgrade Description:		
Drawn:	CDN	First Issue - Site nomination dated: TBC		
Checked:	DH			
Approved:	SD			

CK Hutchison Networks (UK) Limited
Great Brighams Mead,
Vastern Road, Reading,
Berkshire, England,
RG1 8DJ

Design Consultant & Principal Contractor:

WHP Telecoms
Unit 1 Maple Park,
Low Fields Avenue, Leeds
LS12 6HH

Tel: 01133023550
e-mail: info@whptelecoms.com

Site Name: PALATINE ROAD STREETWORKS

Site ID: MAN18387

Address: PALATINE ROAD, WEST DIDSBURY, MANCHESTER, GREATER MANCHESTER, NORTH WEST ENGLAND, ENGLAND, M20 3ZA

Title: 305 EQUIPMENT SCHEDULE & SUPPORT STRUCTURE DETAILS

Project: 5G UNILATERAL

Purpose of Issue: PLANNING

EE Cell ID:	MBNL Cell ID:	Cell ID:
N/A	N/A	N/A

Master Drawing No:	Issue:
MAN18387_M002	B

100mm
50mm
10mm

SITE SPECIFIC SUPPLEMENTARY INFORMATION

1. Site Details

Site Name:	Palatine Road Streetworks	Site Address:	Palatine Road West Didsbury Manchester Greater Manchester North West England England M20 6UT
NGR:	E: 384372 N: 392051		
Site Ref Number:	MAN18387	Site Type: Macro	Street Works Monopole – Macro Proposed telecommunications installation: Proposed Phase 8 Monopole C/W wrapround Cabinet at base & associated ancillary works.

2. Pre-Application Check List

Site Selection

Was an LPA mast register used to check for suitable sites by the operator or the LPA?		No
If no explain why: After a phone call to the LPA it was felt that the industry database was a more up to date source of information.		
Was the industry site database checked for suitable sites by the operator?	Yes	
If no explain why: N/A		

Pre-application consultation with LPA

Written offer of pre-application consultation:	Yes	
Was there pre-application contact?		No
Date of pre-application contact:	N/A	
Name of contact:	The Director of Planning	

Summary of outcome/Main issues raised: No comments had been received in respect to the proposals.

Ten Commitments Consultation

Rating of Site under Traffic Light Model:	Amber		
Prior to the submission of this application the applicant initiates pre-consultation discussions with the local planning authority. This provides an opportunity for the LPA to discuss development proposals and identify site specific issues.			
Summary of outcome/Main issues raised: No responses had been received at the time of submission.			

School/College

Location of site in relation to school/college: West Didsbury Primary School is within close proximity to the proposed location.
Outline of consultation carried out with school/college: A letter of consultation was sent prior to submission of the application.
Summary of outcome/Main issues raised: N/A

Civil Aviation Authority/Secretary of State for Defence/Aerodrome Operator consultation (only required for an application for prior approval)

Will the structure be within 3km of an aerodrome or airfield?		No
Has the Civil Aviation Authority/Secretary of State for Defence/Aerodrome Operator been notified?		No
Details of response: N/A		

Developer's Notice

Copy of Developer's Notice enclosed?		Yes	
Date served:	25th June 2021		

3. Proposed Development

The proposed site:

This is a highly constrained cell search area. The proposed site is located at Palatine Road, West Didsbury, Manchester, Greater Manchester, North West England, England, M20 6UT

There is now a requirement to upgrade the CK Hutchison Networks (UK) Ltd (Three) network to provide improved coverage and capacity, most notably in relation to 5G services. This proposal is for a 20.0m SW (Street Works) monopole located on the adopted highways at Palatine Road. The exact details of this proposal are illustrated on the enclosed drawings (Proposed Phase 8 Monopole C/W wrapround Cabinet at base & associated ancillary works). As with all 5G cells this is an extremely constrained cell search area. Options are extremely limited and the only viable solution that minimises amenity issues has been put forward.

Three are in the process of building out the UK's fastest 5G network. Three has 140MHz of 5G spectrum (and 100MHz of it contiguous), which means our service will be much faster and able to handle more data. To bring this new technology to the people CK Hutchison Networks (UK) Ltd will need to provide a mix of upgrades to existing sites and the building of new sites. New sites will be needed for many reasons, including that the higher radio frequencies used for 5G do not travel as far as those frequencies currently in use and that sometimes not all existing sites can be upgraded. In this area there is an acute need for a new mast to deliver the above.

It should be noted however, that the nature of 5G and the network services it provides, means the equipment and antennas required are quite different to the previous, and existing, service requirements. In particular, the nature of the antennas, and the separation required from other items of associated equipment, is such that it cannot utilise some existing structures that provide an installation for another operator, most notably in a street works or highways environment.

The site selection process has also been influenced by the numerous vertical elements of street furniture distributed around the vicinity of the site including street lighting columns. The height of the pole has been kept down to the absolute minimum capable of providing the required essential new 5G coverage. The site has been selected on a wide adopted area of the highway in a position that will not impede pedestrian flow or the safety of passing motorists. The cabinets are located at the base of the new pole and unless the site is located in Article 2 (3) land these are PD without Prior Approval and do not form part of the proposal from a planning consideration perspective.

This equipment is considered unlikely to have any material impact on the local area but significant connectivity improvements which is a material consideration in the judgment of the site's suitability. The cell search area was assessed at the Survey stage from a planning and residential amenity perspective. The planning constraints (where there are any) have shaped the location of the proposal. The planning analysis and overview of the sites planning designation is captured below. Figure 1-3 illustrates the site and the surrounding area.

The proposed equipment has been strategically located on a wide stretch of pavement at Palatine Road. The proposed site is not overlooked by any residential properties and benefits from some screening provided by the surrounding trees and shrubs. Existing street furniture in the form of streetlights will enable the equipment to blend into the street scene.

Figure 1:



Figure 2:



Figure 3:



Local Planning Authority: Manchester City Council

Development Plan: Manchester's Local Development Framework Core Strategy Development Plan Document (2012) / Citywide Development Control Policies

Policy Relevant to the Development Site:

The site is designated as being in the settlement boundary, with urban uses to the north, east, south and west. The site designation is not a material consideration.

Manchester City Council does have a specific telecoms policy. This, together with the NPPF is of relevance. The National Planning Policy section of this supporting statement goes into detailed analysis of why this site is in compliance with the NPPF.

Policy Analysis:

Policy DC.17.1 states:

Applications for telecommunications developments will normally be approved if the Council can be satisfied that the development has been sited and designed to minimise its impact on residential amenity and in environmentally sensitive areas. Wherever possible, the Council will expect the potential of existing buildings and masts, including the sharing of such facilities, to be fully explored before agreeing to additional separate development.

The proposed works at the site would not result in demonstrable harm to the character of the as well as being suitably distant from residential properties to ensure amenity loss is minimised, yet would provide the requisite coverage needed in the area, so according with the principles of the policy. The public benefits of a greatly enhanced communications network for businesses, residents and visitors alike in this location would qualify as a considerable positive that would contribute to the wider economic output of the area. It fully accords with the requirements of the NPPF.

The proposed works are not to the visual detriment of the surrounding area (being suitably distant from sensitive receptors). The proposal would not result in demonstrable harm to the character of the immediate or wider area; but are vitally necessary to ensure improved delivery of service. Capacity and coverage are the key drivers for this new 5G installation. The proposal would respect and continue to maintain the character of the area, would be suitably distant from potentially sensitive users, and so would accord with the principles of the Development Plan policies. It fully accords with the requirements of the NPPF.

Central Government attaches great importance to the design of the built environment and outlines this within Section 12 (para. 124) of the National Planning Policy Framework. It states:

"Good design is a key aspect of sustainable development, creates better places in which to live and work and helps make development acceptable to communities."

In keeping with the National Planning Policy Framework (NPPF). guidelines of using: "high quality communications" (Section 10), the proposed design has been selected to minimise visual impact upon the street scene by integrating with the existing built environment.

The design of the proposed equipment is considered to be the least visually intrusive option available. Although it is accepted that there will be an intensification in the amount of equipment (an additional monopole and associated cabinets in the area) it is felt that such a minor increase would not detract from the character in which the proposal sits.

Pavement Width:

The CK Hutchison Networks (UK) Ltd Street Works (SW) Project is installing equipment solely on either adopted pavements or verges. In these adopted locations the Mobile Phone Industry have rights to place their equipment. With all SW proposals sufficient pavement width has been given for pedestrian, wheelchair, and pushchair access. Planning Appeal Reference: APP/A5840/W/20/3254830 makes specific reference to this element where the Planning Inspector states:

"Along with the mast the proposal includes the installation of three cabinets. The mast would be located on the corner where the pavement is at its widest and free of street furniture. The cabinets would be positioned against railings just before the junction. It would reduce the width

of the pavement. However, in my view even the narrower width of pavement available would still allow users to pass one another including those pushing a baby buggy or groups of people walking along the pavement. As such, the proposed development would not introduce excessive clutter on the pavement and would not present an obstruction to pedestrian movement or adversely affect pedestrian safety."

Economic and Social benefits of 5G:

A recent CK Hutchison Networks (UK) Ltd Planning Appeal approval (Reference: APP/G4240/W/20/3263529) makes specific reference to the Economic and Social benefits of 5G telecommunications equipment.

"There would be clear economic and social benefits associated with allowing the telecommunications development in accordance with paragraph 112 of the Framework."

Enclose map showing the cell centre and adjoining cells:

There is an extremely small, constrained search area for this cell. See below the cell search area and the existing sites in the immediate vicinity. Often the proposal has been pulled marginally outside of the cell search area due to residential amenity, pavement width, underground services and planning issues. The mast must be in a position where it can be physically constructed. Existing underground services continue to be a significant obstacle to the deployment of this roll out. The optimum solution from a planning and radio coverage perspective has been put forward.

Figure 4 illustrates the nominal and existing 3 UK sites in the area. The nominal is captured by the green pin below. The equipment has to be located in this marker or very close to it to give coverage and not to interfere with the adjoining CK Hutchison Networks (UK) Ltd sites.

Figure 4:



Type of Structure

Description: Proposed Phase 8 Monopole C/W wrapround Cabinet at base	
Overall Height: +20.0m AGL	
Height of existing building	N/A
Equipment Housing:	
Length:	See drawings
Width:	See drawings
Height:	See drawings
Materials	
Tower/mast etc – type of material and external colour:	Proposed Phase 8 Monopole C/W wrapround Cabinet at base - Galvanised
Equipment housing – type of material and external colour:	Material: Steel, Colour: Grey

Reasons for choice of design:
The proposed installation is an CK Hutchison Networks (UK) Ltd (Three) Phase 8 Monopole which will house CK Hutchison Networks (UK) Ltd (Three). The proposal is required due to acute capacity issues and will facilitate significantly improved 5G in areas that have started to gain this service and newly introduce it to the areas that have not gained this level of connectivity yet. In keeping with the National Planning Policy Framework (NPPF July 2019). guidelines of using high quality communications infrastructure the proposed design has been selected to minimise visual impact upon the street scene by integrating with the existing street furniture, having similar vertical lines and overall appearance to the numerous street lighting columns in this area. The 5G antennas are some 3 times as heavy as previous antennas, while the associated Remote Radio Units also now need to be placed at the top of the pole, thus many street works designs are no longer structurally capable of hosting all the equipment of 2 operators. It should be noted that the alternative option that could accommodate two operators would be a more traditional 'greenfield' mast, with an open headframe and more bulky design, which would be inappropriate in a street scene location. There is no such location in this cell search area where a greenfield mast could be housed and thus site sharing is not a viable proposition.

4. Technical Information

ICNIRP Declaration attached ICNIRP public compliance is determined by mathematical calculation and implemented by careful location of antennas, access restrictions and/or barriers and signage as necessary. Members of the public cannot unknowingly enter areas close to the antennas where exposure may exceed the relevant guidelines. When determining compliance the emissions from all mobile phone network operators on the site are taken into account.	Yes	

5. Technical Justification

Reason(s) why site required
The National Planning Policy Framework clearly states that authorities should NOT question the need for the service, nor seek to prevent competition between operators. Notwithstanding this fact, the Applicant considers it to be important to explain the technical justification for the site and how the facility fits into the overall network. The site is required to provide new 5G coverage for CK Hutchison Networks (UK) Ltd in order to improve coverage in the area of West Didsbury. The cell search areas for 5G are extremely constrained with a typical cell radius of approximately 50m meaning that it would not be feasible to site the column outside of this locale.

6. Site Selection Process – alternative sites considered and not chosen

Discounted Options
In accordance with the sequential approach outlined in the National Planning Policy Framework (NPPF) following search criteria have been utilised. Firstly, consideration is always given to sharing any existing telecommunication structures in the area, secondly consideration is then given to utilising any suitable existing structures or buildings and thirdly sites for freestanding ground-based installations are investigated. This sequential approach is outlined below: a) Mast and Site Sharing b) Existing Buildings Structures c) Ground Bases Installations In compliance with its licence and the sequential approach outlined in the NPPF all attempts to utilise any existing telecommunication structures where they represent the optimum environmental solution have been employed. The Ofcom Site Finder mast register is always examined prior to the submission of an application.

DISCOUNTED OPTIONS:

If no alternative site options have been investigated, please explain why:
The NPPF is clear that LPAs should not question the need for the installation. *116. Local planning authorities must determine applications on planning grounds only. They should not seek to prevent competition between different operators, question the need for an electronic communications system, or set health safeguards different from the International Commission guidelines for public exposure.* The cell search area is illustrated below and is extremely constrained. The only viable option has been put forward. As with all 5G cells this is an extremely constrained cell search area. Options are extremely limited and the only viable solution that minimises amenity issues has been put forward. The proposed site is located in a densely packed residential area. The DSA (Designated Search Area) covers this densely packed residential area. There is no scope to pull the mast outside of this area and give the cell 5G coverage. Figure 5:



Alternative locations also explored –

D1 - 384408, 392039 - Discounted due to insufficient pavement width.
D2 - 384384, 392123 - Discounted due to existing SW monopoles being situated in this location.
D3 - 384448, 392237 - Discounted due to obstructing overhead tree canopies.
D4 - 384356, 392118 - Discounted due to insufficient pavement width.
D5 - 383941, 392175 - Discounted due to insufficient pavement width.
D6 - 384399, 392091 - Discounted due to potential visual intrusion and cluttered pavement which could cause pinch points.
D7 - 384438, 391992 - Discounted due to impact on parking.
D8 - 384346, 392108 - Discounted due to insufficient pavement width.

7. Additional Relevant Information

Background to the Proposal

This specific proposal forms part of an integral requirement for CK Hutchison Networks (UK) Ltd to expand its 5G telecommunications network across Manchester specifically in this instance to enhance 5G coverage levels and network capacity within the West Didsbury area.

Mobile phone base stations operate on a low power and accordingly base stations therefore need to be located in the areas they are required to serve. Increasingly, people are also using their mobiles in their homes and this means we need to position base stations in, or close to, residential areas.

A further limiting factor is that the position has to be one that fits in with the existing network. Sites have to form a patchwork of coverage cells with each cell overlapping to a limited degree with the surrounding base stations to provide continuous network cover as users move from one cell to the other. However, if this overlap is too great unacceptable interference is created between the two cells.

Siting

We have considered the detailed siting and design carefully to ensure that the scheme has a

limited impact on the locality and general visual amenity.

Visual appearance

We would repeat that we have carefully placed and designed the scheme to ensure the principles of good siting and appearance are adhered to. The overall impact of the installation on the environment is limited.

DEVELOPMENT PLAN POLICY.

Development plan considerations have a special significance in law. Section 54A of the Town and Country Planning Act 1990 (The Act), and re-iterated in Section 38 of the Planning and Compensation Act 2004, it is stated that:

"Where in making any determination under the Planning Acts regard is to be had to the Development Plan, determination shall be made in accordance with the Development Plan unless material considerations indicate otherwise."

NATIONAL PLANNING POLICY

The Government remain committed to promoting telecommunications and place emphasis on the importance of telecommunications to the wider economy. The National Planning Policy Framework (NPPF July 2019) sets out the Government's planning policies for England and how these are expected to be applied at the Local level. It provides a framework within which local people and their accountable Councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

The purpose of the planning system is to contribute to the achievement of sustainable development. There are three dimensions of sustainable development, each of which give rise to the need for the planning systems to perform a number of roles including: -

- Economic Role – contributing to building strong, responsive and competitive economy;
- Social Role – Supporting strong vibrant and healthy communities; and
- Environmental Role – Contributing to protecting and enhancing our natural, built and historic environment.

The NPPF contains at its core a presumption in favour of sustainable development which runs through both plan-making and decision-making processes. The NPPF recognises the vital importance of high-quality telecommunications and dedicates a whole chapter to this. Chapter 10 of the NPPF outlines the Governments support for high quality communications. The paragraphs below clearly outline the overarching support from Central Government for telecommunications and how Local Planning Authorities should embrace this vital infrastructure:

Paragraph 112 states:

"Advanced, high quality and reliable communications infrastructure is essential for economic growth and social well-being. Planning policies and decisions should support the expansion of electronic communications networks, including next generation mobile technology (such as 5G) and full fibre broadband connections. Policies should set out how high-quality digital infrastructure, providing access to services from a range of providers, is expected to be

delivered and upgraded over time; and should prioritise full fibre connections to existing and new developments (as these connections will, in almost all cases, provide the optimum solution).”

It continues in Paragraph 113:

“The number of radio and electronic communications masts, and the sites for such installations, should be kept to a minimum consistent with the needs of consumers, the efficient operation of the network and providing reasonable capacity for future expansion. Use of existing masts, buildings and other structures for new electronic communications capability (including wireless) should be encouraged. Where new sites are required (such as for new 5G networks, or for connected transport and smart city applications), equipment should be sympathetically designed and camouflaged where appropriate.”

Operators always follow the sequential site selection process. Where an existing site can be shared or upgraded this will always adhered to before a new proposal is put forward for consideration. In this instance there is no scope to upgrade an existing mast nor site share.

The support for telecoms and the need not to constrain Operators is laid out in Paragraph 116:

“Local planning authorities must determine applications on planning grounds only. They should not seek to prevent competition between different operators, question the need for an electronic communications system, or set health safeguards different from the International Commission guidelines for public exposure.”

Conclusion

We consider that the development is compliant with the council’s policy and that in accordance with Section 38 (6) of the Planning and Compensation Act 2004 permission should be granted for the installation.

We consider the development complies with both central government and local planning policy guidance where the underlying aim is to provide an efficient and competitive telecommunication system for the benefit of the community while minimising visual impact.

Taking into account the factors of technical constraints, available sites and planning constraints we consider that this site and design clearly represents the optimum environmental solution.

On the basis of a recognised need to expand and promote telecommunications networks across the region, it is considered that the proposal fully accords with the requirements of the National Planning Policy Framework and Council’s Local Plan Policies.

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Contact Details

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Signed:		Date:	25th June 2021
Position:	Planning Manager	Company: (on behalf of above operator)	WHP

Planning

Growth & Development

Delegated officer report for planning application

Application no.	134901/TEL/2022
Date registered valid:	8 September 2022
Proposal:	Prior approval for the installation of a 18m high Telecommunications mast and associated equipment and power cabinets
Address:	Footway At The North Eastern Corner Of Lapwing Lane & Palatine Road Junction, Manchester, M20 6UR
Ward(s):	Didsbury West Ward
Applicant:	MBNL (for and on behalf of Three UK Ltd), 450 Longwater Avenue, Green Park, Reading, RG2 6GF
Agent (if any):	Mr James Dodd, Clarke Telecom, Unit E Madison Place, Northampton Road, Manchester, M40 5AG
Case officer:	Robert Griffin Tel: 0161 234 4527 Email: robert.griffin@manchester.gov.uk
Recommendation:	Refuse
Date of recommendation:	**19.10.2022**

Application details

Type of application: Telecommunication Application

Development type: Minor Other

Date of site visit: 14.09.2022

Standard consultations:
Printed: 12 September 2022 Expired: 3 October 2022

Neighbour notifications
Printed: 12 September 2022 Expired: 3 October 2022

Site notice
Posted: 14 September 2022 Expired: 5 October 2022

Press advert
Published: 20 September 2022 Expired: 11 October 2022

Departure from Development Plan: No

Environmental Statement: Not required

Description of site/building

Listed building: Not applicable

Conservation area: Ballbrook Conservation Area 1992

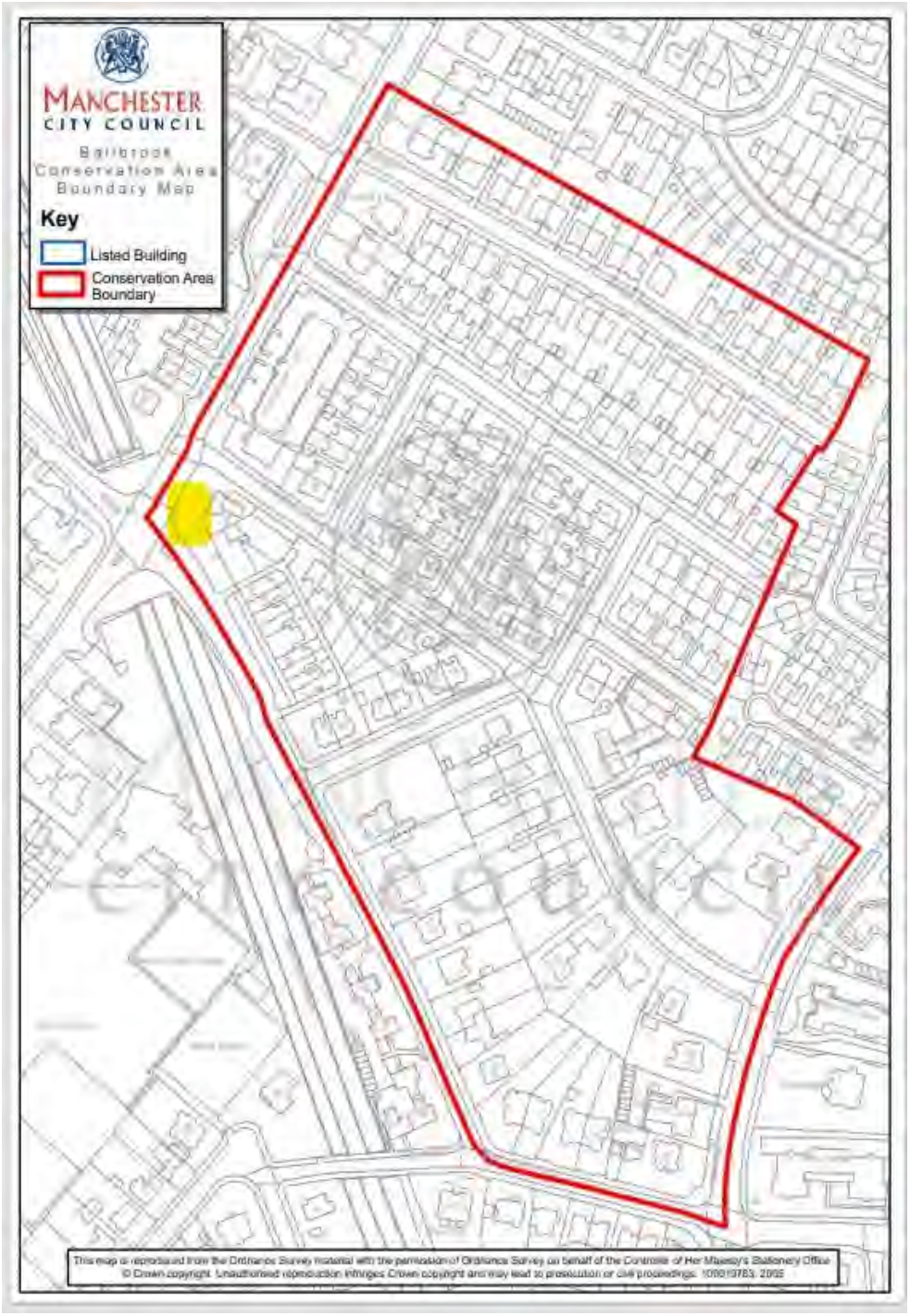
Tree Preservation Order: Not applicable

Description of area

The application site currently forms part of the public realm and public footway on the junction of Lapwing Lane and Palatine Road. In close proximity to the proposed siting of the telecoms mast is existing low level street furniture, trees and a three storey building formerly in use as a bank but converted on the upper two floors into residential and office accommodation in the early 2010s. The bank use of the ground floor ceased in circ. 2019. The site is located at the most westerly point of the Ballbrook Conservation Area designated in 1991, with the adjacent Blackburn Park Conservation Area sharing an adjacent boundary to the south west along Lapwing Lane. To the north east of the site is the grade II Listed Building at the Former District Bank Building, at 99 Palatine Road. The Historic England listing notes:
"1914-15, by Barker, Ellis & Jones of Manchester, brick with applied mock timber framing and cement render panels, deep pitched and half-hipped roof with Westmorland slate coverings, Tudor Revival style, mainly of two-storeys plus basement."

The reason for its designation in 2010 was:
"External architectural quality: It possesses a distinctive and striking Tudor Revival design incorporating the use of jettied gables, mock timber framing and leaded mullioned windows Interior architectural quality: The Tudor Revival design of the exterior is echoed in the decorative treatment of the interior, such as applied 'beams' in the banking hall and a Tudor-arched fireplace in the public waiting area. Intactness: Both the exterior and interior remain

largely unaltered and the principal public and private spaces retain many original features, including fireplaces, the original public counter, panelled dados, and the banking hall skylight.



Boundary of Ballbrook Conservation Area – Yellow highlight is location of proposal

Description of development

The proposals seek prior approval for the siting and appearance of a 18m high telecommunications mast and associated equipment and cabinets within the public realm at the junction of Lapwing Lane and Palatine Road.

The applicants planning statement indicates that the proposed installation is to replace the existing mast located on the opposite side of the road junction, that existing pole is indicates as being removed once it becomes redundant. The proposal is for the upgrade of an existing site. As such, the new monopole needs to be located as close as possible to the existing in order to replicate the coverage and cover the same target coverage area. The existing pole will be

removed as soon as reasonably practicable once it becomes redundant. As the proposal is for the upgrade of an existing site, the applicant confirms that no alternative sites were considered.

Relevant Planning History

130969/TEL/2021 - Proposed telecommunications installation of 15m Monopole with wraproundcabinet at base and associated ancillary works : Palatine Road, West Didsbury – Refused 24.09.2021 – Appeal Dismissed 10.02.2022 for the following reasons –

1) The City Council is not satisfied that this development has been sited and designed to minimise the impact upon visual amenity of the area. The proposed telecommunication installation by reason of its height, siting and appearance would form a visually intrusive and dominant feature which would be harmful to the visual amenity of the area in particular the appearance of the street-scene and fails to preserve or enhance the character and appearance of the Blackburn Park Conservation Area. As such, the proposed installation is considered contrary to saved policies DC17.1 and DC18.1 of the Unitary Development Plan for the City of Manchester, policies DM1, EN3 and SP1 of the Manchester Core Strategy and the National Planning Policy Framework (NPPF).

2) The proposed development, due to its siting and size, would result in the existing footway serving the West Didsbury Metrolink Stop being reduced in width which would have a detrimental impact on pedestrian movement. The proposal would therefore have an unacceptable impact on highway and pedestrian safety. As such, the proposed installation is considered contrary to policies DM1 and SP1 of the Manchester Core Strategy (2012), saved policy DC17.1 of the Unitary Development Plan for the City of Manchester (1995) and the National Planning Policy Framework (NPPF).

065713/FO/SOUTH1/02 - Pavement area opposite the Royal Bank of Scotland, corner of Lapwing Lane and Palatine Road, Didsbury - Erection of 15 metre high telecommunication column with internal antenna together with equipment cabin – Refused 30.09.2002 for the following reasons –

1) The proposed telecommunications apparatus by reason of its siting and appearance would form an unduly intrusive feature within the character of the area in general to the detriment of the visual amenity of the Ballbrook Conservation Area. The proposed development is therefore contrary to the provisions of policies DC17 Telecommunications and DC18 Conservation Areas of the Unitary Development Plan for the City of Manchester.
2) The proposed telecommunications apparatus would be in close proximity to Ewing School on Central Road. The proposal would therefore be contrary to the City Council`s policy relating to the location of base stations as approved in July 2000. This policy seeks to protect children who have been identified by `The report of the Independent Expert Group on Mobile Phones (The Stewart Report)`, as the most sensitive and vulnerable section of the population from the possibly harmful health effects of electro-magnetic radiation generated by such base stations.

Consultations & Notification Responses

A site notice was posted, an advertisement was placed in the Manchester Evening News and nearby properties were notified of the proposal.

Three responses were received objecting to the proposals. A summary of the comments made is set out below:

- Object due to adverse visual impact on the Ballbrook Conservation Area and the setting of the Listed Building, The Bank, 99 Palatine Road , Didsbury.
- I wish to raise a concern relating to ICNIRP and the use of my property. The upper two floors are used as a residential Home of Multiple Occupancy (HMO). There are 11 no. bedrooms, 2 no.rooftop terraces, 2 no. common rooms and bathrooms in constant use. Looking at the extreme proximity to my property, I am very concerned that this proposal is not ICNIRP compliant. I see that Clarke Telecom has signed the ICNIRP certificate, but given that the drawings make no reference to the residential use of the property, I believe that the certificate has been incorrectly completed. I fully expect that if the applicant was to include the public exclusion zones on their design, my property would fall within the exclusion zone.
- As well as the HMO within this building, there is also an office, part of which opens onto the balcony which is only a few meters away from the proposed location. Again this has been omitted from the drawings and I therefore assume the ICNIRP calculations.
- While the proposal is for an 18m phase 7 pole, it has been noted on the drawings which accompany the application, that this is a 20m pole without the 2m spin. Which if added at a later date, would enable both EE and H3G to add up to 6 no. active antenna units (AAU) and therefore deploy 3.5Ghz 5G for both EE and H3G. This would only serve to greatly compound the emissions and ICNIRP concerns.
- The existing telecoms site is located outside of the Ballbrook Conservation Area. The proposal in this application is to build the replacement pole and install the not insignificant cabinets inside the Ballbrook Conservation Area. Not only is the site moving into the Conservation Area, it will be only c.30m away from the Grade II Listed building at the "Former District Bank (West Didsbury Branch)". This is the least favourable planning location and fear that it would negatively impact on the Ballbrook Conservation Area and associated Grade II Listed Building. The proposal is to replace a 12m pole with an 18m pole, as such the 50% increase in height will be detrimental to the Conservation Area and Listed Building. I believe it is possible to move the proposal outside of the Ballbrook Conservation Area and not impact on the radio performance of the proposed site.
- While I am very supportive of the investment and the proposed improved connectivity from H3G, I must object to the proposed location on the grounds of safety and siting and appearance. I would be willing to support a location outside of the Ballbrook Conservation Area, as long as there are no ICNIRP concerns with my property.

MCC Highways - Both the mast and associated equipment appears to be placed in the middle of the adopted footway. This location has existing street furniture, we therefore consider that the width of the footway is insufficient to allow us to support this application. It is also likely that footfall in this area will be high being close to the crossing point.

Policies

National Planning Policy Framework (NPPF) - This Framework came into effect on 27th March 2012 and was amended and updated in 2021. It sets out the Government's planning policies for England and how these are expected to be applied. It defines the Government's requirements for the planning system `only to the extent that it is relevant, proportionate and necessary to do so'. It provides a mechanism through `which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities'.
Chapter 2. Achieving sustainable development
7. The purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs.

8. Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):
- An economic objective - to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;
- A social objective - to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and
- An environmental objective - to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.
These objectives should be delivered through the preparation and implementation of plans and the application of the policies in this Framework; they are not criteria against which every decision can or should be judged. Planning policies and decisions should play an active role in guiding development towards sustainable solutions, but in doing so should take local circumstances into account, to reflect the character, needs and opportunities of each area.
11. Plans and decisions should apply a presumption in favour of sustainable development.
For decision-taking this means:
c) approving development proposals that accord with an up-to-date development plan without delay; or d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:
i. the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or
ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole.
Chapter 10. Supporting high quality communications
112. Advanced, high quality and reliable communications infrastructure is essential for economic growth and social well-being. Planning policies and decisions should support the expansion of electronic communications networks, including next generation mobile technology (such as 5G) and full fibre broadband connections. Policies should set out how high quality digital infrastructure, providing access to services from a range of providers, is expected to be delivered and upgraded over time; and should prioritise full fibre connections to existing and new developments (as these connections will, in almost all cases, provide the optimum solution).
113. The number of radio and electronic communications masts, and the sites for such installations, should be kept to a minimum consistent with the needs of consumers, the efficient operation of the network and providing reasonable capacity for future expansion. Use of existing masts, buildings and other structures for new electronic communications capability (including wireless) should be encouraged. Where new sites are required (such as for new 5G networks, or for connected transport and smart city applications), equipment should be sympathetically designed and camouflaged where appropriate.
114. Local planning authorities should not impose a ban on new electronic communications development in certain areas, impose blanket Article 4 directions over a wide area or a wide range of electronic communications development, or insist on minimum distances between new electronic communications development and existing development. They should ensure that:
a) they have evidence to demonstrate that electronic communications infrastructure is not expected to cause significant and irremediable interference with other electrical equipment, air traffic services or instrumentation operated in the national interest; and
b) they have considered the possibility of the construction of new buildings or other structures

interfering with broadcast and electronic communications services.
115. Applications for electronic communications development (including applications for prior approval under the General Permitted Development Order) should be supported by the necessary evidence to justify the proposed development. This should include:
a) the outcome of consultations with organisations with an interest in the proposed development, in particular with the relevant body where a mast is to be installed near a school or college, or within a statutory safeguarding zone surrounding an aerodrome, technical site or military explosives storage area; and
b) for an addition to an existing mast or base station, a statement that self-certifies that the cumulative exposure, when operational, will not exceed International Commission guidelines on non-ionising radiation protection; or
c) for a new mast or base station, evidence that the applicant has explored the possibility of erecting antennas on an existing building, mast or other structure and a statement that self certifies that, when operational, International Commission guidelines will be met.
116. Local planning authorities must determine applications on planning grounds only. They should not seek to prevent competition between different operators, question the need for an electronic communications system, or set health safeguards different from the International Commission guidelines for public exposure.
Paragraph 197. (Section 16 Conserving and enhancing the historic environment) states that in determining applications, local planning authorities should take account of:
a. the desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation;
b. the positive contribution that conservation of heritage assets can make to sustainable communities including their economic vitality; and
c. the desirability of new development making a positive contribution to local character and distinctiveness.
Paragraph 199 states that when considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be). This is irrespective of whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance.
Paragraph 200 states that any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification.
Paragraph 201 states that where a proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or total loss is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply:
a. the nature of the heritage asset prevents all reasonable uses of the site; and b. no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation; and c. conservation by grant-funding or some form of not for profit, charitable or public ownership is demonstrably not possible; and d. the harm or loss is outweighed by the benefit of bringing the site back into use.
Paragraph 202 states that where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use.
Paragraph 206 states that local planning authorities should look for opportunities for new development within Conservation Areas and within the setting of heritage assets, to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to the asset (or which better reveal its significance) should be treated favourably.
Paragraph 207 states that not all elements of a Conservation Area will necessarily contribute to its significance. Loss of a building (or other element) which makes a positive contribution to the significance of the Conservation Area should be treated either as substantial harm under

paragraph 201 or less than substantial harm under paragraph 202, as appropriate, taking into account the relative significance of the element affected and its contribution to the significance of the Conservation Area as a whole.

Local Development Framework - Core Strategy Development Plan Document (adopted July 2012)

Policy SP1, Spatial Principles - Development in all parts of the City should make a positive contribution to neighbourhoods of choice including creating well designed places that enhance or create character and protect and enhance the built and natural environment.
Policy EN 3, Heritage - Throughout the City, the Council will encourage development that complements and takes advantage of the distinct historic and heritage features of its districts and neighbourhoods, including those of the City Centre.
Policy DM1, Development Management - This policy states that all development should have regard to the following specific issues for which more detailed guidance may be given within a supplementary planning document:-
o Appropriate siting, layout, scale, form, massing, materials and detail.
o Impact on the surrounding areas in terms of the design, scale and appearance of the proposed development. Development should have regard to the character of the surrounding area.
o Effects on amenity, including privacy, light, noise, vibration, air quality, odours, litter, vermin, birds, road safety and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions, such as noise.
o Accessibility: buildings and neighbourhoods fully accessible to disabled people, access to new development by sustainable transport modes.
o Community safety and crime prevention.
o Design for health.
o Adequacy of internal accommodation and external amenity space.
o Refuse storage and collection.
o Vehicular access and car parking.
o Effects relating to biodiversity, landscape, archaeological or built heritage.
o Green Infrastructure including open space, both public and private.
o The use of alternatives to peat-based products in landscaping/gardens within development schemes.
o Flood risk and drainage.
o Existing or proposed hazardous installations.
o Subject to scheme viability, developers will be required to demonstrate that new development incorporates sustainable construction techniques

Saved UDP Policies - Policies DC17, and DC18 are considered of relevance in this instance:
DC17.1 Applications for telecommunications developments will normally be approved if the Council can be satisfied that the development has been sited and designed to minimise its impact on residential amenity and in environmentally sensitive areas. Wherever possible, the Council will expect the potential of existing buildings and masts, including the sharing of such facilities, to be fully explored before agreeing to additional separate development.

Policy DC18, Conservation Areas - Policy DC18.1 states that the Council will give particularly careful consideration to development proposals within Conservation Areas by taking into consideration the following:
a. The Council will seek to preserve and enhance the character of its designated conservation areas by carefully considering the following issues:
i. the relationship of new structures to neighbouring buildings and spaces;
ii. the effect of major changes to the appearance of existing buildings;

iii. the desirability of retaining existing features, such as boundary walls, gardens, trees, (including street trees);
iv. the effect of signs and advertisements;
v. any further guidance on specific areas which has been approved by the Council.
b. The Council will not normally grant outline planning permission for development within Conservation Areas.
c. Consent to demolish a building in a conservation area will be granted only where it can be shown that it is wholly beyond repair, incapable of reasonably beneficial use, or where its removal or replacement would benefit the appearance of character of the area.
d. Where demolition is to be followed by redevelopment, demolition will be permitted only where there are approved detailed plans for that redevelopment and where the Council has been furnished with evidence that the development will be undertaken.
e. Development proposals adjacent to Conservation Areas will be granted only where it can be shown that they will not harm the appearance or character of the area. This will include the protection of views into and out of Conservation Areas.

Issues

Siting & Appearance - Following assessment of the proposal and the proposed siting of the telecoms mast and associated cabinets it is considered that the development would give rise to harmful impact to the visual amenity of the area.

The applicant has indicated that as the proposal is to upgrade an existing site a search of the area for other alternative locations has not been undertaken. In this instance the existing site is located on the opposite side of Palatine Road outside of a conservation area. It is considered that the existing site does not have the same characteristics or relationships to existing buildings many of which are distinctive and identified heritage assets n the case of 99 Palatine Road. The approach undertaken by the applicant is considered deficient and does not follow the guidance in paragraph 117 of the NPPF.

The proposed mast would be taller than the existing street furniture in the area including adjacent buildings and would be visible from various vantage points because this section of the pavement is wide and generally open. By reason of the mast's height, siting and appearance it would stand out as a dominant feature because of the open nature of the immediate surrounding area the mast would therefore appear as an obtrusive and incongruous addition to the street scene. As such the requirement for upgraded infrastructure is not considered to overcome the visual harm that would arise.

The proposed siting would be read with other similar equipment and masts in close proximity on the opposite side of Palatine road. It is noted that two masts and associated equipment cabinets are located on the other side of Palatine Road form the application site. Both of these masts are capable of alterations under the amended General Permitted Development Order, Part 16 Class A. These existing sites lie outside of the Conservation Area and are long standing sites for telecommunications equipment as such the application proposals are considered to add to visual clutter in this area.

It is considered that this scheme is unacceptable in this instance as the proposal would create a significant and harmful impact within the overall character of the local area in terms of visual amenity and appearance. The overall height and width of the mast at 18 metres, would dominate the existing street furniture (i.e. existing street lighting columns) and would dwarf nearby structures and buildings and would appear as a dominant feature in the street-scene.

It is noted that the former bank building and the Listed Building at 99 Palatine Road form an important visual marker of the boundary of Ballbrook Conservation Area defining its western

extent. Both of these buildings add significant interest to Ballbrook Conservation Area with 99 Palatine Road and the former bank building on the opposite side of Ballbrook Avenue providing a marker of the quality of buildings that were being erected in the conservation area in the early 20th Century as the area expanded as a residential suburb. The mast and the necessary requirement for the associated equipment cabinets to support the functions of the antennas would impose on the setting of this building which is enhanced through the expanse of public realm to its frontage. The addition of further infrastructure and street furniture would harm the appreciation of this building but also the listed building at no.99 when viewed from the road crossing and ravelling north along Palatine Road.

Impact of the proposals on the Ballbrook Conservation Area - The requirement to preserve or enhance the Conservation Area is a key requirement within policy EN3 of the Core Strategy, saved policy DC18 of the UDP along with the objectives of the NPPF. As such, any new development must seek to retain the character of the area.

In this instance the proposal would result in the installation of an incongruous and alien feature within the Conservation Area that would dominate the open area where it is proposed to be located and also views into the conservation area. This visual intrusion into the streetscene is considered particularly harmful on a prominent and well used section of pavement. Ballbrook Conservation Area was designated by the City Council in 1991. The application proposals would result in less than substantial harm to the Ballbrook Conservation Area, however it is considered that the level of less than substantial harm is at the higher end in terms of magnitude given the importance of the group of buildings on Lapwing Lane and Palatine Road to the historic development of the Conservation Area. In this instance it is not considered that the level of harm is outweighed by the public benefit that could be derived from the proposal.

Given the scale and siting of the proposed mast and associated cabinets the proposals would fail to preserve or enhance the character of Ballbrook Park Conservation Area and therefore the proposals are not considered to accord with section 16 of the NPPF, policy EN3 of the Core Strategy and saved Unitary Development Plan policy DC18.

Pedestrian and Highway Safety - Concerns have been raised by the Councils Highway Services on the narrowing of the footpath caused by an installation of the proposed equipment, given that it is heavily used by pedestrians using the pedestrian crossing and nearby commercial properties. Existing street furniture is generally organised within a central strip both in front of the commercial properties on Lapwing Lane and on the Palatine Road frontage. The proposed siting of the mast and required equipment cabinets would impinge on the open nature of the public realm in this location and desired routes of those using the footpaths particular to access the commercial properties along Lapwing lane. The concerns of Highway Services is noted, however, retained distances to allow pedestrian movements would be retained following the installation. The issues arising from the siting of the mast and apparatus in this part of the footway is considered to add to the clutter within the street and as described above this clutter is considered to be visually harmful.

Other matters – Concerns have been raised by an objector to the ICNIRP certificate issued alongside the application and in particular impacts on residential properties within the upper floors of the adjacent building. In this instance as the proposals have been found to be unacceptable due to the harm identified and described above the applicant has not been offered an opportunity to comment on the concerns raised. It is noted that the supporting ICNIRP has been supplied and is indicated as conforming to ICNIRP guidance and therefore is in accordance with NPPF.

Human Rights Act 1998 considerations

This application needs to be considered against the provisions of the Human Rights Act 1998. Under Article 6, the applicants (and those third parties, including local residents, who have made representations) have a right to a fair hearing and to this end the local planning authority must give full consideration to their comments.

Protocol 1 Article 1, and Article 8 where appropriate, confer(s) a right of respect for a person's home, other land and business assets. In taking account of all material considerations, including Council policy as set out in the Core Strategy and saved polices of the Unitary Development Plan, the Director of Planning, Building Control & Licensing has concluded that some rights conferred by these articles on the applicant(s)/objector(s)/resident(s) and other occupiers and owners of nearby land that might be affected may be interfered with but that that interference is in accordance with the law and justified by being in the public interest and on the basis of the planning merits of the development proposal. She believes that any restriction on these rights posed by the recommendation given is proportionate to the wider benefits of and that such a decision falls within the margin of discretion afforded to the Council under the Town and Country Planning Acts.

Recommendation: Refuse

Condition(s) to be attached to decision for approval OR Reasons for recommendation to refuse

1) The City Council is not satisfied that this development has been sited and designed to minimise the impact upon the visual amenity of the area. The proposed telecommunication installation by reason of its height, siting and appearance would form a visually intrusive and dominant feature which would be harmful to the visual amenity of the area in particular the appearance of the street-scene and fails to preserve or enhance the character and appearance of the Ballbrook Conservation Area. As such, the proposed installation is considered contrary to saved policies DC17.1 and DC18.1 of the Unitary Development Plan for the City of Manchester, policies DM1, EN3 and SP1 of the Manchester Core Strategy and the National Planning Policy Framework (NPPF).

Appendix 1 – List of consultees & neighbours notified

Highway Services
Ballbrook Conservation Area Group

113 Lapwing Lane, Manchester, M20 6UR
Basement, 99 Palatine Road, Manchester, M20 3JQ
Flat 32, Brankgate Court, Lapwing Lane, Manchester, M20 2PD
Flat 34, Brankgate Court, Lapwing Lane, Manchester, M20 2PD
Northern Lawn Tennis And Squash Club, Palatine Road, Manchester, M20 3YA
15 Redclyffe Road, Manchester, M20 3JR
Danesmoor Court, 95 - 97 Palatine Road, Manchester, M20 3JQ
114 Palatine Road, Manchester, M20 3ZA
Second Floor Flat, 108 Palatine Road, Manchester, M20 3ZA
First Floor Flat, 108 Palatine Road, Manchester, M20 3ZA
31 Ballbrook Avenue, Manchester, M20 3JG
101A Lapwing Lane, Manchester, M20 6UR
115 Lapwing Lane, Manchester, M20 6UR
103 Lapwing Lane, Manchester, M20 6UR
101 Lapwing Lane, Manchester, M20 6UR
111 Lapwing Lane, Manchester, M20 6UR
97 Lapwing Lane, Manchester, M20 6UR
Flat 1, 111A Lapwing Lane, Manchester, M20 6UR
Flat 2, 111A Lapwing Lane, Manchester, M20 6UR
3 Lawnside Mews, Palatine Road, Manchester, M20 3YD
Flat 1, 35 Ballbrook Avenue, Manchester, M20 3JG
115A Lapwing Lane, Manchester, M20 6UR
6 Lawnside Mews, Palatine Road, Manchester, M20 3YD
105 - 107 Lapwing Lane, Manchester, M20 6UR
West Didsbury Post Office, 99 Lapwing Lane, Manchester, M20 6UT
Flat 7, 119 Palatine Road, Manchester, M20 3YA
14 Redclyffe Road, Manchester, M20 3JR
Flat 31, Brankgate Court, Lapwing Lane, Manchester, M20 2PD
14 Lawnside Mews, Palatine Road, Manchester, M20 3YD
11 Lawnside Mews, Palatine Road, Manchester, M20 3YD
109 Lapwing Lane, Manchester, M20 6UR
Flat 4, 119 Palatine Road, Manchester, M20 3YA
16 Redclyffe Road, Manchester, M20 3JR
Flat 36, Brankgate Court, Lapwing Lane, Manchester, M20 2PD
Flat 35, Brankgate Court, Lapwing Lane, Manchester, M20 2PD
12 Lawnside Mews, Palatine Road, Manchester, M20 3YD
Flat 2, 99 Lapwing Lane, Manchester, M20 6UR
2 Lawnside Mews, Palatine Road, Manchester, M20 3YD
40 Lapwing Lane, Manchester, M20 2WR
10 Lawnside Mews, Palatine Road, Manchester, M20 3YD
Flat 2, 35 Ballbrook Avenue, Manchester, M20 3JG
105A Lapwing Lane, Manchester, M20 6UR
Flat 3, 119 Palatine Road, Manchester, M20 3YA
Flat 2, 119 Palatine Road, Manchester, M20 3YA
8 Lawnside Mews, Palatine Road, Manchester, M20 3YD
4 Lawnside Mews, Palatine Road, Manchester, M20 3YD
Lawnside Mews, Palatine Road, Manchester, M20 3YD
Flat 1, 119 Palatine Road, Manchester, M20 3YA
107A Lapwing Lane, Manchester, M20 6UR

108 Palatine Road, Manchester, M20 3ZA
95 Lapwing Lane, Manchester, M20 6UR
109A Lapwing Lane, Manchester, M20 6UR
91 Lapwing Lane, Manchester, M20 6UR
113A Lapwing Lane, Manchester, M20 6UR
99 Palatine Road, Manchester, M20 3JQ
Flat 1, 99 Lapwing Lane, Manchester, M20 6UR
15 Lawnside Mews, Palatine Road, Manchester, M20 3YD
1 Lawnside Mews, Palatine Road, Manchester, M20 3YD
13 Lawnside Mews, Palatine Road, Manchester, M20 3YD
93 Lapwing Lane, Manchester, M20 6UR
121 Palatine Road, Manchester, M20 3YA
16 Lawnside Mews, Palatine Road, Manchester, M20 3YD
5 Lawnside Mews, Palatine Road, Manchester, M20 3YD
9 Lawnside Mews, Palatine Road, Manchester, M20 3YD
7 Lawnside Mews, Palatine Road, Manchester, M20 3YD
Craig House, 33 Ballbrook Avenue, Manchester, M20 3JG
Ground Floor, 99 Palatine Road, Manchester, M20 3JQ
First Floor, 99 Palatine Road, Manchester, M20 3JQ
106 Palatine Road, Manchester, M20 3YB
103A Lapwing Lane, Manchester, M20 6UR
119 Palatine Road, Manchester, M20 3YA
Flat 6, 119 Palatine Road, Manchester, M20 3YA
Flat 5, 119 Palatine Road, Manchester, M20 3YA
29 Ballbrook Avenue, Manchester, M20 3JG
Flat 33, Brankgate Court, Lapwing Lane, Manchester, M20 2PD

Appendix 2 – Planning constraints

Article 4 Direction - Removal Of PD Rights Change Of Use From Class C3 To Class C4
Aircraft Safeguarding Zone - Aircraft Safeguarding Zone - All Exceeding 90M
Conservation Area - Ballbrook Conservation Area 1992
Area Team Boundary - Name: SOUTH AREA



PHOTOMONTAGE PACK

Pipe Bridge LP
NW Corner of Lapwing Lane
and Palatine Road,
Didsbury,
Manchester,
Greater Manchester
M20 6UR

MBNL MAN284





Image 1a
Existing view along Lapwing Lane from the junction with Lyndhurst Road looking North West.



Image 1b
Proposed view along Lapwing Lane from the junction with Lyndhurst Road looking North West.



Image 2a
Existing view along Palatine Road looking North East.



Image 2b
Proposed view along Palatine Road looking North East.



Image 3a
Existing view along Lapwing Lane from the junction with Raleigh Close looking South East.



Image 3b
Proposed view along Lapwing Lane from the junction with Raleigh Close looking South East.



Image 4a
Existing view along Palatine Road looking South West.



Image 4b
Proposed view along Palatine Road looking South West.



Department for
Digital, Culture,
Media & Sport

Code of Practice for Wireless Network Development in England

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Introduction and scope

1. The Code of Practice provides guidance to Code Operators (referred to as ‘operators’ throughout the Code of Practice), including the Mobile Network Operators and wireless infrastructure providers, their agents and contractors, local planning authorities, and all other relevant stakeholders in England on how to carry out their roles and responsibilities when installing wireless network infrastructure. It is also a useful tool for other interested stakeholders such as community groups, amenity bodies and individuals with an interest in mobile connectivity.

2. The aim of the Code of Practice is to support the government’s objective of delivering high quality wireless infrastructure whilst balancing these needs with environmental considerations. It also has an important role in making sure that appropriate engagement takes place with local communities and other interested parties.

3. The Code of Practice covers all forms of wireless infrastructure development, including mobile masts and cabinets. It is recommended that other wireless communications operators follow the principles of this Code of Practice, where appropriate.

4. Led by the Department for Digital, Culture, Media and Sport (DCMS), this Code of Practice has been developed in collaboration with representatives of the mobile network industry, other government departments and public bodies, local planning authorities, and protected landscapes. This document replaces the previous *Code of Best Practice on Mobile Network Development*, which was published in 2016.

Legal framework

5. The guidance provided by this Code of Practice brings together the principles agreed between operators and local planning authorities, in relation to the siting and design of mobile infrastructure, and the approach to consultation and engagement. This Code of Practice sets out best practice when stakeholders are carrying out their responsibilities under the principal legislation. Operators should also adhere to the guidance set out under the Code of Practice for the Electronic Communications Code..

6. This section sets out the principal legislation that applies to the installation of mobile infrastructure.

7. The Code of Practice is best practice guidance. The legislation that applies to this type of development, which includes (at the time of publication)::
    - The Town and Country Planning Act 1990
    - The Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended)

- The Electronic Communications Code (Schedule 3A to the Communications Act 2003)
- The Electronic Communications Code (Conditions and Restrictions) Regulations 2003
- The New Roads and Street Works Act 1991
- The Highways Act 1980
- The Ancient Monuments and Archaeological Areas Act 1979
- The Planning (Listed Buildings and Conservation Areas) Act 1990
- The Wildlife and Countryside Act 1981
- The National Parks and Access to the Countryside Act 1949
- The Environment Act 1995[1]
- The Traffic Management Act 2004
- The Countryside and Rights of Way Act 2000[2]

Policy framework

8. Digital connectivity is vital to enable people to stay connected and businesses to grow. Fast, reliable digital connectivity can deliver economic, social and well-being benefits for the whole of the UK.

9. As the demand for mobile data in the United Kingdom is increasing rapidly, it is important that everyone has access to dependable and consistent mobile coverage where they live, work and travel.

10. The *Future Telecoms Infrastructure Review* (FTIR) and the *National Infrastructure Strategy* set out the government's long-term strategy for meeting its digital connectivity targets and delivering high quality, reliable digital infrastructure that works across the UK.[3]

11. The government has committed to extending mobile coverage across the UK. The government's Levelling Up White Paper has set a mission that the UK will have nationwide 4G coverage, with 5G coverage for the majority of the population by 2020. In support of this, the government and the UK's mobile network operators agreed a £1 billion Shared Rural Network deal to extend 4G mobile geographical coverage to 95% of the UK by the end of the programme.

12. *Next Generation Mobile Technologies: A 5G Strategy for the UK*, and the update to this, set out the government's ambition for the UK to be a global leader in 5G to take early advantage of its potential and help to create a world-leading digital economy that works for everyone. The government also wants businesses and communities

[1] Section 62 of the Environment Act 1995 makes it a duty for all relevant authorities to have regard to National Park purposes when coming to decisions or carrying out their activities.
[2] Includes Section 85, which places a general duty on relevant authorities to 'have regard' to the purpose of conserving and enhancing the natural beauty of an Area of Outstanding Natural Beauty, 'in exercising or performing any function in relation to, or so as to affect, land' in these areas.
[3] *The Statement of Strategic Priorities for Telecommunications, The Management of the Radio Spectrum, and Postal Services* followed the publication of the FTIR and reflects its conclusions.

to benefit from investments in 5G as soon as possible. Through the government's 5G Testbeds and Trials programme we have seen its value to manufacturing, farming, transport networks and healthcare.

13. The planning system plays a key role in delivering the digital infrastructure that we need, in a sustainable and well-designed way, especially as households and businesses become increasingly reliant on mobile connectivity.

14. The *National Planning Policy Framework* ("the NPPF") sets out the government's planning policies for England and how these should be applied. It sets out that the purpose of the planning system is to contribute to the achievement of sustainable development, and at the heart of the NPPF is a presumption in favour of sustainable development.

15. Section 10 of the NPPF sets out the planning policies for communications development in England, and states that advanced, high quality and reliable communications infrastructure is essential for economic growth and social well-being. The NPPF also sets out that planning policies and decisions should support the expansion of electronic communications networks, including next generation mobile technologies (such as 5G). Other sections of the NPPF set out how these policies should be balanced with other considerations, including conserving and enhancing the natural environment and historic environment.[4]

How wireless networks function

16. Cellular wireless networks use base stations to provide an area of radio coverage. Wireless technology uses the radio spectrum to broadcast radio waves between base stations and devices. Different radio frequencies have different characteristics which, along with the density of cell site locations, affect the extent of coverage and how much data can be carried over the network. Depending on the radio frequencies used, base stations can deliver coverage over a wide area or provide extra network capacity in areas where there is a high demand for network bandwidth.

17. Wireless technology continues to evolve rapidly, and mobile devices are now capable of much more. Second generation (2G) technology gave us voice calls and text messages, 3G led to the launch of smartphones, and 4G, which enabled faster browsing, allowed us to do things like watching videos on the move. 5G, the latest generation of wireless technology, is much faster than previous generations of wireless technology and can offer greater capacity and lower latency, allowing thousands of devices in a small area to be connected at the same time. 5G networks, and future mobile generations, will be vital for a range of Internet of Things uses (IoT) and Smart City applications.

[4] The National Planning Policy Framework - sections 15 & 16.

Principles and commitments

18. Operators should develop their networks and install wireless infrastructure according to the following principles and commitments:

    - *Site sharing and use of existing infrastructure*: make use of existing structures, sites and masts wherever possible to reduce the need for new development. The NPPF states that, when installing mobile infrastructure, the number of masts and sites should be kept to a minimum consistent with the needs of consumers, the efficient operation of the network and providing reasonable capacity for future expansion.
    - *Consultation with local planning authorities, local communities and other stakeholders*: participate in dialogue with local planning authorities, along with other relevant stakeholders such as the highways authorities, Area of Outstanding Natural Beauty bodies, Historic England, and Natural England, including pre-application discussions, where appropriate. Maintain clear procedures, and high-quality communication and consultation with local communities and other interested parties. Operators should agree community engagement with local planning authorities and share information as appropriate (see *pre-application consultation with local communities* below*)*.
    - *Standardised and high-quality approach to planning applications, and the notification procedure*: provide standardised supporting documentation for planning applications (where appropriate) within the context of national and local requirements. Ensure planning submissions are of high-quality and provide the necessary evidence to support the application (as per the NPPF).[5]
    - *Prompt responses to enquiries*: respond to complaints and enquiries within a timely manner (see *Review and Enquiries* section below).
    - *Siting and Design*: wireless infrastructure should be deployed in accordance with the guidance set out within this Code of Practice. Where appropriate, equipment should comply with the principles set out in the NPPF and consider any local planning policies, including any local and national design codes. When located in protected landscapes and other designated land, the sensitive nature of these areas must be considered.[6]
    - *Removal of redundant equipment and site restoration:* ensure that when infrastructure is upgraded, any equipment that is made redundant by the upgrade, such as brackets, is removed to benefit the local environment.

[5] Operators will provide a range of supporting information with their planning applications, including a Supplementary Information Template and ICNIRP Declaration (Annexes B and C). The information will not be identical for all applications but should be provided in a standardised format where possible.

[6] Paragraph 115 of the National Planning Policy Framework states that where new mobile infrastructure sites are required the equipment should be sympathetically designed and camouflaged where appropriate; The National Model Design Code provides guidance on the production of design codes, guides and policies to promote successful design. The National Planning Policy Framework makes clear that local planning authorities should ensure that visual tools such as local design codes and guides are used to inform development proposals.

Where a whole site is no longer in use, the site should be restored to its original state.

- *Compliance with guidance laid out in the International Commission on Non-Ionizing Radiation Protection (ICNIRP) public exposure levels guidance*: as required by spectrum licences, comply with international guidelines for limiting exposure to electromagnetic fields (EMF) - including, as set out in the NPPF, providing a statement that self-certifies that ICNIRP guidelines will be met with all applications (see Annex C).

19. Local planning authorities should support the deployment of digital infrastructure by:
    - *Incentivising connectivity:* support the expansion of telecommunications networks, and take a 'joined-up' approach to the wireless infrastructure planning process, including ensuring that Local Plans effectively support the deployment of digital infrastructure.[7]
    - *Facilitating sites:* engage with operators when new sites have been proposed and discuss site requirements.
    - *Engagement with operators*: respond positively to requests for engagement and make decisions in line with national policy and Local Plans. For planning applications, find solutions to issues and ensure timely decisions are made.
    - *Information and communication*: ensure that members of the public can access information about any development proposals within their local area.[8] Send communications promptly to an appropriate operator contact (or their representatives).

Siting and design

20. The government's objective is to deliver high quality, reliable wireless infrastructure whilst ensuring the impact of new network development is kept to a minimum. The siting and design of wireless network infrastructure is central to achieving this. Good siting and design principles should apply to all wireless network development and take into account any site-specific considerations and context. Both can create better places in which to live and work and help make development acceptable to communities.

21. Siting and design should be considered throughout the development process and early discussion between operators, local planning authorities and communities about the location, design and style of the proposals should be encouraged for clarifying expectations and reconciling local and commercial interests.

[7] The Digital Connectivity Portal provides guidance for local authorities and network providers on improving connectivity in local areas, including how local authorities can create a digital strategy and identify a 'digital champion' to lead the process.

[8] Local planning authorities are required to undertake a formal period of public consultation, prior to deciding a planning application - this includes applications for prior approval for development which is subject to permitted development rights. Further information on the public consultation processes can be found at Consultation and pre-decision matters - GOV.UK

22. The choice over the site selection and design of equipment is primarily dependent upon the coverage and capacity requirements and technical constraints of a specific location, although operators should make efforts to reduce visual impacts where possible.

23. There should be a presumption in favour of facilitating sustainable network development and, as such, operators and local planning authorities, as well as all other bodies involved in the deployment process, should work together to ensure connectivity needs are met and find viable solutions to deployment issues.[9]

General siting and design principles

Site selection

24. Operators use a range of sophisticated, computer-based planning tools to predict levels of signal strength and coverage from sites for 2G, 3G, 4G and now 5G. Once an operator has identified a requirement for a new cell site, a suitable site needs to be found. Elements that make a site favourable include: having existing or ready access to a power supply, access to fibre optic cables, vehicular access, and, other buildings and development which may provide a level of existing screening. Operators will typically look to upgrade existing infrastructure prior to considering a new deployment, in particular for initial 5G deployment.

25. When selecting sites for mobile infrastructure, operators should examine local plans and designations for the area, as well as carrying out an in-person site search to identify potential options which meet their requirements. Operators should follow these general siting and site selection principles:

    - *Installation on existing buildings/structures*: where possible, operators should look to use existing buildings/structures for hosting wireless infrastructure, to reduce the environmental impact of installation.[10] Where the erection of a new ground-based mast is required, operators should seek measures to reduce the impact of the development, where possible. For example, measures such as siting near similar structures, screening, and using simple designs and appropriate colouring can help reduce the impact of the new infrastructure in certain locations (see *Design* section below).[11]

[9] Paragraph 11 of the National Planning Policy Framework states that there is a presumption in favour of sustainable development and proposals should be approved without delay where they accord with development plans, or no relevant plan exists.
[10] The National Planning Policy Framework states that the use of existing masts, buildings and other structures for new electronic communications capability (including wireless) should be encouraged.
[11] In selecting sites for new electronic communications infrastructure, paragraph 115 of the National Planning Policy Framework sets out that the number of radio and electronic communications masts, and their installation sites, should be kept to a minimum consistent with the needs of consumers, the efficient operation of the network and providing reasonable capacity for future expansion; An

- *Sharing sites/masts*: sharing sites should always be considered as this reduces the total number of sites/masts required for the network and also minimises the visual intrusion caused by wireless infrastructure. This may involve redeveloping an existing site, including installing a replacement mast that can accommodate additional radio equipment. However, the visual impact of site or mast sharing should be considered in the context of each individual location.

26. The installation of all wireless infrastructure requires a balanced approach between the technical needs and constraints of the proposed site and the potential impact of the development. These constraints are set out in detail in the section '*Technical and Operational Considerations*'. The three key technical and operational considerations for installation sites are:

    - *Coverage*: wireless infrastructure needs to provide an appropriate level of coverage over the intended geographical area. This involves ensuring that antennas are elevated sufficiently (often via masts) to provide clear lines of sight for signals.
    - *Capacity:* where existing network infrastructure can no longer meet the demand for network capacity in a particular area, additional sites may be required within that coverage area to meet the demand. This is more likely to be required in densely populated areas or areas of high footfall.
    - *Backhaul*: the radio access network requires a connection to the core network. Backhaul is sometimes provided by a microwave link, which requires a clear line of sight between the two ends of the link.

27. Planning authorities should consider these issues and consider the need for a site within a limited search area alongside the public benefit of improved connectivity. In general, it should not, therefore, be appropriate for planning authorities to seek wider evidence of alternative sites (beyond that required by the NPPF), unless they consider the proposed development is unacceptable having regard to the relevant material planning considerations.[12]

Design

28. The siting of wireless infrastructure will influence which design options are most appropriate for reducing the visual impact. The following design principles are important considerations:

    - *Protecting visual amenity:* a comprehensive assessment of the area should be carried out to ensure that the design solution appreciates the context of its

application for a new site should also include evidence that the applicant has explored the possibility of erecting antennas on an existing building, mast or structure.

[12] Paragraph 118 of the National Planning Policy Framework also states that local planning authorities should not seek to prevent competition between different operators or question the need for an electronic communications system.

location by fitting with both the site and the wider setting. Proposals should take into account protected sightlines, landmarks and vistas. This is particularly important when mobile infrastructure is located in protected landscapes or heritage sites and their settings (see '*Natural Environment and Heritage Assets'* section below).

- *Mitigating visual impacts*: when possible, operators should look to use sympathetic designs, materials and colour (including camouflage where appropriate) to minimise the contrast between infrastructure and the area. Operators should also consider the design principles set out in the NPPF and local planning policies, and consider any relevant local and national design codes.[13]

29. There are factors that can affect the type of infrastructure that will be deployed (set out in more detail below in the section '*Technical and Operational Considerations*'), including location and the coverage and capacity requirements. Planning authorities should be aware of these constraints when considering proposals. In particular:

    - In urban areas, where there is a high level of demand for mobile data, mobile base stations are likely to need to be deployed more densely. In these settings you can expect to see more use of streetwork monopoles and rooftop installations and, in future, we are likely to see a larger number of smaller units (so-called "small cells") deployed on buildings and on street furniture.
    - In rural areas, base stations often need to cover wider geographic areas. Operators may need to use tall masts or lattice towers to provide the required coverage. The location of masts can sometimes be dictated by access to transmission links back to the operator's main network and proximity to a power supply. Coverage in some areas can be limited because of the geography, topography and terrain.

Radio equipment housing (cabinets) principles

30. Cabinets protect radio transmitters and receivers, provide the power source for mobile equipment, and are connected to antennas via cables. Equipment cabinets are likely to be needed at most sites. The cabinets must be of sufficient size to facilitate hosting various operating equipment whilst also allowing air circulation to reduce the potential for overheating.

Planning and visual considerations

[13] Paragraph 115 of the National Planning Policy Framework states that where new sites are required, equipment should be sympathetically designed and camouflaged where appropriate.

31. Colouring: cabinets should be coloured appropriately to match surrounding street furniture or assimilate with the setting[14]. If required, operators should offer a selection of colours to the local planning authority.

32. Siting on highways and footways: obstructions on footways should be minimised. New, upgraded or replacement sites should be sited so that they do not have an adverse impact upon available footway width to maintain unrestricted pedestrian access. This is particularly important for disabled people, and advice on designing an accessible public realm is given in the Department for Transport's Inclusive Mobility guidance document. Where possible, cabinets should be sited parallel to the carriageway edge in order to minimise any obstruction to pedestrians. Equipment should not obstruct cycle routes, including any shared use routes. The Department for Transport's Manual for Streets and Manual for Streets 2 provide applicable guidance on the siting of street furniture in residential areas and on busy urban and rural streets.[15]

33. Highway safety: operators must give due consideration to ensure that new, upgraded or replacement sites do not adversely impact upon highway safety or road junctions. They should comply with visibility and line of site requirements and should not obscure highway nameplates.[16] Operators and highways authorities should work collaboratively in assessing and addressing potential safety issues in order to facilitate network development.

34. Listed buildings/ scheduled monuments and Conservation Areas: the siting of equipment housing adjacent to any listed building and/ or scheduled monument should be avoided. Scheduled monument consent will be required to site any equipment housing (and associated underground ductwork) within a scheduled monument. Siting of equipment in Conservation Areas should take account of Conservation Area Appraisals and Management Plans.

35. Access: equipment housing must not obstruct any existing means of entering or leaving land, including avoiding obstruction of existing vehicular or pedestrian access to properties and public or private rights of way.

36. Trees: equipment housing installed near a tree should conform to the guidelines in the current National Joint Utilities Group Ltd (NJUG) publication Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees - volume 4.

[14] See relevant guidance on the selection and use of colour in development in Areas of Outstanding Natural Beauty and National Parks.
[15] Inclusive Mobility provides further guidance on minimum widths on footways for mobility impaired and visually impaired people is provided on page 5 of Inclusive Mobility. Guidance on footway space requirements for pedestrians is contained in Section 6.3 of Manual for Streets.
[16] See Manual for Streets for urban and rural environments under 40mph; see Design Manual for Roads and Bridges for high speed roads.

Ground-based masts

37. Operators have committed to use existing structures for network deployment wherever viable to reduce the need for new development and minimise visual impact. However, new ground-based masts will sometimes be required to accommodate the ever-increasing coverage and capacity needs of the country. 4G and 5G are likely to require further network densification in order to meet growing customer demand for data. Where higher frequencies are used, with lower signal propagation characteristics, apparatus will need to be located in closer proximity to user devices. The type of mast deployed will depend upon the location and setting, as well as the coverage requirements of the site. There are many ways by which the potential for environmental and visual impact of a ground-based mast can be reduced.

Planning and visual considerations

38. New masts should be sited in accordance with the relevant guidance stated in the section above (paragraphs 31-36). In addition, the following will apply:

39. Mast positioning: all new masts should be sited, so far as is practicable, so as to minimise their impact on their setting, including the landscape and any buildings. This includes siting next to similar structures - streetworks masts, for example, should ideally be sited in line, and in harmony, with existing vertical infrastructure, such as street lighting columns, to minimise their visual impact. Placing a mast within or adjacent to an existing group of trees, vegetation and other natural features can reduce visual impact. Care should be taken to minimise the unnecessary loss of existing trees, though antennas will need to be sufficiently elevated to clear the tree-line and the trees may need to be maintained to prevent growth above a certain level.

40. Colouring and camouflage: where appropriate, masts should be coloured to match their backdrop to minimise contrast in an urban or rural setting. Streetworks monopoles can utilise design features such as shrouding or banding to protect visual amenity, though, for some 5G infrastructure, camouflage design solutions may not be practicable. Simple designs should be encouraged - masts which have complex designs are more likely to dominate and be in discord with the landscape and have adverse visual impacts. Operators and planning authorities should work collaboratively to agree on the optimal design solution on a site-specific basis.

Building-based masts and rooftop installations

41. Operators should look to utilise existing buildings and structures before deploying ground-based equipment. The use of buildings and rooftops by operators as sites for the installation of wireless network equipment has greatly helped to reduce the environmental impact of these networks. The siting and design of building-based apparatus will be dictated by the rooftop on which it is located. As such, building-

based installations will be site-specific in nature and dependent upon the technical constraints of a particular rooftop (see the section below on '*Technical and Operational Considerations*' for the constraints that affect this). However, operators should seek to reduce visual impacts where possible.

Planning and visual considerations

42. Mast positioning: building-based masts have to be sited to provide sufficient coverage for the surrounding area and positioned to avoid shadowing and antenna 'clipping'. 'Clipping' is dealt with by locating antennas nearer the building edge or on taller structures. The height of the surrounding buildings also affects the antenna height. The mast siting should minimise the impact above the roofline, commensurate with technical constraints, and/or avoid creating unnecessary clutter on the rooftop. This includes striving to preserve rooftop amenity and retain existing other uses. When using pole mounts[17], operators should consider, where technically possible, the feasibility of setting apparatus away from the edge of buildings to reduce prominence and minimise the need for potentially intrusive edge protection. Further considerations will need to be taken when installing equipment on structures and/or buildings located in areas where there are heritage assets or within a protected landscape (including within the setting of these areas). Extra care will need to be taken when installing equipment on listed buildings, and within scheduled monuments (see section on '*Listed Buildings and Scheduled Monuments'*).

43. Mast design: although there is no standardised rooftop design (it will depend upon structural integrity, accessibility, surrounding buildings, aesthetics and building-owner requirements), masts and equipment on buildings and rooftops should, as far as practicable, be designed so as to fit and/or respect the architectural style of the building/rooftop. This could include being painted or clad to correspond with the background and/or surroundings and should minimise the impact on important views and skyline.

44. Health and safety: many older buildings are not capable of taking extra weight from wireless infrastructure. These structural limitations may affect potential sites and should be considered as part of the selection process. Building-based masts require ancillary equipment, such as handrails and rooftop grillage, to ensure access and safety compliance. All rooftop installations will be subject to ICNIRP guidelines, which may restrict siting locations on the rooftop. Antennas (particularly 5G antennas which operate at higher frequencies) need to be elevated higher off building rooftops to ensure that exclusion zones can be maintained, particularly when the rooftop is accessible to the public (see Annex C). Where these types of considerations arise, it is vital that operators and local planning authorities discuss and agree solutions to any matters that could restrict siting options.

[17] Pole mounts are used to secure and support telecommunications poles to hold them in place.

Compounds

45. Masts and associated cabinets are sometimes fully enclosed within a compound, particularly in more rural locations. Compounds are generally surrounded by a fence and provide additional security for electronic communications equipment.

46. Operators and planning authorities should engage collaboratively to ensure that compounds are designed so that they are, as much as possible, in keeping with the character of the area, and that the most appropriate materials and colourings are used, for example, for perimeter walls and fencing. In rural areas this could include planting new trees or hedgerows to integrate the site into the landscape.[18]

Natural environment and heritage assets guidance

Protected landscapes

47. Many rural areas of England are covered by National Parks and Areas of Outstanding Natural Beauty designations. In these areas, as well as the Broads, operators should recognise the increased importance of sensitive siting and design, and seek measures to minimise the impact of wireless network development.

48. The NPPF states that great weight should be given to conserving and enhancing landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty which have the highest status of protection in relation to these issues. It also sets out that development within the setting of these areas should also be sensitively located and designed to avoid or minimise adverse impacts on the designated areas.[19]

49. Section 11A(2) of the National Parks and Access to the Countryside Act 1949, section 17A of the Norfolk and Suffolk Broads Act 1988 and section 85 of the Countryside and Rights of Way Act 2000 require that 'in exercising or performing any functions in relation to, or so as to affect, land' in National Parks and Areas of Outstanding Natural Beauty, relevant authorities 'shall have regard' to their purposes for which these areas are designated.[20] The duty is also relevant in considering development proposals that are situated outside National Parks or Areas of Outstanding Natural Beauty boundaries, but which might have an impact on their setting or protection. Local authorities and statutory undertakers[21] (including Mobile Network Operators) should have regard to these purposes when coming to decisions

[18] Appropriate consideration should also be given to materials used for access/hardstanding.
[19] The National Planning Policy Framework - Paragraph 176.
[20] Section 11A(2) as amended by section 62 of the Environment Act 1995; Section 17A as amended by section 62 of the Natural Environment and Rural Communities Act 2006.
[21] The list of public bodies and persons covered by this duty can be found in the guidance note: Duties on relevant authorities to have regard to the purposes of National Parks, Areas of Outstanding Natural Beauty (AONBs) and the Norfolk and Suffolk Broads.

or carrying out their activities relating to or affecting land within these areas, to deliver the overall achievement of sustainable development.[22]

50. In relation to electronic communications development, the NPPF states that advanced, high quality and reliable communications infrastructure is essential for economic growth and social well-being, and that planning policies and decisions should support the expansion of wireless communications networks, including next generation mobile technology. Planning authorities, and those who represent rural areas, should recognise the importance of access to reliable mobile broadband and services for those who live and work in rural communities, including coverage for the emergency services network. The benefits of high quality wireless connectivity to the rural economy are far reaching - better wireless infrastructure will give rural communities greater choice and access to services, allow businesses to grow, and have positive impacts on healthcare, education, tourism, and remote working.[23]

51. A Joint Accord has also been agreed between National Parks England and the Mobile Network Operators which aims to help communities living in National Parks benefit from consistent high quality connectivity; protect the special qualities of the National Parks by minimising any adverse environmental impacts; and support close working between the Mobile Network Operators and National Park Authorities to achieve these aims.

52. Operators and planning authorities should work collaboratively to ensure that where network deployment is required to provide connectivity in these areas, it is carried out in a way that provides positive benefits to communities, whilst respecting the sensitive nature of these areas (including considering any technical constraints). Operators are advised to seek a meeting at the earliest possible opportunity with the relevant protected landscapes representative.[24]

Designated nature conservation sites and protected species

53. A site of special scientific interest (SSSI) is designated under the Wildlife and Countryside Act 1981 (as amended).[25] Planning authorities and operators, when exercising their statutory functions on this land, need to be aware that the features of Sites of Special Scientific Interest may be affected, directly or indirectly, and avoid or mitigate any adverse impacts. The NPPF provides the highest level of protection for these areas.[26]

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[22] Also see relevant management plans for National Parks, the Broads and Areas of Outstanding Natural Beauty which help to set out the strategic context for development. They provide evidence of the value and special qualities of these areas, and provide a basis for cross-organisational work to support the purposes of their designation.
[23] Also see https://srn.org.uk/ for the potential benefits the Shared Rural Network programme will bring to these areas.
[24] Including the relevant National Park Authority, the Broads Authority, or AONB Partnership or Conservation board.
[25] Amended primarily by the Countryside and Rights of Way Act 2000.
[26] The National Planning Policy Framework - Paragraph 180.

54. The legislation places a general duty on all public bodies to take reasonable steps to further the conservation and enhancement of the special features of sites of special scientific interest. Natural England expects that public bodies will take full account of these responsibilities under this duty whenever their actions may affect sites of special scientific interest. Consent may be required from Natural England in some cases.[27]

55. In most cases, permitted development rights do not extend to sites of special scientific interest.

56. Designated nature conservation sites of international importance or 'Habitats Sites' have additional protection as under the Conservation of Habitats and Species Regulations 2017 (as amended) and the NPPF.[28] Additional approval from the planning authority, or a habitats regulations assessment, may be needed to ensure compliance with these regulations. Natural England is a statutory consultee in such cases.[29]

57. Impacts on protected species protected by legislation also need to be considered. A protected species mitigation licence may be required from Natural England in some cases. Natural England has prepared guidance on protected species for developers.[30]

Heritage assets

58. Heritage assets are an irreplaceable resource and the NPPF requires that they are conserved in a manner appropriate to their significance.[31] The NPPF requires planning authorities to assess the significance of heritage assets affected by proposed development and take this into account to ensure that any conflict between the conservation of the heritage asset and its setting and any aspect of the proposals is avoided or minimised.[32]

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[27] Sites of special scientific interest: managing your land - GOV.UK

[28] The National Planning Policy Framework defines a habitat site as 'any site which would be included within the definition at regulation 8 of the Conservation of Habitats and Species Regulations 2017 for the purpose of those regulations, including candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation, Special Protection Areas and any relevant Marine Sites'.

[29] Habitats regulations assessments: protecting a European site - GOV.UK; General guidance on when to obtain advice from Natural England and Environment Agency on these and other natural environment issues can be found at Habitats regulations assessments: protecting a European site - GOV.UK.

[30] Prepare a planning proposal to avoid harm or disturbance to protected species - GOV.UK

[31] The National Planning Policy Framework defines heritage assets as 'A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. It includes designated heritage assets and assets identified by the local planning authority (including local listing)'.

[32] The National Planning Policy Framework - Paragraph 195.

59. The siting and location of any wireless infrastructure can be critical to visual impact. Operators should therefore consider how harm to heritage assets from both the process of installation of equipment, and subsequent visual impacts, can be avoided or minimised. Appropriate expertise should be sought in order to understand the significance of affected assets and the impact of the proposals on that significance.

60. Where proposals would impact a designated heritage asset[33], the NPPF requires that great weight should be given to the asset's conservation (the more important the asset, the greater the weight should be), and that any harm requires clear and convincing justification[34]. Where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use.[35]

61. Particular care should therefore be taken for sites that are located within heritage assets or their settings to ensure that they are conserved in accordance with the requirements of the NPPF.[36] The design and siting of equipment should, as far as possible, avoid or minimise impacts on local context and character, and the significance of heritage assets or their setting. This may include visible installations on modern buildings that are within conservation areas or are in close proximity to listed buildings.[37] Adverse visual impacts are not the only impacts relevant to heritage assets, for example, the laying of cables can result in the disturbance or loss of archaeological deposits. There are likely to be cases where it will not be possible to avoid harm, and therefore it is important to mitigate harmful impacts through design or positioning, and therefore solutions should be explored to ensure the proposal of least impact is progressed. Early engagement with the local planning authority, and where appropriate Historic England, is advised.[38]

62. In considering any proposals on a listed building or scheduled monument, operators and planning authorities should be aware that any such developments require listed building consent from the local planning authority/scheduled monument consent from the Secretary of State, irrespective of whether planning permission or prior approval is required.

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[33] A World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area designated under the relevant legislation.
[34] The National Planning Framework - Paragraphs 199-200.
[35] The National Planning Policy Framework - Paragraph 202.
[36] The National Planning Policy Framework defines "setting of a heritage asset" as: The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.
[37] The National Church Institutions (NCIs) of the Church of England, the Department for Digital, Culture, Media and Sport (DCMS) and the Department for the Environment, Food and Rural Affairs (Defra) signed an accord in 2018 to encourage the Church of England to use its buildings and other property to improve broadband, mobile and WiFi connectivity for local communities.
[38] Advice from Historic England should be sought in cases which would impact Grade I and II* listed buildings, scheduled ancient monuments or conservation areas, and their settings.

63. Where heritage sites and assets require service provision, infrastructure will be needed within or in close proximity to them. Operators and the relevant bodies should work collaboratively to ensure the proposal of least impact is progressed, while considering technical constraints and the need to provide connectivity in these areas.

Technical and operational considerations

64. All wireless network installations are principally guided by the technical need for the site and the technical constraints placed upon transmitting a signal. The siting and design of such installations must therefore be balanced between visual impact and these needs and constraints. As set out in the siting and design section above, the three primary technical and operational considerations for installation sites are: ensuring that wireless infrastructure provides an appropriate level of coverage over the intended geographical area; ensuring that sites have sufficient capacity to meet user demand; and, requiring a connection to the wider network 'backhaul'.

65. Planning authorities should take account of these constraints, and those set out below, on network deployment and siting and design, when considering proposals.

5G network deployment considerations

66. With the introduction of 5G, more equipment will be required to provide coverage and capacity. 5G, as well as 4G, are data-driven technologies, and high volumes of data will be transmitted between base stations and wireless devices. 5G will require a denser network of base stations than previous generations, including more fixed line fibre optic cable for reliable and high capacity backhaul. The siting of 5G installations will be more constrained and guided by these special technical and operational considerations.

67. Due to the scale and technological constraints of 5G equipment, in some cases previous camouflage design solutions, such as tree mast designs and concealing antennas in flagpoles, may not be practicable or suitable. In these cases, simple designs with particular attention to colouration and finishes may help reduce visual impacts on a site-specific basis.

Power accessibility in rural areas

68. Mobile base stations require a power supply to function. In urban areas this is rarely a problem, but it can sometimes be a challenge to find suitable connections in rural areas. Often it is not commercially feasible to install a new power source to a remote site and wayleaves with third party landowners can be required to deliver the power.

Site sharing and structural loading

69. Operators should seek to share sites where possible, site sharing reduces the number of sites required and network proliferation. However, site sharing means that masts must safely accommodate equipment for all technologies (2G- 5G) from multiple operators. Existing masts may be required to be strengthened or replaced with a larger, lattice-type structure. This may be desirable and more appropriate in rural areas, but less so in more urban environments, where greater densities of base stations will be required.

Site accessibility and availability

70. Access to a site is required for build and maintenance. Base stations may require heavy duty machinery to install them, whilst maintenance work sometimes requires specialist equipment. Access is often subject to permission from third parties who may not grant it and therefore this can limit the number of viable sites.

71. An agreement, or code agreement, is often needed by Code Operators and landowners in order to access land and install wireless infrastructure.[39] However, it is not always possible for an operator and a landowner to reach agreement and this limits the number of sites available to operators for locating their equipment. In addition, the Notice to Quit (NTQ) provisions within code agreements mean that sites have to be relocated. Where NTQs are proposed, the existing coverage and capacity will be removed and as such a replacement site is needed within close proximity to where the existing site was located.

Topography

72. The physical layout of an area can have a significant impact on how radio signals travel. Radio signals will be blocked when they encounter raised land and therefore need to be transmitted over these areas to provide coverage. The taller the base station, or the higher its position on raised land, the better it can enable a larger area to be covered.

Consultation and applications

73. Consultation and engagement are vital for ensuring the installation of electronic communications infrastructure is carried out in a transparent and appropriate way. The type and level of consultation and engagement required will depend on a number of factors, and should therefore be decided on a case by case basis. In general, it is expected that there will be a greater level of consultation for a new site

[39] The Electronic Communications Code is set out in Schedule 3A of the Communications Act 2003.

as opposed to upgrades to an existing site.[40] In all instances, it is important for all parties involved in the process to take a positive approach to consultation and engagement.

74. High-quality applications are essential and this includes ensuring the information provided in the application is of a good standard. The application information should be complete and straightforward. This allows stakeholders with an interest in the development to understand what is being proposed and its likely impact. It will also benefit applicants by avoiding unnecessary time and effort spent explaining the proposals, and can help allay concerns caused by ambiguous and incomplete information. In addition, good quality submissions are likely to result in more timely and better informed decisions by local authorities.

75. Operators should adhere to the guidance on consultation and application set out below, in order to achieve the required quality of engagement and applications.

Pre-application consultation

76. Pre-application discussions are important in helping to identify the most appropriate solution for any proposed individual development. Consultation is important for ensuring the appropriate design and siting for wireless infrastructure and should take place as part of the pre-application process, where appropriate. Effective consultation also enables local planning authorities to give feedback on the planned installation of wireless infrastructure in a timely manner and provides transparency for the public.

77. Operators should identify and consult with all relevant stakeholders at the earliest possible opportunity. This will always involve engaging with the local planning authority but there will be instances when it should include other stakeholder groups, such as executive agencies and non-departmental government bodies, statutory consultees, protected landscape bodies, and community groups. The extent of pre-application consultation will depend on the scale and sensitivity of the proposal. Once contacted, the stakeholder should engage with the consultation process, including providing prompt and timely responses, as engagement is at its most effective when approached as a partnership. Each party should provide a clear point of contact for the consultation.

Pre-application consultation with local authorities

78. Meaningful pre-application consultation is highly valuable. It should be seen as a two-way partnership between the operator and the local planning authority and, if conducted in this way, it can lead to a more efficient process and better outcomes for

[40] Operators can refer to the Traffic Light Rating System as a general guide for consultation and engagement requirements.

all involved. Pre-application discussions are important in helping to identify the most appropriate solution for any individual development.

79. Where multiple installations are planned over an area, it is useful for the operator and the local planning authority to discuss the rollout plan. Operators should highlight their wider plans where relevant and local planning authorities should be open to having this engagement. Strategic-level engagement can build understanding of the proposals, set out expectations and establish ways of working.

80. It is beneficial for operators and local planning authorities to meet to discuss the proposal prior to submitting an application to allow the planning authority to comment on the appropriateness of the siting and design of the proposals, as well as allow the operator to explain how the installation supports the rollout of wireless infrastructure in the local area.

81. Formal pre-application consultation may be of particular importance where the proposal is located in, and likely to have an impact on, protected landscapes or heritage sites and their settings. In these cases the operator should engage with the relevant local planning authority (including National Park authorities) at the earliest possible stage to discuss the proposal prior to submitting a formal application.[41]

82. The operator should seek to provide all necessary information in relation to the proposal at the first available opportunity. At the pre-application consultation stage the operator may provide the following information to the planning authority:

    - an explanation of their needs in a particular area;
    - details of the location and type of telecommunications equipment or structure intended to be constructed;
    - details of any other telecommunications equipment on the building or site;
    - the area of search and details of possible alternative options, which may include other methods of providing the required coverage (where appropriate and requested by the planning authority), and;
    - design options, and where required, an outline of measures to mitigate visual impacts for particular sites.[42]

83. Local planning authorities may charge fees for pre-application services. However, they should consider the extent to which pre-application consultation fees and any associated formal process are appropriate, particularly for strategic level meetings pre-rollout, and relatively minor upgrades or replacement sites. If any pre-application consultation fees or charges are imposed then these should be based on a cost recovery basis only.[43] Local Authorities should provide meaningful, site-specific feedback on proposals during pre-application consultations.

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[41] Where relevant, the operator may also wish to consult with other parties such as Historic England and the respective Area of Outstanding Natural Beauty body at this stage.
[42] This consultation period should be a minimum of 14 days.
[43] Section 93 Local Government Act 2003; also see the Local Government Association's Pre-application Suite,which provides advice on calculating the cost of pre-application services.

Pre-application consultation with local communities

84. For some applications, it may be appropriate for the operator to consult with local residents. For example, a greater level of community consultation may be considered for a new site or where there is a high-level of community interest in development, though the type of engagement should be considered on a case by case basis. Operators should discuss and agree this requirement with the local planning authority. Forms of community engagement which may be appropriate include:

    - Consultation/Notification letter to local residents, communities and their representatives, including parish and town councils
    - Site Notice
    - Key stakeholder briefing
    - Leaflets

Consultation with schools

85. Where it is proposed to install, alter or replace a base station in the vicinity of a school or college, operators should discuss the proposed development with the relevant body of the school or college before submitting an application to the local planning authority.[44]

86. Operators should agree with the planning authority which schools and colleges should be consulted on a case by case basis, and this should form part of the consultation plan shared with the planning authority. In determining whether a school or college should be consulted, the following factors should be taken into account by operators and planning authorities:

    - The proposed site is on school or college grounds;
    - The site is on a main access point used by pupils or students to the school or college;
    - The planning authority has requested consultation with the school or college; and,
    - The school or college has requested to be included in any consultation.

87. At a minimum, the operator should send a consultation letter or email to the school or college. This should be sent by recorded delivery in the case of a letter, or an email that is saved and referenced within any subsequent application. Correspondence should be addressed to the head teacher or principal, and the chair of governors (or equivalent). The operator should wait a minimum of 14 days from the recorded

[44] A school is an institution providing education for children within the nursery (2-5), primary (5-11), and secondary (11-16) education ranges. A college of further education is an institution providing full- or part-time education for students over the age of 16. This includes sixth form colleges (16-19).

delivery of the letter to allow an opportunity for the school to respond prior to submitting an application for planning permission or prior approval.

88. As per the National Planning Policy Framework, planning applications and prior approval applications should include information on the outcome of such consultations with schools and colleges.[45]

Consultation with other stakeholders

89. Operators should assess whether they should undertake pre-application consultation and publicity, including where prior approval is not required, with statutory consultees and other interested groups on a case by case basis. Stakeholders that fall into this category could include Area of Outstanding Natural Beauty bodies, Historic England, Natural England, the Environment Agency, the Health and Safety Executive, and the Church of England.[46]

Consultation with safeguarding stakeholders

90. Operators should notify the appropriate aerodrome safeguarding stakeholder where the proposed development is within a safeguarding area.[47] Evidence of this notification is required where the prior approval process applies.[48]

Consultation record

91. To ensure complete record keeping of the consultation process, a copy of the operator's completed consultation assessment should be retained on the operator's site files and recorded as part of the consultation plan. This will ensure accurate records that can be referred back to in discussions with the local authority in respect of any subsequent planning submission. Copies of the outcome of any consultations undertaken and any responses should be included with any subsequent application if required by the planning authority.

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[45] See paragraph 117a of the National Planning Policy Framework.

[46] Planning law prescribes circumstances where local planning authorities are required to consult specified bodies or 'statutory consultees' prior to a decision being made on an application - See the Town and Country Planning (Development Management Procedure) (England) Order 2015. The Town and Country Planning (General Permitted Development) (England) Order 2015 also sets out statutory consultees for applications of prior approval. Where beneficial, operators may seek to engage with these bodies as part of their pre-application consultation process.

[47] Safeguarded areas include aerodromes and technical sites as set out in Annex 1 - The Circular: The Town and Country Planning (Safeguarded Aerodromes, Technical Sites and Military Explosives Storage Areas) Direction 2002.

[48] See regulations 8B of the Electronic Communications Code (Conditions and Restrictions) Regulations 2003 (as amended) and paragraph A.3(3) of Part 16 of Schedule 2 to the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended).

Applications

92. There are three types of planning permission that cover the installation of wireless infrastructure[49], these are:

    - permitted development with the requirement to notify;[50]
    - permitted development with the requirement for prior approval;
    - planning permission that requires a planning application to be submitted to the relevant planning authority.[51]

93. As the information required by a planning authority is broadly the same for applications for prior approval and for planning permission, these are treated the same for the purposes of best practice within this document.

Permitted development - prior notification

94. Not all telecommunications development that benefits from permitted development rights will require the prior approval of the local planning authority. In these cases, the operator must provide the local planning authority with written notice of its intention to install and a description of the apparatus and location it proposes to install it. It can then exercise the permitted development right after 28 days' notice. This is sometimes referred to as a 'regulation 5 notification' or 'code notification'. The local planning authority may within this period give written notice of conditions with which they wish the operator to comply in respect of the installation of the equipment. Operators should respond positively and promptly to any requests for engagement from local planning authorities and work towards solutions where reasonable concerns are raised about the proposed development.

Prior approval and planning permission

95. The quality of information submitted as part of an application for telecommunications development is very important. It should always be clear, accurate and complete. The information should also be site-specific where appropriate. Good quality submissions can help explain to consultees and local people, as well as officers and elected members, exactly what is being proposed and its likely impact. By adopting high standards, unnecessary time and effort in trying to explain proposals can be avoided and help allay concerns that ambiguous and incomplete information can

[49] Section 57 of The Town and Country Planning Act 1990 sets out development that requires planning permission and Part 16 of Schedule 2 of The Town and Country Planning (General Permitted Development) (England) Order 2015 covers permitted development rights for electronic communication infrastructure.

[50] Regulation 5 of the Electronic Communications Code (Conditions and Restrictions) Regulations 2003 (as amended).

[51] Development may also require Listed Building Consent or Scheduled Monument Consent. See the Planning (Listed Building and Conservation Areas) Act 1990 and Ancient Monuments and Archaeological Act 1979.

cause. In addition, good quality submissions are likely to result in faster and better informed decisions. Local authorities should seek to provide straightforward templates as part of their planning process and align these with other local authorities where possible.

96. An application to the planning authority for planning permission or prior approval will normally be made via the planning portal. Planning legislation sets out validation requirements for applications for planning permission and prior approval applications.[52]

97. National planning policy also states that applications should be supported by the necessary evidence to justify the proposed development. This should include a declaration as to compliance with the ICNIRP guidelines.[53]

98. Operators may provide additional information beyond the statutory requirements where appropriate. This could include:

    - Drawings - along with the location plan that shows the application site in relation to the surrounding area, operators should consult the relevant local list of information requirements for any additional plans and drawings that will be necessary to describe the proposed development.
    - Maps - a map of an appropriate scale should be supplied to highlight all alternative sites that have been considered and discounted, including existing masts and structures.
    - Photo montage - a photo montage is helpful to portray the siting and design of the wireless infrastructure, particularly when infrastructure is being installed on a heritage site or in a protected landscape. This will generally consist of a before and after photomontage of the radio base station, fencing, landscaping and access (where applicable), and when requested, a Landscape and Visual Appraisal should be provided.

99. Applications should be submitted via the planning portal and the determination period starts once a valid application has been received by the local planning authority, that being day one of the determination period. Where a planning portal is not used, the application should be sent by recorded delivery, with the determination period starting once the application has been received by the local planning authority.

[52]See the Town and Country Planning (Development Management Procedure) (England) Order 2015 and the Town and Country Planning (General Permitted Development) (England) Order 2015. Also see Planning Practice Guidance - Making an Application for further guidance on validation requirements and application information

[53] See paragraph 117 of the National Planning Policy Framework. This sets out that, when submitting planning applications (including applications for prior approval under the General Permitted Development Order), mobile operators should certify that the installation will operate in full compliance with the requirements of the radio frequency (RF) public exposure guidelines of the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

100. Where appropriate, operators should provide supplementary information to their application, a supplementary information template can be found in Annex B, although supporting information may be presented in a different format.

Timescales

101. Under the prior approval regime a local authority has 56 days, beginning with the date on which it receives a valid application, in which to make its determination and to notify the applicant of the decision to give or refuse such approval. If no decision is made, or the planning authority fails to notify the developer of its decision to refuse the application within the 56 days, permission is deemed to have been granted.

102. Confirmation should be sent to the developer of the date on which the application has been received by the planning authority, and the planning authority is satisfied that it is valid. The date a valid application is received is day 1 of the 56-day period. It is advisable that the expiry of that period is communicated promptly to all relevant planning authority staff.[54]

103. It is not sufficient for a planning authority simply to have made a decision regarding the application. Such a decision must be communicated to the applicant in a formal written notice, which must be received by the applicant before the end of the last day of the 56-day period. The authority therefore needs to bring such a notice to the attention of the applicant.

104. For applications for both planning permission and prior approval, operators and local planning authorities may agree to extensions of time for the determination of such applications in writing.[55] Both parties should consider the merits of doing so where the planning authority asks the applicant to consider an agreed extension of time. This may be mutually beneficial where the proposed development is complex or sensitive and further engagement is required. Any such agreement must be in writing and set out the timescale within which a decision is expected.

Delegation

[54] The development may only commence after: the planning authority has stated in writing that prior approval is not required; the authority has stated in writing that prior approval is required, and has given such approval in writing before the end of the 56-day period; the authority has stated in writing that prior approval is required, and the 56-day period has expired without the authority having notified the applicant in writing that approval is given or refused; or, the 56-day period has expired without the authority having notified the applicant in writing whether prior approval is required.

[55] Article 7 of the Town and Country Planning (General Permitted Development) (England) Order 2015 and Article 34 of the Town and Country Planning (Development Management Procedure) (England) Order 2015, allow for agreed extensions to determination periods for prior approval applications and planning applications.

105. The 56-day period may make it difficult for planning authorities to use the committee system in determining prior approval applications and therefore effective arrangements to delegate decision-making to officers may be needed.

106. An officer may take executive action on behalf of the council to determine:

- whether or not prior approval is required;
- if prior approval is required whether to approve or refuse consent; and,
- planning applications for telecommunications development.

107. The planning authority should consider the circumstances in which elected members should make the decision (within the time allowed).

Publicity following application

108. Additional publicity for prior approval applications should be considered to allow people likely to be affected by the proposed development to make their views known to the local authority. Where planning authorities consider additional publicity with respect to prior approval applications may be helpful, they should give due consideration to:

- the relevance and amount of information to be made available;
- the timeliness for providing and evaluating this information;
- access to this information; and,
- any special needs of the local community.[56]

Specialist advice and training

109. Certain aspects of telecommunications development (whether in relation to prior approval or planning applications) are complex, and specialist advice may be required to verify whether or not certain technical constraints or arguments are valid. Where the planning authority considers that specialist advice in relation to a certain proposal may be necessary, this should be sought at the earliest opportunity in order to reduce any delays in determination.

110. Given the continuing scale and pace of change in the telecommunications industry, it is important that all who are involved in the planning aspects, including agents and consultants, keep up to date with legislation and the latest guidance and technological advances so that at all times the public receive the highest quality of advice. Local planning authorities should look to maintain an appropriate level of knowledge on telecommunications for their planning officers and members of planning committees. Consideration should be given to encouraging planning officers, as well as elected members, to take up opportunities to attend professional development workshops on technological developments within telecommunications.

[56] The Traffic Light Rating system can provide a guide for when additional publicity should take place.

111. Where resources allow, planning authorities may consider appointing a specialist officer(s) who are familiar with the special operational and technical considerations of telecommunications development and can be the main point of contact. Local authorities could also look to appoint a Digital Champion, and/or Digital Infrastructure Coordinator to work closely in partnership with network operators to develop, implement and advocate a local area digital infrastructure strategy in line with other local policies and priorities.[57]

Review and enquiries

Monitoring and review

112. To ensure the effectiveness of the Code of Practice is kept under review, the Code of Practice Working Group (see Annex D) will meet on a biannual basis. These meetings will be convened and chaired by DCMS. The meetings will provide an opportunity for stakeholders to input on how the Code of Practice is operating and confirm all stakeholders are complying with its provisions, and facilitate engagement and resolution regarding the application of the Code of Practice.

Enquiries

113. Operators have processes in place to handle enquiries from members of the public and other parties about wireless network development.[58]

114. For enquiries concerning the application of the Code of Practice, these should be directed to Mobile UK (info@mobileuk.org) in the first instance.[59] Operators will provide an update on enquiries they have received related to the Code of Practice at the relevant review meeting (see above), including any agreed metrics to measure the effectiveness of the Code of Practice.

[57] See guidance on Digital strategy and leadership and the Digital Connectivity Portal.
[58] General enquiries about mobile network infrastructure should be directed to the relevant operator.
[59] Mobile UK can also be contacted at: 1 Carnegie Road, Newbury, Berkshire, RG14 5DJ

Annex A: Glossary

5G: The fifth generation of mobile technology.

Antenna: a device that transmits and receives radio waves.

Area of Outstanding Natural Beauty (AONB): the primary purpose of an AONB designation is to conserve and enhance the natural beauty of the area.

Backhaul: transmission of signals from a cell site or mast which is part of the radio access network to the core or backbone network.

The Broads: The Broads National Park is managed by the Broads Authority for the purposes of conserving and enhancing the natural beauty, wildlife and cultural heritage of the Broads; promoting opportunities for understanding and enjoyment of the special qualities of the Broads by the public; and protecting the interests of navigation.

Code Operator: Code Operators exercise Code rights under the Electronic Communications Code. Operators can include providers of electronic communications networks and providers of infrastructure systems. The operator must normally have been granted operator status by Ofcom under section 106 of the Communications Act 2003.

Designated Heritage Asset: a World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area designated under the relevant legislation.

Electronic Communications Code: the Electronic Communications Code ('the Code') is set out in Schedule 3A of the Communications Act 2003 and is designed to facilitate the installation, maintenance and upgrade of electronic communications, through a statutory framework of specific duties, obligations and protections that apply to the deployment of digital communications networks by Code Operators.

General Permitted Development Order: The Town and Country Planning (General Permitted Development) Order 2015 grants planning permission for different types of development in specified circumstances. The permissions granted by the Order are commonly known as permitted development rights.

Historic England: a public body that champions and protects England's historic places.

ICNIRP: an independent non-profit organisation, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) provides scientific advice and guidance on the health and environmental effects of non-ionizing radiation.

Internet of Things (IoT): a system of interrelated, internet-connected devices that are able to collect and transfer data over a wireless network without human intervention.

Latency: the delay before a transfer of data begins following an instruction for its transfer.

Local Planning Authority (LPA): the public authority whose duty it is to carry out specific planning functions for a particular area. All references to local planning authority apply to the district council, London borough council, county council, Broads Authority, National Park Authority and the Greater London Authority, to the extent appropriate to their responsibilities.

Local Plans: are prepared by the Local Planning Authority (LPA), usually the Council or the National Park authority for the area. Local plans set out a vision for the future of each area and a framework for addressing housing needs and other economic, social and environmental priorities.

Listed Building: a listed building, or listed structure, is one that has been placed on one of the four statutory lists maintained by Historic England.

Macro site: a macro site is a cell in a mobile phone network that provides radio coverage served by a high power cell site (tower, antenna or mast).

Mast: a structure that supports antennas at a height where they can satisfactorily send and receive radio waves. Masts are typically of either a lattice design (used more in greenfield areas) or monopole style (used in more urban areas). Masts themselves play no part in the transmission of the radio waves for mobile telecommunications.

Monopole Mast: a ground-based mast of non-lattice structure. Monopoles are usually deployed in the urban or suburban street scene to provide extra capacity or coverage for a network.

National Highways: formerly Highways England, is a government-owned company charged with operating, maintaining and improving motorways and major A roads in England.

National Park: the purpose of a National Park designation is to conserve and enhance the natural beauty, wildlife and cultural heritage and promote opportunities for understanding and enjoyment of the special qualities of National Parks by the public. In carrying out these purposes, National Park Authorities are also required to seek to foster the economic and social well-being of local communities in the National Park.

National Parks Joint Accord/Memorandum of Understanding: an accord signed (2018) by National Parks England and Mobile UK to complement the Code of Practice to recognise the special nature of National Parks and the public benefit of mobile telecommunications.

Natural England: a non-departmental public body in the United Kingdom sponsored by the Department for Environment, Food and Rural Affairs. Their purpose is to help conserve, enhance and manage the natural environment for the benefit of present and future generations, thereby contributing to sustainable development.

Network capacity: the amount of traffic that a network can handle at any given time.

Network resilience: the ability to provide and maintain an acceptable level of service in the face of faults and challenges to normal operation.

Notice to Quit: a notice given by a site provider to an operator that brings a Code agreement to an end.

Permitted development rights: a national grant of planning permission which allows certain building work and change of use to be carried out without having to make a planning application. Permitted development rights are subject to conditions and limitations to control impacts and to protect local amenity.

Prior approval: prior approval means that a developer has to seek approval from the local planning authority that certain elements of the development are acceptable before work can proceed. The matters for prior approval vary depending on the type of development - for mobile network development these include the siting and appearance of the equipment to be deployed.

Protected Landscapes: nationally important landscapes that are protected by law. Includes National Parks, the Broads, and Areas of Outstanding Natural Beauty.

Radio equipment housing: radio equipment housing, or equipment cabinets, protect radio transmitters and receivers from damage and can range in size from a small cabinet to a purpose-built cabin serving several operators.

Radio spectrum: is part of the electromagnetic spectrum. Different spectrum bands have different characteristics, which affect the extent of coverage and how much data can be carried.

Scheduled Monument: a nationally important archaeological site or historic building, given protection against unauthorised change.

Shared Rural Network: the Shared Rural Network (SRN) is a programme that will be delivered by the government and mobile network operators. The agreement will see the government and industry jointly invest over £1 billion to increase 4G mobile coverage throughout the UK to 95% geographic coverage by the end of the programme.

Sites of special scientific interest: sites designated by Natural England under the Wildlife and Countryside Act 1981.

Small Cells: small cells are wireless network access transmitters, used to extend network coverage and additional capacity in specific locations. Small cells typically have a small range and operate at much lower power levels than larger mobile base stations.

Annex B: Supplementary information template

SUPPLEMENTARY INFORMATION

1. Site Details

Site Name:		National Grid Reference:	
Site Address:			
Site Ref Number:		Site Type:	

2. Pre-application Checklist

Site Selection (for New Sites only)
(Would not generally apply to upgrades/alterations to existing site including redevelopment or replacement of an existing site to facilitate an upgrade or sharing with another operator)

Was a local planning authority mast register available to check for suitable sites by the operator or the local planning authority?	Yes	No
If no explain why:		
Were industry site databases checked for suitable sites by the operator:	Yes	No
If no explain why:		

Site Specific pre-application consultation with local planning authority

Was there pre-application contact:	Yes/No
Date of pre-application contact:	
Name of contact:	

Summary of outcome/Main issues raised:	

Annual area wide information to planning authority

Has annual area wide information been provided?	Yes/No
If no explain why	
Summary of issues raised	

Community Consultation

Rating of Site under Traffic Light Model: Red Amber Green
Outline of consultation carried out:
Summary of outcome/main issues raised (include copies of relevant correspondence):

School/College

Location of site in relation to school/college (include name of school/college):
Outline of consultation carried out with school/college (include evidence of consultation):
Summary of outcome/main issues raised (include copies of main correspondence):

Civil Aviation Authority/Secretary of State for Defence/Aerodrome Operator consultation

Will the structure be within 3km of an aerodrome or airfield?	Yes	No
Has the Civil Aviation Authority/Secretary of State for Defence/Aerodrome Operator been notified?	Yes	No
Details of response:		

Developer's Notice

Copy of Developer's Notice enclosed?	Yes No
Date served:	

3. Proposed Development

The proposed site:

Enclose map showing the cell centre and adjoining cells if appropriate:

Type of Structure (e.g. tower, mast, etc):	
Description:	
Overall Height:	
Height of existing building (where applicable):	Metres
Equipment Housing:	
Length:	Metres
Width:	Metres
Height:	Metres
Materials (as applicable):	
Tower/mast etc – type of material and external colour:	
Equipment housing – type of material and external colour:	

Reasons for choice of design, making reference to pre-application responses:

Health and Safety - including ICNIRP compliance

4. Technical Justification

Enclose predictive coverage plots if appropriate, e.g. to show coverage improvement.
Proposals to improve capacity will not generally require coverage plots.

Reason(s) why site required e.g. coverage, upgrade, capacity

5. Site Selection Process

Alternative sites considered and not chosen (not required for upgrades/alterations to existing sites including redevelopment or replacement of an existing site to facilitate an upgrade or sharing with another operator).

Site Type	Site name and address	National Grid Reference	Reason for not choosing site

If no alternative site options have been investigated, please explain why:
Land use planning designations:
Additional relevant information (include planning policy and material considerations):

Confirmation that submitted drawings have been checked for accuracy

Name (Agent):		Telephone:	
Operator:			
Address:		Email Address:	
Signed:		Date:	
Position:		Company:	

Annex C: ICNIRP declaration and rooftop deployment constraints and solutions

ICNIRP Declaration

Address *Agent Address*

Dear Sir/Madam

CLARIFICATION OF THE DECLARATION OF ICNIRP COMPLIANCE ISSUED AS PART OF THE SUBMISSION ATTACHED FOR SITE (INSERT SITE REF NO.) AT (INSERT SITE ADDRESS)

I refer to the Declaration of Conformity with ICNIRP Public Exposure Guidelines ("ICNIRP Declaration"), sent with this submission in relation to the proposed telecommunications installation as detailed above.

The "ICNIRP Declaration" certifies that the proposed site shall be operated to be in full compliance with the requirements of the radio frequency (RF) guideline limits of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) for public exposure and UK legislation.

This ICNIRP declaration takes into account the cumulative effect of the emissions from the proposed installation and all radio base stations present at, or near, the proposed location.

All operators of radio transmitters are under a legal obligation to operate those transmitters in accordance with the conditions of their licence. Operation of the transmitter in accordance with the conditions of the licence fulfils the legal obligations in respect of interference to other radio systems, other electrical equipment, instrumentation, or air traffic systems. The conditions of the licence are mandated by Ofcom, an agency of national government, who are responsible for the regulation of the civilian radio spectrum. The remit of Ofcom also includes investigation and remedy of any reported significant interference.

The telecommunications infrastructure the subject of this application accords with all relevant legislation and as such will not cause significant and irremediable interference with other electrical equipment, air traffic services or instrumentation operated in the national interest.

If you have any further enquiries concerning the "ICNIRP Declaration" certificate or anything else in this letter, then please contact me.

Yours faithfully

The Project Manager

Insert agent name
Insert position in organisation
Insert company name
Insert email address

Insert direct telephone number

(for and on behalf of ….)

Address *Agent Address*

Declaration of Conformity with ICNIRP Public Exposure Guidelines
("ICNIRP Declaration")

Name and address of Lead Operator

Declares that the proposed equipment and installation as detailed in the attached submission at;

Insert address
Insert address 2
Insert town
Insert county
Insert Postcode

Insert NGR

shall be operated to be in full compliance with the requirements of the radio frequency (RF) public exposure limit of the International Commission on Non-Ionizing Radiation Protection (ICNIRP)and UK legislation.

Date:	*Insert Date*
Signed:	*Project Manager to sign*
Name:	*Insert Project Manager's name*
Position:	*Project Manager for (Company)*

Rooftop deployment constraints and solutions

Scenario 1.

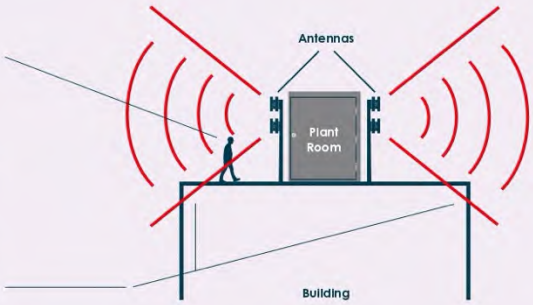
Antennas are of low elevation and set back from the rooftop edge.

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) has developed exposure limits adopted by the UK Government. All mobile network operator installations are designed to comply with the ICNIRP exposure limits as adopted in European Union directives and UK legislation.

This scenario might be considered the most visually sympathetic solution as antennas are both set back from the rooftop edge and are of lower elevation. However, the below example is not an ICNIRP compliant design, and therefore would not be proposed.

The person shown is within the exclusion zone – this is not ICNIRP compliant, as the antennas are too low.

With the antennas positioned here "clipping" occurs. This is when the radio frequency signal propagation from an antenna 'clips' the building edge and would result in exclusion zones over sections of the rooftop. This will impact radio performance and service provision to the point that the solution is not viable.



Each Scenario is indicative and a simplified version to demonstrate the technical constraints and solutions. Although 2D was used for simplicity, antennas must be carefully sited at locations on a building to provide 360 degree coverage, and must always be ICNIRP compliant.

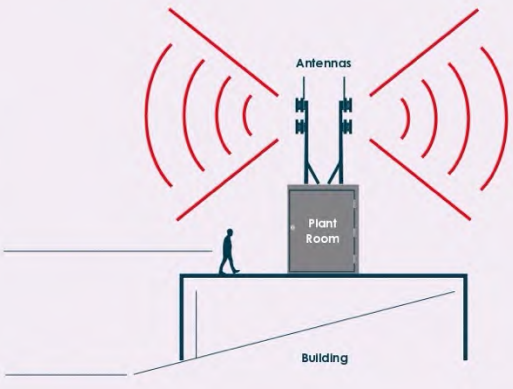
Scenario 2.

Antennas are set back from the rooftop edge and must be elevated.

This scenario is sometimes considered a more visually sympathetic solution, as the antennas are sited away from the rooftop edge. This solution means the antennas must be placed higher, which typically requires more robust support structures, and the essential additional height and bulk can be less desirable in some situations.

The person is accessing the rooftop and is not in the exclusion zone. As the antennas are of sufficient height, there is no RF 'clipping' and the rooftop remains accessible, which may be necessary for access to plant, maintenance or fire escape. The rooftop is safe to access and this ensures that the design remains ICNIRP compliant.

No rooftop edge clipping occurs – ICNIRP compliance is achieved, and there will be no impact upon radio performance or service provision – the design solution remains viable.



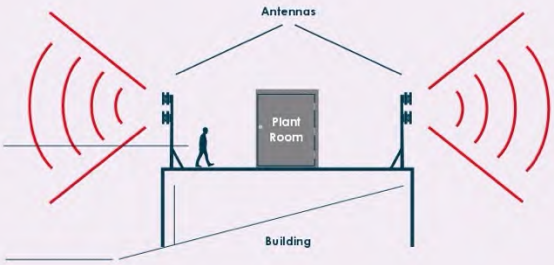
Scenario 3.

Antennas are near edge of rooftop, but less elevation may be required.

This scenario is sometimes considered a less visually sympathetic solution as the antennas are sited on the rooftop edge. However, with this solution there is a reduced necessity for additional antenna elevation, which typically means less structural bracing is needed. The reduced necessity for additional elevation and bracing can, in practice, be the most visually sympathetic solution in some situations, albeit closer to the rooftop edge. This is especially true on medium height to tall buildings, where the natural elevation of the building takes it away from the public realm and provides sufficient antenna elevation for viability.

The person is accessing the rooftop and is not in the exclusion zone. Antennas propagate outward – siting at the edge with outward orientation means that the rooftop remains accessible and there is no rooftop 'clipping'.

ICNIRP compliance is achieved and there will be no impact upon radio performance or service provision – the design solution remains viable.



Annex D: Code of practice working group members

1. This Code of Practice was developed by a Working Group made up of representatives from the following organisations:

    - The Department for Digital, Culture, Media and Sport
    - The Department for Levelling Up, Housing and Communities
    - The Department for Environment, Food and Rural Affairs
    - The Department for Transport
    - Mobile UK
    - Cornerstone Telecommunications Infrastructure Limited
    - Mobile Broadband Network Limited
    - Cellnex UK
    - Wireless Infrastructure Group
    - Local Government Association
    - Planning Officers Society
    - National Association of Areas of Outstanding Natural Beauty
    - National Parks England
    - Ofcom
    - Historic England
    - Natural England
    - National Highways

The Planning Inspectorate

Appeal Decision

Site Visit made on 1 June 2021

by Chris Baxter BA (Hons) DipTP MRTPI

an Inspector appointed by the Secretary of State

Decision date: 18 June 2021

Appeal Ref: APP/G4240/W/21/3268575
Town Lane SW, Dukinfield SK16 5PN

- The appeal is made under section 78 of the Town and Country Planning Act 1990 against a refusal to grant approval required under Schedule 2, Part 16, Class A of the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended).
- The appeal is made by Telefonica UK Ltd against the decision of Tameside Metropolitan Borough Council.
- The application Ref 20/00859/NCD, dated 28 August 2020, was refused by notice dated 30 October 2020.
- The development proposed is installation of a 17.5m slim-line column supporting 6 no. antennas, 2 no. transmission dishes, 2 no. equipment cabinets and ancillary development thereto including a GPS module and 3 no. Remote Radio Units (RRUs).

Decision

1. The appeal is allowed and approval is granted under the provisions of Part 16 of Schedule 2 to the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended), for installation of a 17.5m slim-line column supporting 6 no. antennas, 2 no. transmission dishes, 2 no. equipment cabinets and ancillary development thereto including a GPS module and 3 no. Remote Radio Units (RRUs) at Town Lane SW, Dukinfield, SK16 5PN in accordance with the terms of the application, Ref 20/00859/NCD, dated 28 August 2020, subject to the following conditions:

    1) The development hereby permitted shall be carried out in accordance with the following approved plans: Site Location Maps; Proposed Site Plan; Proposed Site Elevation.

    2) The mast and all equipment housing of the proposed cabinets hereby approved shall be colour coated Burgundy(O4D45) Antique Gold as per street furniture within Dukinfield. The equipment shall be retained in that colour at all times thereafter.

Procedural Matter

2. The provisions of the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended), under Article 3(1) and Schedule 2, Part 16, Class A, requires the local planning authority to assess the proposed development solely on the basis of its siting and appearance, taking into account any representations received. My determination of this appeal has been made on the same basis.

Main Issue

3. The main issue is the effect of the proposal on the character and appearance of the surrounding area.

Reasons

4. The area surrounding the appeal site is characterised predominantly by residential properties of traditional design and sizes as well as some commercial buildings and a day nursery which is adjacent to the site. The site is located within close proximity to a number of highway junctions including the roads of Town Lane, Bates Street, Foundry Street and Crescent Road. The area has common street furniture paraphernalia including street lighting, road signs, bus stops, trees, bollards and an existing monopole telecommunications mast with associated equipment cabinets.

5. The proposal would be taller than the majority of structures and buildings in the area. However, telecommunication structures are common features in built up areas and the proposal, whilst being visible, would not necessarily be highly noticeable as it would blend in with similar structures such as street lighting and the existing monopole mast.

6. The proposed monopole structure would be taller and thicker, including exposed antennas, dishes and RRUs, compared to the existing street lighting and existing monopole structure in the area. The proposed monopole would not be a bulky structure though and would assimilate well with the existing high structures in the area when viewed against the surrounding skyline. The antennas, dishes and RRUs would be slim line features and not protrude significantly from the main monopole structure. The proposal including the antennas, dishes and RRUs would not have a cluttered appearance or be visually intrusive to the surrounding area.

7. The proposed equipment cabinets, including the monopole structure, would be positioned to the rear of the footpath and there would be minimal opportunity for them to be screened by vegetation. Nevertheless, these types of equipment cabinets are not uncommon features on public footpaths and would be similar in nature to existing cabinets in the area including the cabinets associated with the existing monopole. The scale and design of the equipment cabinets are modest, they would be in keeping with similar structures in the area and would not have a detrimental effect on the appearance of the street scene. Due to positioning of the equipment cabinets and the monopole, there would be sufficient space on the footpath to ensure that they do not become an adverse obstruction to pedestrians.

8. Collectively, the elements of the proposal would be visible in the surrounding area including views from Town Lane, Crescent Road and Foundry Street. Although due to its design, siting and bulk, it would not introduce an incongruous feature that would be at odds with the established character and appearance of the area.

9. Accordingly, the proposal would not have a harmful effect on the character and appearance of the surrounding area. The proposal accords with U2 and C1 of the Tameside Unitary Development Plan Written Statement 2004 and the National Planning Policy Framework which seek development for telecommunications to have no unacceptable impact on appearance of buildings and townscape, and to minimise visual impact.

Other Matters

10. I have had regard to concerns raised from local residents which include matters on health issues, trees, nearby war memorial, pedestrian obstruction, living conditions of neighbouring occupiers including outlook and discrepancies on submitted information. I have given careful consideration to these matters, some of which the Council have not raised any objections to, but they do not lead me to a different conclusion on the main issue nor do they amount to harm in which would justify withholding consent.

Conditions

11. Beyond the standard conditions which are imposed by the Town and Country Planning (General Permitted Development) Order 2015, I consider it necessary to add a condition relating to the identification of plans to provide certainty and clarity as well as a condition relating to colour finish in the interests of character and appearance.

12. The Council had suggested a time limit condition of three years however, the standard conditions in the Town and Country Planning (General Permitted Development) Order 2015 refer to a five years time limit condition. I am satisfied that a five year time limit is reasonable and necessary.

Conclusion

13. For the reasons given above, I conclude that the appeal should be allowed and prior approval should be granted.

Chris Baxter

INSPECTOR

The Planning Inspectorate

Appeal Decision

Site visit made on 2 June 2020

by Peter Mark Sturgess BSc (Hons), MBA, MRTPI

an Inspector appointed by the Secretary of State.

Decision date: Friday, 17 July 2020

Appeal Ref: APP/M5450/W/20/3244354
Belmont Circle Streetworks, Belmont Circle, Kenton Lane, Harrow HA3 8RF

- The appeal is made under section 78 of the Town and Country Planning Act 1990 against a refusal to grant planning permission.
- The appeal is made by MBNL against the decision of the Council of the London Borough of Harrow.
- The application Ref P/2476/19, dated 3 June 2019, was refused by notice dated 26 July 2019.
- The development proposed is the removal and replacement of the existing 12.5m monopole with a 20m monopole, 12no antennas, equipment cabinets, the removal of the existing 12.5m monopole, 3no antennas, redundant equipment cabinets and development ancillary thereto.

Decision

1. The appeal is allowed and planning permission granted for the removal and replacement of the existing 12.5m monopole with a 20m monopole, 12no antennas, equipment cabinets, the removal of the existing 12.5m monopole, 3no antennas, redundant equipment cabinets and development ancillary thereto, at Belmont Circle Streetworks, Belmont Circle, Kenton Lane, Harrow HA3 8RF in accordance with planning application Council ref P/2476/19 dated 3 June 2019, subject to the following conditions:

    1) The development hereby permitted shall begin no later than 3 years from the date of this decision.

    2) The development hereby permitted shall be completed in accordance with details supplied with the application: declaration of conformity with ICNIRP dated 2019-06-03; supplementary information dated 03-06-2019; covering letter dated 3 June 2019; Plan No 002 Site Location Plan, issue A; Plan No 100 Existing Site Plan, issue A; Plan No 150 Existing Elevation, issue A; Plan No 215 Max Configuration Site Plan, issue A; Plan No 265 Max Configuration Elevation, issue A.

    3) The electronic communications apparatus provided in accordance with this permission shall be removed from the land upon which it is situated as soon as reasonably practical after it is no longer required for electronic communications purposes and the land shall be restored to its former condition.

    4) The existing monopole and associated cabinets and equipment shall be removed from the site within 60 days of the first operation of the equipment hereby approved.

Main Issue

2. The main issue is the effect of the proposal on the character and appearance of the area.

Reasons

3. Policy DM1 of the Harrow Development Management Policies Local Plan (LP) (2013) seeks, amongst other things, to resist proposals detrimental to local character and appearance and have regard to the height of proposed buildings in relation to their location, surroundings and impact on neighbouring occupiers. Policy DM49 seeks, amongst other things, to ensure that the installation of new telecommunications equipment minimises its impact on the character and appearance of the area within which it is located.

4. The National Planning Policy Framework (the Framework) recognises the importance of the establishment of high quality and reliable communications infrastructure, such as 5G, as being essential to economic growth and social wellbeing. Where new equipment is required the Framework requires that it is sympathetically designed and camouflaged where appropriate.

5. The appellant has argued that the new mast is required in order to facilitate the roll out of the 5G network and is the minimum capable of accommodating the 5G equipment and meeting ICNIRP standard. I also note that the operators have investigated alternative sites for the proposed mast. The proposal is also a mast share between two operators.

6. The site lies at the side of a busy and large roundabout in front of a petrol filling station, adjacent to a cycle track. The roundabout is surrounded on three sides by three storey high mansion blocks with shops, restaurants and takeaways on the ground floors. The centre of the roundabout is covered in well maintained trees and other vegetation. Belmont Circle rises from the petrol filling station to the mansion blocks on the opposite side, with the appeal site and the petrol filling station lying on the lower side of Belmont Circle. This change in levels, to a certain extent, helps to mitigate the impact of the height of the mast when viewed from the opposite side of the circus. The front of the petrol filling station, where the proposed mast is proposed to be located, is currently the site of two 12.5m masts and associated cabinets. There are also prominent streetlights in the locality.

7. Whilst a degree of increased visual impact over and above the existing masts is inevitable due to the increase in height of the proposed mast, it is nevertheless the minimum height and girth capable of providing the improved services and introducing 5G technologies to the area, whilst also satisfying ICNIRP standards. It is also set away from residential development

8. I find that the impact of the proposed mast on the character and appearance of the area, despite its height, would be low. I base this assessment on the siting of the proposed mast, adjacent to existing telecommunications equipment, against the backdrop of a petrol filling station and surrounded by other street furniture such as streetlights and street signage associated with the roundabout and cycle track. This is an urban location where there is already street paraphernalia so it will not appear out of place or especially obvious in that context. Additionally, when the site is viewed from the opposite side of

Belmont Circle the intervening vegetation on the roundabout and the change in levels would break up the outline of the mast and help to reduce its prominence. I therefore consider that the proposal accords with the Policies of the LP. Its siting minimises its effect on the character and appearance of the area within which it is located, and it is not detrimental to local character and appearance, given the street furniture already present in the locality, the local topography and the vegetation on the roundabout. I also give weight to the fact that this is a proposed mast share between two operators. I have also taken account of the appellant's attempts to find a suitable alternative site and the advice given in the Framework concerning the siting of telecommunications masts and find that these also add weight to my decision.

Conditions

9. In addition to the standard time limit and a condition referencing the approved plans – for the avoidance of doubt – there needs to be conditions that ensure the communications apparatus is removed once it is no longer needed and that the land is restored to its former condition once it is removed. I note that the appellant has suggested a further condition requiring the removal of the existing monopole within 60 days of the first operation of the mast which is the subject of this appeal. I consider that a condition such as this would assist in reducing the clutter in the area once the proposal which is the subject of this appeal has been implemented.

Conclusion

10. I find that having regard to all matters before me, including the policies of the development plan, when taken as a whole, that the appeal should be allowed, and planning permission granted.

Peter Mark Sturgess

INSPECTOR

The Planning Inspectorate

Appeal Decision

Site visit made on 22 February 2022

by F Wilkinson BSc (Hons), MRTPI

an Inspector appointed by the Secretary of State

Decision date: 1 March 2022

Appeal Ref: APP/P4225/W/21/3283532
Land at Melbourne Road, Balderstone, Rochdale, Greater Manchester OL11 2EQ

- The appeal is made under section 78 of the Town and Country Planning Act 1990 against a refusal to grant approval required under Article 3(1) and Schedule 2, Part 16, Class A of the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended).
- The appeal is made by Cornerstone and Telefonica UK Ltd against the decision of Rochdale Borough Council.
- The application Ref 21/00158/TELE, dated 20 January 2021, was refused by notice dated 25 March 2021.
- The development proposed is the installation of a 20m slim-line column supporting 6no. antennas, 2no. transmission dishes, equipment cabinets and ancillary development thereto including a GPS module and 3no. remote radio units (RRUs).

Decision

1. The appeal is allowed and approval is granted under the provisions of Article 3(1) and Schedule 2, Part 16, Class A of the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended) for the installation of a 20m slim-line column supporting 6no. antennas, 2no. transmission dishes, equipment cabinets and ancillary development thereto including a GPS module and 3no. remote radio units (RRUs) at land at Melbourne Road, Balderstone, Rochdale, Greater Manchester OL11 2EQ in accordance with the terms of the application Ref 21/00158/TELE dated 20 January 2021, and the plans submitted with it including plan numbers 100 rev A; 201 rev A; 301 rev A.

Preliminary Matters

2. The principle of development is established by Article 3(1) of the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended) (the GPDO). The provisions of the GPDO require the local planning authority to assess the proposed development solely based on its siting and appearance, taking account of any representations received. I have determined the appeal on the same basis. The provisions of Schedule 2, Part 16, Class A of the GPDO do not require regard to be had to the development plan. I have nevertheless had regard to the policies of the development plan and the National Planning Policy Framework 2021 (the Framework) only in so far as they are a material consideration relevant to matters of siting and appearance.

Main Issues

3. The main issues are:

   - the effect of the proposed development on the character and appearance of the area; and
   - if there is any harm, whether this is outweighed by the need to site the proposed development in the location proposed having regard to the potential availability of alternative sites.

Reasons

Character and Appearance

4. The appeal site is located on the north side of Melbourne Road close to its junction with Oldham Road. It comprises an area of highway verge that separates the pavement from the road. The surrounding area is mainly residential, with a mix of commercial and residential uses on Oldham Road in the vicinity of the site.

5. There are several vertical structures in the vicinity along Oldham Road including street lighting columns at regular intervals, bus stop signs, traffic lights and an existing telecommunications mast of 15m in height with associated equipment approximately 300m to the north. There are also street lighting columns on Melbourne Road, including within the highway verge just to the east of the site. A road sign is also located here. There are a number of trees immediately to the west of the site, as well as several within the verge to the north of the pavement including two located to the rear of the site.

6. The height and width of the mast has been reduced to the minimum necessary for its purpose. The antennas would be of a similar width to the mast. It would therefore have a relatively simple form. However, at 20m high, the mast would be considerably higher and have a greater width than the existing vertical structures in the vicinity.

7. The mast would be visible for quite a distance when travelling along Oldham Road. However, it would be mainly the top section that would be visible until in relatively close proximity, due to the screening effect of the buildings fronting onto the road and the nearby trees. From most viewpoints along this road, the mast would be viewed in conjunction with other vertical components and so would not be seen as an isolated vertical structure. The light grey colour proposed would help to reduce its contrast with the sky.

8. From a distance, whilst the mast would be prominent in certain perspectives along Oldham Road, it would not be a dominant or incongruous feature. However, in closer proximity, the mast would be more apparent in the street scene when viewed from public vantage points. The mast would also be apparent from some vantage points along Badger Lane, although it's lower section would be seen against the backdrop of vegetation, which would soften its visual impact. It would also be visible from Holly Street, though views would mainly be of the top section against the sky given the screening effect of the nearby trees and dwellings, which would lessen its prominence.

9. The mast would be visible for much of the length of Melbourne Road. The trees would provide some screening especially in close views, although the mast

would be more clearly visible when the trees are not in leaf. The mast would be seen against the skyline when viewed from locations further along Melbourne Road given its height, and it would be seen at some distance.

10. The rear first floor windows of the dwellings at 6 and 8 Melbourne Close and the side first floor window of 414 Oldham Road would face towards the site. Several windows of the bungalow at 416 Oldham Road would also look towards it. Although the mast would not be directly in front of these windows, there would be clear views of it. It would affect the outlook for those residents to an extent. However, given the separation distance, the filtering effect of the trees and the nature of the mast which would take up a relatively narrow part of the view, the effect on outlook would not be unacceptable.

11. From certain vantage points it would be possible to see the mast in the same view as the existing one to the north. They would, however, be viewed in association with the street lighting columns along Oldham Road. Furthermore, there would only be very limited vantage points where the full height of both masts would be visible in the same view. There would be a reasonable separation distance between the two masts when viewed sequentially. As such, cumulative effects would not be significantly harmful.

12. The scale and design of the equipment cabinets are modest, and they would be seen against the backdrop of the sloping grass verge to the north and the trees to the rear. The siting and design of the equipment cabinets would not therefore have a detrimental effect on the character or appearance of the street scene.

13. Overall, although the appellant has sought to minimise the visual impact of the proposed development through siting and design, given its height, the mast would be a noticeable feature in the street scene from close quarters. There would therefore be moderate harm to the character and appearance of the area.

14. Accordingly, the proposed development would conflict with Policies P1, P3 and DM1 of the Rochdale Adopted Core Strategy, 2016. Collectively these policies require a high quality design, which Policy P1 identifies as being particularly important in Local Improvement Corridors such as Oldham Road, and that development proposals should be compatible with surrounding land uses. There would also be some conflict with the requirements of the Framework relating to communications infrastructure, which requires telecommunications development to be sympathetically designed and camouflaged where appropriate, amongst other matters. However, as set out above, in my view, given the particular nature of the scheme and its surrounding context, such harm may fairly be described as limited in extent.

Alternative Sites

15. Paragraph 115 of the Framework states that the number of communications masts and the sites for such installations should be kept to a minimum consistent with the needs of consumers, the efficient operation of the network and providing reasonable capacity for future expansion. It encourages the use of existing masts.

16. The appellant has investigated alternative sites including mast sharing and co-location as required by paragraph 117 of the Framework. As described in the

appellant's supplementary information and appeal statement, 17 locations were assessed, which would provide similar coverage as proposed here. Given the topography, surrounding context, and land availability, none would achieve comparable benefits.

17. I also note that in respect of a number of the options, rightly, the appellant argues that similar objectives could be achieved but only at the expense of development with greater adverse effects in terms of siting or appearance. These include: existing installation at Oldham Road; footway at Oldham Road; grassed area behind the bus stop shelter opposite the car wash; convenience shop at Oldham Road/Badger Lane; Canberra Way Apartments; Kensington Place, Connaught Avenue; La Scala Restaurant; two storey buildings in between Wasp Avenue and Balderstone Road and similar building across Balderstone Road; Balderstone Road, adjacent to Balderstone Park; Hill Top Drive/Melbourne Road; green space in between Perth Road and Caesar Street; footway along Oldham Road from the junction with Melbourne Road to the junction with Broad Lane.

18. The need for the new site is partly to facilitate the appellant's roll out of the 5G network and improve service coverage and capacity in the area. The Framework recognises that advanced, high quality and reliable communications infrastructure, such as 5G, is essential for economic growth and social wellbeing, and that its expansion should be supported. The appellant has investigated other sites and given that no less harmful sites that would meet the technical requirements have been found, I give substantial weight to the benefits that would result from the proposed development.

19. In weighing all the above matters, the benefits that would be delivered by the proposed development in terms of enhancing local telecommunication coverage would outweigh the moderate harm to the character and appearance of the area.

Conditions

20. The permission granted for the development under Article 3(1) and Schedule 2, Part 16, Class A is subject to conditions set out in Paragraphs A.3(9), A.3(11) and A.2(2) of the GPDO, which specify that the development must, except to the extent that the local planning authority otherwise agree in writing, be carried out in accordance with the details submitted with the application, must begin not later than the expiration of five years beginning with the date on which the local planning authority received the application, and must be removed as soon as reasonably practicable after it is no longer required for electronic communications purposes and the land restored to its condition before the development took place.

Conclusion

21. For the above reasons, having had regard to all matters raised, I conclude that the appeal should be allowed, and prior approval should be granted.

F Wilkinson

INSPECTOR

Department for Digital, Culture, Media & Sport

Ministry of Housing, Communities & Local Government

7th March 2019

Collaborating for digital connectivity

Government is committed to supporting investment in high-quality, reliable digital connectivity so that communities can benefit from faster economic growth and greater social inclusion. It is essential to keep pace with growing demand for internet bandwidth and mobile data from local businesses, residents and those who visit our communities. As outlined in the Future Telecoms Infrastructure Review, the Government would like to see nationwide full fibre coverage by 2033. We would also like the UK to be a world leader in 5G, with the majority of the population covered by a 5G signal by 2027. We are writing to ask for your help in supporting the investment necessary to achieve these objectives.

Recent years have seen substantial investment in mobile and fixed digital infrastructure across the UK. In 2016 the Gross Value Added from the digital sector was £116.5 billion, which equates to 6.7% of the UK economy, so the benefits for individuals and the UK as a whole are substantial. While mobile coverage across the UK has been significantly improving, there are still too many areas where coverage is poor. The UK has now achieved 95% superfast broadband coverage but still only 6% full fibre coverage.

We need to create the market and policy conditions necessary to support the large-scale commercial investment required to extend and future-proof digital connectivity. A key part of this is making it easier for operators to deploy infrastructure. To help to achieve this, the Government recently reformed the Electronic Communications Code - the statutory framework which underpins agreements between communications network providers and those in both the private and public sector who can provide sites for the installation of network equipment. The purpose of the reforms was to make it easier and more cost effective for communications network providers to deploy and maintain digital infrastructure.

Local authorities have an essential role to play as site providers. As Chief Executives, you can support investment in digital communications infrastructure by ensuring your organisations have policies and procedures in place that promote effective engagement with the digital communications industry and minimise barriers to deployment.

We have published guidance for local authorities and network operators on areas such as digital leadership, considerations for the local planning authority, streetworks, and on making local authority assets available to network operators for the installation of networks. This advice follows on from the Digital Infrastructure Toolkit, which was published in 2018 and provides advice for central government and network providers regarding access to government sites.

We welcome the efforts that some local authorities have already made to enable network deployment. In future, the Government intends to publish information on how effectively local authorities are engaging with industry and adopting the principles outlined in this guidance. We would, therefore, ask you:

1. To ensure your teams are aware of, and using, the guidance the Government has provided to improve broadband and mobile connectivity in their areas.
2. If you have not already, identify a Digital Infrastructure Champion within your organisation and share these contact details with local.connectivity@culture.gov.uk, and
3. In particular, to ensure your teams are granting access to your assets and infrastructure effectively to support the rollout of full fibre and mobile networks.

I hope you agree that we should work hand in hand to support the significant new investment in digital infrastructure that can benefit our communities. With this in mind, Government will give significant weight to the extent to which local authorities have adopted the principles contained in our guidance when allocating funding for future DCMS projects aimed at boosting investment in fibre or mobile networks.

If you or any of your colleagues have any questions, please contact DCMS at localconnectivity@culture.gov.uk.

Thank you in advance for your cooperation.

Department for
Digital, Culture,
Media & Sport

INDUSTRIAL STRATEGY

Connected Growth

A manual for places working to boost their digital, cultural and social connectivity



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Susan and Bill Marlor in front of The Big One rollercoaster, Blackpool, Lancashire. The sculpture is The Swivelling Wind Shelter designed by McChesney Architects and Atelier One.

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Foreword from Secretary of State

This manual represents an offer from DCMS to local areas in England planning for future growth and prosperity. DCMS sectors are the foundations of prosperity because they make places where people want to live, work, visit and invest.

As this manual shows, DCMS sectors are central to our economic future. Digital and creative industries are the fastest-growing sectors in the country, and we are only beginning to realise the potential of technology and creativity in contributing to a wealthier and more sustainable world.

Equally importantly, DCMS sectors make 'liveable places'. Like housing and transport, our digital sectors represent crucial local infrastructure, enabling individuals and businesses to be part of the wider economy. Arts and culture, heritage, sport and libraries create the environment that helps individuals flourish, and the shared spaces that bring communities together. Meanwhile the rich and diverse range of civil society organisations provides vital care and support for the country's most disadvantaged people, and develops innovations that are renewing and reshaping public services.

The future for local communities is what we call 'connected growth'. Digital, social and cultural connectivity will ensure our economy grows in a way that is strong and sustainable. Our sectors unite communities, and in so doing unite the country.

I am proud to present the work which my Department, and our colleagues in the arms-length bodies we support, such as the Arts Council and Sport England, are doing to help places flourish. I hope Local Enterprise Partnerships and other policy-makers will make good use of this manual and help our sectors to make their full contribution to local prosperity.



Rt Hon Jeremy Wright QC MP

Secretary of State for Digital, Culture, Media and Sport

What this manual is for

The Government's Industrial Strategy (2017) included the following commitment: 'We will work in partnership with places to develop Local Industrial Strategies, which will be developed locally and agreed with government.' In 2018 the government announced that reformed and stronger Local Enterprise Partnerships will adopt a single mission: to promote productivity by delivering Local Industrial Strategies.

This manual, which will be updated regularly, is designed to help you develop your Local Industrial Strategy (LIS) by showing how DCMS sectors can support the productivity of local places. It builds on existing guidance, providing a source of advice on the best processes for engaging with communities and stakeholders to develop your LIS, as well as being an accessible source of information and intelligence that you can dip into for a better understanding of DCMS policies and programmes.

Our aim is to ensure that your evidence base, objectives, activities and monitoring draw on best practice from across the country. We also want to provide information on the funding streams available from central government and point to other opportunities - for instance, programmes funded by the National Lottery - that you my wish to explore.

Finally, the manual explains who, in DCMS or our arms-length bodies, can help advise you directly on aspects of your LIS.



Queen Victoria Monument, Piccadilly Gardens, Manchester

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Introduction: Connected Growth
why DCMS sectors are central to local prosperity

About DCMS

The Department for Digital, Culture, Media and Sport (DCMS) drives growth, enriches lives and promotes Britain abroad. We protect and promote our cultural and artistic heritage and help businesses and communities to grow by investing in innovation and highlighting Britain as a fantastic place to visit. We are responsible for digital technology policy; the evolving challenge of internet regulation and cyber security; data and Artificial Intelligence; the creative industries; and the media. We give the UK a unique advantage on the global stage, striving for economic success.

We have around 900 staff working for DCMS, but most of the work that people know us for is carried out by the 45 public bodies that support us. These range from Arts Council England and the National Lottery Communities Fund to Historic England, UK Sport, the British Library and the BBC.

DCMS works closely with other government departments, as a key enabler of policy priorities in healthcare, education, business, skills and employment.

Connected Growth

DCMS sectors directly drive growth and productivity. There are 5.4 million jobs in DCMS sectors, accounting for 16% of all UK jobs.[1] In 2017, all DCMS sectors contributed £268bn to the economy, accounting for nearly 15% of goods and services produced in the UK.[2] The Digital sector contributed £131bn to the UK economy, having grown by a third since 2010 and the Creative Industries are now worth over £100bn to the UK economy.[3]

These are among the most promising sectors for the future. Artificial Intelligence (AI), for instance, has the potential to add £232bn to the UK economy by 2030.[4] The digital era represents an enormous opportunity for a further wave of growth in the creative industries, and the sector's share of the workforce is likely to rise steadily in coming years.[5]

However, the British economy requires more than technology, especially if the benefits of growth are to reach all parts of the country. Economic growth has social and cultural roots: places need to be liveable in order to be productive.

DCMS's contribution to local prosperity is the connectivity we help create, the productive connections between people, businesses, institutions and communities. Connectivity happens because of economic infrastructure, including the right transport links, housing and business facilities. It also happens because of digital, social, creative and cultural infrastructure.

Digital connectivity enables collaboration and makes all places (including remote or disadvantaged ones) viable for work in the global economy. The creative sector, and the industries which rely on creative disciplines to thrive, gives rise to prosperous communities with good jobs and greater earning power. Cultural activity unites us (creating so-called 'bonding' social capital) and makes our differences fruitful ('bridging' social capital). The institutions of civil society create gathering places and enable common purpose.

Our ambition is to create an institutional environment for the growth of local economic and social prosperity over the long-term. We call this connected growth.

By supporting DCMS sectors, you will be investing in some of the most productive sectors of the UK economy, sectors which represent the future of the world. You will also be strengthening the foundations of prosperity, creating places where people want to live, work, visit and invest. You will also help ensure that people and places everywhere can contribute to and benefit from inclusive economic growth.

1 DCMS Economic Estimates (2017) Employment, p.1

2 DCMS Economic Estimates (2017) GVA, p.6

3 DCMS Economic Estimates (2017) GVA, p.6

4 PWC, The Impact of Artificial Intelligence on the UK Economy, 2017, p.4

5 NESTA, Creativity vs. Robots - The Creative Economy and the Future of Employment, 2015, p.6

Inclusive Growth

Over the last four and a half decades, the UK has experienced increasing prosperity alongside a growth in income inequality and in relative poverty. The structural imbalances of our economy have created wide disparities in living standards, cementing social and geographic divisions. Growth has also been uneven within towns and cities. When the fortunes of a deprived neighbourhood are improved, the challenge is to ensure that the original residents benefit as well as new workers who arrive from elsewhere.

The response to these challenges is increasingly known as 'inclusive growth', and is a government priority.[6] This is a contested concept, with multiple definitions. However, it is generally seen as a way to reduce socio-economic inequality within and between areas. It emphasises the need for growth that benefits all parts of society, generally by means of ensuring that people everywhere can both contribute to and benefit from economic growth. It is not sufficient - or sustainable - for some people, places and sectors to do well, and then for government to redistribute part of their income to everyone else. As far as possible, everyone should be involved in the production of economic growth.

This is a complex challenge, but it is one in which DCMS sectors have an important role to play. For example, improved digital infrastructure and digital skills lower the barriers to social and economic participation for marginalised citizens. Culture, heritage and tourism improve the quality of life and wellbeing within local communities. Civil Society policies and programmes deliver increased civic participation, engender community cohesion and help to increase people's overall satisfaction with their lives.[7] The Government Inclusive Economy Unit is developing investment models to increase the amount of private capital that flows into less prosperous places. Our work on Social Value provides local commissioners with the tools to 'build in' social benefits to the procurement of government contracts, for example in housing and skills.

The Government wants to ensure that future economic growth does not leave people and places behind. Our sectors will be critical to deliver this mission.

Supporting Local Industrial Strategies

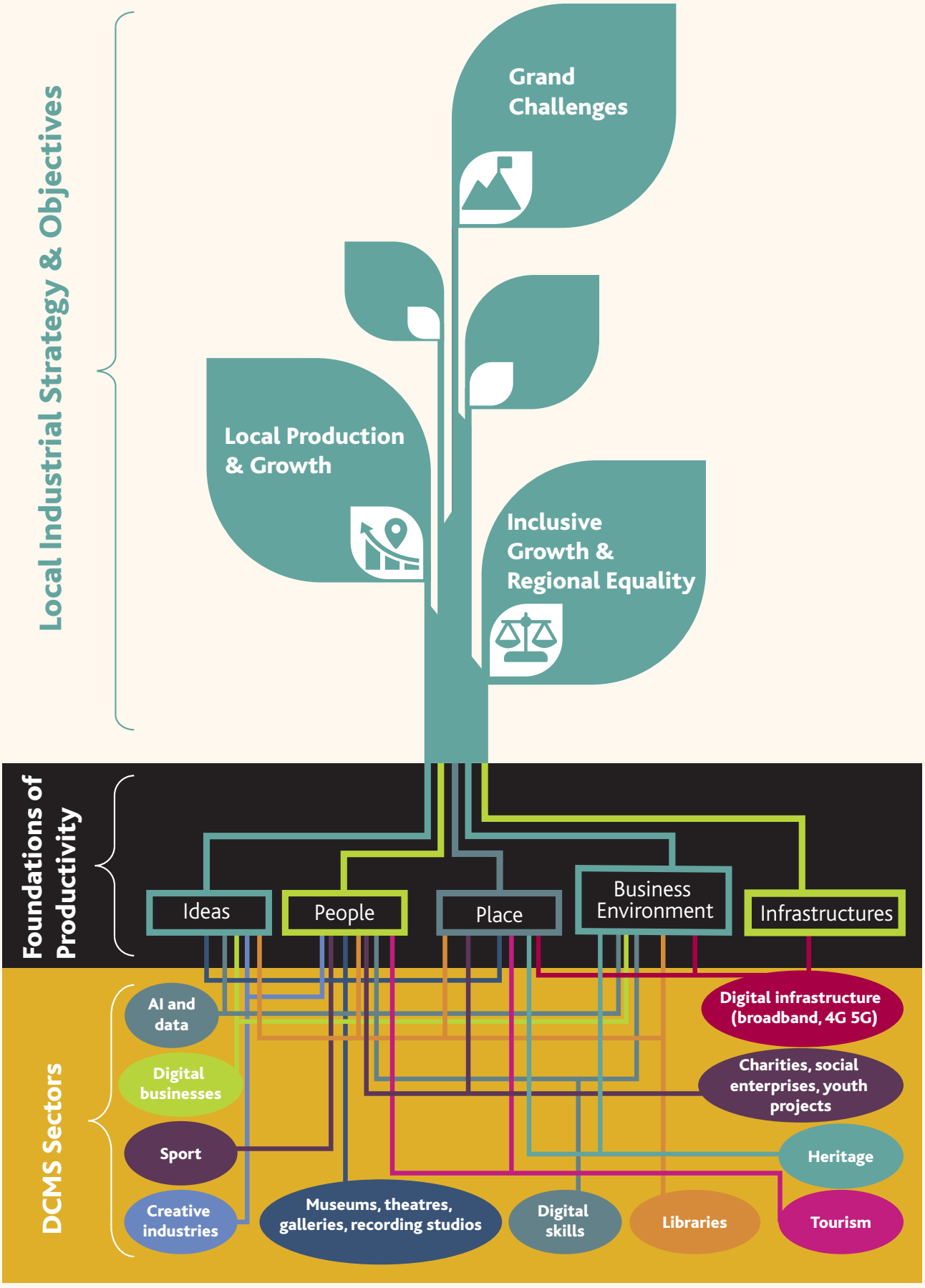
Our sectors directly contribute to boosting productivity and earning power, the key objectives set out in the Industrial Strategy, and to the LISs which LEPs are producing. In developing a LIS, many places' approaches will be shaped by the 'five foundations of productivity' set out in the Industrial Strategy (Ideas, People, Infrastructure, Business Environment and Place), and may involve meeting the government's Grand Challenges (Artificial Intelligence and data, our ageing society, clean growth, and the future of mobility).

The model on the next page demonstrates how DCMS sectors create connected growth and can contribute to the Industrial Strategy foundations and Grand Challenges:

6 Conservative Party Manifesto, 2017, p.35

7 Increasing civic participation: Nesta (2016), People Helping People; Engendering community cohesion: Ipsos MORI (2015), Evaluation of the Community Organisers Programme; Increasing life satisfaction: Centre for Ageing Better (2016), The benefits of making a contribution to your community in later life

Supporting Local Industrial Strategies



The West Midlands and Greater Manchester: Trailblazers for connected growth

The West Midlands and Greater Manchester Combined Authorities have led the way on developing their LISs. They both illustrate the importance of connected growth, and the key role that DCMS sectors can play in LISs.

West Midlands

West Midlands' LIS will build on key sectoral strengths and builds out from landmark DCMS investments, including the Commonwealth Games in 2022, Coventry City of Culture in 2021, and awarding the West Midlands the first multi-city 5G test bed.

Understanding specific sectors' strengths has been key to the West Midlands approach to developing its LIS. The LEP identified strengths within its creative sector, which includes important maker clusters and a globally significant concentration of high-end production, gaming and innovative and immersive content, centered on film, TV and virtual reality.

Major improvements to digital infrastructure will provide jobs and growth, with the West Midlands, trialling new 5G applications and services at scale, paving the way for 5G rollout nationally. The application to industry will be initiated in areas of distinctive strength, particularly health, construction and automotive sectors; benefiting people's lives through participation in new digital tech and transformed public services.

A pragmatic approach to inclusivity informs the West Midlands Local Industrial Strategy. It prioritises ensuring that all residents experience the benefits of rising prosperity. This will create more growth, and the success of the region can best be realised if it capitalises on creativity, talent and ideas in all communities. This will be driven by a place-based approach to change – bringing together transport, housing, skills, Public Service Reform and wellbeing investment.

Greater Manchester

Greater Manchester's LIS is underpinned by the importance of people and connectivity, in line with its landmark Independent Prosperity Review which identified infrastructure and digital innovation as key drivers of productivity for the city region. The Combined Authority has taken a collaborative and inclusive approach to the development of its strategy, leading to a focus on giving people the skills to thrive in the emerging economy; accelerating access to new health technologies to address the local health gap; and sharing prosperity throughout the city region.

The Strategy reflects Greater Manchester's history and strengths in the creative industries. As well as cultivating high-growth firms, the LIS makes clear the role of creative and digital entrepreneurs in revitalising town centres and high streets; enhancing digital skills; and putting public trust at the centre of developing technologies and uses of public data.

GMCA consulted the public extensively over six-weeks, holding twenty events. Council Leaders had a leading role shaping the LIS to focus on the entire region, rather than a small number of high-value assets. This led, for instance, to proposing Greater Manchester's 'advanced materials' manufacturing sites be located in the North East of the city-region, rather than in Manchester. The LIS builds on other local work, most notably the Greater Manchester Strategy, the recently released first Greater Manchester Cultural Strategy and the draft Spatial Framework.

Part 1. Process: how to build a Local Industrial Strategy

About Local Industrial Strategies

Government is committed to Local Industrial Strategies (LISs) so that all places:

- are able to increase productivity and realise their potential: building on well-evidenced and distinctive strengths aligned with the national Industrial Strategy;
- set out the spatial impacts of national and local policy across our cities, towns and rural areas: informing priorities and choices and demonstrating how they will allow all communities to contribute to, and benefit from, economic prosperity.

LISs should be long-term and aligned to the national Industrial Strategy. They will be developed locally and agreed with government. LISs need to be based on evidence, draw on collaboration with a variety of partners, prioritise ambitions and set out clear plans to evaluate progress.

There is a variety of guidance available on developing a LIS, including from the What Works Centre and the LEP Network, which supplement the government's Local Industrial Strategy policy prospectus. The Local Industrial Strategy Analytical Panel, led by the Department for Business, Energy and Industrial Strategy, sets out the following process for developing a LIS:

- Set out a robust and open evidence base.
- Map out specific opportunities and challenges.
- Work in partnership with public and private stakeholders to achieve ambitions.
- Prioritise specific, achievable and long-term ambitions
- Set out clear plans to evaluate progress.

Our guidance supplements this, to support you as you develop priorities involving DCMS sectors.

Each LIS will be different. Part 2 of this manual provides information on each DCMS sector and how to make the best use of it, should your LEP area stand to benefit from this sector. But there are also some cross-cutting principles which, on the basis of the evidence, we think will make your LIS most likely to succeed. These are: involving local people in developing your LIS; maximising digital sectors to drive connected growth; designing the LIS around local anchor institutions; harnessing the power of responsible business; and rural proofing your LIS. Each of these is covered below.

Involving local people in developing your LIS

Extensive consultation with local businesses, public partners and civil society, will allow you to develop a LIS that responds to the unique strengths of your local area, to ensure every community reaches its economic potential and can access good jobs.

DCMS encourages you to use a co-design approach for the development of your LIS, putting communities at the heart of the design and delivery process. This approach will help to identify what your LIS needs to address and prioritise in order that current and future residents benefit from economic growth. Communities often know best what their local challenges are, what assets they have, and can be part of the solution to local challenges. Government has issued guidance on how to involve citizens in the design and delivery of local interventions.[8]

DCMS encourages LEPs to engage with those in our communities whose voices are least often heard. For example, Youth Voice approaches, such as youth forums and co-designing projects with young people, can be used to enable young people to have their voices heard on local issues and involve them in decision making. Government's Civil Society Strategy seeks to change the culture of policy design and implementation so that young people are systematically involved in shaping the policies that affect them. You should consider working with local Youth Voice projects, such as youth councils, to ensure young people are able to be actively involved in local interventions.

8 DCMS & Office for Civil Society, A description of Social Action, 2017

The table below shows some of the available tools to engage communities, with the least ambitious models on the left and the most ambitious on the right. We encourage you to focus on the approaches and tools to the right of the table, as these will help you actively engage with, and benefit from, local people who can identify the barriers to productivity and sources of inequality that your LIS will need to respond to.

	Inform (--) →	Consult (-) →	Involve (0) →	Collaborate (+) →	Empower (++) →
Public Participation Goal	Provide the public with balanced and objective information to assist them in understanding the problems, alternatives and/or solutions.	Obtain public feedback on analysis, alternatives and/or decisions.	Work directly with the public throughout the process to ensure public issues and concerns are consistently understood and considered.	Partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	Place final decision-making in the hands of the public.
Promise to the Public	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and issues are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible	We will implement what you decide.
Example Tools	- Fact sheets - Websites - Open houses	- Public comment - Focus groups - Surveys - Public meetings	- Workshops - Deliberate poling	- Citizens Advisory committees - Consensus building Participatory decision making	- Citizens juries - Ballots - Delegated decisions

IAP2 Public Participation Spectrum, International Association for Public Participation

Maximising digital sectors to drive connected growth

As set out in Part 2, the digital industries have huge potential for growth. They, and digital infrastructure, also represent an enormous opportunity for other parts of our economy and society to prosper.

Tech is increasingly important as the line between sectors becomes more blurred and businesses work in both digital sectors and other sectors. For instance, in 2017 IT, software and computer services was the largest subsector of the creative industries with nearly 145,000 businesses, almost half of all creative industries businesses.[9]

There are opportunities for you to support the improvement of digital capabilities that can make every business in every sector more productive, wherever they are located. It has been estimated that building up digital capability within businesses and charities could unlock up to an additional £84.5bn turnover if they were to develop high digital

9 DCMS Sectors Economic Estimates (2017) - Business Demographics, p.6

capability.[10] Please see the digital skills section, which explains more about what LEPs could do in this space.

Government's Digital Strategy sets out the opportunities of developing a safe and secure cyberspace; developing digital tools, techniques and technologies to improve public services; and, using data to drive innovation this will deliver a thriving, inclusive, outward-looking digital economy, with the benefits and opportunities spread across every region, and every community. This includes putting the UK at the forefront of the 5G and Artificial Intelligence revolutions, which present huge opportunities to boost productivity and grow the economy.

Designing the LIS around local anchor institutions

The sector sections in Part 2 provide details of organisations with particular sectoral expertise. We also encourage you to consider the role that anchor institutions can play. An anchor institution is one that, alongside its main function, plays a significant and recognised role in a place by making a strategic contribution to the local economy.[11] As the Creative Industries Toolkit for Cities and Regions sets out, local 'anchor institutions' play a vital role in defining post-industrial communities. UK Commission on Employment and Skills defines anchor institutions by the following characteristics:

- Spatial immobility: tied closely to a geographic area, through invested capital, mission and relationships with employees and local communities.
- Size: large employers with significant purchasing power. These factors influence the level of impact such institutions can have on the local economy.
- Non-profit: these institutions tend to operate not-for-profit; it is much simpler for private businesses to move, meaning there is no guarantee they will continue serving the local community in the long-term. However, there are examples of for-profit organisations playing the role of an anchor.[12]

Examples of anchor institutions operating in DCMS sectors include universities, theatres, civil society organisations, sports clubs, galleries and specialist cinemas. These organisations have the capacity and expertise to provide leadership, taking on projects and securing funding in ways that may not be possible for LEPs. Anchor institutions and small firms in the UK indicates how anchor institutions can develop interventions to help small businesses in their local area grow.

Harnessing the power of business

DCMS believes there is huge opportunity to work with business leaders to drive growth and productivity in a way that benefits society as a whole, improving understanding and tackling key barriers to inclusive growth.

We are exploring opportunities for businesses to tackle social challenges. We believe that, wherever possible, businesses should increase their focus on creating demonstrable positive social impact alongside financial returns.

To help progress this, DCMS and The Cabinet Office established the Inclusive Economy Partnership (IEP), to bring business together with government and civil society to tackle major social issues. The IEP has scaled social innovations, inspired major new corporate commitments, and has been developing partnerships to find new solutions to shared problems, such as financial inclusion, mental health, and transition to work for young people. The IEP is open for organisations who want to play a positive and purposeful role in society, by creating a systemic change in our economy.

DCMS also leads for government on domestic social impact investing. Social impact investing is the provision of finance to organisations addressing

10 Lloyds Bank, UK Business and Charity Index, 2018

11 UK Commission on Employment and Skills, What is an Anchor Institution? 2015

12 Ibid.

social needs with the explicit expectation of a measurable social, as well as financial, return. It is a means of bringing greater capital commitments to some of the UK's biggest opportunities for social progress, including in those places where traditional investment approaches have previously been insufficient.

There is deepening investor demand with financial market participants keen to do more. To develop this, DCMS is working with the UK National Advisory Board and the Social Impact Investment Implementation Taskforce to help build a culture of social impact investing in the UK. We are talking to a number of LEPs about this work to explore how social impact investment might play a role in helping to finance the delivery of their LIS priorities, for example housing and infrastructure projects in isolated communities that have not fully shared in the benefits that local economic growth is delivering.

Government is determined that public spending generates social value in addition to the services it purchases, and acknowledges that further social value commissioning is needed at all levels of government. The expertise of Civil Society organisations means they are often ideally placed to create compassionate, responsive and efficient public services and to maximise social value creation in your communities.

When engaging with the civil society sector to deliver public services for your communities, The Public Services (Social Value) Act 2012 needs to be considered. It requires commissioners to consider, from the pre-procurement stage, how procurement could improve the social, economic and environmental well-being of that relevant area: further guidance can be found here. The Act applies to all public bodies in England and Wales including Local Authorities and can help identify and deliver wider outcomes with the money you are spending. DCMS has also published guidance for civil society organisations considering selling to central and local government or becoming part of the supply chain for delivering public services.

You should also consider The Commissioning Academy as a development programme for senior leaders from all parts of the public sector, which can help tackle the challenges facing public services, take up new opportunities and commission the right outcomes for your communities. The Academy is run under a concession contract by social enterprise 'PSTA' and is open to all public sector organisations.

Rural proofing your local industrial strategy

Effective rural proofing should assess and take account of the impacts of policies on rural areas, so ensuring these areas receive fair and equitable policy outcomes in LISs.

Thriving rural communities are vital to the UK economy but they face particular challenges around distance, sparsity and demography and it is important that in pulling together your LISs, you consider your rural areas fully.

Urban areas are defined as settlements with populations of 10,000 or more people.[13] Rural areas are therefore those areas outside of these settlements. They make up over 80% of England's land, and are home to around 17% of the English population, nearly 9.3m people.[14] However, rural areas are not all the same and they will include towns (below 10,000 population), villages, hamlets and isolated dwellings, or open countryside. Rural area types can vary from sparsely populated areas in the country through to areas adjacent to larger urban areas. It is important that the individual characteristics of these differing rural areas are considered, with the rural urban classification the basis for this analysis.

Consideration of rural areas is important because nationally they provide positive opportunities including:

- Economy: They contribute 15.8% of England's

13. Official government definition of rural.
14. Census, ONS, 2011

GVA, worth an estimated £246bn (2017).[15]

- Business: There are over half a million registered businesses in rural areas (24% of all registered businesses).
- SMEs: A greater proportion of small businesses are in rural areas compared with urban areas. These employ an average of 6 employees per registered business, compared with an average of 13 employees in urban areas.
- Employment: Rural registered businesses employ 3.5m people.

They also present challenges.

Demographics:

- There are proportionately more elderly people and fewer younger people in rural populations compared with urban ones.
- Access to services: The combination of distance, transport links and low population density in rural areas can lead to challenges in accessing and providing services.
- Service infrastructure: Lower levels of digital infrastructure for broadband and mobile can limit growth in productivity anywhere in the UK. In rural areas, topographical challenges and lower population density mean deployment costs for new infrastructure are often higher than for urban areas.
- Employment: The variety of employment opportunities, the availability of people with the right skills, and access to training can be lower in rural areas.



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15. Contribution of Rural Areas to UK GVA (2017)

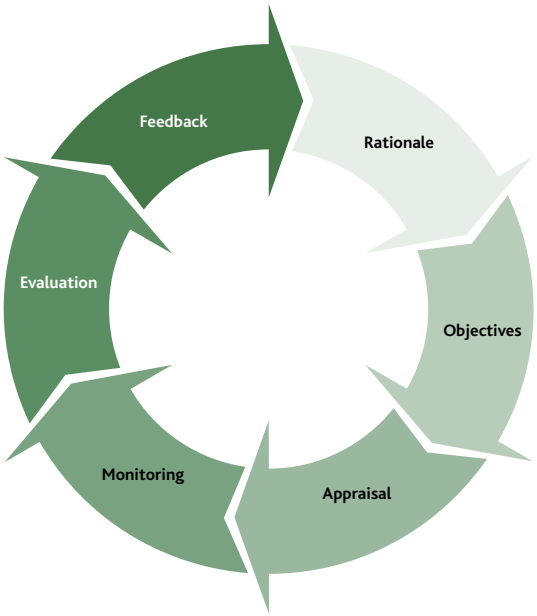


I Am London exhibition on display at More London, Southwark, Greater London.

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Part 2. Policy: sector-specific guidance

The rest of this manual provides detailed guidance to help you develop your understanding of DCMS sectors, and any relevant evidence, which could be applied to your local area. It will help you to ensure your LIS is evidence-based at every stage of the development of the strategy. The HM Treasury Green Book outlines the policy development cycle as Rationale, Objectives, Appraisal, Monitoring, Evaluation and Feedback.



This section will help you to use evidence to demonstrate:

- The value our sectors make to raising productivity and to wider social objectives.
- Current challenges for each sector in your local area and strategic policies that can plug into LIS design to address these challenges.
- How to assess the strengths and needs of your local area and how to design LIS objectives.
- Existing DCMS programmes and interventions that will be relevant.
- Sector-specific tips for tracking progress and evaluating impact.
- Links to some useful local level data sources.
- Possible funding sources.

Each section details a different DCMS sector. In line with other government guidance on LISs each section is structured as follows:

Baseline

Analysis of local level data will help you identify the different aspects of your starting position, or 'baseline', i.e. local strengths, opportunities and/or weaknesses. This analysis will generate ideas for the focus and scope of your LIS. It is important that your strategy is built on detailed local evidence of the issues and opportunities at hand. You must consider how locally specific existing data sources are in order to build an evidence base that shows the challenges and opportunities specific to your local area. This is especially important when considering how to monitor the impact of your interventions.

Sources including Public Health England and the Office for National Statistics will help you develop your analysis covering unemployment, job quality, Index of Multiple Deprivation, wellbeing, healthy life expectancy, physical activity, adult education and school readiness, and resident wellbeing. Additional sources of data for DCMS sectors are included in the sector sections and appendix 1.

Agreeing Objectives

This refers to the priorities for your area that you set out in your LIS. This should take into account the evidence base gathered for the local area in the baseline exercise, and thought must be given to how LIS priorities align with the national Industrial Strategy and other wider central government policies. The Treasury Green Book advises policy-makers as follows:

'A small set (up to 5 or 6) of Specific Measurable Achievable Realistic and Time-limited (SMART) objectives should be identified... They will ideally include the outcomes that are the rationale for a proposal and in some cases the outputs required to deliver them.'

Designing Interventions

This is where you state your plans for funding and other policy commitments to achieve the objectives. The Green Book outlines that, where appropriate,

evaluations of previous or similar interventions, national, international and wellbeing evidence, should be used to design options that build on what works, to avoid repeating past mistakes. There should be a clear path from the resources required to achieve the objectives, then the activities of the intervention, through to the immediate outcomes and long term impacts coming from your intervention. It may be useful to develop a theory of change or logic model to understand the wider economic and social outcomes your intervention is likely to have. The Treasury Magenta Book provides more guidance for designing a logic model or theory of change.

Monitoring Progress

Monitoring and evaluation is essential for understanding if your strategy is working, and allowing you to review and adapt plans on an informed basis. A LIS should identify the expected outcomes for the interventions, but it is helpful to also highlight the potential scale of the outcomes. Also consider the inclusivity and geographic distribution of outcomes. There should be a monitoring system set up to look at the broad range of possible outcomes. Consider commissioning or partnering with local universities to conduct a fuller evaluation of impact. That way you can evidence a broader range of outcomes and develop a more in-depth learning.

Here are some guidance documents that could be useful.

- The Magenta Book: HM Treasury guidance on what to consider when designing an evaluation.
- The Green Book: HM Treasury guidance on appraisal and evaluation in central government.
- What Works Centre for Local Economic Growth - How to Evaluate – What to evaluate?
- What Works Centre for Wellbeing - A Guide to Wellbeing Economic Evaluation.
- Better Evaluation: an international collaboration to improve evaluation.



Arts and Culture



Artonik Bell Square
Photo credit: @ Vipul Sangoi

Arts and culture, including museums and libraries, make a substantial contribution to the UK and local economies, creating an estimated £29.5bn for the UK economy in 2017 (1.6% of the total).[16] This has increased by 38.5% since 2010. For every £1 of Gross Value Added (GVA) generated by the arts and culture industry, an additional £1.30 of GVA is generated in the wider economy.[17] In 2017, the culture sector directly supported 674,000 jobs, 2% of the UK total.[18]

Culture also has a wider growth impact, through making places where people want to live, work, visit and invest. Culture is what makes a place distinctive, and helps provide an answer to the question, "Why should I invest in this place over another?"

A strong cultural offer attracts high skilled workers and retains graduates. This in turn attracts firms and boosts business investment across sectors, increasing employment opportunities. There is evidence that the cultural offer is a significant pull factor in the location decisions of businesses, but particularly in creating clusters of creative industries.[19]

In addition, culture attracts other forms of strategic investment, for example transport and housing expansion, and integrates new neighbourhoods and infrastructure to maintain thriving and attractive places.

Culture has wider social impacts, including wellbeing and health. Participation in arts and culture has been linked to reduced stress, depression and need for medication, and to increased volunteering and charitable giving.[20] Culture creates enriching experiences for all, and cultural belonging increases community pride, cohesion and social inclusion. A wealth of evidence for this can be found in the What Works Centre for Wellbeing Knowledge Bank.

16 DCMS Economic Estimates (2017), GVA, p.6
17 CEBR, Contribution of the arts and culture industry to the UK economy, 2017, p.5
18 DCMS Economic Estimates Employment 2017, p.4
19 DCMS, The role of culture, sport and heritage in place shaping, 2017
20 What Works Wellbeing, Visual art and mental health, 2018, p.3

Developing a baseline

You will need to understand the makeup of the cultural sector in your area in order to identify opportunities and challenges for your strategy. The following sources of data for the culture sector can help you develop your baseline:

- Cultural assets in your area (National Heritage List, RSA Heritage Index, Cipfa library profiles).
- Participation rates in culture (e.g. visitors, volunteers, Active Life Survey).
- Income and spending by local cultural assets, as well as local government funding, and Art Council England investment in the area (including sources of income).
- Networks and partnerships.
- Local visitor numbers and spending, and type of visits.

Approach your Arts Council England Area Team for advice and guidance on data and evidence to inform LIS development.

Agreeing objectives

You will want to consider how locally-controlled policies can affect the opportunities and trends identified in your baseline, for example planning, library and museum funding, cultural programming, high street policy and public health funding. In developing objectives, you should consider:

- How to help everyone enjoy the opportunities culture offers, no matter where they start in life.
- How to support a resilient, innovative cultural sector e.g. encouraging private funding partnerships, shared services, and commercial models.
- The strategic role of culture and leisure in the 'offer' of a place alongside transport, housing and employment.

Examples of good objectives might include:

- X% increase in people participating in cultural activity by [20XX].
- X% increase in positive perceptions of a place, measured through a survey.
- Increase of [X number] creative industry and digital firms by [20XX].
- X% increase in the number of people employed in culture by [20XX].
- Attract or generate [£ amount] in non-public income to cultural organisations by [20XX].

The 2016 Culture White Paper Appendix 1 'Measuring the Impact' contains further example indicators and sources of information to establish a baseline so that progress can be measured.

Designing interventions

Place-making through culture requires a long term strategic view and investment, with strong leadership of cultural institutions and a community engagement plan so that culture has buy-in from the people. For an example of a long term cultural strategy see New Anglia 'Culture Drives Growth'. Arts Council England can support LEPs to work with local partners to develop cultural strategies: contact your Arts Council England Area Team.

There are a number of national funds which support the culture sector. You should consider whether bids to these funds could support the objectives of your LIS. They are: Cultural Development Fund, Northern Cultural Regeneration Fund, Creative People and Places, Creative Local Growth Fund, Cultural Destinations, Great Place Scheme and forthcoming heritage high streets element of the Future High Streets Fund.

In addition, the culture sector in a LEP area can be supported by creating local biddable funds modelled on the aims of these national funds. Evidence suggests that small cultural organisations can be effectively supported through a mix of grant funding and sub £150,000 repayable finance, to increase sustainability.

You should ensure that your plans for the arts, herit-

age and tourism sectors complement the objectives of any existing funding in your area, and avoid duplication. The site 360giving.com can give an oversight of where some foundations and public bodies fund projects.

Culture can attract and integrate new development to create a cohesive sense of place. For example, cultural programming around new major infrastructure (e.g. HS2) can assist integration into the fabric of a place and help to build buy-in from communities. Housing expansion plans should consider how new settlements will be integrated into the existing place.

Cultural leadership is key. DCMS strongly encourages the inclusion of cultural leaders in LIS decision making, to help LEPs embed culture and develop a shared understanding and a 'narrative' on what makes a place distinctive. As a starting point, contact your Arts Council England Area Team for advice.

Representation of cultural organisations in decision making can be achieved either through Board representation or by establishing a cultural steering group to advise the Board. A recommended steering group model is a 'Culture Compact' to bring together a range of partners to embed culture in the life of a place, including in approaches to public health, education and criminal justice. We recommend forging cultural partnerships at all levels (e.g. town, city, town, LEP and/or regional level).

The Local Government Association Culture Hub highlights good practice in the delivery of cultural services by councils and their partners, and provides useful case studies.

Evaluation and monitoring

You should think about how the objectives of your intervention(s) will be monitored and evaluated. Evaluation outcomes should align with your objectives. In addition to the core economic and sector-specific indicators measured in the baseline, you may wish to consider the following indicators:

- Cultural participation.
- Perceptions of place and satisfaction with the local area.
- Health and wellbeing.
- Sense of community belonging.
- Number of new/regenerated cultural assets
- Volunteering rate.

If you need more information on monitoring and evaluation the Arts Council self-evaluation toolkit is a helpful resource.



Case study: Physical regeneration

The physical regeneration of disused and unproductive areas can kickstart wider business investment. Flagship buildings can be the anchor point for regeneration, for example V&A Dundee and Chester Storyhouse. DCMS welcomes innovative ways to transfer ownership of existing assets to drive growth in a local area - see the example of 'asset portfolio approaches' in the recent Cultural Cities Enquiry report. Culture-led regeneration - the conversion of underused spaces into cultural venues or affordable spaces for creative businesses - rejuvenates areas and attracts footfall which supports wider economic activity.[21] This can revitalise whole high streets and areas - consider a Community Interest Company social enterprise model e.g. Liverpool Baltic. With creativity, public space can be re-imagined as a destination in itself with public realm art.

21 DCMS, The role of culture, sport and heritage in place shaping, 2017

Case study: Museums improving local economy

Operated by a Cultural Trust, Touchstones Rochdale houses Rochdale's Museum, Art Gallery and Local Studies centre. Rochdale Borough Council recognises that a vibrant cultural and heritage offer is attractive for businesses looking to relocate to the town, with companies feeding back that it contributes to the holistic offer for workers living in the area. This is a key strand of Touchstones' involvement in the emerging Business Improvement District and Place Board. Working in partnership with the council to understand the need for a cultural offer, the museum has created a programme of events and activities that are designed to support the local economy. Touchstones also has a central role in the Heritage Action Zone, which is promoting Rochdale's broad heritage offer, including the Rochdale Pioneers Museum, Greater Manchester Fire Service Museum, and Town Hall.

Case study: One-off events

One-off events can be used strategically as part of a wider cultural plan, either to launch a cultural programme or to galvanise partners towards a common goal e.g. UK City of Culture bid. Liverpool makes effective use of one-off events to raise the international profile of the City Region and attract inward investment e.g. Giant Puppets. One-off events can boost an area or high street through increased visitor spend and bring the community together through shared identity.

Case study: Libraries

Starting in Wimbledon library and now across seven libraries in London and growing, Wimbletech CIC transform under-utilised library spaces in partnership with councils as Workarys. These enable entrepreneurs to start and grow their businesses in their local area, whilest contributing and giving back to their community. To date they have provided £250,000 in sustainable income for libraries and councils, £1.5m of spending locally and created 210 local jobs.

The Workarys have a diverse membership with a higher proportion of 30-40 year olds than the UK start up national average (50% of members in Wimbledon), and most are from their local community (nearly 80% of members in Wimbledon live within two miles of the library). The network of members, partners and supporters run programmes of events and experiences in libraries designed to support growth and enhance community cohesion.

Case study: Business environment

The cultural offer helps to build the business environment; areas with a culture, sport and heritage offer are more likely to see growth in creative industries.[22] Concentrated cultural investment can create clustering effects, offering benefits of shared infrastructure, knowledge spillovers and innovation. Cultural institutions assist SMEs to grow through small business support and commercialising intellectual property, for example the British Library National Network.

22 Ibid.



Hull-born actor Jon Campling, Queen Victoria Square, Kingston Upon Hull. The image includes Hull City Hall and Blade installation by Nayan Kulkarni

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Case study: Cultural programming

Ongoing cultural programming, such as pop-up galleries or performances, increases the vibrancy of a place and attracts residents and visitors e.g. Waltham Forest art trail, Coventry High Street Shop Front Festival. Renovation of historic buildings, lighting strategies and pedestrianisation can create new spaces for cultural programming. Hull City of Culture and Liverpool European Capital of Culture demonstrate how major cultural programmes kick start regeneration, improve the perception and pride of places and increase private investment. Spread the economic impact and cultural celebration throughout a LEP area with local celebrations e.g. Borough of Culture.

Creative Industries



Leeds Fashion Cluster

© UKRI

Creative industries are as 'those industries which have their origin in individual creativity, skill and talent and which have the potential for wealth and job creation through the generation and exploitation of intellectual property'.[29]

The UK's creative industries are worth £101.5bn to the economy and grew nearly twice as fast as the wider economy in the period 2016-2017.[30] Film and high-end TV attracted £2bn of inward investment in 2017, creating employment and boosting tourism; the UK has the 4th largest advertising market and 5th largest video games market globally; British publishing, music, and fashion continue to flourish in highly competitive global markets.[31]

These creative industries are a motor of growth in local economies, unlocking opportunities, investment, jobs and higher productivity right across the country.

Baseline

In order to prioritise objectives and shape plans to support growth, first conduct an objective assessment of local creative industries. This could include analysis of the size of the local creative industries relative to other industries; specialisms in particular creative industry sub-sectors, or industries that will be central to future growth; and the local capacity for innovation including investment into public research facilities and private centres, universities and spin-out companies, and spaces for innovation. NESTA has conducted research into regional creative employment and business agglomeration on a sub-sector basis.

Identifying local assets which can be leveraged will more effectively build on existing strengths and activity in the creative industries. Assets could include:

- Existing creative clusters: NESTA's 'Geography of Creativity' report identifies 47 hotspots of creativity across the UK, and outlines their contribution to local and national growth.
- Anchor institutions or large companies supporting SME communities which provide the capacity, knowledge and expertise to demonstrate leadership, take on projects and secure a wide range of funding.
- Particular sub-sectors which have competitive advantage or form a key part of the value chain.
- Other major industries and employers that benefit from creative skills, content and services (e.g. designers in the automotive industry).
- A well-known local 'brand' or strong sense of place.

Specific opportunities could include:

- Strategic opportunities to play a leading role in the next generation of products or services.
- Competitive local advantage in a particular industry.
- Exploiting a recognised specialisation or centre of innovation.
- Increased export opportunities.
- Harnessing creative skills, technology and techniques in other sectors to transform products, processes and services.

29 DCMS, Forward to Creative Industries Mapping Document, 2001

30 DCMS Economic Estimates 2017: GVA

31 DCMS, Creative Industries Sector Deal, 2018



The Creative Industries Sector Deal

Led by the Creative Industries Council and supported by the Creative Industries Federation and the sector, the Creative Industries Sector Deal includes a range of measures to increase the number of opportunities and jobs in the creative industries across the country, and improve productivity. Local areas should emulate the approach taken by the programmes, which include:

- Creative Careers Programme: an industry-led Creative Careers Programme to ensure there is a larger and more diverse intake of talent and a broader range of routes into the creative industries. The programme is being delivered by partners including the Creative Industries Federation (CIF) and aims to reach 2,000 schools and 600,000 pupils in two years.
- Cultural Development Fund: £20m to invest in local creative and cultural initiatives.
- Creative Industries Clusters Programme: £39m Industrial Strategy Challenge Funding to support nine creative R&D partnerships.
- Audiences of the Future Challenge: £33m Industrial Strategy Challenge Funding to invest in immersive technology products, services and experiences.

When developing a strategy for the creative industries within a local area, you should use the baseline review to identify region-specific barriers to growth and productivity, such as those set out in the Creative Industries Sector Deal. The challenges facing the creative industries on a national level set out in this document can also be addressed on a local level, and they include:

- Reduced capacity for, and access to, R&D (relevant to the Ideas foundation of the Industrial Strategy). While the creative industries are highly innovative and an important part of the UK's research agenda, they can lack the capacity for strategic, cross-sectoral R&D, including linkages with universities.
- Existing and emerging skills shortages (relevant to the People foundation). Skills gaps exist in many parts of the sector, caused by multiple factors including social and informational barriers to entry, and the quality, availability and consistency of post-secondary education and training.
- Difficulties attracting investment and accessing finance (relevant to the Business Environment foundation). Creative businesses demonstrate a clear demand for investment, yet often lack access to, or knowledge of, financial and business expertise. Coupled with a lack of investor understanding of the characteristics of creative businesses, this makes creative firms in some sub-sectors much less likely to access the finance they need to grow.

All of these challenges are magnified by the proportion of SMEs and micro-businesses in the creative industries, with 95% of creative businesses employing fewer than ten people.[32] This reduces creative businesses' absorptive capacity, ability to access R&D and investment, and capacity to engage with skills and training programmes. Conversely, by bringing creative firms together, business support, R&D, talent and infrastructure can be shared across the supply chain, with spillover benefits for the wider area.

Agreeing objectives

Consider different ways in which the creative industries contribute to productivity and local economic growth when considering the objectives to be set in a LIS.

Most obviously, creative industries make a direct economic contribution to an area. Creative businesses specialise in the creation of new ideas, and this ability to serve large markets efficiently gives them the potential to be highly productive. Just as investments in creative hubs can pull up the local economies around them, so creative growth in one area appears to benefit its neighbours.

The creative industries are also enablers of other sectors of the economy. There is significant overlap between the creative and digital sectors, and the wider creative economy, which accounted for over 3m jobs in 2016.[33] For example, 3D modelling, pioneered in the video games sector, is now widely used within manufacturing industries.

Notwithstanding these opportunities, and although creative businesses are more productive than comparably sized businesses, they will not materially contribute to addressing the UK's productivity problems unless they scale-up significantly.[34] You should consider the capability of your local creative industries clusters to scale up significantly in the next decade.

It may be helpful to look at the relation between creative industries clustering and wider adoption of creative practices in other business to examine how creative businesses support the wider economy, and

32 Creative Industries Federation, Growing the UK's Creative Industries What creative enterprises need to thrive and grow, 2018, p.5

33 Employment in the creative economy can be found in Tables 20-30 of the DCMS Employment Estimates 2017.

34 NESTA, Creative Nation (2018), p.27

where there are opportunities for investment to make other sectors more productive.

The strategic policies set out in the Creative Industries Sector Deal provide a helpful framework to support you when designing objectives. Ideas could include plans to:

- Capture new audiences by strategic investment in immersive content; Build new research and development partnerships; Break down barriers to accessing R&D.
- Support greater diversity of talent and a broader range of routes into the creative industries; Help to deliver more apprenticeships.
- Unlock access to finance for high-growth firms; Boost the sector's export performance.
- Invest to develop more world-class creative clusters.

These objectives should be made Specific Measurable Achievable Realistic and Time-limited according to local conditions and ambitions.

Designing interventions

There are a range of government initiatives which LEPs should seek to align with where appropriate. The box alongside details the Creative Industries Sector Deal. There is also the British Film Industry's National Cluster Growth Fund which provides £2m of National Lottery funding to help develop a number of screen clusters around the UK into hubs of international significance.

Case studies of successful creative industries projects delivered by industry, central and local government working together can be found in the Bazalgette Review and could inspire interventions designed in LISs.

Interventions to consider include:

- capital investment in physical spaces, e.g. affordable workspaces and makerspaces.
- funding R&D and the spinouts of new creative businesses from academic institutions.
- links between local creative businesses and schools to encourage aspirations for careers in the creative sector and develop skills among young people.
- scale-up funding to support SMEs to grow and take on new employees.

Evaluation and monitoring

You should think about how the objectives of your interventions will be monitored. In addition to the core economic and sector-specific indicators measured in the baseline, you may wish to consider the following indicators:

- Use or adoption of new digital technologies by businesses.
- Number of research projects funded/started, or number of business spin-outs from R&D projects.
- Number of employees with requisite fusion of STEM and creative skills, or receiving relevant training.
- Number of creative opportunities delivered and taken up in schools.
- Number and turnover growth of local creative businesses.
- Number of investments in creative businesses, or number of businesses successfully levering appropriate finance.



Bermondsey Street Festival, Bermondsey Street, Bermondsey, Southwark, Greater London

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Case study: Social adVentures

Social adVentures spun out of NHS Salford in 2011 as a public service mutual to deliver health and wellbeing services across Salford. It is jointly owned by employees and service users, so they have a meaningful say in decisions made about the future of the organisation. Since spinning out, it has quadrupled its turnover, employs four times as many staff, and is consistently innovating its service offering to support the changing needs of the community. For example, it uses its community hub to work with Mind to run mental health services, deliver social prescribing and offer fitness classes to the community at an affordable rate. In 2014 it identified a need for affordable childcare, and took on social investment to acquire three children's nurseries which are now running successfully under the Kids aDventures brand.

Civil Society

Civil society refers to charities, voluntary organisations or trusts, social enterprises, mutuals and community interest companies. These organisations contributed £23.5bn to the UK economy in 2017, 1.3% of the total.[23]

Beyond its direct economic contribution, civil society helps create the thriving places that growth and prosperity in general depend upon. It gives us a sense of belonging that comes from feeling connected to our neighbours. It offers people a sense of control over their future and that of their community, empowering local groups to provide solutions to the problems they face.

Civil society has local knowledge and real insight into how policies could impact communities. It can offer innovative and flexible solutions in response to local needs and complex issues.

Civil society also creates opportunities for local people to engage in social action such as volunteering, which has a significant impact on wellbeing.[24] Our youth interventions could also help increase human capital by enabling young people to develop skills, networks, and resilience that can improve productivity at work and life chances for young people.[25]

Baseline

You are encouraged to consider developing a baseline of the civil society sector in your area in order to understand the local contribution of civil society and identify opportunities and challenges in collaborating with the sector to meet local priorities.

The additional resources, outside the formal private and public sectors, which are already deployed in our communities is inspiring, and often far more than policy-makers and funders expect. Quantifying these resources, in terms of finance, physical assets, or skills and man-hours, can be highly effective in attracting further funding or assistance from government and businesses.

Measures could include:

- the number of charities, social enterprises and public service mutuals.
- the policy areas that civil society supports e.g. social care, social inclusion, education and training.
- the number of active volunteers and the monetary value of volunteer hours contributed.
- the number of civil society employees, turnover and income including contracts delivered.

You could work with local voluntary sector support and development organisations (civil society infrastructure organisations) to undertake this baseline. You can look for organisations in your area by using the search function offered by the National Association for Voluntary and Community Action.

Several LEPs have undertaken research into the size and nature of their local civil society sector. In some cases this has led to the formation of Civil Society Sector groups to inform LEP policy, enabling civil society representation, access to business development advice and funding for the sector. For instance, South East LEP has developed a Social Enterprise Strategy and established a Social Enterprise specific Working Group.

The NCVO almanac and the Social Enterprise UK State of the Social Enterprise Sector are useful resources for understanding national sector trends, and include some regional data. UK Community Foundations, with local Foundations in almost every area of England, undertake Vital Signs work to identify issues affecting local areas.

Agreeing objectives

Civil society and local actors can come together to help address a range of complex challenges facing society, and thereby improve the growth, livability and productivity of an area. You will want to consider how civil society could help you to deliver your local

23 DCMS Economic Estimates GVA 2017, p.6

24 Wellbeing and Civil Society working paper, 2013

25 NCS Evaluation 2016

priorities.

The sort of objectives you may wish to consider include:

Increase by [X%] the support offered to long-term unemployed residents by local charities

- X% increase in employment in local civil society organisations by [20XX].
- X% increase in social enterprises created by [20XX].
- X% increase in the number of people volunteering locally by [20XX].
- [X amount] employer-supported volunteer hours per month given locally by [20XX].
- X% decrease in residents' subjective loneliness by [20XX].

Designing interventions

The creation of thriving communities and social value to enable inclusive economic growth is the central focus of the government's Civil Society Strategy, published in August 2018. This sets out a vision of how government will work with civil society to create thriving communities, improving prosperity and economic growth. At the local level there is an opportunity to develop LISs that encompass the ambitions of the Civil Society Strategy.

Useful interventions for LEPs to consider focus on developing sustainable funding models for local civil society. A range of funding opportunities are needed to enable the work of small and local social sector organisations. This includes opportunities to increase earned income (trading) and to fund services through grants, which when used well can combine flexibility with the accountability and performance rigour of a contract, as well as bringing additional benefits, such as charitable investment.

LEPs can also help develop public service mutuals to innovate and reduce demand. Mutuals are staff-led social enterprises, charities or co-operatives, and can offer a great way to actively involve communities and customers in service design and delivery. Research shows mutuals are developing better quality, more innovative public services with happier, more productive staff.[26] You can contact the DCMS Mutuals Team if you want to talk through your ideas.

A key local resource is citizens themselves, in the form of social action: volunteering, the giving of money, or simple acts of neighbourliness. Through the commitment and skill of citizens, social action can empower communities and help people in need. Taking part in social action is also associated with higher levels of wellbeing, and can improve people's confidence and skills. LEPs can help promote a culture of social action locally: for example, by championing employer supported volunteering; or by linking up business leaders with social sector organisations to help upskill and advise those further away from the labour market.

Youth social action is particularly valuable, not least because it builds the skills and capacity of young people. In 2017 81% of young people participating in meaningful social action believed it would help them get a job in the future.[27] Government is supporting youth social action nationally through the £40m #iwill fund (jointly funded by DCMS and the National Lottery Community Fund). The #iwill fund has attracted 20 match funders to date and aims to create new social action opportunities for an estimated 450,000 young people by the end of the fund, particularly targeting those from disadvantaged backgrounds. You can find the opportunities available in your area by visiting the #iwill website. LEPs should consider complementary approaches to boosting youth social action.

Evaluation and monitoring

Evaluation you may wish to conduct to monitor progress towards your objectives include participant data and feedback surveys collected before, during and after interventions; local information on rates of volunteering and other forms of social action; and

26 Public Service Mutuals State of the Sector 2018

27 Ipsos-Mori, National Youth Social Action Survey, 2017

qualitative analysis of case studies and stories written by volunteer organisations to help understand the nature of the community activity they supported.

There have been many evaluations conducted across civil society that can be a guide on the type of monitoring data that you may want to collect, for example: Community Organisers Programme, National Citizen Service Evaluation Report 2016, Youth Investment Fund Learning Project, and work from the Government Outcomes Lab (Social Impact Bonds). To test whether your interventions are helping to promote thriving and connected communities, you may also wish to use the ONS's Loneliness Measure.

DCMS data sets may help in monitoring the impacts of policies, depending on the granularity of the data available, including the Community Life Survey and the Taking Part Survey. These surveys provide statistics at a regional level on trends related to social action, empowering communities and participation in DCMS's sectors. For data corresponding with your LEP area, we would suggest consulting your constituent local authorities and social sector organisations to ascertain local rates of social action.



Case study: Smart Works

Smart Works is a volunteering organisation that helps unemployed women back into the workplace by providing high quality interview clothes, styling advice and interview training. The model has a profound impact on the women it supports, many of whom have been out of work for many years and are low on confidence and self-esteem. The government provided funding to Smart Works through the Centre for Social Action Innovation Fund, a fund to support the growth of innovations that mobilise people's energy and talents to help each other, working alongside public services.



Case study: Volunteer It Yourself

Volunteer It Yourself (VIY) pairs professional tradespeople volunteering their time with young people, aged 14-24, to help renovate and repair youth centres and other community buildings. This supports young people to learn trade and building skills on the job, and helps them gain vocational skills accreditations as well as access to further training, work placement and apprenticeship progression opportunities. VIY is a not-for-profit Community Interest Company and has received government funding through the Centre for Social Action Second Half Fund. It has formal partnerships with a range of public and private sector organisations, including Wickes.



Case study: IntoUniversity

IntoUniversity supports young people from disadvantaged backgrounds to attain either a university place or another chosen aspiration. Volunteers offer tutoring and mentoring support to these young people at IntoUniversity learning centres across the country. The IntoUniversity programme can demonstrate evidence of improvements in academic performance, chances of getting to university, and attitudes to learning.[28] The government provided funding for new learning centres through the Centre for Social Action.

28 IntoUniversity Impact Report 2017



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Digital Industries
(including Artificial Intelligence and Data)

As the Prime Minister wrote in her foreword to the Tech Nation 2018 Report: 'The digital tech sector makes an essential contribution to local economies in our towns and cities. Clusters built around AI, machine learning, cyber security and big data industries are supporting growth, jobs and productivity in communities large and small.'

The Digital Sector contributed £130.5bn to the UK economy in 2017, accounting for 7.1% of UK GVA.[35] The contribution from this sector has increased by a third since 2010 (£98.2bn in 2010). Between 2014 and 2017, employment in the digital tech sector increased by 16.1%.[36] The GVA in the UK Cyber Security Sector is estimated to contribute around £2.3bn in 2015/16.[37]

At a local level, digital and cyber security firms are forming more and more business clusters inside and outside the major cities, which are motors for local economic growth and higher productivity.[38]

Developing a Baseline

The Tech Nation 2018 Report can provide you with an initial understanding of the size of the tech sector within local areas, with information on sector density, growth stage, location of high growth firms and sector productivity. It also provides detailed insights into the growth of individual tech clusters, which should provide valuable information on turnover, contribution to local GVA and important firms.

The UK Cyber Sectoral Analysis Report gives an overview of the clusters of cyber security firms throughout the UK. Both reports show that digital and cyber security companies cluster within certain parts of the country, with firms being concentrated within London and the South East, but with clusters developing across the country, with firms not only growing in big cities but smaller cities, towns and suburbs as well.

DCMS encourages you to consider the extent that businesses within your local area outside of the digital sector have adopted digital technologies. The Lloyds UK Business Digital Index provides regional assessments of the digital capability of businesses and civil society organisations that can be used to assess some of the barriers to digital take up among SMEs within local areas and benchmark against the national average.

This take-up is also tied in with levels of digital skills within local areas. See the Digital Skills section below for more guidance.

Many local areas are starting to see the benefits of sharing data across public sector agencies and where possible making that data available as open data. Doing this proactively, and encouraging other local partners to do this, would give a richer supply of data to encourage AI solutions to support local needs.

The box overleaf provides more detail for LEPs seeking to support the Artificial Intelligence and Data sectors, which represent one of the government's Grand Challenges in the national Industrial Strategy.

35 DCMS (2017) Economic Estimates: GVA

36 DCMS Economic Estimates - Employment 2017

37 UK Cyber Security Sectoral Analysis and Deep-Dive Review 2018

38 Tech Nation UK (2018), Tech Nation Report

The AI and Data Grand Challenge

Looking at AI and Data in particular, the following questions can help when considering the contribution that can be made locally to the Grand Challenge:

Current situation

- What is the current extent of adoption of AI technologies among local businesses?
- What is the current level of awareness of AI in your local area?
- What is the composition of the local workforce and how might an increased use of AI impact or be impacted by this composition?
- What is the value of collaborative R&D in AI and data analytic technologies among local industry and research partners?
- What is the current extent of adoption of AI technologies by the public sector locally?

Opportunities

Supply

- Is there an AI ecosystem in your area; are there active AI companies, research institutions, investors or AI hubs?
- If so, what are their specialities and particular needs/challenges?
- What is the AI/STEM skills base in your local area, and how available is AI expertise to local businesses?
- What training opportunities can businesses and individuals access to improve competency and expertise in AI?
- What types of local datasets, private or public, have been, or could be, made available for wider use in your area?
- How diverse is your AI skills base?
- What opportunities are there to create local data trusts and explore other models of data governance to facilitate easy and secure sharing of data?

Demand

- What is the sectoral make-up of your local area and in which are there opportunities for AI adoption?
- What is the level of demand for AI/data expertise from local businesses?
- Which local public services are most in demand and/or least digitised?
- Which local products/processes could be made more efficient through better use of data?
- Is there demand for public datasets that are currently held by local government?
- What linkages exist between industry and academia for collaborative R&D in AI and data analytic technologies?

Agreeing Objectives

The UK Digital Strategy (2017) sets out our plans to develop the digital economy across all parts of the UK. Government's ambition to support all businesses to digitise, grow tech jobs and unlock the power of data are complemented by a commitment to build the skills and infrastructure which people and businesses need.

Local leaders know that investment in the business environment is needed to maximise the local benefits of technologies. The UK is an international leader in the development of a range of the tech of tomorrow; including AI and data, robotics, quantum and autonomous vehicles. In 2017, our tech business sector grew 2.6 times faster than the economy as a whole, increasing by 4.5%.[39]

The Digital Strategy and the national Industrial Strategy can only be delivered in places. Our National Cyber Security Strategy sets out objectives for growing clusters based around interdependent strengths which are applicable to local conditions. Together in partnership with local leadership, businesses and citizens, government is committed to working towards the following outcomes to be achieved through investment in our digital business environment:

- More businesses accessing appropriate external support, and being satisfied that they have access to specialists who understand digital enterprise.
- More businesses understanding the challenges they face arising from technological development, and the opportunities to grow and thrive through digital adoption of productivity-enhancing technologies.
- Increased entrepreneurial activity, including number of startups, and higher firm-level GVA.
- Increased finance for businesses applying digital technology generating higher demand for external finance from diverse sources.

Designing interventions

There may be existing programmes within your local area that are stimulating growth within the local digital and cyber security sectors, investing in and supporting companies at every stage of development. Tech Nation provides a number of Growth Programmes that can help businesses to grow, and you can help promote these growth programmes to companies in your areas. The National Cyber Security Centre Cyber Accelerator and London Office for Rapid Cyber Advancement are designed to help cyber security startups and bring innovative new cyber security solutions to market, while Cyber 101 coaches cyber security leaders in critical business skills.

Evaluation and monitoring

Evaluation should distinguish between the direct impacts of the programmes you are implementing and the secondary impacts to the overall economy. Where interventions focus mainly on supporting individual businesses, we recommend monitoring the individual performance of these businesses. However, you should also consider assessing (and monetising) the wider impacts that supporting these firms has on the wider local economy.

The Tech City UK Impact Evaluation can be a guide to help with monitoring the impact of programmes intended to improve growth of digital companies. This evaluation showed the particular difficulties in directly attributing effects on 'hard performance measures' (such as sales turnover and employment) to the activities of the programme, which should be borne in mind when designing an evaluation.

39 Tech Nation Report (2018)



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Digital Infrastructure

Digital Infrastructure underpins the digital, cultural and social infrastructures to develop places where people want to live, work and visit. Over the next few decades our digital networks will be the enabling infrastructure that drives economic growth and productivity.

The Digital Infrastructure sector contributed £33bn to the UK economy in 2017 (1.8% of GVA), up by a third since 2010.[40] A core contributor to connected growth in local areas, direct benefits from improved digital connectivity include large increases in download speeds leading to more productive economic activity. It is estimated that by subsidising upgraded infrastructure in certain postcodes £9bn of turnover was added to firms in those postcodes.[41]

Government has set targets for nationwide full fibre coverage by 2033 and for the majority of the population to be covered by a 5G signal by 2027. Full Fibre to the Premises (FTTP) will deliver future-proof, reliable, gigabit-capable connections. These will support greater productivity and economic benefits, underpinning growth sectors such as creative industries and tourism, and helping to reduce inequalities between and within regions. Good quality broadband and mobile coverage has become a modern necessity, both at home and work.

A range of evidence shows direct benefits from improved digital connectivity, including large increases in download speeds leading to more productive economic activity.[42] Wider potential impacts are in areas such as remote healthcare, education, travel and transport, and wellbeing, including loneliness. Gigabit-capable technology will ensure future opportunities in these areas, plus technologies such as AI or the Internet of Things, will be available to everyone in every region.

Baseline

There are several areas to consider as part of developing an evidence base and strategy.

Following £1.7bn investment of public money from government and local authorities into the BDUK Superfast programme, superfast (>24Mbps) broadband coverage is at 95% of the UK, according to the latest Connected Nations 2018 report from Ofcom, with Fibre to the Cabinet (FTTC) the most widely used technology.

Full fibre, or Fibre to the Premise coverage is currently at 6.20% across the UK.[43] The BDUK Superfast programme is continuing to roll out and has turned its focus to full fibre, with other government interventions including the Local Full Fibre Networks and Rural Gigabit Connectivity programme designed to deliver full fibre and stimulate commercial investment. The Connected Nations 2018 report can help places quantify the state of local coverage, while Thinkbroadband has detailed maps illustrating local coverage, which can be both browsed by area and searched by postcode.

The Universal Service Obligation is currently being implemented by Ofcom. It is expected to allow consumers with connectivity below 10Mbps to be able to request a USO connection subject to conditions, from the beginning of 2020, funded via an industry cost-sharing mechanism.

Government is working to ensure that 95% of the UK has good coverage by 2022. Government wants the UK to be a world leader in 5G, and for the majority of the population to have access to a 5G signal by 2027. Mobile network operators are preparing for the launch of commercial 5G services, with initial launch cities and investment plans identified and first commercial deployments expected in the second half of 2019.

Agreeing Objectives

DCMS's Future Telecoms Infrastructure Review (FTIR) (2018) sets out our roadmap to achieve the

40 DCMS Economic Estimates 2017: GVA

41 Evaluation of the Economic Impact and Public Value of the Superfast Broadband Programme

42 For example Deloitte, Value of Connectivity: Economic and social benefits of expanding internet access, 2014

43 See Thinkbroadband for updates on broadband roll out statistics: https://labs.thinkbroadband.com/local/

government's digital connectivity targets, chiefly by encouraging commercial investment across the UK and creating the conditions to support deployment. It found c.10% of UK premises are unlikely to benefit from commercial investment without some form of additional funding. Government is committed to an 'outside-in' approach to ensure these harder to reach areas are addressed at the same pace as the rest of the country.

On mobile, the FTIR concluded that 5G offers potential new revenue opportunities for existing carriers and opens up opportunities for new players to enter the UK mobile market. New players could provide tailored solutions to connectivity challenges and help unlock the full potential of 5G. The FTIR recommends policies that maintain the benefits of competition between the mobile network operators, while encouraging new solutions.

The FTIR also focuses on the growing convergence between fixed and mobile markets. Delivering the high speed and high capacity capabilities of 5G will require dense fibre networks, and in some places 5G could provide a more cost-effective way of providing ultra-fast connectivity to homes and businesses.

When developing a strategy for digital infrastructure within a local area, recommendations for LIS objectives include:

- Supporting commercial deployment by reducing barriers for industry providers, and proactively using existing powers to promote commercial provision.
- Publicly funding gigabit-capable interventions targeted at non-commercial areas (the 'final 10%') that are unlikely to receive commercial investment.
- Ensuring any publicly funded interventions are sufficiently future-proofed, and reflect the growing convergence between fixed and mobile networks.
- Encouraging consumer take-up of broadband services in order for users to realise the benefits, and to support greater commercial investment.

These objectives should be made Specific Measurable Achievable Realistic and Time-limited according to local conditions and ambitions.

Designing interventions

Public funding will be dependent on local areas having a clear plan to reduce and remove barriers to deployment and adopting best practice. You should work with providers to support commercial deployment of both broadband networks and mobile coverage infrastructure (in terms of conventional macro-level mast deployment and small-cell deployment at street-level):

- The Digital Connectivity Portal provides guidance for local authorities and network operators on effective policies and processes to facilitate deployment of broadband and mobile networks.
- Introduction to Community-led schemes provides guidance on options.

Public models for deployment of fixed broadband include:

- BDUK Superfast programme: rolling out superfast broadband across the UK via local body delivery partners.
- Local Full Fibre Networks challenge fund: models including Public Sector Anchor Tenancy / Building Upgrade / Asset Reuse.
- Local Full Fibre Networks Gigabit Broadband Voucher Scheme.
- Rural Gigabit Connectivity programme: trialling a public building hub model with rural specific vouchers to deliver gigabit connectivity to rural areas in the 'final 10%'.

Identifying the location of areas within the non-commercial 'final 10%' will become clearer with further roll out in the coming years. Currently, premises without access to superfast broadband are considered more than likely to be within the 'final 10%'. It is recommended that any public investment be initially targeted at areas and premises with sub-superfast speeds.

Fixed broadband policies are strongly encouraged to align with government policy to deliver gigabit capable networks. While publicly funded interventions should be targeted at the non-commercial 'final 10%', they should align with areas and premises currently targeted by other public programmes to avoid overbuild (e.g. DEFRA's Rural Broadband Infrastructure Scheme which funds Local Authorities to deliver superfast broadband to rural businesses and communities).

Interventions to consider include encouraging planning authorities to adopt de minimis provisions with regard to small-cell mobile infrastructure, and working with Mobile Network Operators to proactively identify possible sites for infrastructure deployment / improvement.

Monitoring progress

Projects should assess reducing the digital divide between communities, as well as benefits to the economy and the public sector.

The Ofcom connected nations report should be referred to in order to monitor geographical coverage of fixed and mobile infrastructure, which are likely to be important outcomes for any digital infrastructure programme outlined by a LIS.

Monitoring of interventions should also focus on the connection between the policy outputs (i.e. FTTP coverage) and specific economic outcomes, such as the effect on local firm performance and productivity. Monitoring should also consider value for money.

The Superfast Broadband evaluation provides an example of how these outcomes are monitored at a local level. This will provide you with ideas of how to evaluate your interventions in the digital infrastructure space and highlights the tangible economic and wellbeing benefits that increased connectivity brings to communities.



Photo by Lucrezia Carnelos on Unsplash



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Digital Skills

Digital skills are critical across the majority of sectors and occupations, and are essential entry requirements for two thirds of UK occupations. Local economies will benefit from investing in both those individuals who already have advanced digital skills and work at the heart of the growing digital economy, as well as those who have yet to gain the essential basic skills.

It is estimated that nationally, closing the digital skills gap could unlock £85bn in turnover every year.[44]

- 8.4% of UK adults have never used the internet (down from 9.2% in 2017), and 10% of households do not even have internet access.[45] According to the Lloyds Bank Consumer Digital Index, 11.3m people (aged 15 and over) lack one or more of the five Basic Digital Skills; 4.3m have zero.
- The Employer Skills Survey 2017 identified that a third (33%) of all skill-shortage vacancies in the UK were attributed, at least in part, to a lack of 'digital skills'. This includes both basic computer literacy (23%) and/or more advanced or specialist IT skills (21%). Around 35% of businesses reported that their current staff was lacking digital skills. You can learn more about digital skills shortages and gaps in your local area using the data here.

The challenge is particularly acute in the SME and social sectors. According to the Lloyds Digital Index in 2018, 16% of SMEs and 30% of Charities nationally have low digital capability, so are not taking advantage of the improvements in productivity that digital skills uptake can provide.

Baseline

Working with your Skills Advisory Panel and if in place locally, your Local Digital Skills Partnership, you should review what skills interventions and policies you can influence. This should include publicly funded provision delivered through HE/FE colleges, T-levels, apprenticeships, and private/third sector provision.

Your baseline exercise should seek to identify gaps, where demand for digital skills is not being met by the supply of individuals with relevant qualifications, and therefore where investment in a new programme/ provision would be beneficial. It is also important to analyse, where possible, the diversity of people in digital roles and taking up digital skills courses in the area, in order to design programmes that successfully engage the local community.

One particular challenge when developing your baseline is the variety of terms used to define 'digital skills', which will require you to draw on a range of quantitative and qualitative sources as part of your evidence gathering. Broadly you should collect data assessing digital skills needs at the basic (essential), general and advanced levels and with reference, for example, to the new Essential Digital Skills Framework.

Skills shortages and gaps can be difficult to quantify. The following resources will help:

- Employer skills survey 2017.
- Online vacancy data e.g. Burning Glass and Adzuna.

DCMS is collaborating with the Department for Work and Pensions to develop a digital skills information service (data tool), which will enable you to understand the digital skills needs in your area. A prototype is expected in spring 2019 and once it is launched we will be encouraging you to use this service to help produce the baseline for your LIS.

The analysis produced through the Skills Advisory Panels (a Department for Education programme supported by DCMS) will underpin the 'people' pillar of each region's LIS.

44 Lloyds Bank, UK Business and Charity Digital Index, 2018

45 ONS, Internet users, UK: 2018

Agreeing objectives

You are strongly encouraged to work with cross-sector partners to develop initiatives that increase digital capability at all levels, and that improve the diversity of those in tech roles. DCMS encourages you to consider embedding a Local Digital Skills Partnership as part of your LIS. Alignment with the objectives set out in the Digital Strategy (2017) will be important to ensure that everyone can access the skills they need to fully participate in society. DCMS has developed a five-step model in consultation with DSP partners, which it encourages local DSPs to adopt:

- Build the partnership. Ensure that local businesses, academia, charities and training providers are represented and contributing.
- Create a strategy. Gather and analyse evidence, and match provision to needs.
- Deliver training.
- Monitor and evaluate the impact of provision.
- Share data, tools and practice with other region.

Designing interventions

DCMS is supporting Local Digital Skills Partnerships (LDSPs), which are being set up to tackle local digital skills challenges to help build thriving and inclusive local economies. Working closely with LEPs and other regional stakeholders, these partnerships are encouraged to design and deliver new and innovative digital skills provision that can then be replicated and scaled across the country as more Local DSPs are set up.

The local DSP Delivery group that reports to the main DSP Board is developing a "Playbook" that will collate and showcase best practice and best in class digital skills provision across the country. This will include sections around the setting up of a Local DSP, the governance required, and will enable regions without Local DSPs to develop their own. The DSP is currently collecting content for the Playbook, and a first iteration will be live by Summer 2019.

Monitoring progress

You should set up evaluation and monitoring strategies that demonstrate the improvement in digital skills in individuals, and what wider effects these improvements have at a local level. The Employer Skills Survey, the Lloyds Bank Consumer Digital Index and the Lloyds Bank Business and Charities Digital Index are metrics you can use to measure.[46]

If you need more information on monitoring and evaluation the Digital Inclusion Evaluation Toolkit is a helpful resource.

DCMS has commissioned an evaluation outline plan to identify a strategy and metrics for evaluating the impact of the Digital Skills Partnership programme, including that of the Local DSPs. This work is due to be completed in spring 2019, with evaluation and monitoring beginning later in the year. The framework and metrics identified to measure the impact of Local DSPs, could be adapted to monitor and evaluate digital skills policy/programmes in your regions.

46 DfE, UK Employer Skills Survey 2017; Lloyds Bank, Consumer Digital Index, 2018



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Cyber Skills

An expansion of digital skills, cyber security is central not only to our national security, but also in realising the ambition to make the UK the safest place in the world to be online and the best place in the world to start and grow a digital business. As such, local economies would benefit from an additional focus on investing in initiatives that increase both the number and diversity of individuals working in the cyber security profession, and providing necessary training and education to build understanding in the general workforce.

- In 2017, over 70% of large businesses, 64% of medium businesses and 42% of micro/ small businesses in the UK suffered a cyber breach.[47]
- We know that only 27% of UK businesses and 21% of charities have a formal policy or policies covering cyber security risks and many organisations lack the knowledge, understanding and confidence around cyber security to implement appropriate measures.[48]

Baseline

Working with your local employers, you should review what skills interventions and policies you can influence. This should include publicly funded provision delivered through HE/FE colleges, apprenticeships, and training providers.

Your baseline exercise should seek to identify gaps, where demand for cyber skills is not being met by the supply of individuals with relevant qualifications, and therefore where investment in a new programme/ provision would be beneficial. It is also important to analyse, where possible, the diversity of people in cyber roles and taking up cyber skills courses in the area, in order to design programmes that successfully engage the local community.

One particular challenge when developing your baseline is the variety of terms used to define 'cyber skills'. An initial definition of a cyber security skill has been set out in the initial Cyber Security Skills Strategy (2018). Cyber security skills have been defined as the combination of essential and advanced technical expertise and skills, strategic management skills, planning and organisation skills, and complementary soft skills that allow organisations to:

- Understand the current and potential future cyber risks they face.
- Create and effectively spread awareness of cyber risks, good practice, and the rules or policies to be followed, upwards and downwards across the organisation.
- Implement the technical controls and carry out the technical tasks required to protect the organisation, based on an accurate understanding of the level of threat they face.
- Meet the organisation's obligations with regards to cyber security, such as legal obligations around data protection.
- Investigate and respond effectively to current and potential future cyber attacks, in line with the requirements of the organisation.

Agreeing objectives

Alongside the cross-sector work with partners to develop initiatives that increase digital capability at all levels, you are encouraged to work with partners to identify, develop and scale up initiatives that address the cyber capability gap at all levels ranging from general awareness to cyber security practitioner. This includes a focus on boosting not only the number, but the diversity of those in cyber roles.

47 DCMS/Ipsos Mori, Cyber Security Breaches Survey, 2018

48 DCMS/ Ipsos MORI and Pedley, D., McHenry, D., Motha, H., Shah, J, Cyber Security Breaches Survey, 2018; Ipsos Mori Understanding the UK cyber security skills labour market, 2018

Designing interventions

DCMS is supporting interventions that look to develop the supply of homegrown cyber security talent, whilst funding specific interventions in the immediate term to help meet known skills gaps. This includes a range of initiatives sponsored by the Cyber Skills Immediate Impact Fund (CSIIF), which includes a full-time cyber retraining bootcamp for women, online training portals and a training programme for individuals retraining around existing work and caring requirements.

Alongside this, government has supported a range of bursaries for individuals undertaking both undergraduate and postgraduate courses in cyber security, while also delivering a £20m Cyber Discovery Schools Programme for 14-18 year olds.

Monitoring progress

DCMS will be evaluating all interventions to understand the effectiveness of these in developing a talent pipeline in the longer term, while addressing current cyber skills needs in the immediate term. Alongside this, you should set up evaluation and monitoring strategies that demonstrate the improvement in digital skills in individuals, and what wider effects these improvements have at a local level.



Photo by Kaitlyn Baker on Unsplash



Freddie Gilroy and the Belsen Stragglers sculpture, North Bay, Scarborough, North Yorkshire. The sculpture by Ray Lonsdale depicts retired miner Freddie Gilroy, who was one of the first soldiers to relieve the Bergen-Belsen concentration camp at the end of the Second World War.

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Heritage

Heritage is increasingly recognised as a key component in shaping the development of places where people live, work, visit and invest. From prehistoric henges and medieval market towns to postwar city centres, each place has a unique history and its own distinctive character. That distinctiveness is a resource that can be harnessed to deliver future prosperity.

Across England, the heritage sector currently generates £13.1bn for the economy, higher than either the security, defence or the aerospace industries.[49] Investing in historic areas can deliver substantial economic as well as environmental benefits to a local community. £1 of public sector investment on heritage-led regeneration generates £1.60 additional economic activity over a 10-year period.[50]

Heritage shapes people's perceptions of place; is an important 'pull' factor in business location decisions; and provides an attractive backdrop for businesses and visitors. Investing in historic areas and buildings can be a catalyst to regenerate and revitalise both communities and local economies.[51]

Baseline

There are a range of publicly held sources of information that can support your work on your local baseline. These include:

- Your local Historic Environment Record (HER). HERs are locally run information services that provide access to comprehensive resources relating to the historic environment in that area. Access to HERs in England are available from the Heritage Gateway.
- The National Heritage List for England.
- The Heritage at Risk Register.
- Heritage Counts, the audit of England's heritage.
- Local Authority Heritage profiles.
- The RSA Heritage Index (2016).

Historic characterisation is a useful tool for regeneration strategies and master-planning to assess and identify local strengths. Historic England (formerly English Heritage) has supported survey work in historic towns, cities and suburbs across the country. The results of these projects are typically held by local HERs, and can be used for a wide range of purposes, including strategic planning and development management. Many of these projects are also available on the Archaeology Data Service website.



Case study: the Bristol Temple Quarter Enterprise Zone

The Bristol Temple Quarter Enterprise Zone uses a heritage assessment to highlight heritage significance, placing it at the heart of subsequent master-plan work and informing the vision for the redevelopment of sites around Isambard Kingdom Brunel's Grade I listed Bristol Temple Meads Station. A key component of this Enterprise Zone is the Engine Shed: an innovation centre for companies, in the high-tech, creative and low-carbon sectors, which provides flexible work-spaces within the station.

49 CEBR for Historic England, The heritage sector in England and its impact on the economy, 2018

50 AMION and Locum Consulting, Impact of Historic Environment Regeneration, 2010, p.72

51 Historic Environment Forum, Heritage Counts, Heritage and the economy, 2018, and Heritage in Commercial Use, 2018

Agreeing Objectives

You have an opportunity to develop a vision and objectives that can support positive heritage strategies developed by Local Planning Authorities as part of their spatial development plans. These ensure that the benefits of the historic environment are maximised. The delivery of these objectives will be most effective if they are agreed with, and shared by, all partners and stakeholders.

Examples of objectives you may want to consider are:

- X% increase in footfall to the (high street/ market place/other heritage destination) by [20XX].
- Attract [£ amount] in non-public funding to support environmental improvement works (public realm, building repairs/ enhancements) by [20XX].
- Increase by [X%] the number of people (including under-represented groups, youth, BAME etc) participating in heritage related events/ activities/ volunteering in X place by [20XX].
- X% increase in individuals' feelings of belonging to their community and subjective well- being [by 20XX].
- X% increase in positive perceptions of the heritage of X place, measured through a survey.
- X% decrease in the number of At Risk heritage assets (for positive reasons) by [20XX]

Heritage Counts provides further guidance that can help you develop economically and socially focused objectives.



Case study: Nottingham Heritage Strategy

Nottingham's Heritage Strategy aims to understand the contribution that the historic environment makes to the city, to capitalise on the existing and potential roles that heritage brings to city life and to celebrate the city's rich past, promoting Nottingham as a distinctive place to live and visit.

The strategy was developed for the City Council, working with partners, including the local community, business, government agencies, civil society organisations and educational institutions. It sets out how heritage will be used to attract investment, foster local identity, increase volunteering, promote social cohesion and well-being, as well as feeding into the other strategies for local development. These include the city's Local Plan and its Growth Strategy, which seeks to grow and diversify the city, reconnecting it with its history of manufacturing success, generating a distinctive and unique local brand.

Designing interventions

Strategies should include positive measures to ensure the historic environment plays its fullest role in contributing towards the ongoing economic, social and environmental success of any area. Developing local distinctiveness, through intelligent investment in the historic environment, can promote retail activity and attractive, vibrant places.

Heritage Works is a best practice toolkit that provides a step-by-step guide on how to develop heritage-led regeneration projects. Successful models including letting space in historic buildings to small arts and creative businesses as office space, with spaces for exhibitions and cultural events, including 'pop up' events.

Inspirational case studies of successful intervention and investment is found in Heritage Foundation for Success.

As noted in Translating Good Growth for London's Historic Environment, cities are always evolving and will need to change further in response to growth pressures. In addition to providing high quality places, investment in the historic environment can also have transformative effects on surrounding areas. The development of King's Cross has transformed former railway backlands, and catalysed regeneration in Camden and Islington, supporting Camden Council's Community Investment Programme which refurbishes estates around King's Cross, the transformation of the Caledonian Road and the redevelopment of Euston Station.

Unfortunately some historic buildings and areas have suffered from lack of investment and care. With thought and investment it is usually possible to bring them back into productive use. Risky Business demonstrates that investing in even the most challenging historic buildings leads to 'good growth' and unrivalled regeneration, from economic and employment outputs to community engagement and education.

Case study: Our Northern Mills Engines of Prosperity

Historic England's cross Pennine project has helped to understand the potential for growth that vacant historic textiles mills offer, as well as the economic benefits that investing in heritage can bring to a local area. These benefits may not be fully captured by private investors due to the potential poor condition of these assets. However studies covering West Yorkshire and the North West showcased successful re-uses of textile mills and identified 20 target mills where Historic England are engaging with the owners to identify opportunities to make mills viable investments and ensure that the wider regeneration benefits are fully captured.

The project concluded that across West Yorkshire and the North West there is 3m sqm of untapped economic potential which could provide 35,000 homes, 200,000 jobs, £9bn GVA and £23m PA in Business Rates.[52]

The regeneration of Sunny Bank Mills, Farsley, Leeds illustrates the opportunity, creating 300 jobs and becoming home to 70 businesses. Sunny Bank Mills was a major employer for more than a century. Production of woollen cloth ended in 2008 and the owners commenced incremental regeneration to re-establish an employment centre and to create high-quality commercial floor space. They have used the individual character of the buildings and the site's history to make and market a unique product. It is now home to designers, textile artists and a children's play gym and houses a café, art gallery and shop, and hosts a community festival, drawing thousands of visitors every year.

52 Historic England, Engines for Prosperity: New Uses for Old Mills, 2017, p.73

Monitoring progress

Developing specific and measurable objectives, such as the examples above, will help you to monitor the contribution that your interventions to the historic environment are making to regeneration and growth. These can be supported by performance indicators tied to Local Spatial Development Plans assessing the impact of development on the historic environment; by public survey data; by participation data held by event organisers; and by investment data held by Local Authorities, and grant funding bodies including NLHF and Historic England.

Where your interventions are tied to a broader heritage strategy we recommend ensuring that monitoring and evaluation criteria are embedded within the strategy, and supported by all stakeholders. This will ensure that the benefits of conserving and enhancing the historic environment, and allowing communities to engage with and benefit from it, including increased productivity, public perception of places and improved sense of local identity, can be captured and reinforced by future interventions. The Derby PSiCA Monitoring and Legacy Report demonstrates how qualitative and quantitative data can be captured and effectively presented to illustrate the impact of investments in the historic environment.



Case study: Derby Cathedral Quarter

Derby Cathedral Quarter illustrates how collaboration between Historic England, a local authority (Derby City Council), cultural organisations like Derby Museum and Art Gallery, and local retailers has resulted in the historic city centre being transformed. Once one of England's poorest-performing retail areas, the scheme has brought 2,800 sqm of floor space back into use. It has created 42 new jobs, saved many more, and helped the Cathedral Quarter win the category of Best City Location in the 'Great British High Street Award' 2016.



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Sport and Physical Activity

Sport and physical activity is a significant economic sector which may itself be a priority for development in many areas. As importantly, sport and physical activity can also be used to help drive economic impact across all other sectors and this chapter helps local areas explore both of these considerations.

Sport and physical activity are at the heart of many people's personal, local and national identities. The UK invented many sports and we take pride in hosting some of the greatest sporting competitions in the world. Sport and physical activity opportunities provide part of the fabric of place, and make place attractive to people to 'work, rest and play' and hence for businesses to base themselves.

As well as mental and physical wellbeing, sport and physical activity supports individual development, nurturing character and teaching important skills such as leadership and teamwork. Being active plays a key role in brain development in early childhood and is also good for longer-term educational attainment. Physical activity can also lessen the costly burden of health and social care. It also brings communities together and fosters cohesion.

Sport supports economic development, contributing £9.8bn to the UK economy in 2017, up 5% on the year before.[53]

World class sports events not only contribute significantly to GVA but also creating connected and cohesive communities and civic pride.

Investing in the growth of the local Sport sector will not only provide jobs to significant numbers of people, it will also benefit the wider economy and society more generally by ensuring that people are fit and healthy enough to participate fully in work and local life.

Being fit and healthy benefits economic productivity, resulting in fewer work absences and less illness. In England, the costs of lost productivity have been estimated at £5.5bn per year from sickness/absence and £1bn per year from the premature death of people of working age.[54]

Physically active employees have lower levels of absenteeism, greater efficiency and are less likely to suffer from stress or depression and are more productive.[55] 26% of adults in England are inactive (i.e. they do less than 30 minutes of physical activity a week). National data shows that only 18% of children and young people (1.2m) are meeting the current Chief Medical Officer guidelines of taking part in sport and physical activity for at least 60 minutes every day.[56] A further 26% (1.8m) sit just below this threshold, taking part on average for 60+ minutes a day across the week, whilst 33% (2.3m) do less than an average of 30 minutes a day.

Investing in the growth of the local Sport sector will not only provide jobs to significant numbers of people, it will also benefit the wider economy and society more generally by ensuring that people are fit and healthy enough to participate fully in work and local life.

Baseline

Increasingly, the focus of sport policy has been to move beyond assessing participation to assessing how sport and physical activity can be an economic and social good. The following considerations will help develop your evidence base for how people and communities within your area experience sport and physical activity:

- How many people are meaningfully engaged in watching, playing, working and volunteering in sport and physical activities in the local area?

53 DCMS Economic Estimates 2017: GVA

54 Department of Health Start Active, Stay Active

55 Nuffield white paper report commissioned by Sport England in 2018.

56 Sport England, Active lives children and young people survey academic year 2017/18

- What are the demographics of these people? What barriers do they face in engaging sport and physical activity?
- What are the economic and wider benefits this engagement brings in terms of productivity, health, educational attainment, reducing recidivism and promoting social cohesion?
- How productive and sustainable is your local sport sector?

In order to answer these questions for your local area, the following evidence sources can assist:

Produced by Sport England, the Active Lives Survey provides metrics on participation and volunteering levels in sport and physical activity, broken down for nine regions, 43 Active Partnerships and 353 local authorities. Active Lives Online Query Builder is a user-friendly tool that can build a more accurate picture of participation in physical activity across your local area and understand more about the barriers to participation faced by particular groups.

The Active Lives for Children and Young People Survey provides data for under 16s, again broken down to a local level. This survey provides the most detailed and reliable information on this age group yet.

The Sport Satellite Account provides figures on the economic value of sport to the UK economy and the number of people employed. This can be used for benchmarking the local sports economy against the national economy. Sport England's The Economic Value of Sport is a data tool that provides a starting point for understanding the size of the local sport economy, measuring both direct impact on local GVA of sports companies (covering companies that facilitate participation and companies that facilitate spectating), numbers of jobs supported as well as estimations of wider monetary benefits to health, volunteering and wider spending within the local area.

The Sport Industry Research Centre has produced guidance on the Social Return of Investment of Sports, which you can use to understand the wider benefits of investing in sports. Work is currently underway to update this (due by Summer 2019).

These sources will help provide an understanding of the strengths within their local sport sector and participation, as well as considering the challenges.

The Active Lives Survey has shown that participation varies massively across different communities depending on deprivation, and within communities depending on age, ethnicity and a number of other demographic groups. It is important to understand where these differences exist in order to design the best interventions to tackle them.

Agreeing objectives

When developing a strategy for sport and physical activity within a local area, you may wish to consider adapting the participation targets for 2020 agreed with Sport England. These are an increase in the number of people being regularly active across the English population by over 500,000, including an increase in the number of women by at least 250,000 and an increase in the number of people from lower socio-economic groups being active by 100,000. The aim is that this will pave the way for a major step change in engagement by 2025 and Sport England will propose targets for additional increases in participation by 2025 before 2021.

The five outcomes identified in the government's Sporting Future: A New Strategy for an Active Nation are: Physical wellbeing; Mental wellbeing; Individual development; Social and community development; Economic development.

Your developed baseline should help you reach achievable objectives for each of these different areas. The Sporting Future measurement dashboard provides further data which might be a helpful reference. The latest copy of this can be found here.

Designing interventions

There are a wide range of interventions that can be used to grow the sport and physical activity sector, tackle inactivity and drive engagement in sport and physical activity as a means to supporting the local

economy. Plans should be based on sound evidence and insight. They must understand and cater for the needs of local people.

It is increasingly recognised that a place based 'whole system' approach that encourages a more active everyday lifestyle through a combination of physical, policy and social design, underpinned by collaborative leadership, behaviour change principles and community understanding is key to tackling inactivity. For example new housing and infrastructure developments offer an unrivalled opportunity to start creating physical environments that encourage physical activity by design through high-quality walking and cycling infrastructure.

The Sports Outcomes Evidence Review, produced by Sports England should be used as an introduction to understanding the strength of evidence supporting the outcomes of sporting interventions. This will give you an idea of the key risks and opportunities involved in designing certain interventions.

You should also consider the wider benefits of investment of any intervention that you plan. The National Institute for Health and Care Excellence (NICE) has developed an online tool for demonstrating the return-on-investment of interventions encouraging physical activity that can help when developing interventions.

Case studies: Great Sankey Neighbourhood Hub, West Warrington

Funded with a £1.5 million National Lottery grant through Sport England's Strategic Facilities Fund, Great Sankey Neighbourhood Hub in West Warrington is a flagship wellness hub which replaced an old leisure centre with new sport and leisure facilities, a vibrant learning and cultural centre, plus GP and other primary health care services. It is next to a secondary school so the pupils there also benefit from new sporting opportunities on their doorstep. Great Sankey Neighbourhood Hub has been designed to accommodate people with specific health and lifestyle, needs, for example it is the first Dementia accredited building in the UK.

Case studies: Campus Skatepark – Bristol

Sport England's Community Asset Fund is a programme dedicated to enhancing the spaces in a local community that give people the opportunity to be active. It helps sports clubs or community organisations with great ideas that will make a difference to the places where people play sport and get active. This could be by taking over existing underused facilities in a community for example, or making improvements to existing experiences, projects or facilities. With the help of Sport England funding, as well as investment from a range of other sources including crowd-funding, founders Andre Seidel and Tim Nokes have transformed a disused swimming pool into Campus Pool, a vibrant indoor skatepark with reception area, skate shop and café. The skatepark provides 200 free annual memberships to young people from local deprived areas, and reduced entry fees. The café is highly-valued by the wider community, offering parents and toddlers a space to meet and enjoy coffee and a friendly atmosphere.

Examples of intervnetions that may contribute to Local Industrial strategy priorities

- Employability – programmes to enhance sport and physical activity contribution to supporting those currently outside the labour market through engagement, health and skills improvement and opportunities to get involved in work experience, volunteering and training which will help them be more prepared for employment.
- Productivity – creating more healthy, motivated and productive workforce through programmes to promote Active Work Places
- Active Aging - Responding to the Aging Society, through initiatives for active aging and early preventative work through workplace health initiatives
- Technology - Exploring how wearable technology from the sport and PA sector and opening up participation data could meet the AI and Data grand challenge around preventative health.
- Housing Growth Infrastructure & Active Design – building sport and physical activity into the new homes, towns and infrastructure to encourage active local environments.
- Further information on Sport England funds can be found here.
- You should also consider working with your local Active Partnerships. Active Partnerships work at a local level tocreate the conditions for an active nation, and use the power of sport to improve lives, and will be able to work with you to maximise the social and economic impact of the sector.

Monitoring progress

As the government sport strategy Sporting Future has shown, monitoring strategies should consider the best ways to measure economic, social and personal outcomes within the local area. Strategies should attempt to measure both the direct economic impacts of interventions on the local sports economy (i.e. regional GVA, numbers of jobs supported), as well as the wider benefits of increased participation in physical activity on the local economy and the public sector. The Sport England Question Bank provides an understanding of what sort of outcomes metrics should be measured.



Tourism



Royal Pavilion Gardens, Brighton

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Tourism is one of the UK's most important industries, directly responsible for over 1.6 million jobs throughout the UK.[57] It is worth £68bn to the UK's economy, representing approximately 4% of our total GVA in 2017.[58] In 2017, we received a record number of visitors who spent a record amount, over 39m inbound visitors who spent nearly £25bn.[59]

You should consider how the unique attractions of your local area can drive increases in visitor numbers, thereby driving demand for dynamic businesses to cater to the needs of these visitors.

Developing a baseline

In order to conduct an objective assessment of local tourism sector, you should consider the following factors:

- Numbers of visitors to your LEP area. This can be found through data held through your Destination Management Organisation (DMO). See Visit Britain for details. Your LEP area may or may not be the same as the boundaries covered by your local DMO.
- The amount of money and time these visitors spend in the area, including the number of overnight stays. The Destination Specific Research section of the VisitBritain site has this information.
- How many people the sector employs, both directly and indirectly (e.g. in pubs and restaurants). VisitBritain's 'Destination Specific Research' site has this information.
- What the main tourist attractions are in your area and how they are performing.
- What your visitor profile is, e.g. international versus domestic markets.
- How well connected your area is with major transport hubs, including airports.

In terms of existing evidence available to consider the contribution of tourism to your local economy, the VisitBritain website provides useful statistics on visitor numbers, visitor spend and overnight stays, regional spread of inbound tourism to Britain and splits by domestic and international visitors. The International Passenger Survey can provide some indicative estimates of tourist visits, the amount of money they spend and the number of nights they stay at a regional and county level. A user friendly online tool showing inbound nation, region & county data can be found here.

Visit Britain can provide you with significant amounts of evidence into various aspects of the tourism sector within Great Britain, here is a short list of some of the topics where they can provide you with evidence (this should not be considered to be an exhaustive list and we recommend visiting their website):

- Activities undertaken by international visitors. This shows the variations between activities undertaken by visitors in different regions.
- Film and TV locations as a driver for tourism.
- Areas of Britain where international visitors would like to go. This presents evidence of what areas of Britain international visitors would likely visit during a trip, showing the strengths of different areas of the country.

You are encouraged to consider how the cultural and heritage landscape of their area helps to drive the growth and productivity of the tourism sector. National Lottery Heritage Fund and VisitBritain research notes that heritage driven tourism alone accounts for £4.3bn of GDP and creates employment for 113,000 people.[60]

Other areas that will support the consideration of the impacts on your local tourism economy include:

57 DCMS (2017) Economic Estimates: Employment

58 DCMS (2017) Economic Estimates: GVA

59 ONS, Travel Trends 2017

60 NHLF and VisitBritain, Investing in Success: heritage and the UK tourism economy, 2010, p.9

- Business Events. Business Events are worth £32.6bn into the UK economy annually and DCMS are working closely with VisitBritain to look at how the UK can attract major business events to the UK and internationalise ones that we already have.[61] The Business Events Growth Programme offers financial and advocacy support to destinations looking to host international events. Understanding your capacity in hosting business events is important, and we would suggest talking to your local DMO or Convention Bureau to discuss what's available.
- Accessibility. There is a compelling business case for making tourism venues and experiences more inclusive. People with health conditions and impairments and their travelling companions spend around £12bn on trips in England each year, but an additional £117m could be generated from additional trips if accessibility was improved.[62] People from this market are more likely to take longer trips, spend more and are reported to be very loyal to places that meet their requirements.

Agreeing objectives

Government's Tourism Action Plan sets out its priority areas for growing the UK tourism sector:

- The Tourism Landscape: Strengthening coordination and collaboration.
- Skills: Boosting apprenticeships and attracting more people to careers in tourism
- Common Sense Regulation: Examining the scope of deregulation.
- Transport: Making it easier for visitors to explore by rail, bus and coach.
- A GREAT Welcome: Driving continuous improvements in our visa service.

61 Business Visits and Events Partnership, Opportunities for Global Growth in Britain's Events Sector

62 VisitBritain Business advice: make your business accessible

Case Studies: Manchester and the Great West Way

The following projects from Visit England's £40 million Discover England Fund are currently attempting this more collaborative approach:

Growing Manchester as an International Gateway to the North, led by Marketing Manchester: This project is increasing the volume and value of visitors coming through Manchester Airport by creating itineraries that showcase the city, and excursions that open up the North of England. Working with destinations, travel trade and the tourism industry and targeting the US market, Marketing Manchester will lead a partnership to maximise the potential of the North of England as an international destination and gateway to the North.

The Great West Way: The 'Great West Way' project, led by destination management organisation VisitWiltshire, will develop a new touring route and link a package of tailored visitor experiences, including destinations, accommodation, attractions and transport options, working with rail and bus companies along the route. The 'Great West Way' will make it easier for international visitors to book personalised trips that take in more of the region, boosting tourism along the way.

For more information visit VisitEngland Discover England Fund page.

Designing interventions

VisitBritain's Destination Advice Hub provides support to those looking to create a successful and sustainable visitor economy in your area. Additionally, there are a number of existing funds that you can bid into which can help support tourism. These include the Cultural Development Fund, Future High Streets Fund, Business Events Growth Programme, and the Coastal Communities Fund.

Working with your local DMO should help you understand what encourages visitors to your area, and what work they are doing to increase numbers. The priorities of the Tourism Action Plan can be used as a guide for the kind of interventions that might be required to increase Tourism. Often the effects on the tourism sector should be considered when developing wider interventions. Improvements in transport and communications infrastructure will have effects on tourism to the local area, so it is useful to think about what input you can have into the design of these wider interventions to maximize benefits for the tourism sector.

Evaluation and monitoring

It is important to measure the outcome of any intervention to deem whether it was successful in driving an increase in the number of visitors to the area, as well as the quality of the visitor experience. The Annual Progress Reports of the Coastal Communities Fund can provide help with understanding how multiple programmes can contribute to the sustainable growth of the Tourism Sector within a local area. Your local DMO will also be able to share evaluations of previous marketing campaigns and the impact of visitor numbers.



Gallery visitor, Natasha Tedstill, at Manchester Art Gallery, Mosley Street, Manchester

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Appendix 1: evidence and resources

Title	Date of Publication	Organization	Relevant Industrial Strategy Foundation	Details
DCMS Sectors Economic Estimates	Annual	DCMS	All themes - useful for strength identification	Collection of economic estimates for DCMS sectors, including GVA, Employment, Business Demographics and Trade.
Museum Key Performance Indicators	Annual	DCMS	Place	The Department for Digital, Culture, Media and Sport (DCMS) sponsors 15 national museums which provide free entry to their permanent collections. The data for this release are collected by the museums through sample surveys, with the exception of the information on educational visits and total visits, which are based on actual counts.
The Mendoza Review: an independent review of museums in England	2017	DCMS	Place, People, Business Environment	The Mendoza Review provides detailed analysis of how museums can add to growth, placemaking, health, and communities.
The Geography of Creativity in the UK	2016	NESTA	Place, Ideas, People	Systematic mapping of the UK's creative clusters (CCs) including geographies and demographics. Provides evidence for the importance of CCs in driving local/national growth, and outlines ways to drive the success of CCs.
Creative Nation	2018	NESTA	Place, Ideas, People	Creative Nation uses official, open and web data to map the creative industries in the UK: their evolution, contribution to local economic development, the strength of their support ecosystems, including research and networking, and their connections with each other.
Bazalgette Review	2017	Peter Bazalgette	Place, People	Chapter 2 outlines measures to build world-class clusters and enhance CI growth including:: - "Fused" companies (bringing together creative and STEM skills) - Strong cultural, heritage and sporting offers which make places more attractive to live and work - Tailored, community-based approaches to close skills gaps and improve access to finance

Brighton Fuse Report	2016	AHRC, NCUB, University of Brighton, University of Sussex, Wired Sussex	Place, People	Analysis of the factors driving the UK's creative economy and cluster growth: - Arts and Humanities skills combined with technical STEM skills. -Integrating knowledge from other industries to promote innovation - Local demand, economic environment and strong commercial links - Bottom-up initiatives to build on local strengths and existing firms, support by policy to promote the conditions for growth
Creative Industries: A Toolkit for Cities and Regions	2017	Creative Industries Council	Place, People	Examples of successful local leadership building cultural and creative industries into local and regional policy-making.
Industrial Strategy for the Creative Industries	2017	Creative Industries Federation	Business Environment, People, Infrastructure	Proposes priority areas to be addressed by creative industry policy makers. On a local level these include: - Skills shortages - Finance and funding - Digital Infrastructure
Ofcom Media and Communication report	Annual	Ofcom	People	Provides data and commentary on key market developments in the UK communications sector. Data and analysis on broadcast television and radio, fixed and mobile telephony, internet take-up and consumption
Internet access – households and individuals, Great Britain	Annual	Office of National Statistics	People	Data on how people access the internet and if and how they use it.
Tech Nation 2018 Report	Annual	Tech Nation UK	Ideas	Explore the report to find out about the connections and collaborations that underpin UK tech, drive ambitious entrepreneurs and power economic growth.
Ofcom Connected Nations	Annual	DCMS	Infrastructure	Data on the connectivity of the UK - (breakdown of data by postcode) allows for identification of possible areas of intervention. Report on UK's communications infrastructure, focusing on coverage and performance of fixed and mobile broadband networks.

Superfast Broadband Programme Evaluation	2018	DCMS/Ipsos Mori	Infrastructure	Appraisal of economic benefits (and wellbeing) of the government's Superfast Broadband Programme that rolled out improved digital infrastructure to 95% of premises in the UK. Can be used to estimate benefits of other fixed network (broadband) rollout schemes
Think Broadband Broadband Coverage data	Regularly updated	Think Broadband	Infrastructure	Gives multiple helpful local statistics on local broadband coverage and accessibility.
Broadband Delivery UK	Regularly updated	DCMS	Infrastructure	
Full fibre networks in the UK	2018	House of Commons Library Briefing	Infrastructure	
Telecoms infrastructure international comparisons	2018	NERA, for DCMS	Infrastructure	Benchmarks the UK's readiness to roll out these new technologies against international comparators.
Costs for Digital Communications Infrastructures	2017	National Infrastructure Commission	Infrastructure	
Superfast Cornwall Evaluation Report	2015-8	PFA Research/ SERIO	Infrastructure	
Broadband requirements of small businesses in the UK	2015	BSG	Infrastructure, Business Environment	
Unlocking the digital potential of rural areas across the UK	2018	Rural England	Infrastructure, Business Environment, People	

ICT infrastructure and economic growth	2018	IIMB Management Review	Infrastructure	
National Fixed Telecoms market baseline and projections	2018	Frontier Economics for DCMS	Infrastructure	Provides an overview of the current national baseline for the rollout of FTTP and what interventions are needed to facilitate take-up.
National Mobile Telecoms market baseline and projections	2018	Frontier Economics for DCMS	Infrastructure	Provides an overview of the current national baseline for the rollout of 5G and what interventions are needed to facilitate take-up.
Future Digital Inclusion - Programme Evaluation 2016-2017	2017	Good Things Foundation	People	The Future Digital Inclusion programme aims to help one million digitally excluded people to improve their basic digital skills by using the community reach of the Online Centres Network to support some of the hardest-to-reach groups in society.
Digital Inclusion Evaluation outcomes framework toolkit	2017	DCMS/Just Economics for DCMS	People	Toolkit associated with the Future Digital Inclusion programme.
Lloyds Bank Consumer Index:	Annual	Lloyds Bank	People	Survey, includes measures of financial and digital capability of people in the UK. It has also regional backgrounds.
DCMS Digital Skills Research	Mid-2019	Burning Glass	People	DCMS has commissioned Burning Glass to conduct analysis of data on the relative demand for different digital skills.
DCMS Advanced Digital skills Research	Mid-2019	Pye Tait	People	DCMS commissioned Pye Tait report on advanced digital skills
Taking Part Survey	Annual	DCMS	Place, People	Statistics on regional engagement (England only) in arts, museums and galleries, archives, libraries, heritage and sport. Can be used as indicators of regional cultural and sport engagement.

Community Life Survey	Annual	DCMS	Place, People	Statistics on regional engagement (England only) in community life (volunteering, charitable giving, community participation, belonging and cohesion). Can be used as indicators of regional social engagement.
Heritage Index	2016	RSA	Place, People	The Heritage Index is a resource that consolidates over 120 data sources to provide a rich picture of heritage assets and heritage activity at the local scale.
National Heritage List for England	Updated regularly	Historic England	Place	The NHLE is the official, up to date, register of all nationally protected historic buildings and sites in England (listed buildings, scheduled monuments, protected wrecks, registered parks and gardens, and battlefields).
Heritage at Risk Register	Updated annually	Historic England	Place	The Register includes designated heritage assets that have been assessed and found to be at risk.
Sport Satellite Account for UK Statistics	Annual	DCMS	People	This report provides figures on the economic value of sport to the UK economy and the number of people employed.
Tourism Satellite Account	Annual	Office of National Statistics	People	The annual contribution of tourism to the UK economy from demand for goods and services caused by tourism activity and supply of these goods and services.

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making communications work
for everyone

Connected Nations 2022

UK report



Published 15 December 2022

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1. Overview

Ofcom's objectives include delivering internet we can rely on through ensuring fast and reliable connections and services for everyone, everywhere. In this annual Connected Nations report, we measure progress in the availability of broadband and mobile services in the UK, including the roll-out of gigabit-capable, full fibre and 5G networks.

We have published separate reports on broadband and mobile availability in each of the UK's nations. Our interactive report allows people to easily access data for different areas of the UK and specific services. We are also releasing the International Broadband Scorecard 2022, which compares the UK's recent position on broadband availability with a number of other European nations.

What we found

- **Full-fibre broadband is available to 12.4m homes (42%):** this is 4.3 million more premises (14 percentage points higher) than a year ago, and for the second year running represents the highest year-on-year increase since full fibre started being rolled out in the UK.
- **Gigabit-capable broadband is available to 20.8m homes (70%):** this includes full fibre and upgraded cable networks that are capable of delivering download speeds of 1 Gbit/s or higher.
- **The number of premises without access to decent broadband continues to fall:** factoring in coverage from both fixed and fixed-wireless networks, nearly 80,000 homes and businesses (0.3%) still do not have access to decent broadband. We estimate that around 15,000 of these will be covered by publicly funded roll-out schemes in the next 12 months.
- **5G rollout has rapidly increased**: the level of coverage provided outside of premises by at least one mobile network operator is now at 67-77% (up from 42-57% last year). This coverage is supported by 5G deployments on a total of around 12,000 sites, almost double the amount we reported last year.
- **We have seen some small improvements in 4G coverage:** the four mobile network operators (EE, Virgin Media O2, Three and Vodafone) each estimate they provide 4G outdoor coverage to c.99% of premises. Their coverage of the UK's landmass ranges from around 80-87% (up from 79-86% last year), with similar small improvements in Scotland, Wales and Northern Ireland. These improvements are partly as a result of initiatives such as the Shared Rural Network (SRN), with more than 150 new sites deployed directly to meet the SRN coverage commitments.
- **The storms last winter had a significant impact on communications services:** this was primarily because of lengthy power outages, which led to communications services becoming unavailable in impacted areas. It initially took providers longer than expected to recover from these impacts, which has highlighted the need for better co-ordination across the communication and energy sectors. Improvements are already being made in this area and we urge industry and others to continue this progress.

Faster, better networks are increasingly available across the UK

Full fibre and gigabit-capable broadband coverage continues to improve

Just over 12m (42%) of UK homes now have access to full fibre connections – an increase of over 4m premises in the past year. This is the largest year-on-year increase in full fibre coverage we have seen so far and represents a nearly seven-fold increase over the last five years.

Gigabit-capable broadband – able to provide broadband speeds of 1Gbit/s or higher – can be delivered over full fibre networks and the latest version of cable networks. Gigabit speeds are now available to just under 21m (70%) homes. This has increased by 23 percentage points (7m homes) over the last year. Full fibre and gigabit-capable availability is highest in urban areas in Northern Ireland, and lowest in rural Scotland.

5G rollout is expanding

EE, Virgin Media O2, Three and Vodafone have continued to extend their 5G networks across the UK, and we are reporting individual mobile network operator (MNO) coverage for the first time, based on the High to Very High Confidence range which we established in 2021. These ranges cover an increasing probability that the coverage predicted by MNOs will translate into coverage on the ground. As noted above, the level of coverage provided outside of premises by at least one mobile network operator across this range is now at 67-77% (up from 42-57% last year). The coverage provided outside of premises from individual MNOs ranges from 39-58% at High Confidence, with a range of 31-45% at our Very High Confidence level. Though most 5G sites are focused around busy urban areas - providing additional capacity to existing mobile data services - we're now seeing coverage extending into smaller towns and other high footfall locations. The distribution of this investment remains broadly similar to last year, with 86% of sites in England, 8% in Scotland, 4% in Wales and 2% in Northern Ireland.

Good connections are available to most people across the UK

Superfast broadband (with speeds of at least 30Mbit/s) is now available to 97% of UK homes (an increase of one percentage point from last year). We estimate that around 73% of premises that are able to get superfast broadband actually take it. So, although most people have superfast broadband available to them, some do not always choose the fastest speeds.

Mobile operators provide a high level of 4G coverage outside of premises, with coverage from each individual mobile network in the vicinity of c.99% premises. Indoor coverage from each MNO covers a range (from the MNO with the least to the most coverage) between 92% and 95% of all premises. However, coverage levels remain lower in rural areas, and across the extent of the UK landmass. Individual operator coverage ranges between 77% and 85% of the rural landmass, slightly below the overall UK coverage figures (80-87%, as noted above). Alongside this view of coverage, we also present emerging findings from our work towards a new approach for reporting on the quality of mobile networks.

We continue to support investment in new networks

We are supporting investment in the deployment of competing gigabit-capable networks to provide customers with a choice of fast and high-quality services. Last year we put in place a regulatory framework for competition and investment for the five years to March 2026 to support this aim.

Rapid progress is being made in rolling out full fibre and gigabit-capable services. This is largely driven by deployments from the larger fibre providers, including Openreach which has committed to pass 25m homes with its full fibre network by 2026, Virgin Media O2, which plans to upgrade its cable network to full fibre by 2028 (having already upgraded to gigabit capable speeds last year) and and CityFibre, who plan to pass up to 8m premises by 2025. At the same time, a large number of smaller network providers are also increasingly deploying full fibre, with many targeting underserved communities and regions across the UK.[1]

We are also supporting the rollout of new wireless services – including 5G. This includes making sure a diverse range of companies can access the spectrum they need to develop new services, bringing a better mobile experience to consumers and delivering economic benefits for the UK. We continue to engage with, and report on the progress of, the Shared Rural Network programme, which is seeking to expand the provision of 4G mobile coverage across the UK. We will undertake an initial compliance assessment against MNOs' 88% landmass coverage targets in 2024.

As the UK focuses on deploying new networks, we are closely monitoring the transition from the legacy fixed public switched telephone network (PSTN) - which is used to deliver traditional landline and other services - and 3G (and eventually 2G) mobile networks to ensure that disruption is minimised and customers are protected, particularly those that are more vulnerable. The first 3G network switch-off is starting next year and we are working closely with the mobile operators to ensure a smooth transition.

A small, but decreasing, number of UK properties still cannot access decent broadband

Around 80,000 premises cannot get a decent broadband service of at least 10Mbit/s download speed and 1Mbit/s upload speed from either fixed or fixed wireless networks. Some of these premises may be eligible to be connected under the universal broadband service.[2] Since its launch in early 2020, there have been around 1,850 orders for the universal service that will result in full fibre connections being available to almost 9,500 premises that previously had no access to decent broadband.

We expect that many of the remaining premises will be in particularly remote areas, so households will have to contribute to the costs of building a connection. For a significant number of these,

[1] We recently published our first forward looking report about planned network deployments of full fibre. Ofcom, Planned Network Deployment, November 2022.

[2] Where the costs to provide the connection are below the cost threshold set by Parliament (£3,400), the customer can be provided a service at standard connection and rental charges without having to pay any additional installation charges. Where the cost of connection is above the cost threshold, these premises can still receive a service if the customer pays the additional costs.

connection costs will be very high, which means they may need alternative solutions. The UK Government is continuing to look at options for these very hard to reach premises and has recently launched a trial to see whether satellite can be used to deliver high speed connections in more than a dozen hard to reach locations across the UK.

We estimate that there are around 30,000 UK premises that cannot access either a decent broadband service, or good 4G mobile coverage.

The UK's communications networks were severely impacted by the storms last winter

Towards the end of 2021 and in early 2022 the UK was hit by several severe storms, starting with storm Arwen in November 2021, followed by storm Barra in early December and storms Malik and Corrie in late January 2022. In February 2022 there were three further storms in the space of a week – storms Dudley, Eunice and Franklin.

These storms had a significant impact on communications services. This was primarily because of lengthy power outages which caused communication services to become unavailable in impacted areas, for several days in some cases. For example, during storm Arwen, thousands of mobile cell sites were disrupted by power outages, and this affected all four MNOs. On the fixed networks, the largest impact was due to customers losing power to equipment in their homes (e.g. broadband routers).

The recovery process following the storms, particularly after storm Arwen, took longer than expected due to the volume and scale of the power outages. This highlighted the need for better co-ordination and information sharing between the communication and energy sectors. Improvements have already been made to these processes, which helped reduce recovery times during the later storms. We are continuing to work with industry and government to act on lessons learnt during the storms and help ensure improved resilience of the networks in future.

A new framework for telecoms security

The new Telecoms Security Act came into force on 1 October this year. It imposes new, strengthened duties on communications providers to implement network security measures as appropriate for the purposes of identifying and reducing the risk of security compromises, and preparing for when they do occur. It also requires communication providers to take specific security measures, as well as giving Ofcom extended powers and duties to monitor and enforce compliance against these new obligations. The Government has recently published a Code of Practice for communications providers on its preferred approach to demonstrating compliance with the new requirements. In future we will report on the extent to which communications providers comply with their new duties, as part of our Connected Nations reports.

2. Fixed broadband and voice

Introduction

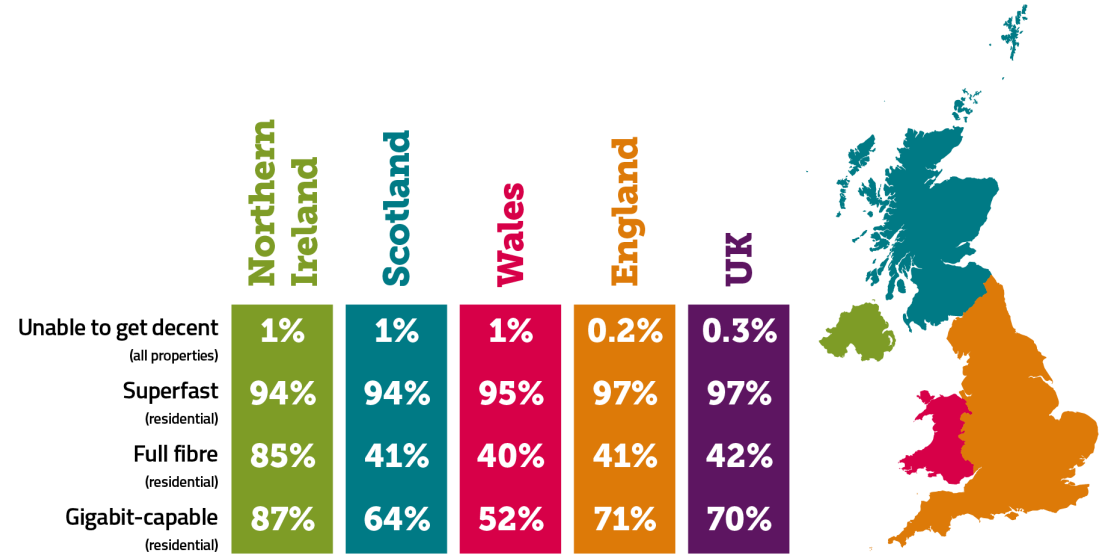
High speed networks are rapidly expanding, bringing fast and reliable voice and broadband services to homes and businesses across the UK. In this section we provide an update on the roll-out of these networks over the last year, as well as the remaining numbers of premises that still do not have access to decent broadband.[3] We also update on the deployment and performance of fixed wireless and satellite networks, that are also delivering broadband connectivity. We then cover take-up of fixed broadband and voice services, as well as the migration away from traditional voice services and the changes in data traffic use on broadband networks since last year.

Highlights

- **Coverage of high-speed networks continues to grow rapidly**. Full fibre is available to 42% / 12.4m of premises – an increase of 14 percentage points / 4.3m premises over 2021. Gigabit-capable broadband covers 70% / 20.8m of premises. Superfast coverage has increased to 97%.
- **The number of premises without access to decent broadband continues to fall.** It is now around 0.3% / 80,000.[4] We estimate that around 15,000 of these premises will be connected via publicly funded schemes in the next 12 months.
- **The availability of low earth orbit satellite broadband services has increased**, offering a possible alternative for customers in poorly served areas, including some areas where customers are otherwise unable to access decent or better broadband.
- **Customers are increasingly taking up the higher speed services that are now available to them**. Over 73% of consumers that have access to superfast broadband have upgraded to a superfast service. We estimate that around 25% of premises that are able to get full fibre are actually taking it, with take-up increasing by at least 1.4 million premises since last year.
- **Average monthly data use has grown this year** to 482 GB per connection compared to 453 GB last year.

[3] We plan to report on the coverage of fixed broadband services to small and medium enterprises as part of our Spring 2023 update.
[4] Unless otherwise specified, coverage figures for decent broadband count all UK premises (residential and commercial). Coverage for other speed tiers count residential premises only.

Figure 2.1: Summary of broadband coverage at a fixed location across the UK and Nations



Source: Ofcom analysis of provider data (September 2022).

The UK has a variety of available fixed broadband services

Fixed broadband in the UK is available at a variety of speeds, delivered over different technologies

- **Copper (ADSL)**[5] – Copper cables are used to connect from the exchange to the premises (also known as 'standard broadband'). Maximum download speed is up to 24 Mbit/s. Actual speeds delivered by copper connections diminish with distance. Copper can also be affected by poor weather. Since the copper network is old, it can be susceptible to faults, and it consumes more energy than newer broadband technologies.
- **Fibre to the cabinet (FTTC)** – There is fibre to the cabinet, with copper cables used to connect from the cabinet to the premises. FTTC uses very high-speed digital subscriber line (VDSL) technology. Maximum download speed is up to 80 Mbit/s (except for G.fast)[6]. As with ADSL, actual speeds diminish with distance, and the network can be affected by poor weather and is susceptible to faults.

[5] Asymmetric Digital Subscriber Line.
[6] Openreach deploys G.fast at some cabinets. It uses fibre to the cabinet, and copper from the cabinet to the customer. By using a higher frequency signal on the connection to the customer, G.fast can offer higher speeds than normal FTTC deployment, with Openreach offering wholesale services at up to 330 Mbit/s. However, the signal degrades more quickly so the customers able to get ultrafast speeds are limited to those closest to the cabinet.

- **Hybrid fibre coaxial cable (HFC)** – The cable TV network[7] uses fibre to a street cabinet and coaxial cable from the street cabinet to the premises. There is decreased signal loss compared to the use of copper, which means co-axial cables are capable of delivering much higher speeds. Broadband is supported using the DOCSIS standard, which shares the capacity downstream and upstream between multiple customers.[8] The latest standard of cable technology, DOCSIS 3.1, is capable of delivering gigabit speeds, although since capacity is shared among users, it may not be the case that each user can simultaneously receive gigabit speeds. Depending on the configuration of the access network in any particular area, this can lead to localised congestion. This may be particularly acute in the upstream direction where total capacity is more limited.[9]
- **Full fibre or 'fibre to the premises' (FTTP)** – The connection from the exchange to the premises is provided entirely over fibre. Generally, distance to the premises does not affect the speed delivered. Full fibre is less susceptible to faults and is not usually impacted by poor weather. It is also more efficient as it consumes less energy whilst transmitting the same amount of data.[10] Most full fibre implementations utilise Passive Optical Network (PON) approaches where capacity in the downstream and upstream direction is shared. The number of customers connected to each shared PON is usually 32 or less, which is generally fewer than shared infrastructure on a cable network. This, along with managing the maximum guaranteed throughput provided to each customer, can be used to manage congestion. PON technology has an upgrade path that allows for speed to increase from a shared 2.5 Gbit/s download and 1 Gbit/s upload, to 10 Gbit/s in both directions, and future generations will expand this further. Some providers are already deploying 10Gbit/s XGS-PON and it can co-exist with earlier versions which minimises upgrade costs.
- **Fixed Wireless Access (FWA) via mobile networks**: Fixed wireless access on mobile networks is offered on licensed 4G and 5G networks, usually to an indoor router. These services share the network capacity with mobile users, meaning that the capacity of the network must be carefully managed between the demands of existing mobile users and FWA customers. There may be areas of high mobile demand where a reliable FWA service cannot be offered.
- **Fixed Wireless Access via Wireless ISPs (WISPs):** The majority of these services are delivered over wireless networks that communicate via a wireless link between a provider's mast site and an external antenna fixed to a customer's premise. These networks mostly use license exempt or lightly licensed spectrum and we are beginning to see some use of 5G technology.[11] Due to the frequencies where this spectrum is available, performance may be limited by line-of-sight issues although use of 5G spectrum alleviates some of these issues.

[7] Most cable broadband in the UK is provided by Virgin Media O2.
[8] DOCSIS: Data Over Cable Service Interface Specification.
[9] Virgin Media O2 is in the process of upgrading its cable network to full fibre to deliver further enhancements to its services. Virgin Media O2, Q3 2022 Earnings Release, November 2022.
[10] FTTP consumes less energy than traditional broadband technologies because it does not require active, powered equipment such as amplifiers or powered splitters between the exchange and the premise due to the use of passive street cabinets. There is also a reduced energy consumption at the exchange per user.
[11] Quickline, UK's First Broadband Provider to deliver 5G SA Cloud-Native Open RAN solution, August 2022.

Table 2.2: Summary of characteristics of different types of fixed broadband

Type of broadband	Speed	Use cases	Fixed broadband technologies that can provide this service
Decent[12]	10 Mbits/s download; 1 Mbit/s upload	Making a high definition video call using applications like Zoom, Teams, WhatsApp or Facetime. Downloading a 1 hour HD TV episode (1GB) in almost a quarter of an hour.	Copper (ADSL) FTTC (VDSL) HFC Cable Full fibre
Superfast	At least 30 Mbit/s download	One person streaming 4K/UHD video. Downloading 1 hour HD TV episode in under 4 and half minutes. Several devices working simultaneously.	FTTC (VDSL) HFC Cable Full fibre
Gigabit	1 Gbit/s and above download	It is feasible to download a full 4K film (100GB) in under 15 mins, or a 1 hour HD TV episode in 8 seconds. Likely to be more reliable and future proofed.	HFC Cable (when upgraded to DOCSIS 3.1) Full fibre

FWA (both that provided by MNOs and by WISPs) can also provide decent and superfast speeds and, under certain conditions, may be gigabit-capable, but this will be dependent on the specific deployment, available capacity at the site, and the number and location of users.

Fixed broadband coverage has continued to increase across the UK

Full-fibre broadband is now available to 42% of premises, with gigabit-capable broadband available to 70%

Full-fibre (FTTP) broadband is now available to 42% / 12.4m premises

Full fibre roll-out is growing quickly, with 42%/ 12.4m premises in the UK now served by full fibre, a growth of 14 percentage points and 4.3m additional premises in the past year. This is a nearly seven-fold increase compared to just five years ago.[13] This is primarily driven by deployments from the larger fibre operators (Openreach, Virgin Media O2 and City Fibre) but supported by a number of smaller providers across the UK which are increasingly included within our data gathering programme.[14] These new providers tend to be smaller and often target their rollout in underserved

[12] The UK Government defines a decent broadband service as one that delivers at least 10 Mbit/s download speed and 1 Mbit/s upload speed. This is the level of connection currently deemed necessary for consumers to participate in a digital society.
[13] In 2018 we reported that 1.8m premises had access to full-fibre broadband. Ofcom, Connected Nations 2018.
[14] This year we have included data from over 60 full fibre communications providers (compared to around 40 last year).

communities and regions. As such, they do not significantly alter the national figures, but they are important in providing full fibre coverage at the local level.

Gigabit-capable broadband is now available to 70% / 20.8m premises

Our data shows rapid expansion of gigabit-capable networks. By September 2022, 70% / 20.8m residential premises had access to gigabit-capable broadband, compared to 47% / 13.7m residential premises in 2021. This significant growth has been driven by the continued rollout of full-fibre broadband by many network operators, as well as Virgin Media O2's now completed upgrade programme.[15]

Some of these premises have access to more than one gigabit-capable network; around 16% / 4.9m residential premises have access to more than one gigabit-capable broadband service over both cable and full fibre technology, 7% / 2.1m residential premises have a choice of two or more full fibre networks, and 21% / 6.4m residential premises have a choice of two or more gigabit-capable networks.

Table 2.3: Residential gigabit-capable and full fibre coverage

	Gigabit-capable			Full fibre		
	Total	Urban	Rural	Total	Urban	Rural
England	71% (17.6m)	76% (16.5m)	37% (1.1m)	41% (10.1m)	42% (9m)	34% (1.1m)
Northern Ireland	87% (0.7m)	96% (0.5m)	65% (0.2m)	85% (0.7m)	94% (0.5m)	65% (0.2m)
Scotland	64% (1.7m)	72% (1.6m)	26% (0.1m)	41% (1.1m)	44% (1m)	24% (0.1m)
Wales	52% (0.8m)	58% (0.6m)	34% (0.1m)	40% (0.6m)	41% (0.5m)	33% (0.1m)
UK	70% (20.8m)	76% (19.3m)	37% (1.5m)	42% (12.4m)	43% (11m)	35% (1.4m)

Source: Ofcom analysis of provider data (September 2022).

The table above illustrates that while there has been an increase in gigabit-capable coverage in both urban and rural areas, there has been a greater increase in urban areas.

The largest percentage increase in full fibre roll out has been in Northern Ireland and Scotland, both of which saw total coverage increase by 14 percentage points. There has been rollout in both urban and rural areas, but urban areas continue to have greater access to full fibre due to some providers (e.g. Virgin Media O2) tending to focus their roll-out on these areas.

[15] Virgin Media O2, Virgin Media O2 completes gigabit upgrade in boost for Britain's broadband target, December 2021.

Roll-out of gigabit-capable and full fibre networks

Availability of full-fibre and gigabit-capable networks is expected to continue to increase over the next few years, with different providers continuing to take different approaches to their business models for deployment:

- Openreach is the incumbent wholesale infrastructure provider for almost all of the UK.[16] It has the largest network and connects the most premises. It plans to reach 25 million premises with full fibre by December 2026. This includes 6m homes in harder to reach areas by 2025.[17]
- Having completed the upgrade of its cable network in December 2021,[18] Virgin Media O2 has this year been progressing with a fibre upgrade across its existing network with the aim of offering full fibre across its network footprint by 2028.[19] In July 2022, Virgin Media O2's shareholders (alongside an investment firm) announced a new joint fibre venture which plans to pass up to 7m premises with a wholesale full fibre network, including an initial focus on 5m homes not currently served by Virgin Media O2's existing network;[20]
- CityFibre plans to pass up to 8 million premises (both residential and business) across 285 towns and cities by 2025. It recently announced it has now passed 2m homes, completing 25% of its target. It uses a partnership model, with over 30 retail providers offering full fibre services to customers over its network.[21]
- Some providers, like Hyperoptic and Community Fibre, focus on connecting premises in urban areas, while Gigaclear, B4RN and a number of others focus on connecting more rural areas. There are a range of approaches taken by these providers. Some work closely with local communities to determine areas with demand, and may include the local community undertaking some of the work. Others plan their own commercial builds in areas they assess as less well served by providers such as Openreach. Some may also bid for public funding to support rollout. Providers may follow one of these approaches, or a combination of them.

In addition to these publicly available statements on network roll-out, we have gathered data on the deployment plans of network operators over the next three years, including privately funded and publicly supported interventions. We recently published this data in a separate report[22] - see also the summary in a later section below.

Deploying these new networks requires significant investment and engineering resources. The cost and timeframes for deployment can be reduced if a provider can roll out its network by using Openreach's c.480,000km of duct and c.4.1 million poles. Since 2019, our rules have allowed easier access to Openreach's physical infrastructure (PIA). As of the end of September 2022, 154 providers

[16] KCOM is the incumbent in and around the city of Kingston upon Hull. KCOM committed to full fibre deployment a number of years ago and availability is approaching 100%. KCOM is also extending its full fibre footprint beyond its traditional area of operation. KCOM, KCOM unveils £100m vision to deliver full fibre future for region, September 2022.
[17] BT Group, BT to increase and accelerate FTTP build to 25m premises by the end of 2026, May 2021. Openreach, Openreach focuses broadband build plans on upgrading millions more rural homes, May 2021. BT's latest quarterly report (30 September 2022) indicates it has FTTP build to over 8.8m premises, including 2.8 in rural areas.
[18] Virgin Media O2, Virgin Media O2 completes gigabit upgrade in boost for Britain's broadband target, December 2021.
[19] Virgin Media O2, Q3 2022 Earnings Release, November 2022.
[20] Virgin Media O2, New £4.5bn investment to extend Virgin Media O2's fibre footprint to 80% of the UK, July 2022.
[21] CityFibre, CityFibre network passes 2 million homes on its march toward 8 million, September 2022.
[22] Ofcom, Planned Network Deployment, November 2022.

had registered with Openreach as customers of PIA, and over 83% had already built network using PIA or have placed orders to do so. Providers have ordered c.112,000km of duct (20,000km of which has been delivered) and c.810,000 poles (134,000 of which have been delivered) to deploy networks.

The UK Government has continued its work to ease the administrative burden required when agreeing access to private land for operators looking to roll-out gigabit-capable (and 5G) networks. The new Product Security and Telecommunications Infrastructure Act (PSTI),[23] as well as addressing security issues, will include a number of telecommunications infrastructure measures. This will include making changes to the Electronic Communications Code[24] to support gigabit-capable and 5G network rollouts which will encourage collaborative negotiations between site owners and telecommunications operators, ensure expired agreements can be renewed more easily and enable telecoms providers to gain access to certain types of land more quickly in circumstances where a landowner repeatedly does not respond to access requests. We will be supporting this work through consulting on changes to the Electronic Communications Code of Practice.

Coverage of superfast broadband remains high, with most UK homes having access to a superfast broadband connection

Superfast broadband is now available to around 97% / 28.7m of UK premises, an increase of one percentage point, and about 600,000 homes compared to last year.

Figure 2.4: Residential superfast coverage

	Superfast	Urban	Rural
England	97%	98%	88%
Northern Ireland	94%	99%	82%
Scotland	94%	99%	76%
Wales	95%	99%	84%
UK	97%	98%	86%

Source: Ofcom analysis of provider data (September 2022).

As discussed above, providers are now heavily focused on deploying gigabit-capable networks and, in the future, will mainly deliver increased availability of full fibre. As such, we expect future increases in superfast broadband coverage to continue to be modest.

[23] UK Parliament, Product Security and Telecommunications Infrastructure Act, December 2022.
[24] Ofcom, Electronic Communications Code.

Broadband services are also available across large parts of the UK using wireless networks

Fixed wireless access (FWA) on mobile networks

Of the four mobile network operators (MNOs) in the UK, only Virgin Media O2 does not offer FWA services. Based on information from the MNOs about their coverage levels, we estimate that 95% of UK premises have access to an MNO FWA service. This is an increase of one percentage point from last year. [25]

FWA services offered over the MNOs 4G and 5G networks, share the network capacity with mobile users, meaning that the capacity of the network has to be carefully managed between the demands of existing mobile users and FWA customers. This means that there may be areas of high mobile demand where a reliable FWA service cannot be offered.

We carried out some research this year on the performance of FWA services delivered over mobile networks (similar to the research we carried out last year on the speeds offered by WISP networks – see below). Our results show that FWA packages are offering similar capabilities to fixed connections, except in relation to latency. Specifically we found that: [26]

- two of the MNO 5G FWA packages that we tested delivered higher average broadband speeds than some packages on fixed technologies. These packages delivered average download speeds of over 140 Mbit/s and upload speeds of over 24Mbit/s;
- average packet loss for FWA services was similar to average packet loss for fixed broadband services; and
- latency of the FWA services we measured was higher than on fixed broadband technologies.

Fixed wireless access via wireless ISPs (WISPs)

These FWA services are delivered over networks that communicate via a wireless link between a provider's mast site and an external antenna fixed to a customer's premise. They mostly use license exempt or lightly licensed spectrum, and due to the range of frequencies being used to deliver this service, performance may sometimes be limited by line-of-sight issues. We are beginning to see some use of 5G technology, which alleviates some of these line-of-sight issues.

We have further expanded our collection of WISP data this year to now include 26 providers. Based on estimates from these providers, around 7% of UK premises have coverage from a WISP network, which is the same as last year.

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[25] This estimated coverage figure is based on coverage data provided by EE and Three. While Vodafone provides an FWA service across its mobile network, we do not have data at the level of granularity needed to map its coverage to UK premises and so it is not included in this figure. More generally, coverage forecasts are determined by predictive modelling tools, localised issues may mean that particular premises may not be able to receive a service despite being predicted to do so.

[26] See our interactive report for more information. Note that the fixed broadband data included in this report was collected in March 2022. The FWA (and other wireless technology data) was collected in September 2022 and is not weighted to a representative sample for the UK. The analysis is therefore limited to the individual connections used in the study, which are spread across local regions across the UK and the majority of which are from remote or rural areas.

Table 2.5: Coverage of MNO and WISP FWA networks with at least decent broadband (residential premises)

	MNO FWA	WISP FWA
England	96%	7%
Northern Ireland	85%	0%
Scotland	95%	2%
Wales	93%	32%
UK	95%	7%

Source: Ofcom analysis of provider data (September 2022).

There continues to be a small number of premises that cannot access decent broadband

Excluding fixed wireless access coverage, 98% of UK homes and businesses have access to at least decent broadband on a fixed line connection. This means around half a million premises do not have access to decent broadband via a fixed connection – a drop from around 650,000 premises last year. Most of these premises are in rural areas of the UK.

As discussed above, MNOs and WISPs can offer a decent broadband service and can provide an alternative network technology for the premises that cannot currently access decent broadband from a fixed connection. Based on the coverage estimates from FWA providers, we estimate a significant proportion of those premises that do not have access to a decent broadband service could have access via an FWA network.

Table 2.6: Premises without access to a decent broadband service from either a fixed or wireless network

	Remaining premises without access to decent broadband
England	40,000
Northern Ireland	9,000
Scotland	21,000
Wales	10,000
UK	80,000

Source: Ofcom analysis of provider data (September 2022).

This leaves around 0.3% / 80,000 premises in the UK that still do not have access to a decent broadband service via either a fixed or wireless network. This figure continues to decrease year on year (down from 123,000 last year). This reduction is likely due to a combination of factors, including

the increased number of smaller fibre network and FWA providers from which we have gathered data, and the increasing roll-out of some publicly funded schemes.

When we analyse the 80,000 premises against 4G indoor mobile coverage data (reported in the next section), we estimate that around 30,000 premises cannot access either a decent fixed broadband service, or good 4G indoor coverage (of at least 2Mbit/s).

Some of the 80,000 premises will be due to receive a decent broadband service under a publicly funded scheme within the next 12 months. We discuss the publicly funded schemes further below but based on the data we have gathered on these schemes, we expect around 65,000 premises will still be left without access to decent broadband. These remaining premises may be able to have a new connection built under the broadband universal service obligation.

The broadband universal service obligation (USO)

The broadband USO provides everybody with the right to request a broadband connection with a download speed of at least 10 Mbit/s and an upload speed of 1 Mbit/s (as well as a number of other specific technical characteristics).[27]

Where an affordable service[28] with these characteristics is not available, or due to become available in the next 12 months under a publicly funded scheme, the customer is eligible for the USO if the costs of providing the connection are below £3,400 or, where the costs are above £3,400, the customer agrees to pay the excess.[29] BT is the USP for the UK (excluding Hull), and KCOM for the Hull area. They are required to provide the USO and to report at six monthly intervals on delivery.[30]

BT's delivery of the USO

As of October this year, BT had received 1851 orders.[31] Each order requires network build that can serve multiple premises, and therefore will lead to full fibre connections being built that can serve just under 9,500 premises that do not have access to decent broadband. These break down by Nation as shown below.

Table 2.7: USO orders and number of premises built

	Number of USO orders	Total homes passed by resulting build
England	1488	7099
Northern Ireland	85	702

[27] In particular these are: a contention ration of no more than 50:1; latency which is capable of allowing the end user to make and receive voice calls effectively; and the capability to allow data usage of at least 100GB a month.
[28] When the USO was launched (in March 2020), we specified in the USO conditions that an affordable service was one that costs £45 per month, rising annually by CPI. This has now risen to £48.90 per month in line with CPI.
[29] In calculating whether the costs are below or above £3,400, the universal service provider (USP) must take into account where costs could be shared by several USO eligible premises.
[30] BT Group, A Universal Service Obligation - Keeping the UK connected.
[31] BT's public reporting shows a slightly lower number of total confirmed orders, this is because it only covers orders prior to, and during, network build, whereas the 1851 figure also includes orders made once build has completed.

	Number of USO orders	Total homes passed by resulting build
Scotland	110	583
Wales	168	1096

Source: Ofcom analysis of BT data.

BT's latest delivery report shows that of the c.25,000 requests to its USO helpdesk received to date, two-thirds were ineligible as a decent broadband product already existed from BT or another provider, or would be made available within 12 months by a publicly funded scheme.[32]

There are still some premises that may not get connected under the USO

Data analysis by BT indicates that there are a number of premises where the costs to connect them are likely to exceed the £3,400 cost threshold in the USO. In these cases customers will receive excess cost quotes that may be quite high in some cases. Those premises that are the most expensive to connect and are likely to need alternative solutions.

The availability of satellite services is increasing and may offer an alternative option for customers in poorly served areas

Satellite broadband services have been available in the UK for some time but take-up of these services has remained low compared to traditional broadband services.[33] The technology for delivering satellite broadband has evolved significantly in recent years, and continues to do so, with an increasing number of satellite constellations now being launched.

Geostationary (GSO) satellites, which orbit the earth at about 36,000km, have traditionally been the primary way of delivering satellite communication services. GSO providers[34] can provide satellite broadband to most premises across the UK, including some in the most remote areas, but the connection's performance can be limited by its higher latency and by data caps, which may mean the service is not suitable for all customers. However, newer GSO services offering higher speeds and unlimited data are becoming increasingly available.[35]

Low Earth Orbit (LEO) satellite constellations are now also available offering residential and business broadband to UK customers. LEO satellites can deliver lower latency services due to their lower orbit (below 2,000 km), enabling a more seamless use of applications like two-way video calling and gaming. Starlink launched its LEO satellite broadband service in the UK last year and it now provides coverage across the UK (excluding the top two thirds of the Shetland Islands).[36]

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[32] BT Group, BT report on progress against the Broadband USO, October 2022.
[33] We report in the 2022 Communications Market Report that there were 25,500 fixed broadband satellite connections at the end of 2021. This figure represents data collected from a non-exhaustive list of UK satellite service providers (excluding Starlink).
[34] For example ViaSat's KA-SAT and EutelSat's We Konnect services.
[35] We Konnect offers broadband in the UK, Europe and Northern Africa using GSO satellites. They state that average download speeds of 20 to 75 Mbit/s are available on plans ranging from about £38-£48 per month. Konnect.
[36] See Starlink's online coverage map. In September, Starlink expanded its coverage further north, reaching up to around the bottom third of the Shetland Islands, with the rest planned to follow in the first quarter of 2023. ISPreview, Starlink Expand UK Coverage to Include Part of Shetland Islands, 27 September 2022.

OneWeb also recently launched LEO satellite services in the UK and have partnered with BT to offer connectivity services. Its initial service trials have focused on satellite's role as a supplementary backhaul solution to sites where additional capacity or a back-up connectivity solution is required, and to deliver improved resilience for business customers.[37]

Starlink is therefore currently the only direct to consumer LEO satellite broadband service in the UK. We have recently carried out our own performance measurements of Starlink's services based on a small sample of individual connections spread across the UK (the majority of which were in remote or rural areas).[38] Our results confirm that Starlink customers on average receive download speeds of almost 100Mbit/s in peak hours, as well as upload speeds of around 14 Mbit/s. Whilst the latency of the service is higher than for fixed broadband, it was equivalent, or lower, than the FWA services that we also measured as part of the same study.

As of October 2022, approximately 13,000 customers have opted for a broadband service from Starlink and, based on our analysis of Starlink's data, at least some of these customers are based in areas which do not have access to traditional decent broadband services. These services are currently more expensive than traditional broadband services (Starlink's broadband is priced at £75 a month, plus a £460 one-off installation fee)[39] but may offer a good alternative option for customers in hard to reach areas who would otherwise face very high costs to install a traditional fixed broadband connection. The UK Government has recently announced a new trial, initially supported by Starlink, which aims to see the extent to which LEO satellites can deliver high-speed broadband connections to more than a dozen very hard-to-reach locations across the UK.[40]

There is a limitation on the number of customers both GSO and LEO services can currently provide services to due to the number and capacity of existing satellites, as well as the available spectrum which is shared between users. These capacity constraints can lead to Starlink occasionally suspending availability of its service to new customers in certain areas, meaning services are not immediately available and customers must instead sign-up to a waiting list.[41] As the number of operational satellites in orbit grows, so too will network capacity. We are releasing more spectrum which will offer more options for increased capacity in future.[42]

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[37] OneWeb, OneWeb and BT sign agreement to explore rural connectivity solutions in the UK and beyond, June 2021. BT Group, BT secures industry-first global partnership with OneWeb, November 2021. BT Group, Our Space Strategy, April 2021.

[38] Note that this sample was not weighted to be representative of the UK, and is limited to the individual connections involved in the study. See our FWA measured performance interactive report.

[39] Starlink.

[40] UK Government, Broadband beamed from space to isolated areas under plans to boost countryside internet connections, November 2022.

[41] For example in August 2022, Starlink reported it was temporarily suspending service offerings to new customers in two areas, south Manchester and southeast London. However, at the time of publication, Starlink's online coverage map now shows all areas in the UK as available for new customers.

[42] Ofcom, More spectrum for satellite connectivity – extending access in the Ku band, August 2022. Ofcom, Space spectrum strategy, November 2022.

Both private and public sector investment are continuing to play a role in building faster networks

Our planned network deployment report indicates how roll-out of full fibre could progress over the next three years

We recently published our first forward looking report about planned network deployments of full fibre.[43] This report is based on the stated deployment plans of network operators as of March 2022 up to three years in advance, and it includes plans that are privately funded as well as those that are supported through public funds/intervention that were known at the time the data was collected in May 2022.[44]

Some of our key findings were that, if all network deployments are realised as planned, the number of properties covered by full fibre could reach nearly 84% / 25m premises, with gigabit-capable coverage reaching up to 92% of premises. Up to 66% of premises are expected to receive gigabit-capable service from two or more providers.[45] For further details on our findings see the full report.

While this data sets out the operators plans, as opposed to achieved build, we have considered how their plans might change some of the measurements we report on in Connected Nations. For example, we have estimated how this expected deployment of full-fibre broadband services is likely to reduce the number of properties that cannot get decent broadband from either a fixed or fixed wireless connection over the next three years. Specifically, our estimates indicate that there will be 52,300 properties which will continue to be without access to decent broadband, and which may therefore be eligible for the broadband USO. Table 2.8 shows how this estimate breaks down by Nation.

Table 2.8: Estimate of remaining premises unable to access decent broadband by March 2025[46]

	March 2025
UK	52,300
England	29,400
Northern Ireland	3,300
Scotland	12,200
Wales	7,500

Source: Ofcom analysis of provider data (March 2022).

[43] Ofcom, Planned Network Deployment, November 2022.
[44] The report only takes account of communications providers planned deployments (whether privately or publicly funded), and therefore does not account for any aspirations or plans by public authorities, whether national or local, to roll out networks in their geographical areas.
[45] These estimates include coverage for plans across all planning stages (including those for which financial approval had not yet been obtained) as detailed in the Planned Network Deployment report, see page 4.
[46] This analysis is based on all premises (residential and commercial) and takes account of current FWA coverage. It does not include the coverage of future FWA deployments as the necessary coverage modelling has not taken place.

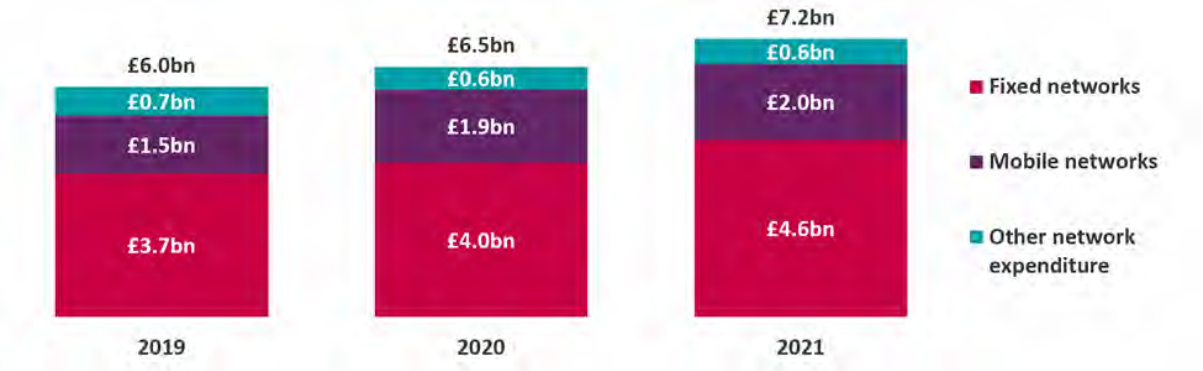
Expenditure on telecoms infrastructure increased to £7.2bn in 2021

In order to understand how telecoms providers are investing in network infrastructure, we collect network investment data from over 30 of the UK's largest fixed and mobile telecoms providers.[47] The information collected from providers relates to their annual financial reporting periods, which can differ between providers. To take account of this, we pro-rate the figures received to estimate network investment in each calendar year.

The figures below include public funding provided to support the rollout of better fixed and mobile connectivity, such as UK Government funding, funding provided via the governments of the devolved nations and local authority funding. Further information on mobile network expenditure can be found in the mobile section of this report.

Our analysis suggests that, in total, UK telecoms providers invested £7.2bn in network infrastructure in 2021, a £0.7bn (11%) year-on-year increase in real terms (i.e. adjusted for inflation). During the year, fixed network investment totalled £4.6bn (64% of the total) with mobile network investment accounting for a further £2.0bn (27% of the total). An additional £0.6bn related to 'other network expenditure' (investment in infrastructure that is used to provide both fixed and mobile services).

Figure 2.9: Telecoms network capital expenditure: 2019 to 2021



Source: Ofcom analysis of provider data. Note: Adjusted for CPI (2021 prices).

Expenditure on fixed telecoms network infrastructure increased to £4.6bn in 2021

Data collected from the UK's largest providers suggest that UK telecoms providers invested £4.6bn in fixed telecoms network infrastructure in 2021, a £0.6bn (15%) increase in real terms compared to

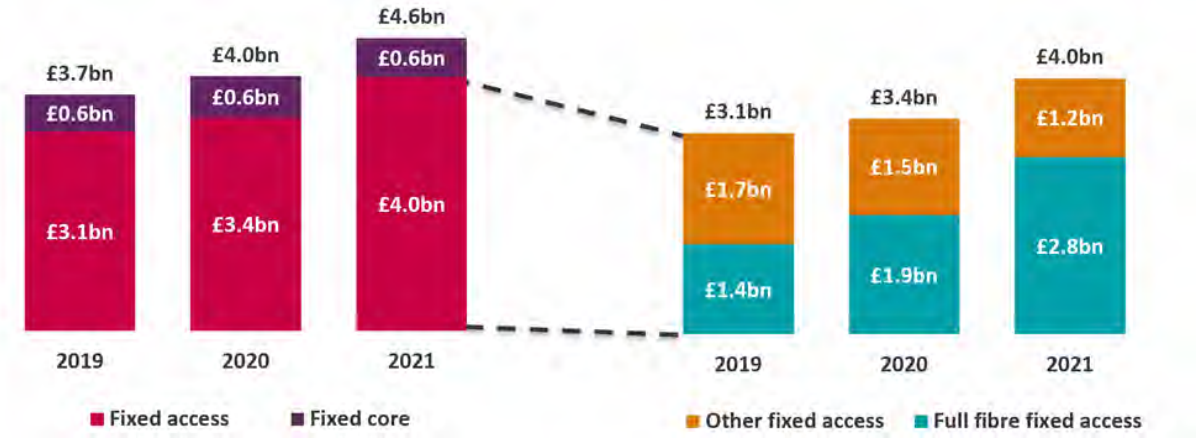
[47] Only capital expenditure required to provide and operate network infrastructure in the UK is included: figures exclude VAT and expenditure on retail activities (e.g. retail billing or marketing systems). Figures include capital expenditure on tangible and intangible assets, including capitalised staffing and labour expenditure, and expenditure on assets in the course of construction (AICC). Figures exclude expenditure on assets that have been added to a balance sheet through adoption of the IFRS16 accounting standard, on assets held for sale and the costs of maintenance contracts purchased alongside hardware. Expenditure associated with asset transfers and leasing follows the same guidelines the Office for National Statistics provides when requesting information in its quarterly acquisitions and disposals of capital asset survey. While the figures shown have been rounded, any percentage changes shown are calculated using the unrounded data.

2020. In addition to this, £0.6bn was invested in infrastructure that is used to provide both fixed and mobile telecoms services in 2021.

Investment in access network infrastructure accounted for most fixed network investment during the year, (£4bn, or 87% of the total), with fixed core and backhaul networks accounting for the remaining £0.6bn (13% of the total). The proportion of total fixed network expenditure that related to access networks increase by 3 percentage points in 2021, while there was a similar drop in the proportion relating to fixed core networks.

Gigabit-capable full fibre access network investment totalled £2.8bn in 2020, a year-on-year increase of £0.9bn (49%). In addition, a proportion of the £1.2bn that was spent on other fixed access networks may also support deployment of gigabit-capable networks where this is related to upgrades to physical infrastructure (such as fibre deployments for fibre-to-the-cabinet) that could be re-used in future.

Figure 2.10: Fixed telecoms network capital expenditure: 2019 to 2021



Source: Ofcom analysis of provider data. Note: Adjusted for CPI (2021 prices).

Public sector investment has a key role in delivering connectivity, particularly in harder to reach areas

Governments across the UK continue to supplement commercial rollout by investing in faster speeds for the hardest to reach areas. While subsidy schemes designed to bring superfast speeds continue to operate, governments are also now using public funding to support gigabit-capable connectivity, primarily full fibre services.

The UK Government has set a target of at least 85% gigabit coverage by 2025, alongside an ambition to get as close to 100% as possible. To help achieve this, it has committed, under Project Gigabit, to invest £5 billion to bring high speed broadband to hard-to-reach areas considered too difficult or expensive to connect under industry commercial plans. Its latest report on progress indicates that it has now launched procurements totalling over £780m which aim to cover up to 545,000 premises.[48]

[48] UK Government, Project Gigabit Delivery Plan - autumn update 2022, 30 November 2022.

The first contract was awarded under Project Gigabit in August this year, with three further contracts awarded since.[49]

Other examples of ongoing government schemes to support fast speeds in hard-to-reach areas include:

- The UK Government provides vouchers through the Gigabit Broadband Voucher Scheme for individual eligible customers to contribute towards the installation of faster connections using gigabit-capable infrastructure. In November 2022, the UK Government announced that over 79,000 vouchers had been used to connect premises to gigabit-capable broadband under the scheme.[50] It also increased the value of vouchers from £1,500 and £3,500 for homes and businesses respectively, to £4,500 for all beneficiaries. In July, the UK Government also announced an £82 million investment to help connect up to 3,000 schools in England to gigabit-capable broadband over the next three years.[51]
- The Welsh Government's £56m full fibre roll-out with Openreach will conclude in March 2023 serving around 39,000 premises that would not otherwise have been connected to full-fibre broadband. The Local Broadband Fund supports local authorities and social enterprises to deliver broadband to whole communities. The fund has provided grant funding to schemes across Wales including in Monmouthshire, Cardiff and Gwynedd. The Access Broadband Cymru grant scheme provides a broadband safety net though funding of up to £800 to connect individual homes, businesses and third sector premises.[52]
- The Scottish Government is making substantial investments in Scotland's digital infrastructure. Building on the work of Digital Scotland Superfast Broadband, the Reaching 100% (R100) programme is made up of three strands of activity –the £600 million R100 contracts (North, Central, and South), the R100 Scottish Broadband Voucher Scheme (R100 SBVS) and ongoing commercial deployment.[53] All three R100 contracts are delivering connections and going beyond the original superfast commitment by providing increased gigabit-capable and full fibre coverage. Over 14,300 premises have been connected through the R100 contracts with a further 2,600 connections delivered through the voucher scheme. Island communities in Scotland will also benefit from gigabit-capable broadband following the deployment of 16 R100 subsea cables that were laid during Summer 2022.[54] . In August 2022, a further £36 million of funding was jointly announced by the Scottish and UK Governments, which will see an additional 2,637 premises receive access to gigabit-capable speeds.[55]
- In Northern Ireland, the Department for the Economy secured additional capital funding of £32 million[56] in order to bring an extra 8,500 premises, including 2,500 hard-to-reach premises, into its broadband intervention scheme, Project Stratum. The inclusion of these additional premises

[49] UK Government, Work begins on first major broadband upgrade under £5 billion Project Gigabit, 30 August 2022.
[50] UK Government, Project Gigabit Delivery Plan - autumn update 2022, 30 November 2022.
[51] UK Government, Thousands of rural primary schools to get huge broadband upgrade, 1 July 2022.
[52] Welsh Government, Update on Digital Connectivity in Wales, 8 July 2022.
[53] Digital Scotland, R100 - Access for all.
[54] Digital Scotland, R100 subsea deployment.
[55] Digital Scotland, Delivering faster internet, 19 August 2022.
[56] The Department for Digital, Culture, Media and Sport provided £22.3 million, while the Department for Education and Department of Agriculture, Environment, and Rural Affairs will each provide £4.85 million. Fibrus Networks, which is delivering Stratum, is making an additional contribution of £2 million.

will bring the total number of premises to benefit from Project Stratum to 85,000. The deployment of the new full fibre network to reach all 85,000 premises will continue across four extended quarters of network build, with Fibrus Networks expected to complete deployment by March 2025. [57]

More information about schemes run by the devolved governments is available in the individual nations reports.

Earlier this year the UK Government published its response to its consultation on premises in very hard to reach locations, which the current public schemes will not reach. [58] It plans to use the evidence gathered from the consultation to produce a set of policy proposals to address the needs of these premises. [59] We will continue to work with the UK Government as it develops its policy in this area.

More people are upgrading to higher speed services and new technologies

Take up of full fibre and gigabit-capable services is increasing

It is important to understand whether consumers are benefiting from higher speed and more reliable broadband services when they are available.

We estimate that the take-up of services using full fibre at any speed, where fibre is available, is around 25%. Take-up of gigabit-capable networks is higher at around 38%.

Our reporting of full fibre take-up may appear lower than expected because networks are deploying at pace and take-up lags behind coverage. This could occur because there is a lag in awareness of availability or consumers need to wait until their existing service contract ends before they can migrate to a new service. However, take-up is increasing with at least 1.4 million new full fibre connections in the year to September 2022.

Table 2.11: Estimated full fibre take-up as a percentage of premises where full fibre services are available: 2021 and 2022

	2021	2022
UK	24%	25%
England	25%	25%
Northern Ireland	19%	25%

[57] Department for the Economy, Project Stratum – extension to include 8,500 additional premises.
[58] UK Government, Improving broadband for Very Hard to Reach Premises: Government response, 25 May 2022.
[59] As noted earlier in this section, the UK Government is also currently trailing the use of satellite to deliver high speed connections in a more than a dozen UK very hard to reach locations. Following the trial, it intends to consider the feasibility of using satellite broadband to connect very hard to reach residences and business across the UK. UK Government, Broadband beamed from space to isolated areas under plans to boost countryside internet connections, 30 November 2022.

	2021	2022
Scotland	22%	23%
Wales	24%	28%

Source: Ofcom analysis of provider data (May 2022).

Customers taking a full-fibre broadband service can usually choose from a range of speeds. Approximately 9% of full fibre customers take a service at the highest available speed.

Take-up of superfast broadband has also increased

Overall, we estimate that for those premises that are able to take superfast broadband services (97% of all premises in the UK), around 73% of them do so.[60] This is an increase from around 69% last year. Take-up of superfast broadband is highest in England and Northern Ireland, however, take-up has increased in all nations in the last year.

Table 2.12: Estimated superfast take-up as a percentage of premises where superfast services are available: 2021 and 2022

	2021	2022
UK	69%	73%
England	69%	73%
Northern Ireland	73%	73%
Scotland	68%	71%
Wales	66%	71%

Source: Ofcom analysis of provider data (May 2022).

Helping customers choose the right broadband service

Customers will be best placed to decide which broadband service is most suitable for their needs if they understand the available options. We are continuing with a range of work to help customers understand their broadband choices, and to see the benefits that faster connections may give them.[61] Our coverage checker shows the estimated fastest speeds and network providers that are available at a particular address.[62] We also recognise that customers need the right information to make informed choices about their broadband services. Earlier in the year, we paused the work of the industry working group on developing a common terminology for broadband services,[63] as the

[60] For all UK premises, the take-up of superfast broadband is slightly lower, at 70%. Under section 72B of the Communications Act, the Secretary of State must give Ofcom a direction to review the broadband USO if it appears that, on the basis of information we have published, take-up of superfast broadband has reached at least 75% of all UK premises.
[61] Ofcom, How to get more from your broadband.
[62] Ofcom, Mobile and broadband checker.
[63] Which?, Gigabit Take-up Advisory Group report, June 2021.

group was not able to reach a consensus at the time. Instead, to progress this work, we commissioned research on consumer understanding of the different kinds of terminology used to describe broadband technologies, and whether further, consistent information on these would be useful to consumers. We plan to report on the research next year, along with a consultation on next steps if appropriate.

The affordability of broadband services will also have a significant impact on customer choice – particularly in the current context of wider cost of living pressures on households and rising retail prices. Our latest affordability research shows an increasing number of households reporting affordability issues (6% of customers reported an affordability issue with their fixed broadband service).[64] Social tariffs can help ensure that fixed broadband services remain affordable. As part of our work on affordability we are monitoring the take-up and availability of social tariffs, as well as seeking to address barriers to help increase take-up of social tariffs among eligible customers.

The migration of the UK's telephony network to digital is gradually progressing

The UK's traditional landline services are undergoing a substantial transition as network providers retire their legacy systems (referred to as the Public Switched Telephone Network, or 'PSTN') and replace them with modern systems. BT and Openreach aim to retire BT's PSTN network and the Openreach wholesale services that deliver PSTN by the end of 2025, with Virgin Media working on a broadly similar timescale. To make sure landline services continue in the future, providers currently using legacy telephony networks will deliver landline calls over a digital technology called Voice over Broadband (VoBB), which uses Voice over Internet Protocol (VoIP) over a broadband connection.

Analysis of provider data shows that around 27% of landline services[65] are now delivered over broadband, up from 15% last year. Increasingly, customers have their landline service moved to VoBB when they change provider or upgrade their phone and broadband package. Last year, BT and Virgin Media also began migrating some of their existing customers, known as managed or provider-led migrations. In the year to August 2022, around 1.6m customers migrated to a VoBB service, with just over half resulting from a managed migration.

In March, BT announced it had temporarily suspended its programme of managed migrations of existing customers, noting it had underestimated the disruptive impact the upgrade would have on some customers. It aims to re-start the programme once it has key solutions in place.[66]

We are continuing to monitor the migration closely and engage with providers to help ensure customers are protected and disruption is minimised. The migration from the legacy telephone networks also brings certain challenges with respect to the resilience of landlines in the event of power cuts. We discuss this further in Section 3 on Network Security and Resilience.

Customers can also choose a 'broadband-only' package, where they no longer take a phone service. Broadband-only packages – with or without the option to add a landline service – are offered by

[64] Ofcom, Affordability of communication services, September 2022.
[65] This figure relates primarily to residential and SME voice lines, although not all operators were able to provide SME data.
[66] BT Group, We're pausing our Digital Voice plans for Consumers, while we work on a more resilient rollout, 29 March 2022.

most full fibre providers and are increasingly being offered for copper-based broadband as well. In the year to August 2022, over half a million customers dropped their landline in favour of a broadband-only service. This is more than double the number that did the same last year. With landline usage falling,[67] we anticipate that adoption of broadband-only packages will continue to grow in the coming years.

Data usage over fixed broadband continues to grow

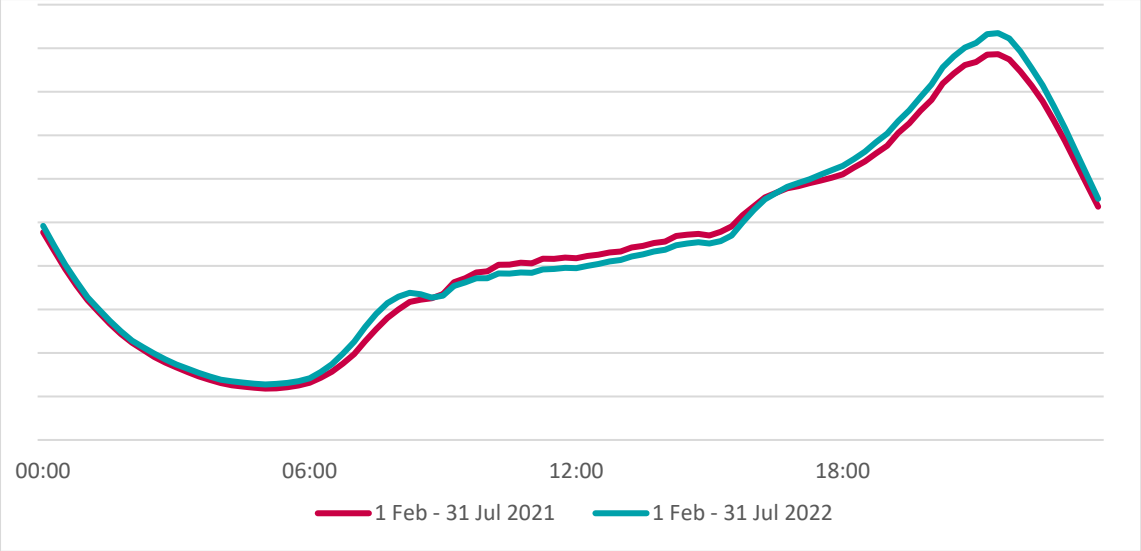
Fixed data traffic continued to increase this year, but the level of growth was slower in line with last year's trend. Average monthly traffic rose by 6% to about 482 GB per connection. This is up from 453 GB last year, which represented a 5% increase over 2020. Whilst this is a similar level of growth to last year, it is noticeably lower than the significant c.30% growth in 2020, largely as a result of the impact of Covid-19. Peak download traffic grew in line with overall usage, increasing by around 7% this year (compared to 13% last year).

We also obtained information and analysis on data traffic from some providers for the months of February to July this year. Some providers gave detailed reports covering the entire period, while others had higher level analysis, or limited data. Figures 2.13 and 2.14 show the typical traffic profile for weekdays and weekends for:

- the period from February to July 2021, when there were still Covid-19 restrictions in place, including national lockdowns;[68] and
- a similar period during 2022, when Covid-19 restrictions had lifted in England and begun easing in other Nations.

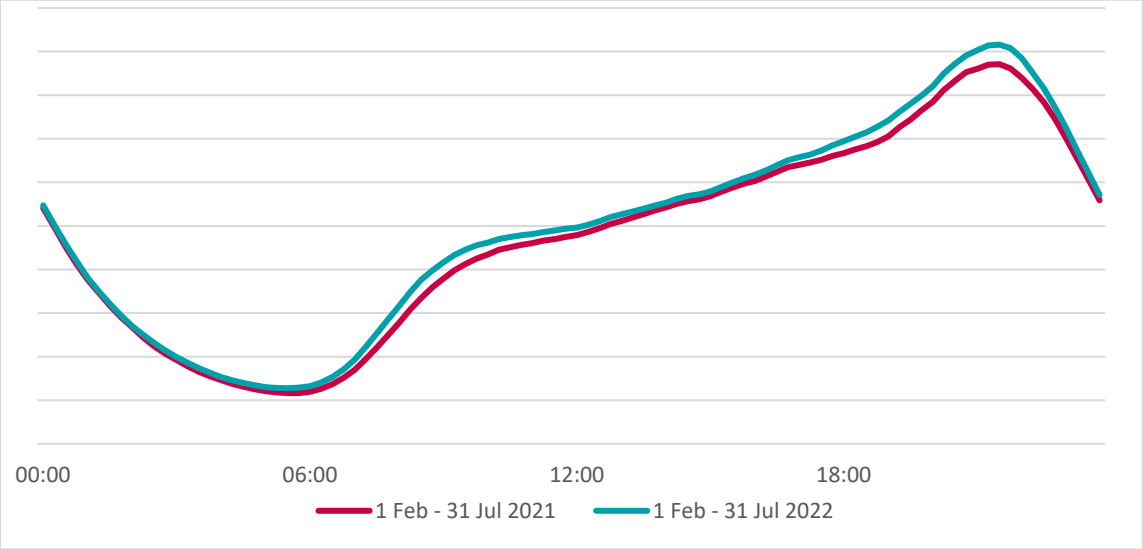
[67] Ofcom, Communications Market Report 2022, 18 July 2022. Fixed voice call volumes fell by 14% in 2021.
[68] At this time, many people were still working from home on a permanent or regular basis. Entertainment venues such as pubs were open to different degrees and with different rules in different Nations.

Figure 2.13: Average traffic profile (Gbit/s) on weekdays in 2021 and in 2022



Source: Ofcom analysis of provider data.

Figure 2.14: Average traffic profile (Gbit/s) on weekends in 2021 and in 2022



Source: Ofcom analysis of provider data.

The slight reduction in daytime, weekday traffic indicates lower broadband traffic during traditional working hours, potentially because of a return to in-office work after pandemic restrictions lifted. Otherwise, apart from this slight shift, the overall pattern of usage has remained similar to last year suggesting that overall usage patterns developed during the pandemic are here to stay. The growth in peak traffic indicates customers continue to use their fixed broadband connections for bandwidth heavy activities, such as streaming and gaming. Data from the operators from across this period indicated that overall usage levels were at their highest in February, with a trend towards decreasing usage in the spring and summer months.

3. Mobile, data and voice

Introduction

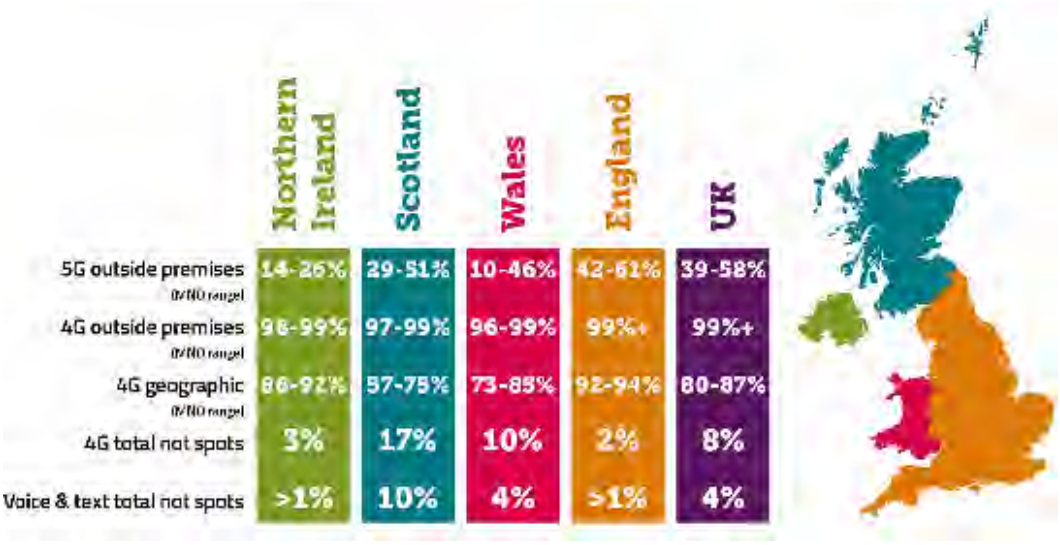
Mobile services continue to play an ever more central role in people's lives, from on-the-go calls and internet access to wireless connectivity for smart meters. In this chapter, we provide an update on the progress operators are making with their 5G rollout plans, while continuing to report on the broader availability of mobile coverage outside and inside premises, across the UK's landmass and on roads.

This chapter also provides early insights from our work to provide additional perspectives on the quality of mobile network performance. We then report on investment in, and the take up of mobile services, as reflected in the continuing growth of mobile traffic. Finally, we also update on the availability and use of Internet of Things (IoT) devices and services.

Highlights

- The availability of 5G services continues to grow rapidly, with the level of coverage provided outside of premises by at least one Mobile Network Operator (MNO) rising from 42-57% in 2021 (across a range covering Very High and High Confidence) to 67-77% in 2022.
- Our analysis of MNO 5G predictions indicates that Three has the most extensive 5G coverage outside premises at our 'High Confidence' level, at 58%; BT EE retains the most coverage at our 'Very High Confidence' level, reaching outside 45% of premises.
- 4G continues to carry the majority of mobile data traffic (accounting for 87% of total data traffic), with 4G coverage from at least one MNOs reaching 92% of UK landmass.
- Mobile traffic continues to grow, though we have seen slower growth this year, with traffic levels increasing c27% year on year, compared with a 37% rise between 2020 and 2021. However, it is too early to determine if this represents a trend.
- Data traffic carried over 5G has increased more rapidly, rising from 3% of all traffic in 2021 to over 9% this year, generated from a device pool which now includes c20% 5G capable handsets.
- We see continued evolution in non-consumer connectivity, with growth in private networks offered by MNOs, and by other players. Internet of Things (IoT) traffic also rose significantly, with a 20% growth in MNOs' IoT traffic.

Figure 3.1: Overview of voice and data coverage across the UK and UK nations[69]



Source: Ofcom analysis of operator data (September 2022).

5G availability continues to grow, extending beyond the busiest urban locations

5G is within reach of a growing number of consumers, with around 20% of mobile handsets now 5G capable (up from c10% in 2021), and significant increases in coverage observed across the UK.[70]

The mobile coverage data in this report is based on predictions provided to us by the MNOs. To evaluate the accuracy of the information provided to us, we undertake regular testing to ensure the predictions provided are suitable for national and regional reporting. The development of 5G predictions has required new approaches from the MNOs, and in many cases relies upon new iterations of their modelling tools. We have therefore undertaken a 5G-focussed monitoring exercise before publishing these predictions, and we will continue to engage with MNOs, and undertake further monitoring, as networks are rolled out and models are updated.[71]

In 2021, we set out our approach to reporting on 5G availability across a confidence range covering High Confidence and Very High Confidence. These confidence levels reflect the likelihood of on the ground coverage for consumers in a particular location. We consider a High Confidence, associated with a signal strength (-110 dBm), to equate to at least an 80% confidence level, and a Very High Confidence - associated with a higher signal strength (-100 dBm) - to equate to a circa 95% confidence level.[72]

[69] The MNO ranges in this figure refer to the span between the MNO with the least coverage and that with the most coverage on a given measure. For 5G outside premises the MNO range is based on our 'High Confidence' measure, rather than the 'Very High Confidence' measure which we also use in this report.
[70] We note that not all 5G capable devices may be enabled with 5G subscriptions.
[71] Measurement data is collected as part of our monitoring activity on a regular basis. Ofcom, Mobile signal strength measurement data from our spectrum assurance vehicles, 26 July 2022.
[72] These signal strengths refer to control channel signals – for further detail see our Methodology Annex.

For 2022 we find that the area outside of premises[73] where 'At least one MNO' provides coverage is predicted to be between 77% for High Confidence and 67% for Very High Confidence.[74] This represents an increase of 20 percentage points and 25 percentage points respectively from 2021.

Figure 3.2: 5G coverage outside of UK premises by 'At least one MNO' (2021 and 2022)



Source: Ofcom analysis of operator data (May 2021 and May 2022).

The 'All' MNO footprint, representing the places where all 4 MNOs provide coverage, remains at a significantly lower level but has also increased, reaching outside 20% of premises at High Confidence, and 11% at Very High Confidence.[75]

These coverage increases have been driven by additional 5G deployments, with over 12,000 5G deployments now in place across the UK, up from the 6,500 reported in 2021.[76] Of these, 86% are located in England, 8% in Scotland, 4% in Wales and 2% in Northern Ireland, broadly in line with previous trends.

5G availability comes in different forms, and user experiences may vary

While this section focusses on 5G availability (i.e. the area in which a consumer can connect to a 5G network), it is important to recognise that there is a diversity of deployment strategies leading to potentially different consumer experiences within this coverage footprint.

Some areas that receive 5G may benefit from the deployment of new spectrum, released specifically to provide new bandwidth for 5G services, such as the 3 GHz and 700 MHz bands auctioned by

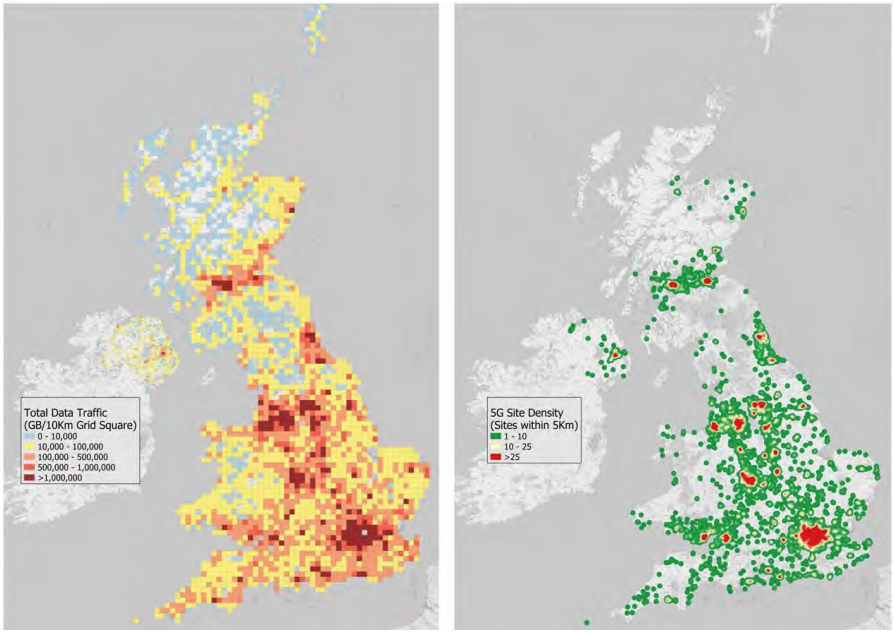
[73] By coverage outside a premises, we mean that coverage is predicted in a 100x100m area in which a dwelling is located, which can be seen as a proxy for outdoor coverage of populated areas.
[74] By 'At least one MNO' we mean the combined coverage that would be available if the total coverage of each MNO was included in an aggregated coverage footprint.
[75] All the 5G coverage reported here is currently provided on a Non-Stand Alone basis – although trials of Stand Alone 5G are underway. Non-Stand Alone 5G relies on a 4G core network and uses 4G for signalling and network control functions. Stand Alone 5G operates independently of the existing 4G layers.
[76] It should be noted that these deployments do not necessarily equate to a total of individual sites across all MNOs. For example, 2 MNOs may be offering coverage from the same site.

Ofcom in 2021. In other cases, MNOs are beginning to utilise pre-existing 4G spectrum holdings for 5G. Taken together, this provides MNOs with a range of 5G coverage and capacity options, with deployments typically influenced by the density of user demand.

The 3 GHz band offers very high capacity to support large numbers of demanding users across smaller areas, and consequently has to date been deployed predominantly in high traffic urban locations. Lower frequency bands such as 700 MHz may provide a more similar experience to existing 4G coverage – with additional capacity where fresh spectrum is made available – and are suitable for in-building and wide area coverage, so are increasingly present in both urban and more rural environments. Other bands previously used for 4G, such as the 2.1 GHz band, also offer a mix of coverage and capacity characteristics, without the need to deploy new spectrum. In some cases, this 5G coverage will be delivered through Dynamic Spectrum Sharing, where 4G and 5G services are carried over the same spectrum, which can help facilitate 5G rollout. [77]

Consequently, while 5G deployments continue to be focussed most intensively around more densely populated or regularly visited areas, 5G is increasingly available beyond city centres and can be found in smaller towns and along busy transport routes. Figure 3.3 shows how the density of these deployments remains most intense in the areas with greatest traffic (noting that the 5G capacity provided in these areas will vary, and is a product of both this site density and the available bandwidth). [78]

Figure 3.3: Intensity of total monthly mobile traffic per 10 km^2 (left) and density of 5G site deployments (right)



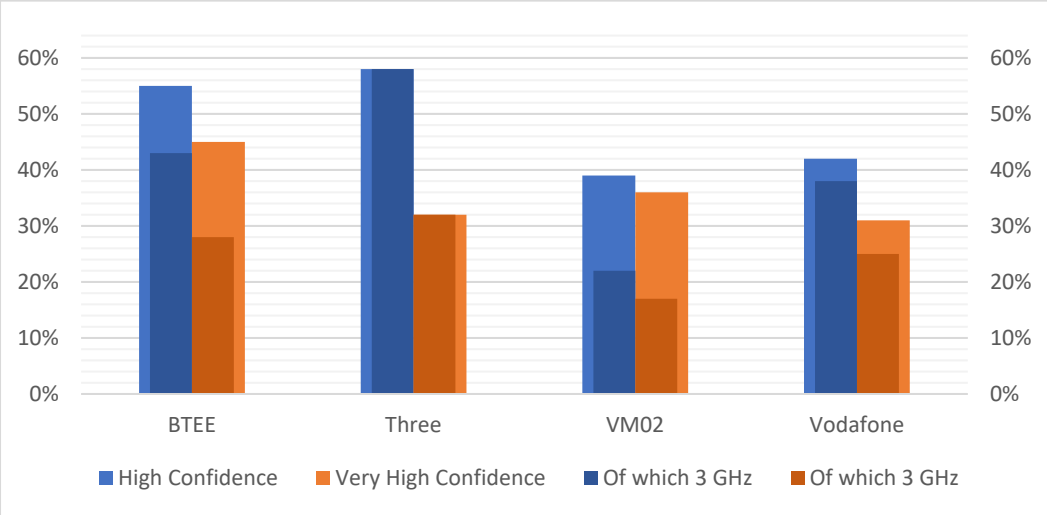
Source: Ofcom analysis of operator data (May 2022).

[77] Dynamic Spectrum Sharing is a process which enables operators to switch resource allocated to different technologies (i.e. 4G and 5G) in the same band dynamically, based on user demand, which allows MNOs to smoothly adjust the capacity provided to one technology or another depending on the number of devices in an area requiring 5G at the time.
[78] We note that where 5G and 4G are sharing the same spectrum, 5G is currently accounting for less than 4% of the total traffic in these shared bands.

Individual MNOs are now providing 5G outside a significant portion of UK premises

This year, for the first time, we are reporting on the 5G coverage of individual operators across the UK, and in each of the four UK nations. As shown in Figure 3.4, Three has the most extensive 5G coverage outside of premises at the High Confidence level, reaching to 58%, whilst BT EE retains the most extensive 5G coverage outside premises at the Very High Confidence level, at 45%. We have noted above some of the potential differences between the 3 GHz and other spectrum bands, and Figure 3.4 also highlights the extent to which outdoor 5G coverage for each of the MNOs is available on the 3 GHz band, as an indication of where the greatest increases in bandwidth have been seen.

Figure 3.4: MNO 5G coverage outside of UK premises, at Very High and High Confidence



Source: Ofcom analysis of MNO predictions (September 2022).

Landmass coverage remains at much lower levels across the UK, with coverage ranging across individual MNOs from 6% to 16% of the landmass at High Confidence, and 3% to 12% at the Very High Confidence level.

We note that predicted coverage can differ substantially across the High to Very High Confidence levels, reflecting the greater signal strength required to meet the Very High Confidence of coverage measure. The fact that some MNOs see smaller reductions in coverage, and others larger reductions, is likely to reflect different deployment choices. For example, it could be affected by the balance between more dense urban and more rural deployments, and also the point at which different MNOs have planned to hand coverage from one site to another. It could also reflect the extent to which deployments are focussed on higher frequency airwaves, which travel shorter distances and so see a more rapid decline in signal strength.

Differences in deployment strategies are also reflected in different coverage levels across the UK nations. Currently, 5G coverage outside of premises in each UK Nation ranges across individual MNOs as follows: 42-61% for England; 29-51% for Scotland; 10-46% for Wales; and 14-26% for Northern Ireland (all based on our High Confidence level).

Overall premises coverage

Even as 5G coverage increases, voice and data services continue to be most widely available (and accessed) via older technologies. In particular the 4G services offered by each of the MNOs continues to provide the fundamental backbone of most consumers' experience. We therefore highlight below the range of 4G coverage available from individual MNOs, alongside measures for voice coverage (where 2G and 3G also play a role).[79]

Outdoor premises coverage remains at a high level

As we have reported in recent years, individual operators continue to provide good 4G coverage outside more than 99% of UK premises.[80] In addition, 98% of premises have outdoor 4G coverage from all MNOs. Individual MNOs each provide coverage for outdoor voice calls in the vicinity of more than 99% of premises, while 99% of UK premises also have coverage for outdoor voice calls from all MNOs.

There continues to be a significant difference between coverage in urban and rural areas. Individual operators' 4G coverage outside rural premises ranges from 93-98% (up from 93-97%), while each MNO continues to serve 99+% of urban premises. Outdoor voice coverage levels remain unchanged from 2021, and ranges from 97-99% across individual MNOs for rural premises, rising to 99+% across individual MNOs for urban premises.

Indoor coverage continues to be high and other solutions are available for hard to serve locations

There are a number of factors which affect the coverage people receive indoors. These include the thickness of the walls, the building materials used in construction, and where in a building people are using their phone.[81] As a result, some premises may see differences between operators' predicted indoor coverage data and the actual coverage experience.[82]

For indoor 4G coverage, this year we find that the percentage of premises served ranges from 92-95% across individual MNOs. This is a slight change since last year (up from 90-95% across individual MNOs in 2021). The availability of indoor voice calls is estimated to remain stable, ranging from 96-99%+ across individual MNOs, in line with 2021 levels.

We continue to see a significant difference between rural and urban areas for indoor coverage, though there have been small improvements this year. Individual MNOs provide indoor 4G coverage to 71-81% of premises in rural areas (up from 69-80% in 2021), compared with 96-98% of urban

[79] We continue to report on other metrics, including where all operators, or any one operator has coverage, both here but also in more detail in our online datasets.
[80] By coverage outside a premises, we mean that coverage is predicted in a 100x100m area in which a dwelling is located, which can be seen as a proxy for outdoor coverage of populated areas.
[81] Ofcom's Mobile Coverage Checker provides information on the likelihood of there being indoor coverage in buildings at different locations and explains more about the factors that affect mobile signal indoors.
[82] Ofcom determines indoor coverage by applying an average building entry loss of 10dB across buildings. We acknowledge this approach provides only a simplified view of indoor coverage and that the real experience depends heavily on the types of building material and insulation in a specific building.

premises (up from 94-98% in 2021). Indoor voice coverage is somewhat higher, ranging from 80-98% across individual MNOs for rural premises (up from 80-96% in 2021). This compares to a range of 99-99%+ for urban premises (from 98-99% in 2021).

Where indoor coverage is poor or unreliable, there are other solutions which can improve user experience. These include broadband-based calls on services such as WhatsApp, femtocells and WiFi calling.[83] All MNOs offer WiFi calling to their customers – although not all mobile phones are configured to support this feature. The percentage of calls made using voice over WiFi by MNOs has remained largely stable this year, ranging between 2% and 17% across individual MNOs (compared with between 2% and 16% in 2021).[84]

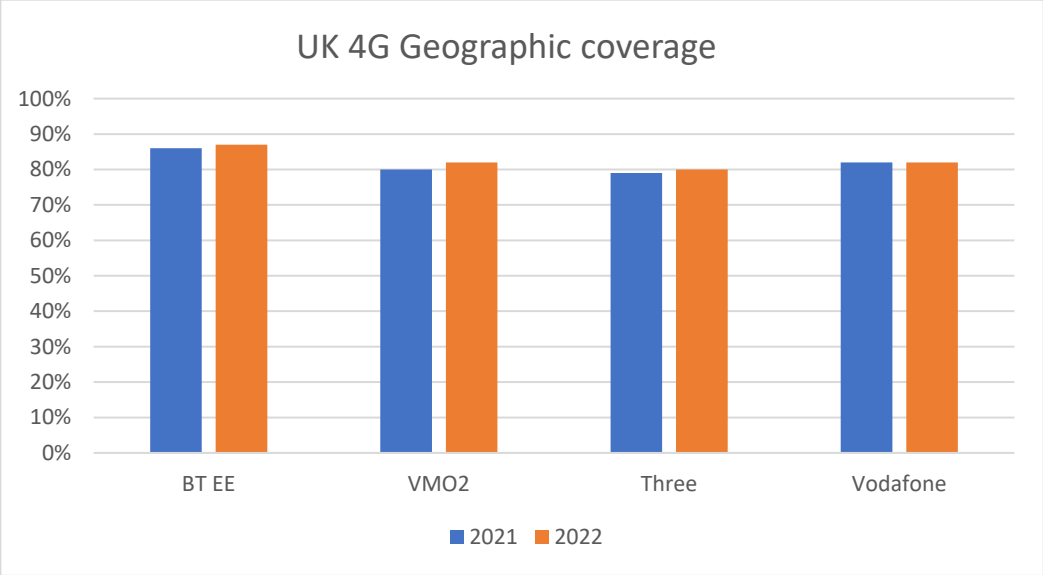
4G geographic coverage

The majority of operators have made small but notable improvements in their geographic coverage this year.

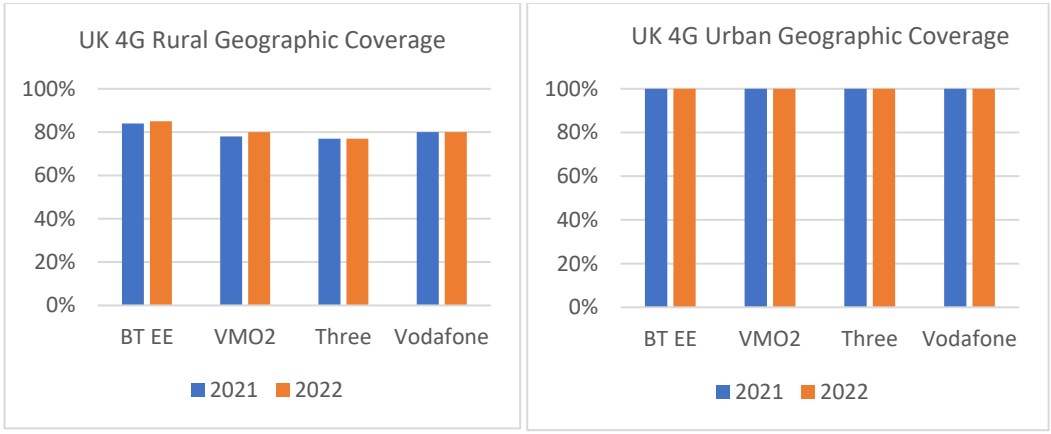
From the data reported to us, we can see that BT EE has increased its 4G geographic coverage by c1% to 87% of the UK; Virgin Media O2 has increased its coverage by c2% to 82%; and Three has increased its coverage by c1% to 80%.[85] Vodafone has also seen small incremental increases though its coverage remains statistically stable at 82%

Therefore, the UK landmass covered by individual MNOs ranges from 80-87% (up from 79-86% in 2021). As the majority of the UK landmass is rural, rural coverage levels are similar, with significantly higher urban geographic coverage.

Figure 3.5: UK geographic coverage, broken down by total UK, rural and urban geographic areas



[83] WiFi calling is the ability to make and receive a call and text/SMS over a WiFi network.
[84] There are two types of WiFi calling solutions: 'cellular preferred', where the devices use WiFi calling only if there is poor cellular coverage, and 'WiFi preferred' where all the calls are made via WiFi, when WiFi is available. The majority of MNOs currently use a cellular preferred solution.
[85] We note that over this period Virgin Media O2 has updated its coverage prediction model, so changes may reflect changes to that model as well as additional coverage deployments.

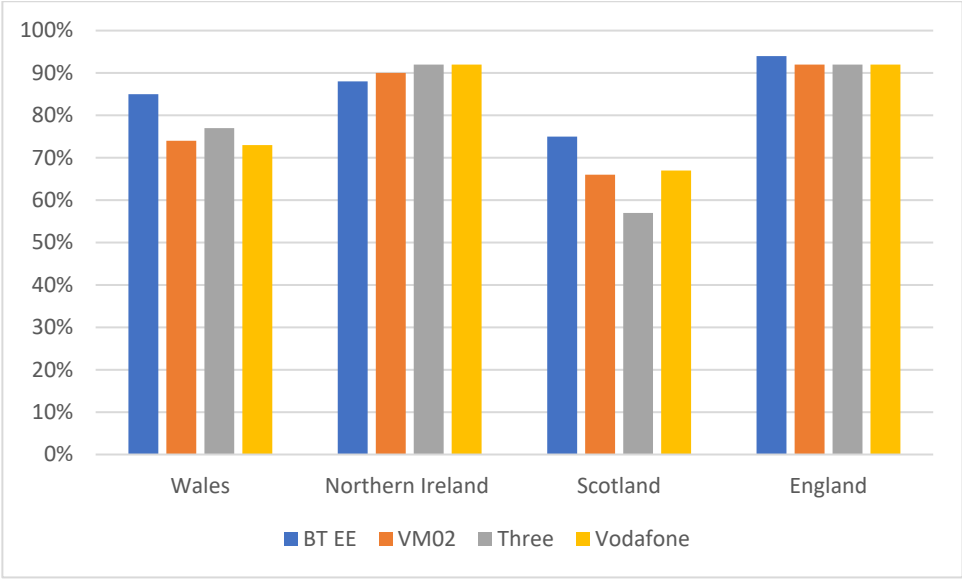


Source: Ofcom analysis of MNO predictions (September 2021 and 2022).

Differences remain in coverage across the UK Nations, but small improvements can be seen

There remain significant differences in geographic 4G coverage across the UK's nations. As of September 2022, MNOs provided geographic coverage ranging from 92-94% in England; 88-92% in Northern Ireland; 57-75% in Scotland; and 73-85% in Wales. This means that compared with 2021 the coverage range for England remains stable, with a 1 percentage point increase to the bottom end of the range in Northern Ireland, a 2 percentage point increase to the top of the range in Scotland, and 1 percentage point increases at both points of the range in Wales.

Figure 3.6: Differences in 4G geographic coverage in Wales, Northern Ireland, Scotland and England (2022)



Source: Ofcom analysis of MNO predictions (September 2022).

Public policy interventions, including the Shared Rural Network, continue to progress

The Shared Rural Network (SRN) was agreed between the UK Government and the MNOs in March 2020. Work has continued throughout 2022 on a range of fronts towards the delivery of the SRN, with operators' licence obligations to achieve good quality coverage across 88% of the landmass falling due in June 2024, and 90% of the landmass to be covered by January 2027. The UK Government also expects that as a result of this activity there will be good 4G coverage available across 95% of the UK landmass by the end of 2025 (based on the 'At least one MNO' measure).

Operators are committed to achieving the 88% target through their own investment, which includes a mixture of new site deployments, sharing and upgrades to existing infrastructure - and as noted above, we have seen statistically significant increases in coverage from 3 MNOs through the course of the year. MNOs have now deployed more than 150 new sites directly towards these SRN requirements (this excludes sites that were already planned at the time the SRN was announced, or built primarily to support the Emergency Services Network[86]). Many more sites have been upgraded. Taken together this activity has seen a small increase in the area where all MNOs now provide coverage. As a result of this activity, good mobile coverage from at least one MNO is now available across 92.2% of the UK, up from 91.9% in 2021.

Figure 3.7: Changes in partial and full coverage over time, and as represented in UK coverage today

	2019	2021	2022
Complete Not Spot	9%	8%	8%
Partial Coverage	25%	22%	22%
Full Coverage (All 4 MNOs)	66%	69%	70%



Source: Ofcom analysis of MNO predictions (September 2022).

On the publicly-funded side of the SRN, Digital Mobile Spectrum Limited is managing the programme and has continued to advance the required procurements which will underpin delivery of coverage in Total Not Spots.[87] Activity this year has included contracting for the acquisition, design and build

[86] The Emergency Services Network (ESN) is a UK Government programme to replace the current Airwave service, which is used by the emergency services in Great Britain, and will transmit voice, video and data across a 4G network. UK Government, Emergency Services Network: overview, 14 April 2022.

[87] Digital Mobile Spectrum Limited (DMSL) is a joint venture of all four mobile network operators which manages and runs the Shared Rural Network programme.

of the Total Not Spot sites and the managed services associated with this.[88] The sites delivered are expected to be shared by all 4 MNOs.

The process of enabling sharing of the Home Office Extended Area Service (EAS) masts is also progressing. Over 100 masts have been put into acquisition by Building Digital UK (BDUK) and are now with Home Office suppliers to start work. The number of sites acquired, built and then made available to MNOs will continue to grow into 2023. This includes the Home Office completing the passive build upgrades to around 28 sites by March 2023. This will be followed by a programme of works with the operators to activate commercial coverage. The arrangements which will enable the MNOs' access to these sites have been agreed and the first pilot site in Scotland is expected to be handed over to the MNOs for activation early next year.

This new coverage will sit alongside a range of other public policy interventions, including the Scottish Government's 4G infill programme, a £28.75m investment to tackle up to 55 Total Not Spots across rural Scotland. As of September 2022, 29 new mast sites had been activated, including in communities across the Highlands, Orkney and Aberdeenshire.[89]

Roads

4G coverage is predicted to be available inside vehicles on motorways and A roads in a range across individual MNOs between 83-88%. This falls to 73-79% for B roads (but with a 1 percentage point increase from H3G and 2 percentage point increase from BT EE within this). Outside vehicles, 4G coverage on motorways and A roads ranges between 94-98% across individual MNOs for (up 1 percentage point at the bottom of the range), and between 89-95% for B roads (up 1 percentage point at the top end).

In-vehicle mobile voice services on motorways and A roads range between 91-98% across individual MNOs (up 1 percentage point at both ends of the range). This falls to 80-94% of B roads (with a 3 percentage point increase at the top end of the range). Voice call coverage outside vehicles on motorways and A roads remains stable, ranging from 98-99% across individual MNOs, with voice calls outside vehicles on B roads ranging from of 94-98% across individual MNOs.

Rail

In 2019, we undertook a measurement campaign in partnership with Network Rail to gain a better understanding of the mobile signal on train lines.[90] This showed that, while predicted coverage may be present in the surrounding area, this often does not translate into a good experience on the ground, given the challenges for mobile signals reaching into railway cuttings and inside carriages themselves.

[88] Digital Mobile Spectrum Limited, https://srn.org.uk/shared-rural-network-publishes-contract-award-notices/, 8 July 2022.
[89] Scottish Government, Scottish 4G infill programme: progress update, 23 November 2022.
[90] Ofcom, Mobile signal strength measurement data from Network Rail's engineering trains.

In last year's report, we noted that solutions to these challenges will often require track-side access, and so are not something that MNOs can easily pursue on their own. Over the last year, there have been a number of developments around this approach.

Case study: Trackside Infrastructure Partnerships

One such solution is a project being led by Evo Rail, on behalf of South Western Trains and in partnership with Network Rail, which is installing new telecoms infrastructure along 70km of track between Basingstoke and London. It aims to deliver gigabit-capable connectivity and an enhanced onboard WiFi experience, and with much infrastructure now deployed is expected to offer services from early 2023.[91]

Throughout this year Network Rail has also been inviting companies to invest in upgrading its rail telecoms network in return for the right to commercialise spare capacity that might support improved services for consumers.[92] Network Rail uses its network for signalling, CCTV and internet for trains, depots and offices. In May 2022, it was reported that two groups – Neos Networks (bidding alongside Cellnex) and Virgin Media (bidding alongside Nokia and Jacobs) would be proceeding to bid in the auction.[93]

A significant development we highlighted in last year's report was Transport for London's 20-year concession partnership with BAI Communications to enable mobile coverage on the Tube network, including within the tunnels, by the end of 2024. This initiative uses a neutral host-led model.[94] This year has seen further progress, with the permanent enablement of mobile services on part of the Jubilee Line, and confirmation that all 4 UK MNOs will offer services to their customers as part of the solution.[95]

2G and 3G coverage, and switch-off

Plans for switch-off of 3G networks, and eventually 2G networks, are progressing

In December 2021, the MNOs confirmed to the UK Government that they do not intend to offer services on their 2G and 3G networks past 2033 at the latest.[96] 2G and 3G services launched in the 1990s and 2000s respectively, and running these networks alongside newer 4G and 5G services involves increased operating costs, as well as a less efficient use of spectrum and energy. Moving

[91] Evo-rail, evo-rail, South Western Railway, and Network Rail bringing new superfast Wi-Fi to train passengers, 25 October 2022.
[92] Network Rail, Network Rail invites £1bn private sector investment in telecoms, 26 April 2021.
[93] ISPreview, Neos and Virgin Media to Bid on British Rail's Trackside Cables, 10 May 2022. The Daily Telegraph, Privatisation plan to give commuters faster internet, 10 May 2022.
[94] BAI Communications, Mobile connectivity on the eastern section of the Jubilee Line made permanent, as BAI Communications completes first milestone of its rollout, 7 April 2022.
[95] BAI Communications, Customers of all major networks set to have access to high-speed mobile coverage across London Tube network, 8 July 2022.
[96] UK Government, A joint statement on the sunsetting of 2G and 3G networks and public ambition for Open RAN rollout as part of the Telecoms Supply Chain Diversification Strategy, 8 December 2021.

away from these older technologies will improve network efficiency and enable more spectrum to be used for 4G and 5G services.

MNOs are developing plans to switch-off their 3G networks first, with each MNO setting its own timetable. Vodafone is starting the switch off of its 3G network in early 2023, and has been contacting affected customers to advise them of the steps they need to take ahead of switch-off to ensure that their services are not disrupted. EE plans to start its 3G switch-off in early 2024, and Three expects to complete its switch-off by the end of 2024. Virgin Media O2 has yet to confirm a planned date for switch-off of its 3G network.

Vodafone, EE and Virgin Media O2 have not yet confirmed a date for switching off their 2G networks. We expect they will start making plans for this after their 3G network switch-offs are complete.

There are a range of users whose needs will require careful management

Ofcom is actively monitoring the implementation of switch-off and working closely with the MNOs to understand their progress and plans, in particular to ensure that affected customers and services are adequately informed. Early next year we plan to publish a document setting out our expectations of mobile providers as they implement switch-off, in particular the measures they should be taking to ensure that customers are protected and disruption is minimised.[97]

Based on the latest estimates from MNOs, there are likely to be nearly 5.5m[98] customers using devices reliant on 2G and 3G connectivity which will ultimately need to be upgraded or replaced.[99] Some customers will continue to be able to use these devices after 3G switch-off as they can carry on using the 2G network for voice calls in particular.[100]

In addition to mobile handsets, affected devices include those that offer machine-to-machine and Internet of Things (IoT) type applications, such as care alarms, security alarms and payment terminals. Many of these rely on roaming SIMs (non-UK SIMs which are used on a permanent basis in the UK and which roam to the best available network), where there may not be a direct relationship with a UK MNO and so will not be captured by the total device estimate above. Given this, raising awareness of upcoming switch-offs across all affected stakeholders will be essential. As part of our monitoring activity, we are engaging with government and other relevant stakeholders, such as service providers and equipment manufacturers, to help support a smooth transition.

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[97] Ofcom, Switching off the UK's 3G mobile networks: what you need to know, 3 August 2022.
[98] This number excludes 2G/3G Smart Meter devices supported by Virgin Media O2 in the southern half of England.
[99] Last year we reported an estimate of c.4m devices relying on 2G and 3G connectivity. This was an under-estimate and we consider the updated estimate this year is more accurate for a number of reasons, including: (i) MNOs have now undertaken a more detailed analysis to identify all the potentially affected devices; (ii) it now includes some devices that are 4G capable but not VoLTE-enabled and which are outside of the period of handset support for the software upgrades needed to enable VoLTE (therefore these devices will continue to be reliant on the 2G/3G network to make voice calls); and (iii) it also includes estimates relating to machine to machine devices reliant on 2G/3G – some MNOs did not include these in the figures reported last year. We are continuing to monitor this with MNOs and expect to see the overall number of devices decrease next year as more customers upgrade and update their devices ahead of upcoming 3G switch-offs.
[100] Three does not have a 2G network, so the network will not be able to offer native circuit switched calling once it switches off its 3G network, though roaming based solutions for emergency calling will still operate where other networks are present.

There is still a relatively significant level of ongoing 2G and 3G usage, particularly for voice traffic

The proportion of data traffic being carried over each MNO's 3G network is now relatively small, ranging from 2%-6%. In comparison, there is a higher proportion of voice traffic still using the 3G network, although the proportion varies significantly between the MNOs, with one MNO reporting 60% of its voice traffic using 3G, whereas for two other MNOs it is less than 15%. We would expect these percentages to decrease significantly over the coming years as 3G network switch-offs start being implemented and more customers upgrade and update their devices.

A much smaller proportion of MNOs' voice traffic is currently carried over 2G (around 4-5% for each MNO), although these percentages may rise as 3G networks switch-off. We expect MNOs to have plans in place to ensure their 2G networks have sufficient capacity so that customers do not experience degraded quality of voice calls once 3G networks are switched-off.

Our data has not yet shown a change in the levels of 2G or 3G coverage available across the UK, however we expect we will start to see a decline in 3G coverage levels from next year as the MNOs start to progress their plans. We will monitor this closely but envisage that any impact on coverage will be negligible, given MNOs are taking steps to ensure that their 4G coverage is improved ahead of switch-off, particularly in any areas which might be reliant on 3G currently. Three, for example, has committed that by the time 3G switch-off happens, it will have updated its 3G sites to 4G as a minimum, or ensured that coverage is provided from neighbouring sites. [101]

Emergency calls remain stable, with mobile increasingly used as a backup for fixed services

As we explain in Section 2, traditional landline services are being retired. Fixed voice services will in future be delivered over broadband connections instead. However, if there is a power cut, voice over broadband connections will not work where back up power is not provided. [102] Some broadband providers are using mobile to provide back up services in such situations. Where this is the case, it is increasingly important that people have indoor mobile coverage so that they can make emergency calls in the event of a localised power cut.

Longstanding arrangements mean that when making an emergency call, a mobile handset will be able to use any network that is available, even if it is not the network the handset user subscribes to.

Calls can currently be made over 2G, 3G and 4G (via VoLTE) and we predict that emergency calls are possible inside almost all UK premises and across 96% of the UK's landmass. [103]

On roads, emergency calls should be possible inside vehicles for around 99% of motorways and A roads, and 97% of B roads outdoors (up 1% on B roads from last year).

Emergency calling via 4G VoLTE, and the ability to roam onto another network using VoLTE, will become more important as 2G and 3G networks start being switched off by MNOs. As of June 2022, two of the UK's four MNOs were offering emergency calling via VoLTE (the same as in 2021). The

[101] Three, Our plans to switch off 3G.
[102] We explain this further in the Network Security and Resilience section of this report.
[103] VoLTE means voice over long term evolution on 4G.

number of emergency calls made via VoLTE on these networks was in the range of 243,000-756,000 in June 2022.[104] The two other MNOs expect to introduce emergency calling via VoLTE within the next few months. All MNOs will need to have implemented emergency calling over VoLTE, and the ability to roam onto another network using VoLTE for these calls, ahead of switching off their 2G networks (or 3G network in the case of Three).[105]

Developing insights into the quality of mobile network performance

While coverage is a prerequisite for connectivity, the quality of mobile connectivity is becoming increasingly important as services used by consumers become more demanding, and play an ever more important role in people's lives.

Network quality can differ between different mobile operators and technologies across different areas, due to both supply and demand factors. The supply is largely driven by network capacity and is affected by aspects such as the density of cell sites, the amount of spectrum deployed, and the technologies used. Demand is affected by the number of users on the network, the location of those users, and the impact of the applications they use.

We noted in our 2021 report our intention to develop new approaches to report in more detail on the quality of performance possible in different areas, particularly given the potential for different technologies to provide similar performance levels, and the range of experiences that are possible even while accessing a single technology (as touched on in our 5G coverage update above). We have explored a range of approaches to capture this experience and further inform consumers, and set out our initial approach and findings below, based on crowdsourced data.

Crowdsourcing can give a real-world view of network performance

Crowdsourcing is an approach that gathers network performance measurements from the user experience perspective, over many different devices, to build up a view of the network quality in an area. No single approach is likely to provide a perfect view of what mobile networks are capable of delivering, but we consider that data gathered in this way – via automated network tests – can provide meaningful insights into network quality. We have used performance data from an Opensignal dataset (which conducts such active background testing to measure network capability) to provide an initial view, which we will develop in the months ahead.[106]

To provide a view of overall performance, this approach combines measures for download speed, upload speed, latency, packet loss, jitter and time to first byte.[107] We then analysed results across a range of thresholds, to provide insight into where different performance levels are available.[108] We

[104] This year, we have not been able to calculate a total figure for emergency calls via VoLTE as one of the operators providing emergency calls via VoLTE has not been able to split the volumes of VoLTE and non-VoLTE emergency calls.
[105] Three already supports emergency calling via VoLTE.
[106] Active background testing conducts tests from the device across the MNO's network without needing user initiation.
[107] For more detail on these measures and their application see Annex 2 on Mobile Performance.
[108] A performance level is deemed as likely to be experienced if 80% of all measurement samples meet or exceed the relevant thresholds.

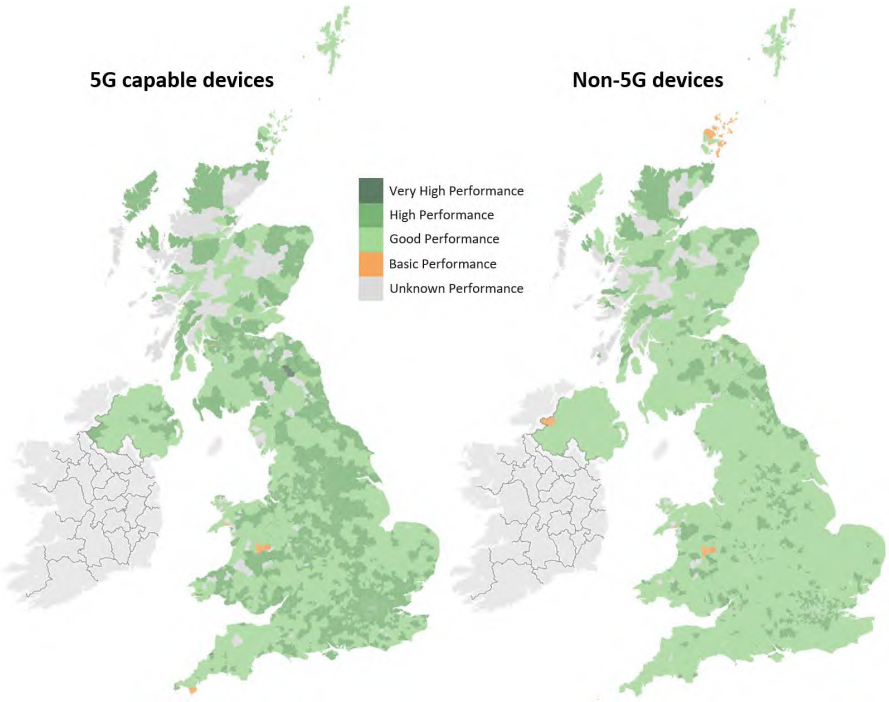
present this data using initial levels, but expect these levels may change over time as we develop our approach, and as we take account of how consumer expectations and service requirements change.[109] The thresholds used for this analysis are set out below, and a fuller explanation of this approach can be found in Annex 2 on Mobile Performance.

Table 3.8: Performance Key Performance Indicator technical thresholds

	Download speed	*Upload speed*	*Latency*	*Jitter*	*Packet loss*	*Time to first byte*
Good	*2 Mbps*	*0.5 Mbps*	*100ms*	*20ms*	*4%*	*1.2s*
High	*5 Mbps*	*1 Mbps*	*50ms*	*15ms*	*2%*	*0.8s*
Very high	*10 Mbps*	*2 Mbps*	*30ms*	*10ms*	*1%*	*0.5s*

For this year's report, we are providing an overview of the network quality provided in postcode district areas[110] based on composite data for all MNOs, showing the differences in experience that can be expected for those with a 5G capable device (whether connected to a 5G or 4G network) and those with a 4G device. The colours denote the performance that a device in each area can typically expect to experience (where there is coverage available). The maps do not confirm that coverage is available in the whole of each postcode district, but rather that sufficient samples were recorded within the postcode district as a whole.

Figure 3.9: Combined MNO performance for 5G-capable devices (left) and non-5G devices (right)



5G-capable devices may not always be connected to 5G and will also report results from areas where only 4G is available.

Source: Ofcom analysis of Opensignal data. Based on data provided by Opensignal, provided under a CC BY-SA 4.0 (Creative Commons) licence. Data may not be used for any commercial purpose.

[109] The Key Performance Indicator thresholds we use here are our own and are not those of Opensignal.
[110] Postcode district means a geographical area indicated by the (alphabetical) letters and numbers in a postcode preceding the space in the code e.g. SE1.

As can be seen, many more areas achieve a 'high performance' level where a consumer device is capable of accessing a 5G service, reflecting the impact of the newer technology and some of the capacity increases described above – although we note that even here, few areas meet the highest performance level. Areas of 'unknown performance' may well have coverage, but there were insufficient data samples for us to be confident of a meaningful result – and consequently we find slightly more areas of unknown performance for the smaller sample of 5G devices.[111]

In the coming months, we intend to make further information available to consumers based on this approach. This will include providing additional information on the performance of each MNO, and a more localised view of network performance via our coverage checker. This will enable the reported quality of mobile network performance across a local area to be accessed on a lookup basis, and compared between providers.

As noted above, we recognise that no single tool is likely to provide a complete view of mobile network performance that distinguishes all influencing factors. For example, this approach does not currently enable us to provide insights across the entirety of UK, given the limited samples available in the many rural areas. It also aggregates samples from different device locations at the time of the test (e.g. whether a device was indoors or outdoors) and whether the test was conducted at a very busy period or not, such that additional, more granular insight may be possible over time. We will consider whether and how our approach can be refined as we make greater use of crowdsourced data in the future.

Mobile traffic

Mobile traffic grows significantly, with 5G traffic growing most quickly

As a result of the increased coverage and take up of 5G described above, 5G traffic has grown substantially over the last year, more than trebling from 17 PB in 2021 to 63 PB in 2022.[112] This means that 5G now represents over 9% of the total mobile traffic, up from 3% in 2021.

The increasing share of traffic carried over 5G has the potential to be more energy efficient than use of previous technologies, when defined on a bits per Joule basis. This is because of changes in the air interface from 4G and 3G technologies, and can be further enhanced by application of sleep modes - enabling base stations to be put to sleep for longer periods of time when experiencing low traffic loads - and a capability to reduce transmission power levels during off-peak periods.[113]

While 5G traffic has increased rapidly, growth in mobile traffic as a whole has been slower, though absolute growth remains significant. Total monthly traffic has risen from 570 PB to 724 PB, an

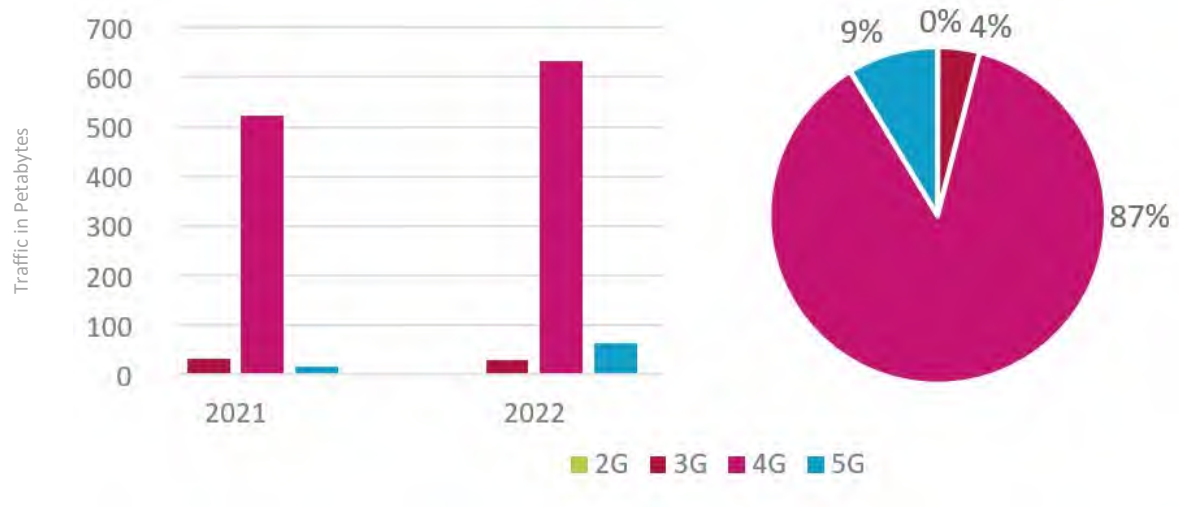
[111] This data comes from many different types of mobile devices, in different areas, in different locations (both indoor and outdoor) and at different times. To reduce any risk of biases in results where sample sizes are too low, we are only showing a view of performance where we have a good supply of data in a given area. A minimum of 100 different full measurements, a minimum of 15 different types of device, and a maximum margin of error of 10%. This is set out in more detail in Annex 2 on Mobile Performance.

[112] 1 PB is equivalent to 1,000,000 GB.

[113] It is important to note that despite this improvement in energy efficiency, we anticipate the total energy consumption of the mobile networks may continue to rise in the coming years, given increases in the volume of mobile data traffic being generated by consumer demand can exceed efficiency gains.

annual growth of c27%, compared to a c37% increase in 2021. This aligns with other reports on mobile traffic internationally over the last year, but it is too early to ascertain if it represents a trend, especially noting the variations between MNOs within this.[114] Possible explanations might include changes to population mobility (where more home-working might increase offload onto the fixed networks), or limitations on consumer demand (e.g. increased price sensitivity, or natural limits on data demands). We will continue to report on these traffic levels in future years to allow any long-term changes to be observed.

Figure 3.10: Total monthly traffic by technology (2021-2022) and percentage share (2022)



Source: Ofcom analysis of operator data (May 2021, May 2022).

In December 2021, the UK Government confirmed a target for 35% of mobile traffic to be carried over 'Open RAN' by 2030.[115] Such open architectures promise to offer additional resilience through the disaggregation of radio equipment suppliers. As of this period, Open RAN has been deployed on only a small number of sites (fewer than 20) with minimal mobile traffic carried over such architectures. We note that we are still at an early stage in the commercialisation of Open RAN, with the UK Government announcing a £250m Open Networks Research Fund this summer, and we will continue to monitor progress in the years ahead.[116]

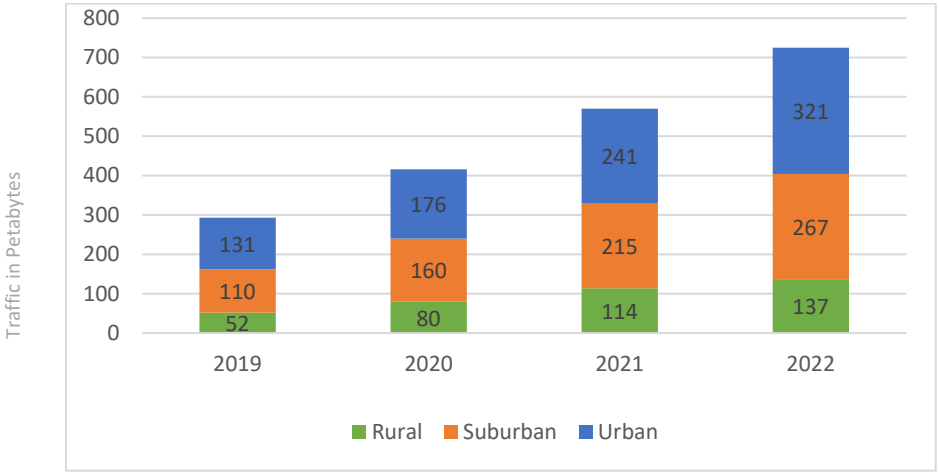
Distribution of mobile data traffic

In 2022, urban areas have seen mobile traffic growth higher than the average 27%, with a 33% year on year growth. Increases have also been seen in more rural and suburban locations, but are less pronounced, at 20% and 24% respectively. Conversely, we had seen slightly greater than average data growth in rural areas over the preceding years. This change may in part reflect population shifts back to urban areas as Covid-19-related public health restrictions were lifted. We note that the spread of data traffic continues to broadly reflects the population distribution, with the rural

[114] For example, see Tefficient's report on international trends in mobile data traffic. Tefficient, Further slowdown in data usage growth causes positive ARPU development to soften, 25 November 2022.
[115] Minister for Media, Data and Digital Infrastructure, Telecoms Diversification: Update Against Taskforce Recommendations, 8 December 2021.
[116] UK Government, Open Networks Research and Development Fund, 29 July 2022.

classification representing approximately 19% of all traffic, and a similar amount of the population.[117]

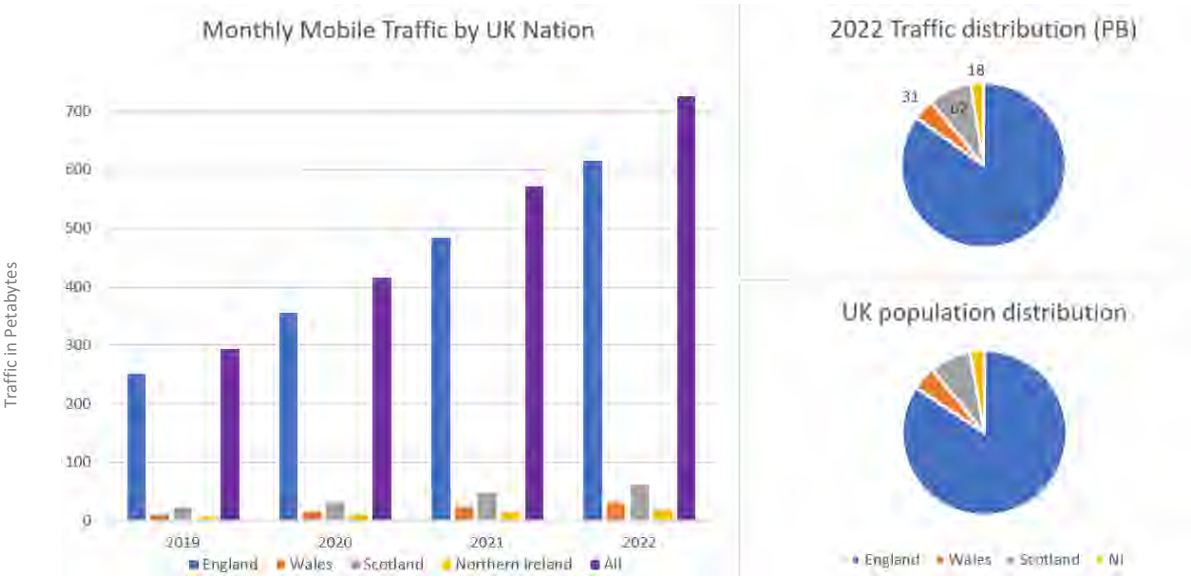
Figure 3.11: Total monthly mobile data traffic in rural, suburban and urban areas (2019-2022)



Source: Ofcom analysis of operator data (May 2019, June 2020, May 2021, May 2022).

Mobile traffic in the UK grew fastest in Scotland, with year-on-year growth of 29%, while Northern Ireland displayed the least growth at c20%. However, traffic in the UK continues to be distributed broadly in line with national populations.

Figure 3.12: Total monthly mobile data traffic by UK Nation (2019-2022)



Source: Ofcom analysis of operator data (May 2019, June 2020, May 2021, May 2022).

We note that this analysis includes the impact of all traffic across mobile networks, and therefore includes traffic generated by Fixed Wireless Access, where operators are offering domestic fixed

[117] The rural population of England, Scotland and Wales is estimated to be between 17-20%, with the rural population in Northern Ireland somewhat higher. UK Government, Rural population and migration, 28 October 2021. Scottish Government, Rural Scotland Key Facts 2021, 24 February 2021 Welsh Government, A Statistical Focus on Rural Wales, 2008. Northern Ireland Executive, Key Rural Issues: Northern Ireland 2021.

broadband services over their wireless networks. Where MNOs offer such a service, we estimate that on average it accounts for 13% of all traffic, with significant variation around this average.

Investment in mobile telecoms infrastructure

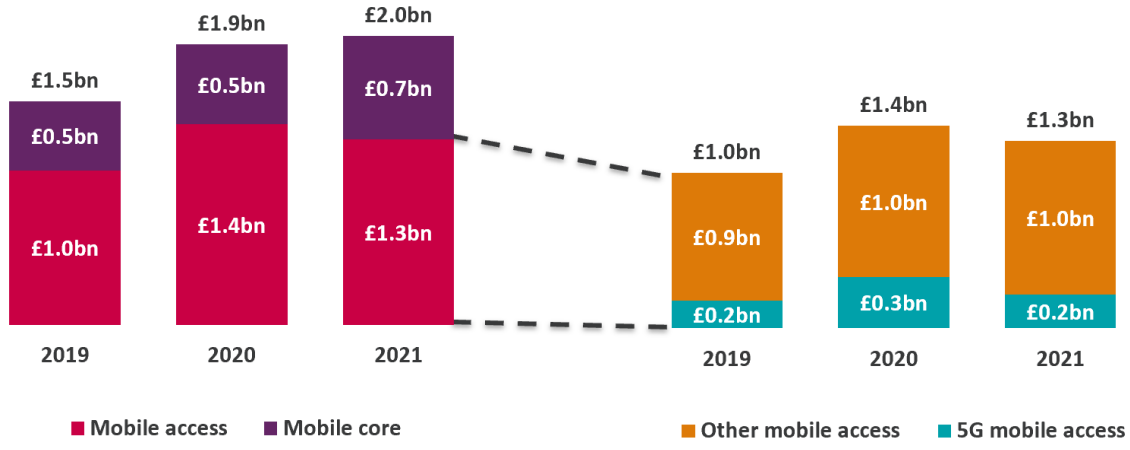
Expenditure on mobile telecoms network infrastructure increased to £2.0bn in 2021

The extent and quality of mobile coverage is influenced by investment in network infrastructure. Data collected from operators shows that £2.0bn was invested in UK mobile network infrastructure in 2021, a £0.1bn (3%) year-on-year real-term increase. In addition to this, £0.6bn was invested in infrastructure that is used to provide both fixed and mobile telecoms services in 2021.[118]

Of the total mobile investment, £1.3bn (64% of the total) was investment in mobile access network infrastructure (including site acquisition, equipment and electronics). This was down by £0.1bn (7%) compared to 2020. The remaining £0.7bn was spent on mobile core and backhaul networks.

All four mobile network operators continued to deploy 5G network infrastructure in 2021, when investment in 5G access networks totaled over £220m. This represented a fall of more than £110m (34%) compared to 2020. We note that this investment data lags behind some of the coverage gains we are reporting this year.

Figure 3.13: Mobile telecoms network capital expenditure: 2019 – 2021



Source: Ofcom analysis of operator data. Note: Adjusted for CPI (2021 prices).

Network infrastructure is provided by an evolving set of players

While MNO investment in infrastructure underpins much of the coverage and services we report on here, a range of third-party players also invest in and provide access to infrastructure which supports the public network. This ranges from remote rural lattice masts to sites on urban rooftops, and small

[118] We note that in our December 2022 *Future Approach to Mobile Markets and Spectrum – Conclusions Paper* we reported a higher figure for capital investments. That figure includes a range of non-network costs, including investment in property and non-network ICT systems upgrades.

cells on street furniture to indoor coverage solutions. As part of this, we are beginning to see the emergence of new 'neutral host' models to provide mobile coverage and capacity in busy locations – often indoors, where a majority of mobile traffic is generated. [119] Services such as WiFi also play an important role in picking up and supporting consumer demand for data generated over mobile handsets. [120] And there is the potential for this diversity of provision to grow in the future, with some satellite operators indicating that they expect to be able to support a limited set of mobile services (such as voice and text) on consumer mobile handsets in the future. [121]

In the UK, we estimate that just under 11,000 mobile sites are provided by third party providers, covering everything from macro cells, to street furniture, to small cell deployments indoors. [122] Of these, 82% are located in England, 11.5% in Scotland, 5% in Wales and 1.5% in Northern Ireland. A majority of sites host only 1 MNO, while fewer than 10% of sites host 3 or 4 MNOs.

Approximately 83% of such sites are macro tower structures, whilst 14% of these third party sites are based on street furniture deployments, typically on lampposts, bus shelters, traffic signals or CCTV poles. The vast majority of such street furniture sites currently support single MNOs. This may reflect load bearing limitations of the physical asset, or that some of these deployments are filling in small coverage and capacity gaps specific to a particular MNO.

The emerging picture for indoor solutions looks somewhat different. Deployment is at a relatively early stage and as of today accounts for only around 3-5% of the total third party deployments. [123] However, there are a number of additional players increasingly active in this space, as well as work amongst the operators to develop refined standards for neutral host in-building (NHIB) solutions. [124] Some approaches, such as BAI's London Underground deployment and Freshwave's provisioning of 22 Bishopsgate in London, build on existing Distributed Antenna Systems approaches, while Freshwave has also recently announced a partnership with Three to roll-out the newly specified NHIB small cells. [125] We find that almost half of third party indoor deployments are supporting 3 or 4 MNOs at the same time, indicating that there may be potentially greater synergies between different MNOs' coverage and capacity challenges indoors, and a potential for efficiently addressing these challenges through such shared mechanisms. We will continue to monitor these developments over the coming years to further understand these trends as the model matures.

[119] Estimates for mobile traffic generated indoors range up to 80% (Cisco Vision 5G) though have been shown to vary substantially by location (Ericsson, Planning indoor 5G coverage).
[120] Developments such as Wi-Fi Passpoint may facilitate seamless access, to increasingly enable MNOs to offload mobile traffic. Wi-Fi, Passpoint.
[121] T-Mobile, T-Mobile Takes Coverage Above and Beyond With SpaceX, 25 August 2022.
[122] This figure is based on responses from the following organisations: BAI communications, Britannia Towers, Cellnex, Freshwave and Wireless Infrastructure group. It excludes sites provided by CTIL and MBNL.
[123] This range encompasses differences in responses we have received from neutral host infrastructure providers and the MNOs.
[124] Recent developments include the development of a neutral host in building joint operator technical specification.
[125] Freshwave, Three UK partners with Freshwave on the operator's first JOTS Neutral Host In-Building mobile deployments, 20 September 2022.

Business Connectivity and IoT

5G and private networks

Mobile services are not only provided for the general public, they can also support business connectivity and device to device services as well. Private networks are playing an increasing role in the mobile market, with their ability to provide tailored connectivity solutions and meet stringent quality of service requirements. Taking advantage of the added capabilities of 5G, including its potential for ultra-low latency, they can provide monitoring of products and devices and real time connectivity between manufacturing equipment. Such networks are now playing a role in supporting the digital transformation of many sectors of the economy, from ports to airports, and from factories to smart agriculture.

As we noted last year, non-mobile operator players are now able to access mobile spectrum to provide services across localised areas of the country – authorisations are provided either for single base stations at a medium power level, or multiple lower power base stations authorised within a 50m radius.

Ofcom has issued around 900 shared access licences since new rules were introduced in 2019, up from the 550 we reported in 2021.[126] We continue to estimate that around half of this increased number can be considered as supporting private network type solutions. Around 91% of shared access licences are found in England, 4.5% in Wales, 3.5% in Scotland and 1% in Northern Ireland.

We have also seen evidence of increased MNO activity developing these solutions. Last year, we reported that only 7 MNO-led private networks were live in the UK. This year, that figure has risen to 26. These networks operate using 4G, 5G or a combination of 4G and 5G technologies, noting that none are currently delivered as a slice of the commercially deployed 5G network.

Internet of Things

The Internet of Things (IoT) refers to a network of devices and sensors which are capable of collecting and sharing data with people or with other devices, and taking action based on this information. IoT and Machine-to-Machine (M2M) networks support a range of uses. These include: connecting smart meters for utilities[127]; travel and transport; environmental sensors and energy management solutions for smart buildings; car telemetry; video surveillance; and pipeline monitoring for oil and gas companies.[128]

[126] Including legacy licences, there are over 1,600 active licences in the shared access bands.
[127] Arqiva Limited provides radio communications links between smart meters and energy suppliers in Scotland and the north of England. O2 provides the radio links in the rest of England and Wales.
[128] IoT can be delivered via other tech such as Wi-Fi, Zigbee, Bluetooth and several others. In this report, we focus only on IoT services delivered through traditional cellular technologies by MNOs and LPWAN technologies such as NB-IoT, LTE-M, Sigfox and LoRa.

IoT connectivity available from Mobile Network Operators

IoT connectivity is delivered by both MNOs and other non-MNO players, often operating in a specific local area. MNOs use a mix of cellular technologies (2G, 3G, 4G and 5G) and Low Power Wide Area Networks (LPWANs) such as NB-IoT and LTE-M.

This year, the number of active IoT connections on MNO networks stands at just above 19 million.[129] While these connections typically generate much lower data volumes than consumer handsets, IoT traffic volumes continue to increase significantly up by 20% in the last year to 1.51 PB per month (from 1.26 PB last year). However, such volumes remain significantly less than 1% of overall data traffic.

IoT connectivity available from non-mobile network operators

Non-MNO players operate both private IoT networks and public community networks.

Public community LoRaWAN networks are open-source and generally free to use. Users can connect their devices to gateways (base stations) or add new gateways to extend coverage.[130] Public community networks support developers, small and medium-sized businesses, government and other public policy initiatives. The Things Network, a global provider of public LoRaWANs, currently has about 855 gateways in the UK serving 105 communities (a small increase in the total communities served from last year, whilst decreasing the total gateways they report in operation).[131]

Private networks offer carrier-grade services with guaranteed availability, for a charge. Several private LoRaWAN providers operate in the UK. These include Comms 365, Connexin, The Things Industries and North SV Limited. We estimate that these networks have at least 746 gateways (an increase from at least 580 gateways last year), between them serving about 100,000 devices (up from about 37,000 devices last year). The services provided by these networks include intelligent lighting, smart building, flood and air quality monitoring, waste management solutions, soil moisture sensing and asset tracking.

IoT is playing a growing role across a range of services

The increase in IoT devices and traffic this year suggests that businesses are increasingly using the services IoT can deliver. One such benefit can be the capacity for IoT applications to support businesses in their sustainability goals. For example, they can enable businesses to reduce the need for travel, reducing their carbon footprint. Smart technology in cities – for example smart lights, smart bins and traffic management systems – can also help to drive the more efficient use of resources and infrastructure.

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[129] We note that we have made a methodological change to the information we now request from operators since we reported c10 million active connections in 2021. Based on information provided in 2021 and 2022 we consider that year on year active connections are broadly static.

[130] They are usually bound by fair use policies which restrict, for example, data rates, packet sizes, transmit time, and number of gateway/devices. The network servers are hosted by not-for-profit institutions like the Digital Catapult (UK) or companies which also offer private networks.

[131] The Things Network, United Kingdom.

As noted above, the ongoing PSTN switch-off planned for completion in 2025, and 2G and 3G switch-off planned by the end of 2033, can have implications for a range of sectors, and for residential and business customers. IoT can also play a supporting role here, enabling future solutions and innovations in services such as security systems, telecare and utility network monitoring.

4. Network security and resilience

Introduction

The resilience and reliability of networks is critical. We rely on our connections at work, at home and on the move. Strong, secure networks that are resilient to outages and cyber-attacks are therefore essential. In this section we provide an update on new requirements for operators to implement network security measures and how we will be reporting on compliance in future. We also provide an update on how the storms last winter affected communications services, as well as an overview of the network and resilience incidents reported to us during the year. Finally, we also report on other developments in our network resilience work.

Highlights

- The new Telecoms (Security) Act 2021 came into force on 1 October. It revised the legislative requirements for providers to report the incidents which form the basis for much of this chapter. It also introduced new requirements, focussing particularly on cyber security. Our monitoring of compliance with the Act will be used for our security reporting in future Connected Nations publications.
- The storms last winter had a significant impact on communications services. This was primarily because of lengthy power outages which caused communications services to become unavailable in impacted areas; for several days in some cases.
- The recovery process following the storms (particularly after Storm Arwen) took longer than expected due to the volume and scale of these power outages. This has highlighted the need for better co-ordination and information sharing between the communication and energy sectors. Improvements have already been made to these processes.
- We are continuing to work with industry and UK Government to act on lessons learnt and help ensure improved resilience in future.
- There was a significant increase in the number of network and resilience issues reported to us this year, particularly for mobile where the total number of incidents doubled. One cause of this was the impact of the winter storms.

Security

New legislation will improve telecoms security and increase our role in monitoring and enforcement

In October 2022, the remaining provisions of the Telecoms (Security) Act 2021 (the "TSA"), as well as the accompanying Regulations[132], came into force. The TSA replaces section 105A-D of the Communications Act 2003. These are the provisions which, amongst other things, require providers

[132] UK Government, The Electronic Communications (Security Measures) Regulations 2022.

to report incidents to us, and it is these reports which form much of the basis for this chapter of the report.

We do not expect the reporting of resilience-related incidents to change significantly as a result of the TSA, as in this sense the new provisions are similar to the previous ones. However, the TSA does add a particular focus on the reporting of cyber security compromises, so we expect more reports on these in the future. It also adds requirements for us to report on the extent to which providers of public UK networks and services are complying with their duties under sections 105A-D[133]. We will be fulfilling this requirement in this section of Connected Nations.

As the new obligations only entered into force in October 2022, we do not, at the time of publication of this report, yet have information on compliance with them. We will instead explain our intended approach to building the knowledge on which we will base our future reports. We preface this with a brief introduction to the DCMS Telecommunications Security Code of Practice, which will play an important role in this work.[134]

DCMS Telecommunication Security Code of Practice

The intention of the TSA is to drive a change in the approach to security in the telecoms sector. Alongside the TSA itself, the Regulations do this by imposing a much more detailed set of security requirements than we have had in the past. However, translating these requirements into practical security measures that a provider should take in order to best achieve them, is challenging. To assist with this, DCMS has published the Telecommunication Security Code of Practice (the "Code"). This contains detailed technical guidance for large and medium-sized providers on the UK Government's preferred approach to demonstrating compliance with the requirements. Although the Code is not itself legally binding, we are required to take its content into account in determining whether a provider has met its legal obligations.

Our plans for monitoring compliance

We consulted on two draft documents related to the TSA earlier this year. One, known as our "procedural guidance"[135], covers our general approach to the exercise of our functions under the TSA, including the detail of how we will be monitoring compliance. The other, our "resilience guidance", focuses on how we expect providers to meet their requirements in relation to the network and service resilience aspects of the TSA. We have recently published the final versions of these documents.[136]

Demonstrating full compliance with the TSA will be a longer term journey. The Regulations and the Code are complex and for some providers will require significant changes in how networks and services are currently designed and secured. As such, the Code sets out timescales by which it is

[133] See s134A in combination with s134B(1)(ha) and s134B(2)(fa) Communications Act 2003.
[134] DCMS, Telecommunications Code of Practice, December 2022.
[135] Under section 105Y of the Communications Act 2003, as amended by the Telecommunications (Security) Act 2021, Ofcom has a duty to publish a statement of our general policy with respect to the exercise of our functions under sections 105I and 105M to 105V of the Communications Act 2003 Act.
[136] Ofcom, Guidance on resilience requirements imposed by or under sections 105A to D of the Communications Act 2003, December 2022.

expected that providers will reach full compliance with different sets of technical measures. These timescales span from 2024 to 2028. We therefore expect to see a gradual improvement in security, and the levels of compliance, over this time.

We are structuring our monitoring approach around a series of formal information gathering exercises with the large and medium-sized providers (or Tier 1 and Tier 2 in the language of the Code). We will use these to ask for information and evidence about the security measures the providers are taking, or are planning to take, and whether these follow or depart from those in the Code.

Due to the amount of measures in the Code, we expect it will take two or three years before we have formally requested information on all the measures in the Code from providers. At this point, some of the timescales for implementing the measures in the Code will not yet have passed, so we will still not have a complete view of compliance. However, at the end of this period we do expect to have a good baseline understanding, across all the elements of the TSA, of the providers' current levels of security and their improvement plans.

In parallel with this planned information gathering, providers have an ongoing obligation to report significant security compromises to us. In receiving these reports, and in following up or, if required, taking enforcement activity, we expect to further build our understanding of the extent of compliance with the TSA.

For next year's Connected Nations report, we will therefore only be part way through our information gathering exercises. We will not have gathered information about all the aspects of the Code, but we do expect to have received information on some of the most important and urgent matters. We will use this knowledge, and whatever we have gained from reported compromises, to inform next year's Connected Nations reporting on the extent of compliance with the TSA.

Network resilience

The winter storms led to significant communication network outages across the UK, largely due to sustained power losses

Towards the end of 2021 and in early 2022 the UK was hit by several severe and named storms starting with Storm Arwen in November 2021, followed by Storm Barra in early December and storms Malik and Corrie in late January. In February there were three further storms in the space of a week – Storms Dudley, Eunice and Franklin. A key feature of all these storms were gale force winds, reaching 100mph in some cases. Storm Arwen caused complete power outages for almost 1 million customers - 40,000 customers were without supply for more than three days, and nearly 4,000 customers were off supply for over a week.[137] Storm Eunice also caused a record power outage over a 24-hour period, with over 1.4m homes affected.[138]

[137] Ofgem, Final report on the review into the networks' response to Storm Arwen, 9 June 2022.
[138] BBC, Storm Franklin hits UK with flooding and high winds - BBC News, 21 February 2022.

These storms, in particular Storm Arwen, created major challenges for communications providers and led to multiple network outages, causing major disruption for customers.

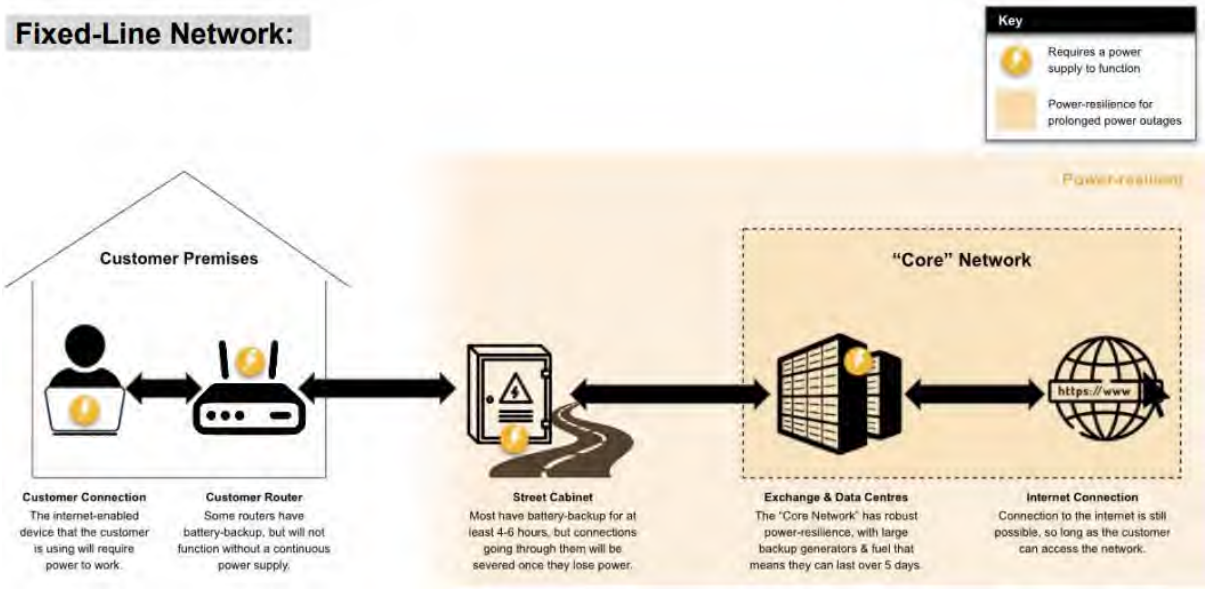
Impact on fixed networks

The storms caused considerable damage to Openreach's overground network. Some of its poles and overhead wiring were damaged by debris and falling trees. For example, storms Dudley, Eunice and Franklin destroyed more than 650 of Openreach's poles,[139] with South Wales, the South of England and parts of East Anglia worst affected. The impacts were more significant in rural areas where there is greater use of overground infrastructure. Urban areas have less overground access network cabling, and therefore experienced less of this type of damage.

While damage to fixed infrastructure was the cause of some services becoming unavailable, it was the loss of mains power which created the majority of broadband and fixed line outages. This impacted both customers of the larger fixed line providers, as well as smaller fibre network operators. Again, the impact was more significant in rural areas because of the prevalence of overhead power lines in these areas (in urban areas power lines are more routinely buried underground).[140]

The diagram below illustrates how fixed networks are dependent on power.

Figure 4.1: Power dependency in fixed access networks[141]



The largest cause of fixed line service loss during the storms was due to customers losing power to their homes. As illustrated above, fixed line services are dependent on power in the home – this

[139] Openreach has approximately 4m poles in total. Openreach, How recent storms have affected our network, 1 March 2022.
[140] Department for Business, Energy & Industrial Strategy, Energy Emergencies Executive Committee Storm Arwen Review Final report, June 2022.
[141] Diagram sourced from the Electronic Communications Resilience & Response Group (EC-RRG), 2021/22 Severe Storms Post-Incident Report, May 2022.

includes the broadband router, any connected devices including landline phones using VoIP, as well as any cordless landline phones[142] (which make up the majority, c.75% of landline phones).[143]

Core fixed networks remained operational throughout the power outages. This is because exchanges typically have integrated generator back-up which will typically hold fuel for up to five days. During the initial days of Storm Arwen, over 1,500 of Openreach's exchange sites were running on back-up power generators.[144] Fibre street cabinets also have battery back-ups fitted, which typically can withstand mains power loss of up to four hours – however because the storms caused prolonged power outages in some areas, this also meant some fibre street cabinets lost power.

Impact on mobile networks

During Storm Arwen, thousands of mobile cell sites were disrupted by power outages, and this affected all four mobile providers.[145] Storm Eunice also caused several hundred sites to be disrupted.

Some mobile mast sites are backed up with an on-site battery designed to last between 15 minutes and six hours. However, because many of the power outages were prolonged, and in excess of the battery capacity, it led to mobile cells ceasing to operate and customers losing access to their mobile services.

For example, one provider reported that over 1,500 of its mobile sites went down during Storm Arwen, and around 130 of these were down for more than 72 hours. Another provider reported that over 1,200 sites were impacted by Storm Eunice.

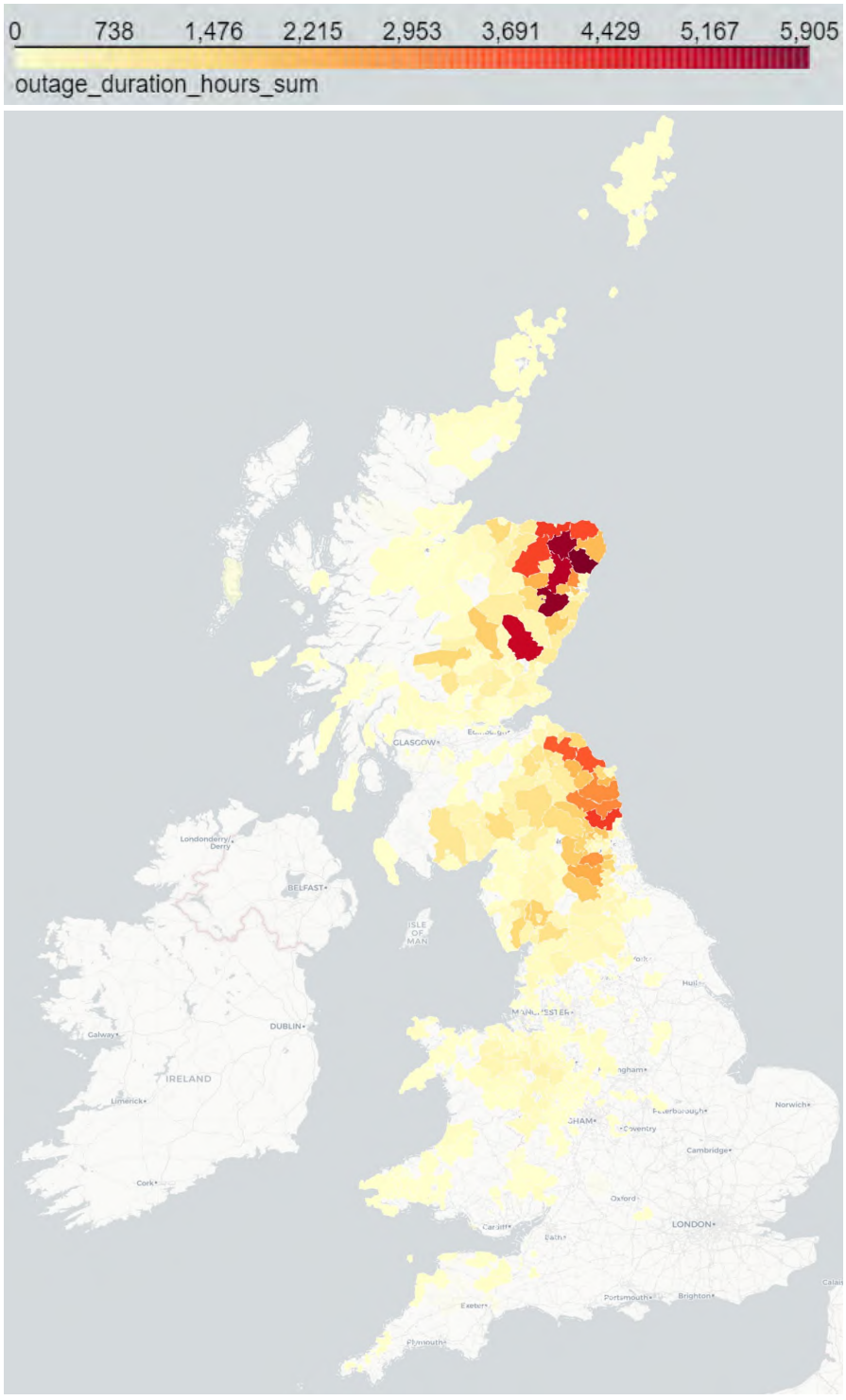
The combined impact across fixed and mobile services left some customers cut-off completely

The impact of the winter storms on communication services was particularly severe in those areas where mobile cell sites went down and the loss of power also affected customers' fixed line services. Some customers were left without any means to communicate, including for calls to the emergency services.

The most prolonged and consistent power outages during Storm Arwen were experienced in rural areas of Northern England and Eastern Scotland. The map below illustrates the extent of the power cuts during Storm Arwen. This shows the volume of mains power outage hours experienced in a postcode region; where clear means negligible hours lost and deep red is highly disrupted.

[142] Where a landline phone is corded, the power is provided by the PSTN exchange line so there is no requirement for additional mains power.
[143] Communications Consumer Panel, Quantitative research into the needs of landline telephony consumers, September 2022, page 10.
[144] EC-RRG, 2021/22 Severe Storms Post-Incident Report, May 2022, page 4.
[145] EC-RRG, 2021/22 Severe Storms Post-Incident Report, May 2022, page 5.

Figure 4.2: Power outage map of the UK on 26 November 2021 (Arwen Day 1)



Source: Ofcom analysis of data supplied by Ofgem.

The response to, and recovery from, the impact of the storms on communications networks took longer than expected

In some cases, portable generators were despatched to mast sites and street cabinets which were experiencing prolonged power outages. However, the use of this approach proved challenging

during the storms, given the limited number of generators available and the complex logistics involved in deploying them, particularly given the poor weather conditions.

Providers would typically prioritise the deployment of generators to the sites where they are most needed, in particular those sites where mains power restoration was likely to take longer and/or where battery back-up capacity was likely to be exceeded. However, during the storms, providers sometimes struggled to get clear and timely information from energy network distribution operators on power restoration plans, which made it difficult for providers to prioritise effectively and contributed to a longer than necessary recovery period in several areas. This highlighted the urgent need for improved co-ordination and information-sharing between the energy and communications sectors.

This was the first major incident across the newer fibre network which has less well-established (and tested) recovery processes compared to the copper network. Exacerbating this were delays to repairs caused by factors outside the providers' control (such as difficulties in accessing infrastructure due to fallen trees, limited daylight hours, getting permission to access private property and closed roads). There were also delays to recovery times because customers without power were unable to contact their providers in order to report faults. This is illustrated by the fact there was a dramatic spike in reported faults on the Openreach network in the second week after Storm Arwen. After Storm Arwen, whilst most faults were resolved within the first two weeks, fixed network infrastructure providers still took up to two months to reconnect all customers to their networks. This meant several hundred customers were left without telephone and internet services over Christmas.

Lessons have been learned from the impact of the storms and work is ongoing to ensure the industry is more prepared in future

Following the severe impact of Storm Arwen in particular, the communications industry identified a number of important learnings and were able to use this knowledge to help reduce the overall impact and recovery delays resulting from the later storms. These learnings included the need to scale-up fixed network management processes, taking a more proactive approach to fault identification in the networks, and improved engagement between energy and communications providers.

The Electronic Communications Resilience and Response Group (EC-RRG) published a post-incident review that outlined many of these learnings and set out an action plan to improve the sector's response and resilience to severe storms in future.[146] This is an important area of work, particularly as changing weather patterns from climate change may make these incidents more frequent in future. We are therefore continuing to work closely with the UK Government and industry to ensure that these learnings are taken on board, and action is being taken to improve the preparedness for future such events.

[146] EC-RRG, 2021/22 Severe Storms Post-Incident Report, May 2022.

Incident reports from communication providers

As in previous years, we continue to receive reports from communications providers throughout the year about any resilience incidents that created a significant impact on their networks and services. Our guidance for providers explains the types and sizes of incident we expect them to report to us in order for them to comply with their regulatory obligations.

As highlighted earlier in this section, we have recently updated this guidance to reflect changes to section 105A-D of the Communications Act 2003 implemented by the TSA, which introduced a new definition of 'security compromise'. [147] A 'security compromise' has a broad meaning, and covers both 'cyber-type' compromises such as those caused by hackers, and 'resilience-type' compromises such as outages caused by external factors (e.g. a flood or power cut) or internal factors (e.g. hardware failure, or operational process error). Our updated resilience guidance applies to the section 105A sub-category of security compromises relating to the resilience of networks and services, in terms of availability, performance, or functionality. It also provides some general observations and specific incident scenarios that will inform our approach to compliance, drawing on the changing nature of resilience risks and our experience of incident reporting and investigation.

Total number of reported incidents increased significantly this year, particularly for mobile

We received a total of 1,281 reports of relevant incidents from providers this year. This is a notable increase on the 761 reports we received in 2021.

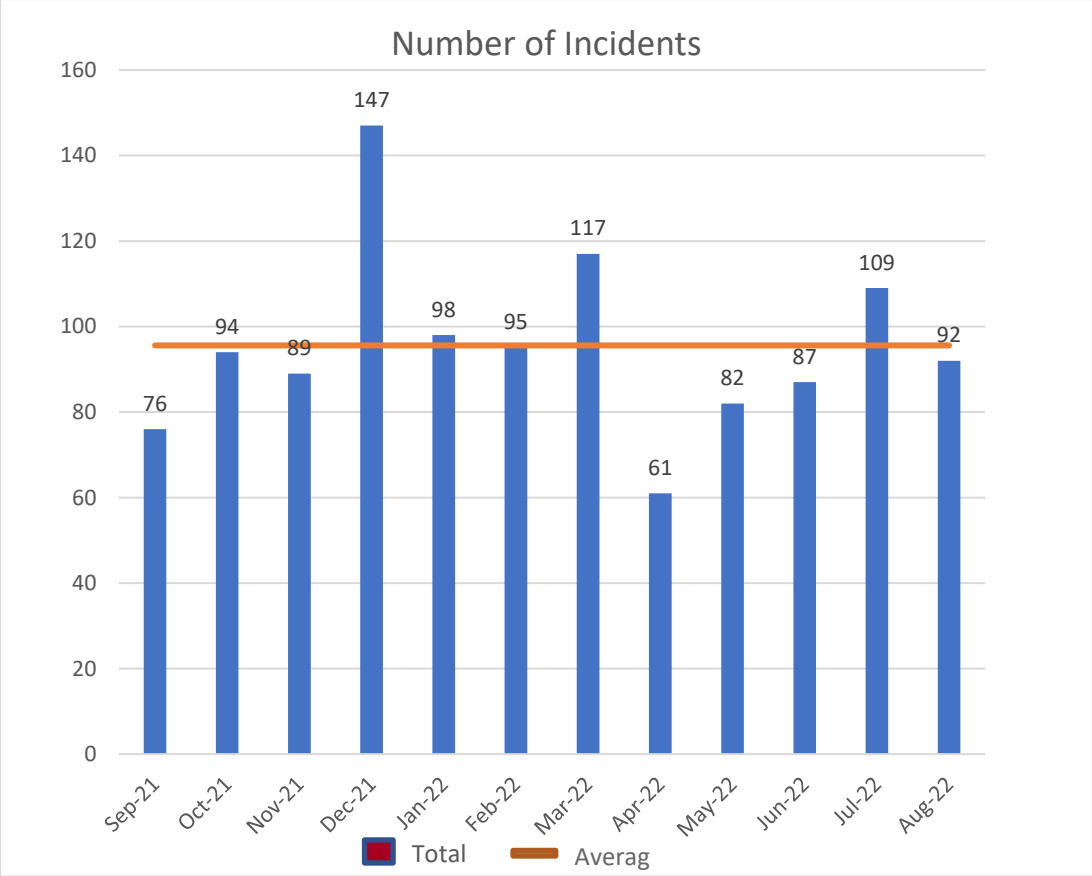
The increase in the number of fixed network incidents (545 in 2022 compared with 426 in 2021) was broadly in line with previous year-on-year variability. There was, however, a significant increase in number of mobile network incidents, more than doubling from 335 last year to 736 this year.

The monthly breakdown of incidents in Figure 4.3 shows the extent of month-on-month variability in the incidents as well as the average, which increased to 95 incidents each month in 2022, compared to 62 in 2021. The chart shows how the winter storms had a considerable impact on the number of reported incidents, particularly during December and March.

The overall increase in reported incidents is also likely to be due to our continued work to ensure consistent reporting across mobile and fixed providers, in accordance with our procedural guidance.

[147] Ofcom, Guidance on resilience requirements imposed by or under sections 105A to D of the Communications Act 2003, December 2022.

Figure 4.3: Monthly number of incidents reported between September 2021 and August 2022



Source: Ofcom analysis of provider data.

Equipment failure was the most common cause of reported incidents

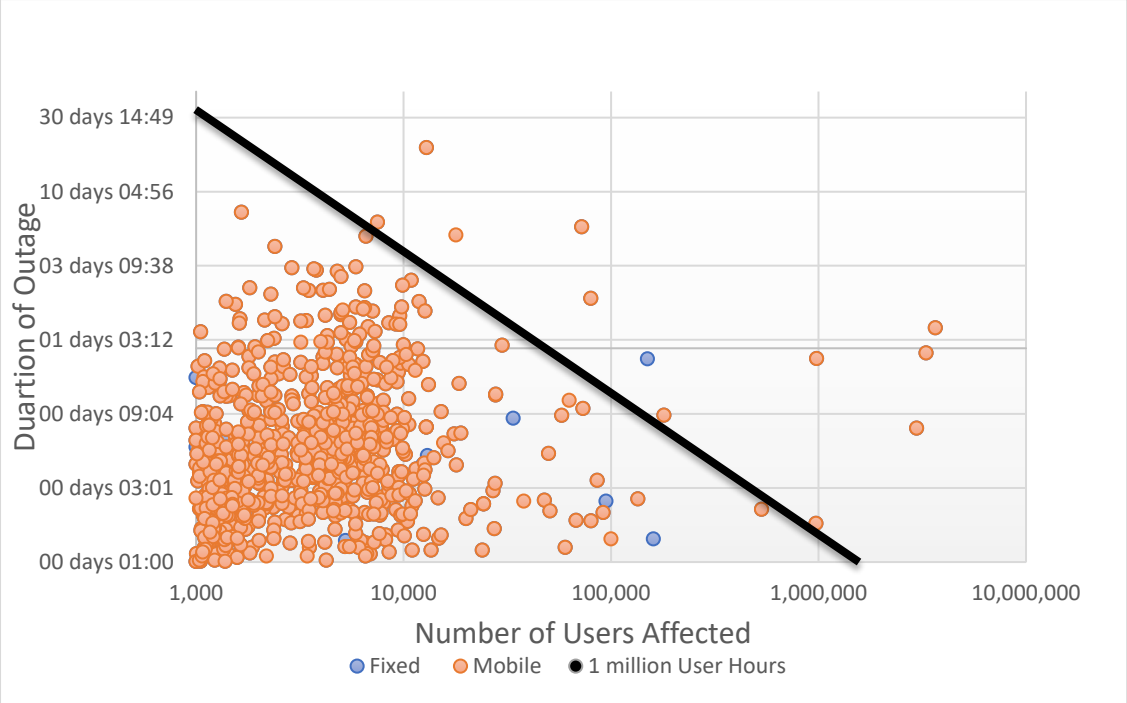
Over the last few years, we have made changes to the categories used to classify the cause of reported incidents based on the information included in providers' reports. These changes are helping us to look at how the type of incidents being reported to us is changing as technology evolves, and what this might mean in future as further developments are made.

Similar to previous years, hardware failures were the most common cause of outages this year, contributing over half of all incidents in the reporting year. This year, as discussed earlier, power issues were also more common as a result of the widespread power outages during the winter storms. We will continue to analyse causes and mitigation actions and work closely with industry to share our analysis and improve the accuracy and relevance of incident reporting to enable better learnings to be shared with stakeholders.

There were an increased number of mobile incidents which impacted a large number of users, and which lasted more than three days

The chart below sets out the duration of incidents and the number of users impacted. This provides a view of the total number of hours lost to users of the networks or services during an incident. Each of the fixed and mobile points to the right of the black diagonal line indicates an incident that caused more than one million user hours to be lost for that incident.

Figure 4.4: The impact of incidents reported between September 2021 and August 2022



Source: Ofcom analysis of provider data.

The chart illustrates that the majority of incidents lasted less than one day and impacted less than 10,000 customers. However, there was an increase this year in the number of incidents, particularly for mobile, which lasted more than three days. Many of these incidents were driven by the impact of the winter storms. Within the incidents that exceed a million user hours there were no themes or patterns of which we have concerns.

Other network and service resilience issues

Service loss in Shetland

In October this year residents of the Shetland Islands were cut off from their mobile and fixed line services for approximately 16 hours.[148] This resulted from one of the Islands' subsea fibre link cables (which connects Shetland to Orkney and onto mainland Scotland) being damaged by a fishing trawler. A secondary fibre link subsea cable to the Island was already unavailable at that time due to damage sustained the previous week.

While the impact of this incident is still under investigation, we understand that PSTN landlines for voice remained largely available due to the presence of legacy low bandwidth microwave backhaul.

The damage to the south fibre cable meant that there was a loss of light through the fibres, and temporary restoration of the services was achieved by increasing power output at the source. Over the next ten days, repairs were carried out across both the primary and secondary fibre cables to the islands, leading to a permanent restoration of services.

[148] BBC News, Damaged cable leaves Shetland cut off from mainland, 20 October 2022.

As part of the R100 North Contract, the Scottish Government has laid 16 new subsea cables[149] which is connecting 15 Scottish islands to faster and more reliable broadband services.

Ongoing engagement with fibre network providers

Given the significant growth in the number of fibre network providers, we are keen to understand the approach these providers are taking to ensuring the resilience of their networks, and providing service assurance. To help meet this aim, we undertook a series of site visits with some of these providers over recent months. These visits have been useful and positive, and we have been encouraged by the careful consideration these providers have put into the expected growth of their networks and into ensuring the appropriate architecture is used to meet the resilience needs of their growing customer base in line with our guidance. We plan to continue this engagement next year to build our understanding and knowledge of resilience approaches across these providers.

Reliability around the world

In addition to incidents reported to us, we are also aware of incidents outside the scope of our regulation that have occurred worldwide. These incidents provide insight into the types of issues that can lead to network outages as technology evolves around the world and understanding the causes can help inform any future guidance and advice we may produce.

In particular there were a number of incidents last year which were reported in the media, including nationally in Japan[150] and Canada.[151] We are continually engaging with the national regulatory authorities in relevant countries where incidents occur to get a better understanding of the causes and any useful learnings that might be relevant for UK-based networks.

We note that a common theme in these incidents appears to involve large network transformation or change programmes where a specific action was taken that does not appear to have been tested, documented or planned sufficiently. The impact of this type of error was then compounded by the absence of appropriate back-out processes or recovery preparation. This is recognised as poor practice that should be avoided. While it is understood that unexpected events and failures can occur, rigorous testing processes should always be in place, as well as appropriate contingency plans. It is important that UK providers therefore also review and learn from incidents such as these to ensure they have appropriate testing and recovery procedures in place.

[149] Digital Scotland, R100 subsea deployment.
[150] Reuters, KDDI aims to restore service Sunday after 40 mln users affected, 3 July 2022.
[151] BBC, Canada's internet outage caused by 'maintenance', 10 July 2022.

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Online Nation

2022 report



Welsh version available: Ein Gwlad Ar-lein

Published 1 June 2022

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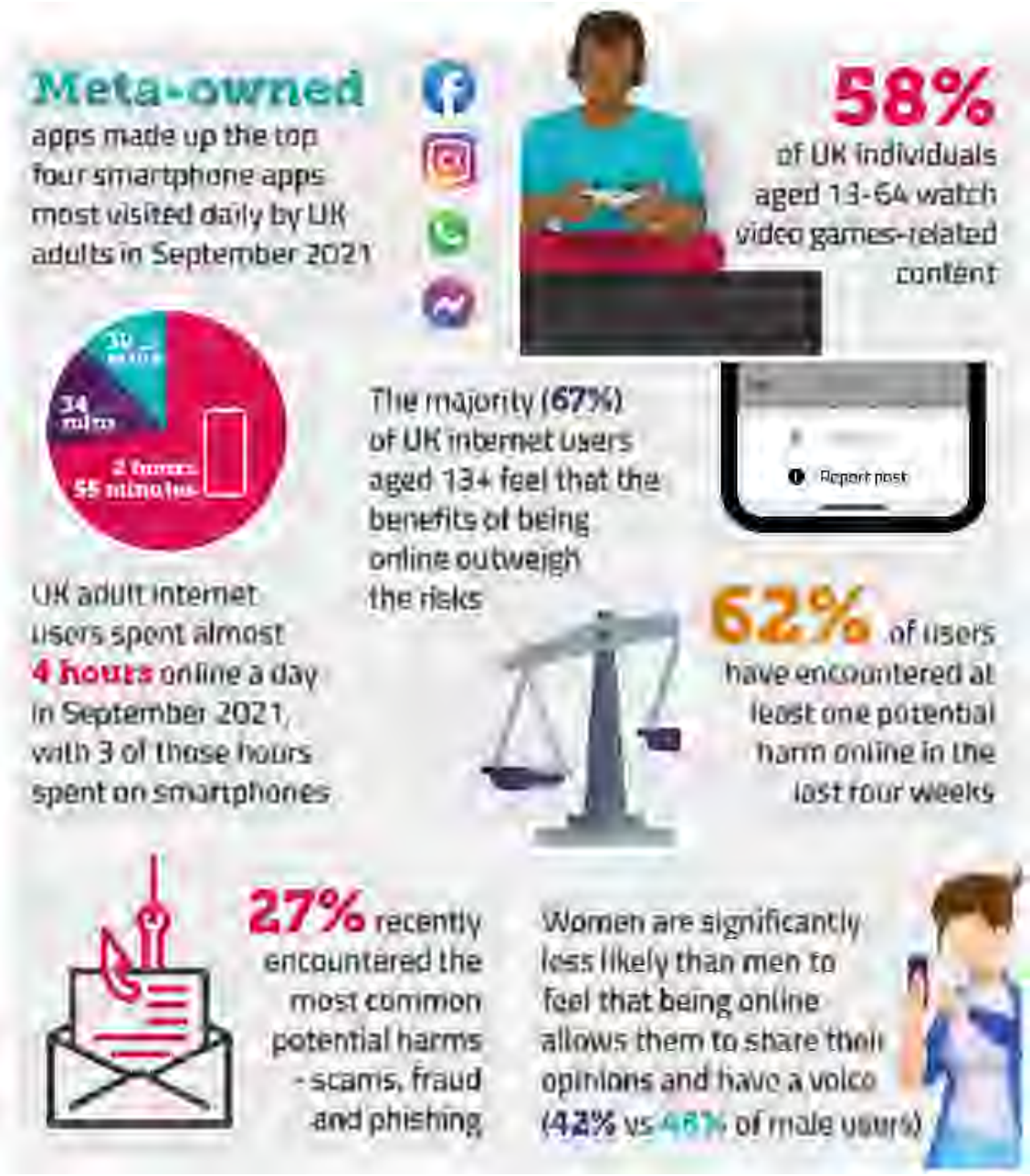
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Overview

What we have found – in brief

For most people in the UK, being online is a major part of daily life. Being online allows people to connect with others, sometimes in ways they may not be able to do offline. Our data shows how we benefit from a range of online services, from messaging and calling platforms to gaming platforms, online news outlets and online shopping. However, we have also collected data that shows how the internet can pose risks through exposure to potential harmful content or behaviour from other users.



Online use in the UK

UK adult internet users spent four hours online a day in September 2021

UK adult internet users spent an average of 3 hours 59 minutes a day online in September 2021 on computers, tablets and smartphones. Young adults continue to spend the most time online, with 18-24-year-olds spending an average of 5 hours 6 minutes online a day, and those aged 55+ spending the least time (2 hours 58 minutes). Women spent more time online (4 hours 11 minutes) than men (3 hours and 46 minutes). Online adults in Scotland spent the most time compared to the other UK nations (at 4 hours 18 minutes), while online adults in Northern Ireland spent the least amount of time online (3 hours 25 minutes). Seventy-three per cent of the time spent online per day by UK online adults was on a smartphone; one in five people *only* use a smartphone to go online, compared to one in ten last year.

National and regional online information services are widely used across the UK

News and governmental public services are among the most-visited websites and apps in the UK. The UK Government online service, which includes gov.uk, was the internet domain with the seventh highest reach (71% of UK adult internet users) in September 2021. This may reflect use during the pandemic, with people accessing information on Covid-19 as well as financial and travel information. NHS online services were the ninth top reaching sites, reaching 67%. Among online news services, BBC News was the most visited in all four UK nations, and in total was visited by 71% of UK online adults. Most of the top ten news websites and apps for the whole of the UK were equally popular across each UK nation. But the high reach of Wales Online (the second most visited online news service in Wales), Belfast Live (second in Northern Ireland) and the Daily Record (fourth in Scotland) shows the importance of news tailored to audiences in each of the UK nations.

Meta-owned apps made up the top four smartphone apps most visited *daily* by UK adults in September 2021

In September 2021, 88% of UK online smartphone-using adults visited WhatsApp, the top-reaching smartphone app, followed by the Facebook app (87%). Comparing average daily visitors, Facebook was visited by 61%, WhatsApp by 50%, Instagram by 35% and Facebook Messenger by 27% of UK smartphone-owning adults who went online. Instagram was the top smartphone app among UK online 15-24s, of whom 60% visited it daily, on average. One in five adults use all three Meta-owned communication services.

Nearly all (94%) UK adult internet users aged 16+ said they used an online communications service for making voice/video calls or sending messages in 2021, and 80% of children aged 3-15 did the same. Eighty-seven per cent of adults said they used any of Meta's communication services: WhatsApp, Facebook Messenger or Instagram.

One in ten UK online adults visited an online dating service in September 2021

Tinder (owned by Match) was the highest-reaching online dating service, reaching 1.9 million (4%) online adults in September 2021. Online dating is particularly popular among internet users aged 25-34; 19% of them visited at least one service in September 2021.

Tinder remains the most popular dating service with younger age groups, visited by 15% of online adults aged 18-34; 62% of Tinder's UK adult visitors are male while 38% are female. OurTime, a dating service for the over-50s (also owned by Match), was visited by 1% of those aged 65+, making it the most-visited service for this age group.

Thirty-nine per cent of UK adults aged 16+ play games online, as do 56% of UK children aged 3-15

UK gamers aged 13-64 spent 7 hours 33 minutes a week gaming in Q4 2021. Online gameplay became increasingly important to children aged 8-17 during the pandemic: 85% of parents of children aged 8-17 said their child spent more time playing games online in 2021 than previously.

Candy Crush Saga is the top-reaching games app, visited by 1.2 million UK adults daily, while website-based game Wordle reached 1.8 million UK adults daily in February 2022

In 2021, 20% of British adults said they played free-to-play digital games at least monthly. *Candy Crush Saga*, released in April 2012, is the top-reaching games app on mobile devices in the UK and was visited by 2.5 million adults in February 2022. The game is particularly popular with women, with 1.7 million female adults visiting the app in February 2022 – making up 68% of its total UK adult visitors. In January 2022, Microsoft agreed to acquire gaming company Activision Blizzard, the owner of Candy Crush, for £51bn, the largest-ever agreed sale in the gaming industry.

Wordle had 8.4 million adult visitors in the UK in February 2022; 17% of UK online adults visited the site, with an average of 1.8 million daily adult visitors. The game has a higher monthly reach among women (19%) than men (15%).

Fifty-eight per cent of UK individuals aged 13-64 watch video games-related content

Watching games-related content on video platforms is important to many gamers as a way of feeling part of the gaming community: 37% of UK 13-64-year-olds who watch games-related content cite this as a reason for doing so, rising to 54% of 16-24-year-olds. YouTube is the most popular platform for watching games-related content, used by 74% of those who watch gaming content. Twitch, the gaming streaming service, is used by 25% of games content viewers; 2.9 million adults visited Twitch in September 2021, with UK adults spending on average 20 minutes per day on the platform via desktop, laptop or mobile devices.

Fifty-eight per cent of UK gamers aged 13-64 subscribe to a gaming subscription service

On average, UK gamers spend more on digital than on physical game purchases; this includes gaming subscription services. PlayStation Plus, the multiplayer gaming online console, was the most popular paid-for gaming subscription in the UK, with 3.2 million subscribers at the end of 2021. There were 2.1 million paying subscribers to cloud gaming services (a method of gaming by which devices connect to video games running on remote servers in data centres) at the end of 2021. Subscription service PlayStation Now is the most popular cloud gaming subscription service in the UK, reaching 7% of 13-64-year-olds.

Among UK VR gamers aged 13-64, 32% used the PlayStation VR headset – the most popular headset

We can expect immersive technologies such as augmented and virtual reality (AR and VR) to become more prominent in our everyday online lives. It is anticipated that there will be a shift from the current 2D use of the internet (i.e. websites and smartphone apps) to a 3D metaverse internet. There is a good deal of industry investment in VR, with gaming potentially becoming the first mass-market metaverse application. Virtual reality headsets can enhance the gaming experience by immersing users within entirely computer-generated environments. However, take-up of VR headsets remains low, with 3% of adults playing games on a VR headset.

User experiences

Most UK internet users feel that the benefits of being online outweigh the risks

The majority (67%) of internet users aged 13+ feel that the benefits of being online outweigh the risks, compared to 7% who believe that the risks outweigh the benefits. Forty-three per cent agree that being online has an overall positive impact on their mental health, while 14% disagree. Heavy users (those who spend more than 22 hours a week of personal time online) are more likely to agree that the online benefits outweigh the risks (73%) and are more likely to agree that being online has a positive effect on their mental health (50%).

However, younger adults, women and those from a minority ethnic group are more likely than others to believe that the risks of being online outweigh the benefits. Those from a minority ethnic group are twice as likely as white users to state that the risks of being online outweigh the benefits. Women and 18-34s are more likely than average to *disagree* that being online has an overall positive effect on their mental health. And women are significantly less likely than men to feel that being online allows them to share their opinions and have a voice.

More than six in ten (62%) internet users aged 13+ have encountered at least one potential harm online in the last four weeks. The most common potential harms encountered are scams, fraud and phishing

Users aged 18-34 and those from an ethnic minority background are more likely than average to say they have experienced at least one potential harm online in the past four weeks (65% and 68% respectively). Older users, those aged 55+, are less likely than average to have encountered potential harms (57%). The most commonly experienced potential harms are scams, fraud and phishing, encountered by 27% of users in the past four weeks. This is the only type of potential harm that was experienced by the 55+ age group at a higher rate than average. The second most frequently experienced type of potential harm was misinformation, with 22% having encountered it in the past four weeks.

People are most likely to come across potential harms while using social media, most notably Facebook

Almost half (47%) of internet users aged 13+ report coming across a potential harm while using social media.

Users are more likely to have encountered their most recent potential harm on Facebook than on any other platform: 45% of users said that the potential harm they had encountered most recently was on Facebook, more than three times the proportion who encountered it on the second most likely platform, Instagram (12%).

Women are particularly likely to be negatively affected by hateful, offensive or discriminatory content and trolling

Women are significantly more likely than men to say that they were bothered or offended by their most recently encountered potential harm (41% vs 28%). Sixty per cent of female users who had experienced trolling most recently said they were bothered or offended by that experience, compared to 25% of men. Women from a minority ethnic background are more likely than white women to have experienced at least one potential harm in the past four weeks (67% vs 61%).

Almost three-quarters of mixed ethnicity and Black internet users said they had encountered at least one online potential harm in the past four weeks. Mixed ethnicity and Black internet users are more likely than either Asian or white users to have encountered potential harms in the past four weeks (74% and 71% compared to 63% and 61% respectively).

Over half of users from a minority ethnic group were negatively affected by their most recently encountered potential harm. In particular, users with Black (56%), mixed ethnicity (51%), and Asian (49%) backgrounds were more likely than white users (36%) to report that they had been bothered or offended by that content or behaviour.

The majority (59%) of children aged 8-15 report that using social media, and messaging sites and apps, makes them happy *all* or *most of* the time

Almost all children aged 3-15 go online (98%) and nearly two-thirds (58%) use social media. Sixty per cent of children aged 8-15 say that using social media and messaging platforms makes them feel closer to their friends. More than three-quarters of children aged 12-15 said that being online can help with their school/ homework, while half said it can be used to learn a new skill.

We found that 58% of children aged 3-15 use social media such as YouTube, TikTok and Snapchat. Four in ten parents of 8-12-year-olds said they would allow their child to use social media before they reached the minimum age. The most popular social media platforms have a minimum age requirement (usually 13) for opening an account.

A third of children aged 8-15 who go online have seen worrying or upsetting content online in the past 12 months

Over six in ten (63%) children aged 8-15 who go online said they would always tell someone if they saw something 'worrying or nasty' online; 88% of these said they would tell a parent. A third (34%) of children aged 8-15 who go online said they had seen something 'worrying or nasty' online in the past 12 months; and one in five (21%) parents of this age group said that their child had told them about something they had seen online which had scared or upset them. Among children aged 8-15 who have experienced bullying, more than eight in ten (83%) had experienced it through a communications device such as a phone or laptop,[1] compared to 60% being bullied face-to-face.

Young adults aged 18-34 are at the highest risk of encountering potential harms online

Those aged 18-34 are more likely than average to have most recently experienced at least one potential harm (65% vs an average of 62% for all users), whereas users aged 55+ have a lower overall risk of encountering a potential harm (57%).

Younger adults, aged 18-24, are more likely to encounter hateful, offensive or discriminatory content (17% vs an average of 11%), and older users 55+ are more likely to encounter scams, fraud or phishing (31% vs an average of 27%). It is difficult to isolate a single reason why some encounter potential harms more than others, as many factors can influence this, such as a person's age, gender or ethnicity and how much they use the internet.

A fifth of users said they had reported or flagged the potentially harmful content or behaviour they encountered online

Six in ten users who encountered harmful content or behaviour took some sort of action. The most common types of action taken were unfollowing/ unfriending/ blocking the perpetrator (20%) and clicking the report or flag button or marking as junk (20%). Of those who reported or flagged content, a fifth said that the content had been removed. The most common reason for not taking action was that the user "didn't see the need to do anything". Users from a minority ethnic group were more likely than white users to take some form of action (68% vs 59%), and also more likely to report or flag (37% vs 31%). Children aged 13-17 were less likely to use reporting and flagging to inform platforms of potentially harmful content or behaviour they had seen, with only 14% doing this compared to an average of 20% for all users.

[1] This includes offline methods of device-based bullying such as SMS message and phone calls.

1. The online landscape

Introduction

This chapter sets out an overview of the UK online landscape in 2021. It explores consumer behaviour and use of online services, as well as industry market developments and data, to provide commentary on select online markets: search engines, social media, news, retail, finance (including digital currencies) and a forward look to the metaverse. We examine the key players in each sector, such as Meta, Amazon, Microsoft, Alphabet and Apple, as well as challenger firms that are making an impact.

This year our report includes measurement data on UK online adults aged 15+, provided by Ipsos iris, the UKOM-accredited online audience measurement currency. As Ipsos iris was only launched in 2021, year-on-year trend data is not available, so we mainly provide a snapshot of online use in September 2021. The report also includes data from Ofcom's Adults' Media Literacy Tracker, on adults aged 16+.

The global pandemic since March 2020 has resulted in significant changes in online behaviour; in particular, our online shopping habits that developed during lockdown periods appear to be here to stay. Overall, online companies grew in 2021. The largest online platforms' revenues and profits increased significantly during the lockdown periods and this growth continued in 2021. The growth is being driven by UK consumers' increasing spend on e-commerce and entertainment subscription services, while advertising revenues are also increasing with the continuing brand migration to online.

Key metrics

Figure 1.1: Percentage of UK adults who used the internet in 2021

Percentage of households	Internet access
2021	94%

Source: Ofcom Adults' Media Literacy Tracker 2021: Core survey and CATI omnibus survey. Q1 - do you or does anyone in your household have access to the internet at home (via any device, e.g. pc, mobile phone etc)? and do you personally use the internet at home? Base: All adults 18+ (3143).

Figure 1.2: Percentage of UK online adults accessing the internet, by device: 2021

Percentage of adult internet users	Smartphone	Tablet	Laptop	Smartphone only
2021	88%	43%	53%	21%

Source: Ofcom Adults' Media Literacy Tracker 2021: Core survey and CATI omnibus survey. IN1. Which of these devices do you use to go online? (MULTI CODE) Base: All adults 16+ that go online (at home or elsewhere) (excluding those who did not give a response at the postal survey) (3577)

Figure 1.3: Average time spent online across computers, tablets and smartphones, per UK adult visitor per day (hours: minutes): September 2021

UK age	15+	15-17	18-24	25-34	35-44	45-54	55+
Average daily time spent online (hours:mins) in September 2021	3:59	5:04	5:06	4:36	4:32	3:51	2:58

UK nation	England	Scotland	Wales	Northern Ireland
Average daily hours online (hours:mins) in September 2021				

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021 - 30 September 2021, adults, age 15+, UK. Note: Custom data supplied by Ipsos.

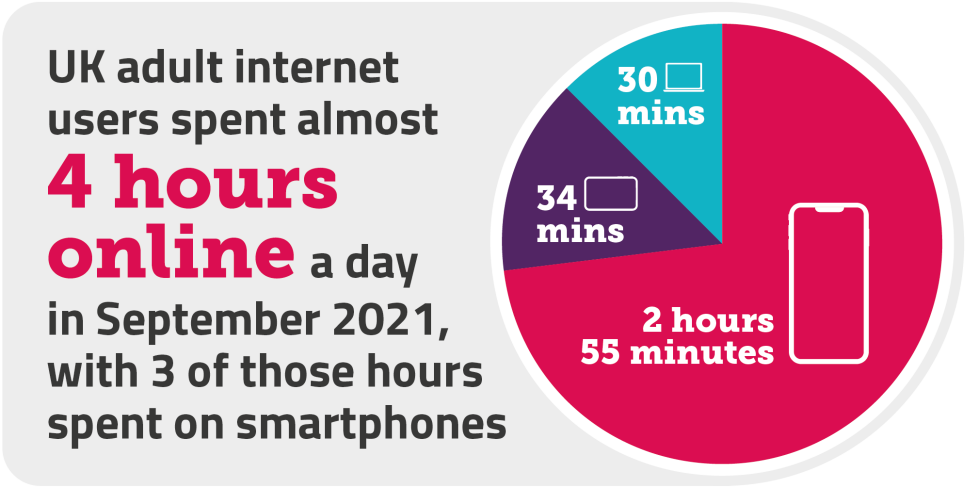
Internet take-up and use

UK adult internet users spent almost four hours online a day in September 2021, with three of those hours spent on smartphones[2]

Data from Ipsos iris shows that 49.9 million UK individuals aged 15+ accessed the internet on smartphones, tablets and computers in September 2021 (our sample month), spending an average of 3 hours 59 minutes a day online. Young adults continue to spend the most time online, with 18-24-year-olds spending a daily average of 5 hours 6 minutes, and the 55+ group spending the least time (2 hours 58 minutes). Women spent more time online (4 hours 11 minutes) than men (3 hours and 46 minutes). Online adults in Scotland spent the most time compared to the other UK nations (4 hours 18 minutes), while those in Northern Ireland spent the least (3 hours 25 minutes) (see figure 1.3 above).[3]

[2] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September– 30 September 2021, adults age: 15+, UK. Note: Custom data supplied by Ipsos.
[3] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September– 30 September 2021, adults age: 15+, UK. Note: Custom data supplied by Ipsos.

Figure 1.4: Average time spent online across computers, tablets and smartphones, per UK online adult per day: September 2021



Source: © Ipsos, Ipsos iris Online Audience Measurement Service 1 September 2021 - 30 September 2021, adults, age 15+, UK. Note: Custom data supplied by Ipsos. Infographic shows use of the following devices: smartphone, tablet and desktop computer.

Ninety-four per cent of adults have access to the internet at home

Six per cent of UK adults do not have access to the internet at home, and this increases with age, with a fifth of those aged 65+ not having home internet access, compared to just one per cent of 18-34s. Those aged 65+ are also the most likely to say that they have access to the internet but do not use it (7%), indicating that they either do not feel the need to use it or lack the necessary skills.[4] People in DE households are the most likely to not to have internet access at home (14%) compared to 2% of people in AB households.[5] The proportion of those with access to the internet at home remains unchanged since early 2021 for UK adults (94%).[6]

Ofcom research in 2021 found that among people who don't use the internet at home, the top reasons given for not going online were a perceived lack of need or interest (47%); that it was "too complicated" (31%) or cost (19%).[7] Ofcom estimates that in October 2021 about 2 million households were experiencing affordability issues with either their fixed broadband and/or smartphone. This suggests that a number of households in the UK do currently have access to the internet, but are at risk of having to modify or even cancel their service, or reduce household spending elsewhere. The latest estimate regarding the number of households which do not have

[4] Ofcom Adults' Media Literacy Tracker 2021: CATI omnibus survey.
[5] 'DE' and 'AB' households refer to socio-economic groups as a measure of occupation and affluence. 'AB' denotes those in the highest socio-economic groups, with more highly-skilled occupations, while 'DE' refers to the lowest socio-economic groups, including lower-skilled workers and the unemployed. Source: UK Geographics, UK Geographics - Social Grade, accessed 29 March 2022.
[6] Ofcom Technology Tracker CATI omnibus survey - 12 February to 5 March 2021, KDR06 - Do you or does anyone in your household have access to the internet at home (via any device, e.g., PC, mobile phone etc)? And do you personally use the internet at home? Base: 3126.
[7] Ofcom Adults' Media Literacy Tracker 2021: CATI omnibus survey. Q5 - Which of these are reasons that you have internet access at home? January 2021. Base: All UK adults (18+) without internet access at home (200).

internet access, at least partially due to cost, stands at 100,000, indicating the role that affordability plays in keeping people offline.[8] Half (49%) of the people who don't go online at home had asked someone to do something for them on the internet in the past year.[9] In December 2021, the most commonly-cited activity that adults without home internet access had asked someone to do for them was online shopping (64%), followed by accessing public services provided by the Government or council (18%), and accessing online health services (16%). The December holiday season and the Government 'Plan B' Covid-19 measures in force at the time may have been significant factors here.[10]

Figure 1.5: Proportion of adults with home internet access, by age, gender and SEG

	18+	18-24	25-34	35-44	45-54	55-64	65+
Do not have internet access at home	6%	1%	<1%	3%	2%	3%	20%
Have access at home and go online	92%	99%	99%	97%	97%	96%	73%
Have access at home but do not use it	2%	<1%	1%	<1%	1%	1%	7%

	AB	C1	C2	DE	England	Scotland	Wales	NI
Do not have internet access at home	2%	3%	5%	14%	6%	7%	9%	1%
Have access at home and go online	97%	96%	91%	82%	92%	91%	90%	95%
Have access at home but do not use it	1%	1%	4%	3%	2%	1%	1%	3%

Source: Ofcom Adults' Media Literacy Tracker 2021: CATI omnibus survey Q1 - Do you or does anyone in your household have access to the internet at home (via any device, e.g. PC, mobile phone etc)? And do you personally use the internet at home? (single coded) Base: All adults aged 18+ - 3143

Device take-up and use

One in five people *only* use a smartphone to go online in 2021, compared to one in ten in 2020

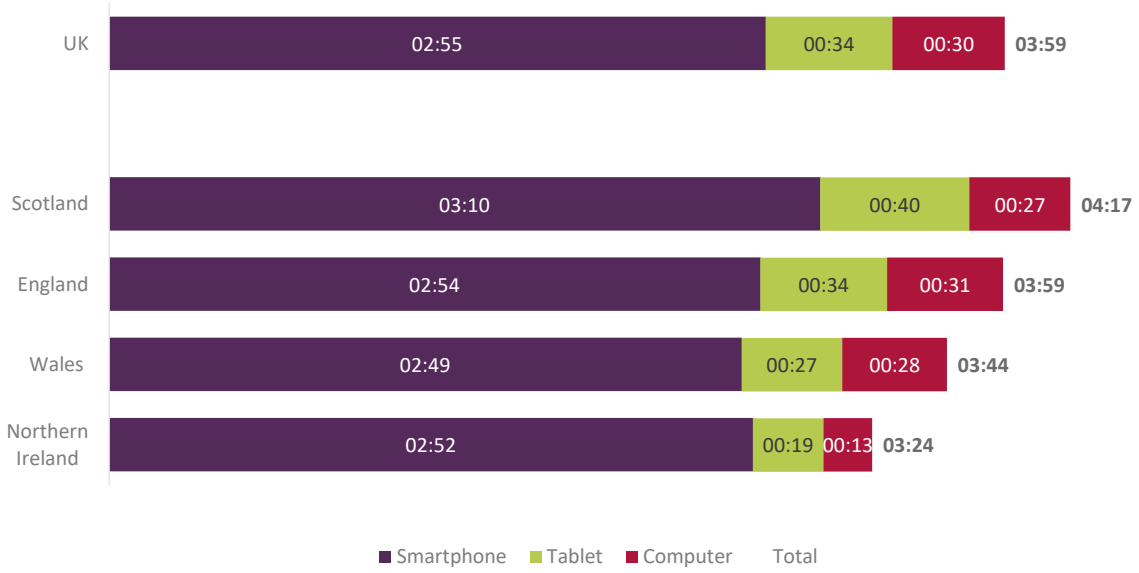
Smartphone adoption is widest among younger UK adults: 90% of 16-24s use a smartphone to go online compared to 68% of those aged 65+. Younger adults are also more likely to *only* use a smartphone to go online, with a third of 25-34s reporting this as the only way they go online,

[8] Ofcom Affordability of Communications Services report, 15 February 2022.
[9] Ofcom Adults' Media Literacy Tracker 2021: CATI omnibus survey. Q3 - In the past year, have you asked someone else to do something for you on the internet? Base: All UK adults (18+) who don't use internet at home or elsewhere (216).
[10] Ofcom Adults' Media Literacy Tracker 2021: CATI omnibus survey.

compared to 9% of the 65+ age group. This is also the group most likely to use tablets (52%), compared to 30% of 16-24s. More people are using only a smartphone to go online. People were more likely in 2021 than in 2020 to *only* use a smartphone to go online (21% vs 11% in 2020).[11] There could be many reasons, but this may be because people were spending more time at home in late 2020 and early 2021 than in late 2021, and therefore used a wider range of devices. It may also reflect the larger screen size and better-optimised app functions of many smartphones, making them easier and potentially more cost-effective to use as a sole device for accessing the internet.

In September 2021 73% of the time spent online by UK online adults per day was on a smartphone. UK online adults are also spending slightly more time using tablets than computers, demonstrating that there is a clear preference for using mobile devices to go online. Those aged 25 to 34 spend the highest proportion (85%) of their online time using a smartphone, followed by 35-44s (80%); 15-24s (78%); 45-54s (74%) and those aged 55+ (55%).[12]

Figure 1.6: Average daily time spent online by adults in September 2021, by device and UK nation (hours:minutes)



Source: © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021– 31 September 2021, adults age: 15+, UK. Note: Custom data supplied by Ipsos.

Smartphones and tablets are the devices of choice for children

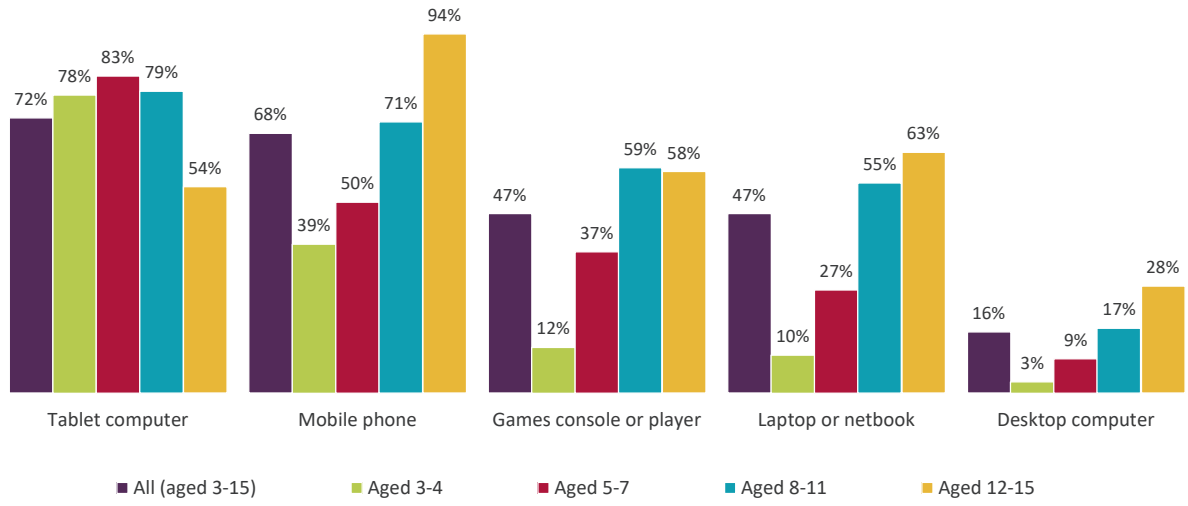
Research from Ofcom's Children's and Parents' Media Literacy Tracker shows that smartphones (68%) and tablets (72%) are the main ways for children aged 3-15 to go online, and this varies significantly by age. Children are increasingly likely to use a smartphone to access the internet as

[11] Ofcom Adults' Media Literacy Tracker 2021: Core survey IN1. Which of these devices do you use to go online? (single coded) Base: All adults aged 16+ who go online at home or elsewhere (excluding those who did not give a response at the postal survey) – 3,577.
[12] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September– 30 September 2021, adults age: 15+, UK. Note: Custom data supplied by Ipsos.

they get older; from 39% of 3-4-year-olds to 71% of 8-11-year-olds and 94% of 12-15s.[13] Our research shows that by the age of ten, the majority of children (61%) own their own smartphone. Use of tablets to go online tells the opposite story, with 83% of 5-7s using them to go online, compared to 54% of 12-15s. Tablets are likely to be the device that children use the first time they access the internet; the large screen adds to their appeal for children and parents, and there are many tablet devices designed specifically for young children.

Older children (aged 12-15) are the most likely to use either a laptop, netbook or desktop computer (77%), as they will be using these devices to complete schoolwork; 63% of these groups use a laptop or netbook and 28% a desktop computer. Access to a computer and to home internet is important for schoolchildren and has become more so during the pandemic, as remote learning continues to be used when for any reason the child cannot attend school. In 2021 11% of parents with primary-school-age children and 3% with secondary-school-age children at home said that the children in their household 'rarely' or 'never' had adequate access to an appropriate device for their schooling needs.[14] This is in line with figures that show that older children are more likely to have their own device suitable for use for schoolwork, such as a laptop or desktop computer.[15]

Figure 1.7: Devices used by children to go online, by age group



Source: Ofcom Children's and Parents' Media Literacy 2021: Parents Only survey. QP1. Please think about any reason your child may have for going online – maybe to look at a website or use an app, watch a TV programme, or videoclips on sites or apps like YouTube, to play games online, for social media, or to do school or homework. Does your child use any of these to go online at home or somewhere else? (MULTI CODE) goes online using any type of device. Base: All parents of children aged 3-15 (2,006)

[13] Ofcom Children's and Parents' Media Literacy 2021: Parents Only survey.
[14] Ofcom Media Literacy CATI omnibus survey. Q9/Q10 - To what extent do the children in your household at primary/secondary school have access to appropriate devices at home, which connect to the internet, for their schooling needs - such as home online learning and/ or online homework? Base 412.
[15] Ofcom Children's and Parents' Media Literacy 2021: Parents Only survey QP1).

Use of internet services

Leading online companies

Alphabet- and Meta-owned sites and apps are the most visited in the UK, used by almost all online adults

Alphabet, which owns Google and YouTube, is the organisation whose sites and apps are most visited[16] by UK adults, followed by Meta (the owner of Facebook, WhatsApp and Instagram) and Amazon. The Alphabet- and Meta-owned sites and apps have near-universal use among UK online adults, and the Amazon-owned website and apps are visited by at least 90% of online adults in all four UK nations. Taking all their subsidiary services together, the BBC and Reach PLC are the joint-highest-ranking UK-based organisations by reach (both 77%). In Scotland and Wales, the newspaper group Reach PLC – publisher of the Mirror, Daily Express and Daily Star, as well as local titles – is the UK-based organisation with the highest reach, whereas in Northern Ireland websites run by the UK Government have the highest reach. Online adults in Wales and Northern Ireland are more likely than those in Scotland or England to visit UK Government sites and apps (77% vs 66% and 71%). The high UK adult reach of Government sites may be partly due to the pandemic, with people accessing information about Covid-19 restrictions, financial support or travel requirements. Twitter appears in the top ten most-visited organisations for Scotland (65%) and Northern Ireland (59%) but not for England (62%) or Wales (58%). Two-thirds of people in Scotland visited Wikipedia in September 2021; this is the only nation in which Wikipedia's parent company appears in the top ten.[17]

NHS Sites appears in ninth position, reaching 67% of UK online adults in September 2021, and reach to NHS sites and apps increased to 80% of UK online adults in December 2021. The increase was likely due to the roll-out of the vaccine booster programme in response to the Omicron variant. Reach then dropped again to 67% by February 2022.[18]

[16] 'Organisations' are the parent companies of the groups of websites and apps; for instance, Alphabet organisations include Google Search, Gmail and YouTube; Meta includes Facebook and Messenger, Instagram and WhatsApp.

[17] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September – 30 September 2021, adults age: 15+, UK.

[18] © Ipsos, Ipsos iris Online Audience Measurement Service, NHS Sites (ORG), Monthly: 1 September 2021 – 28 February 2022, adults age: 15+, UK.

Figure 1.8: Top ten organisations visited by UK online adults on mobile/desktop devices, by nation

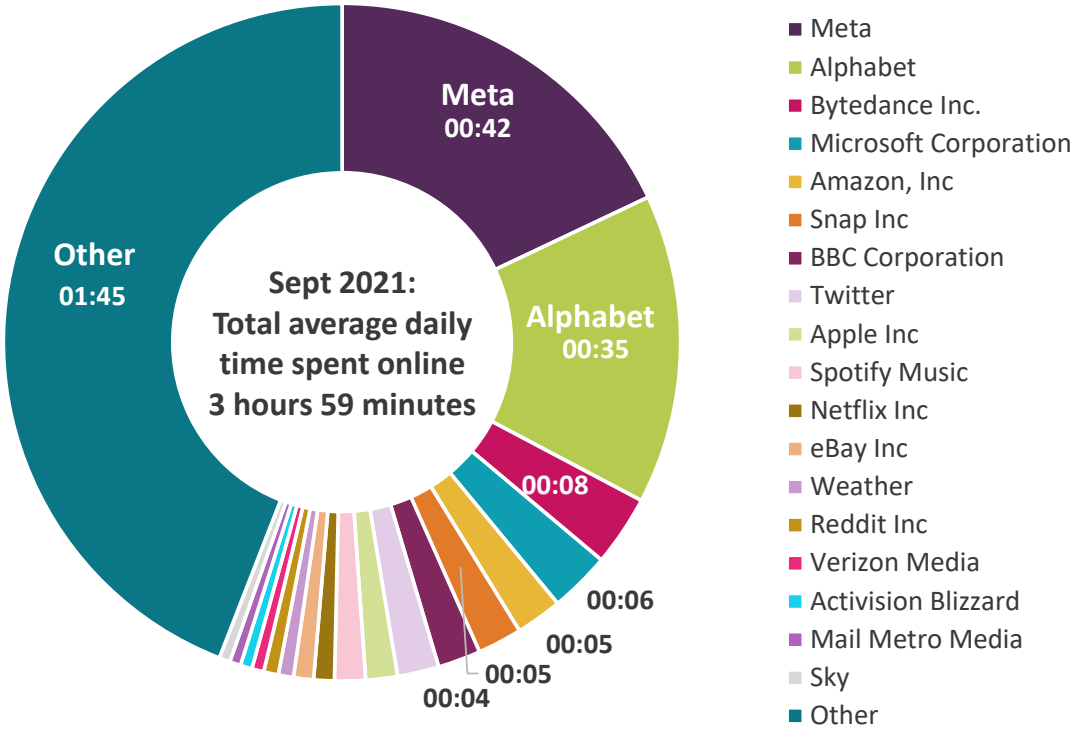
	UK		England		Scotland		Wales		NI	
Rank	Organisation	Reach	Organisation	Reach	Organisation	Reach	Organisation	Reach	Organisation	Reach
1	Alphabet	100%	Alphabet	100%	Alphabet	99%	Alphabet	100%	Alphabet	100%
2	Meta	98%	Meta	97%	Meta	98%	Meta	99%	Meta	96%
3	Amazon, Inc	91%	Amazon, Inc	91%	Amazon, Inc	92%	Amazon, Inc	96%	Amazon, Inc	92%
4	Microsoft Corporation	82%	Microsoft Corporation	82%	Microsoft Corporation	82%	Microsoft Corporation	80%	Microsoft Corporation	86%
5	BBC	77%	BBC	78%	Reach Plc	77%	Reach Plc	79%	UK Government	77%
6	Reach Plc	77%	Reach Plc	77%	BBC	75%	UK Government	77%	BBC	77%
7	UK Government	71%	UK Government	71%	Wikimedia Foundation Inc	66%	BBC	77%	Reach Plc	74%
8	eBay Inc	69%	NHS Sites	70%	eBay Inc	66%	eBay Inc	69%	eBay Inc	64%
9	NHS Sites	67%	eBay Inc	69%	UK Government	65%	Mail Metro Media	63%	PayPal Inc	59%
10	PayPal Inc	64%	PayPal Inc	65%	Twitter	65%	NHS Sites	62%	Twitter	59%

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021 – 30 September 2021, adults age: 15+, UK.

UK adult internet users spent an average of 42 minutes a day on Meta-owned sites and apps and 35 minutes on Alphabet-owned sites and apps

By time spent, Alphabet and Meta remain the top two leading organisations accessed on smartphones, tablets and computers. Eighteen per cent of measured time spent online by UK adults in September 2021 was on Meta-owned apps and sites, and 14% was on Alphabet-owned apps and sites. Of the 42 minutes spent on Meta services, 28 minutes were spent on Facebook and Messenger, 7 minutes on WhatsApp and just under 7 minutes on Instagram. Time spent on Netflix is significantly understated, as the data only captures time spent on computers and mobile devices and excludes time spent watching Netflix on connected TV sets or smart displays. The same applies to YouTube, which will be captured under Alphabet's time. The figure for time spent on Spotify does not include time spent listening on smart devices or while the app is not active but audio is playing.[19]

Figure 1.9: Share of average time spent online per day by UK adult digital population, split by organisation (hours:minutes)



Source: © Ipsos, Ipsos iris Online Audience Measurement Service, Organisations, 1 September 2021 – 30 September 2021, adults age 15+, UK.

[19] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021– 30 September 2021, adults age: 15+, UK.

Applications

Smartphone app use

WhatsApp, Facebook and Google Maps were the top three smartphone apps by UK online adult reach in September 2021[20]

Eighty-eight per cent of UK online adults visited the WhatsApp app in September 2021; the high reach of WhatsApp across UK online adult age groups suggests that it has reached a level of saturation in the market and is now the 'go-to' communication app. Similarly, the Facebook app reached 87% of UK online adults while the Google Maps app reached 70%. Amazon is the most popular online shopping app for all three adult age ranges (Figure 1.10) and was most popular with 35-54s (69%). TikTok's audience is heavily concentrated among younger adults and was ranked in eighth place among 15-24-year-olds, compared to 33rd for 35-44-year-olds and 79th for those aged 65+. Instagram is also much more popular with younger users, used by 81% of 15-34s compared to only 44% of the 55+ group.[21]

Figure 1.10: Top ten smartphone apps by UK adult reach, by age: September 2021

Age	15-34		35-54		55+	
	App	Online reach	App	Online reach	App	Online reach
1	**WhatsApp**	90%	**WhatsApp**	90%	**WhatsApp**	86%
2	**Facebook**	88%	**Facebook**	89%	**Facebook**	83%
3	**YouTube**	82%	**Google Maps**	73%	**Google Maps**	62%
4	**Google Maps**	72%	**Facebook Messenger**	73%	**Facebook Messenger**	59%
5	**Instagram**	81%	**YouTube**	70%	**YouTube**	49%
6	**Facebook Messenger**	68%	**Amazon**	69%	**Gmail**	45%
7	**Amazon**	62%	**Instagram**	68%	**Amazon**	45%
8	**Gmail**	53%	**eBay**	56%	**Instagram**	44%
9	**eBay**	42%	**Gmail**	47%	**Google Play Store**	41%

[20] © Ipsos, Ipsos iris Online Audience Measurement Service, top smartphone apps by reach, 1 September 2021–30 September 2021, adults age: 15+, UK.
[21] © Ipsos, Ipsos iris Online Audience Measurement Service, smartphone apps only, 1 September 2021–30 September 2021, adults age: 15+, UK. See interactive report for top smartphones apps for adults age 15+.

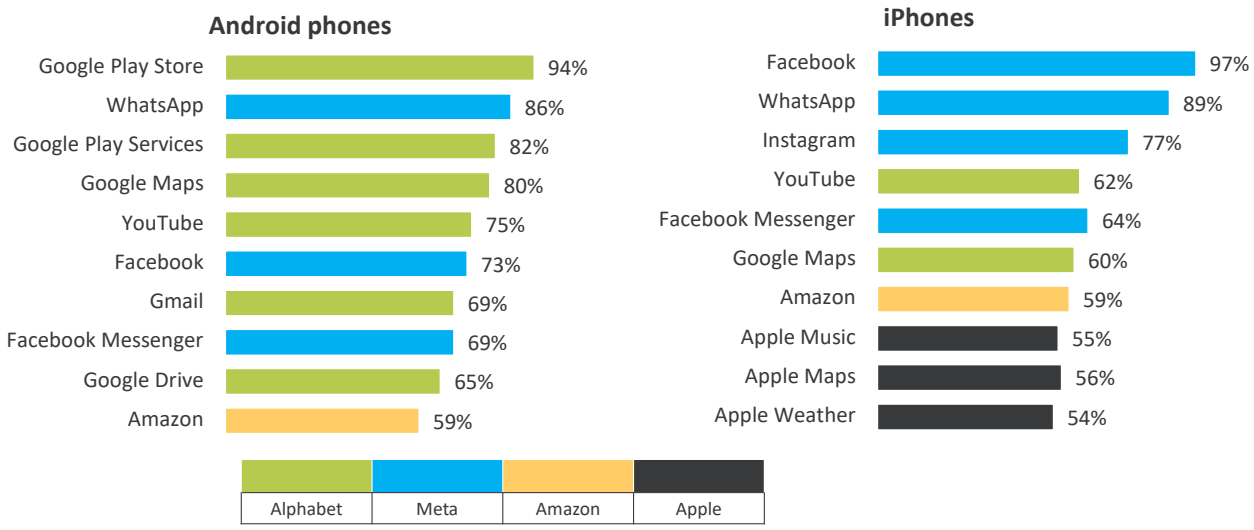
Age	15-34		35-54		55+	
10	**Google Play Store**	41%	**Google Play Store**	46%	**eBay**	34%

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, smartphone app, 1 September 2021– 30 September 2021, all adults age 15+, UK.

Alphabet-owned apps are the most-visited apps by UK adults on Android smartphones while Meta-owned apps are the most-visited apps on iPhones

Six of the ten most-visited apps on Android phones are owned by Alphabet, compared to three in ten Apple-owned apps on iPhones. [22] Many of these apps come pre-installed on devices, such as Google Play, Google Maps and Gmail for Android, and Apple Music and Apple Maps on iPhones. But Google Maps has higher reach than Apple Maps on iPhones, despite the fact that it is not preinstalled on iPhones, which suggests the ubiquity of Google Maps, and that users like its added functionality, such as being able to download maps for offline use.

Figure 1.11: Top ten smartphone apps, Android phones vs iPhones, based on reach as a % of the total smartphone app universe



Source: © Ipsos, Ipsos iris Online Audience Measurement Service, app only Android vs iOS, smartphone only, 1 September 2021– 30 September 2021, adults age: 15+, UK. Note: Apple App Store is not measured by Ipsos iris.

Meta-owned Facebook, WhatsApp, Instagram and Facebook Messenger are the top four most-visited smartphone apps daily

Meta's apps also have a large daily reach: as the table below shows, four of the five apps with the highest daily reach on smartphones are owned by Meta. The top apps (by average daily visitors) can all be used for messaging or calls. Instagram is the smartphone app with the highest daily reach among 15-24s, visited by 60% on a daily basis in September 2021. The Facebook app has the next

[22] © Ipsos, Ipsos iris Online Audience Measurement Service, app only Android vs iOS, smartphone only, 1 September 2021–30 September 2021, adults age: 15+, UK.

highest reach in the 15-24 age group, at 60%, and Snapchat is third at 56%.[23] Seven in ten UK online adults aged 25-34 visited the Facebook app on a daily basis in September 2021, and this age group has the highest daily reach for Facebook.[24]

See the Communications Services chapter for more detail on these services.

Figure 1.12: Top five daily smartphone apps reached by UK online adults in September 2021

Rank	App	Parent company	Average daily UK online adult reach in September	Daily UK online adult reach in September
1	**Facebook**	Meta	61%	28.3m
2	**WhatsApp**	Meta	50%	23.0m
3	**Instagram**	Meta	35%	16.1m
4	**Facebook Messenger**	Meta	32%	14.8m
5	**Gmail**	Alphabet	27%	12.4m

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, top smartphone apps by daily reach, 1 September 2021 – 30 September 2021, adults age: 15+, UK.

App revenues

After an increase between 2019 and 2020, spending in app stores fell in 2021

App revenue data includes all purchases in app stores, including one-off purchases, in-app spend and recurring subscription payments. The data is built from credit and debit card transactions, so each account can include purchases by other people such as children or partners. UK iOS and Android App Store revenues increased significantly in 2020, helped by an increase in the number of active users:[25] from 47% in 2019 to 58% in 2020. In 2021, the overall user base increased by only one percentage point, to 59%. The average number of paid-for apps bought by people active in app purchasing went down from 2.9 to 2.6 per month, resulting in a 2% decline in total UK revenues.

Figure 1.13: Combined Apple and Google app store purchases per bill payer, by year

Year	Bill payer adoption	Monthly average spend	Average number of transactions per month	Spend per transaction
2019	47%	£26.36	2.9	£9.25

[23] © Ipsos, Ipsos iris Online Audience Measurement Service, top smartphone apps by daily reach, 1 September 2021–30 September 2021, age 15-24, UK.
[24] © Ipsos, Ipsos iris Online Audience Measurement Service, top smartphone apps by daily reach, 1 September 2021–30 September 2021, age 25-34, UK.
[25] Active users from Money Dashboard panel of 33k users aged 15+. Calculated as % of people in panel using the service divided by total panel.

Year	Bill payer adoption	Monthly average spend	Average number of transactions per month	Spend per transaction
2020	58%	£26.61	2.9	£9.02
2021	59%	£23.82	2.6	£9.24

Source: Ofcom analysis of cohort of 33k UK users aged 15+ from Money Dashboard.

Online sector revenue streams

Advertising comprises 68% of estimated total UK online revenues in 2021

UK online sector revenues grew in 2021, following record growth in 2020. The growth of sectoral revenues in 2021 was helped by increased consumer adoption and use during lockdown. Advertising, subscriptions and transactions are the main online revenue streams, and each grew in 2021.

Figure 1.14: Estimated UK online revenues[26] by revenue stream: 2017-2021

UK	2016	2017	2018	2019	2020	2021	5-year CAGR
Total revenue	£14.6bn	£17.1bn	£20.0bn	£23.2bn	£25.6bn	£33.5bn	18%
Annual growth %	21%	17%	17%	16%	10%	31%	
of which ...							
Advertising %	64%	65%	65%	65%	63%	68%	20%
Subscription %	14%	14%	15%	16%	17%	15%	21%
Transactional %	22%	20%	20%	19%	20%	16%	11%

Source: Ofcom estimates based on data from IAB UK/PwC Digital Adspend Study, PwC Global Entertainment and Media Outlook: 2020-2024 and 2021-2025, http://www.pwc.com./outlook, Ampere Analysis, Enders Analysis, AA/WARC Expenditure Report, and company reports and public filings. Both subscription and transactional revenues refer to revenues derived from sales of the relevant product or service, either on a repeating basis or through one-off sales, respectively. In the case of online news and consumer magazines, all such revenues are included under 'subscriptions'. In the case of online games, all revenues are included under 'transactional'. Figures are indicative only, with overlapping categories – and as such, data presented may differ from other industry sources due to differences in sectoral definition or other methodological differences. CAGR is compound annual growth rate over the five years.

Advertising revenue plays an important role in each of the sectors we cover; search, classified, social media, messaging and entertainment (which covers audio and visual, gaming, news and classified).

[26] The sectors combined are search, classified, social media and messaging, Entertainment – audio ad visual, gaming, news and classified. It excludes e-commerce.

Advertising comprises 68% of the total revenues for these combined sectors and is explored in more detail later in the chapter.

Subscription revenues grew by 19% in 2021, primarily due to two trends. Companies continued to develop products and promote subscription services as a premium alternative to advertising-funded services, such as online newspapers putting much of their content behind paywalls and video-on-demand services offering advertising-free options for a monthly subscription. The second driver was moving users from transaction-funded models to subscription models. Here, the primary example is gaming, where most of the major platforms and incumbents are looking to launch and develop existing games. Apple Arcade, Google Stadia, Microsoft and Sony are doing this; they are further developing their consumer 'all-you-can-eat' monthly subscription offer. Having a sufficiently large catalogue to choose from, ideally including exclusive content, is a key competitive factor and a driver of consolidation in the gaming industry: Microsoft and Sony have made major acquisitions, and many smaller independent games studios have been purchased in the last two years. See the Gaming chapter for more information on subscription services.

Transaction revenues primarily comprise one-off purchases of apps and digital downloads. Overall, transaction revenues grew by 6% in 2021 compared to 2020. This growth rate was slower than in previous years due to the tough comparison with 2020's record growth, and to a lesser extent because platforms were promoting subscription alternatives.

Advertising

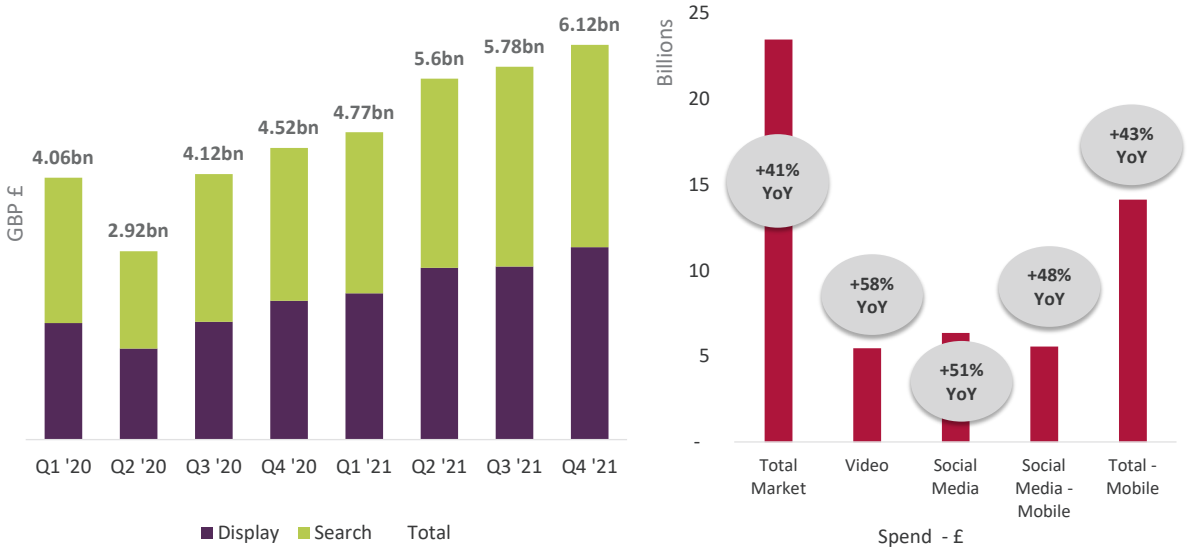
Due to the pandemic, UK online advertising revenue growth in 2020 was the lowest in over a decade at 7%. In 2021, UK online advertising revenue growth was the highest in over a decade at 41%, reaching £23.5bn in 2021 and up by £6.8bn since 2020

Advertising remains the most important revenue stream for many online businesses, and for many smaller publishers the only one. In the UK, all types of online advertising spend increased in 2021, with each segment growing broadly in line with overall online advertising growth (41%).[27] Some of the smaller segments, hit hardest during lockdown, have made a strong recovery. Classifieds, which were down 30% in 2020, were up 8% in 2021, with a strong recruitment market contributing to this growth. Online advertising grew year on year in each quarter in 2021, including a bounce-back of 90% in quarter 2, reflecting the significant impact of Covid on results in quarter 2 2020.

> *"The UK has held its position in 2021 as the largest advertising market in Europe through the pandemic and is now the third largest in the world, behind the USA and China."*
>
> - Stephen Woodford, Chief Executive of Advertising Association, 28 April 2022.

[27] AA/WARC Expenditure Report, 28 April 2022.

Figure 1.15: UK online market returns to strong steady growth, with mobile social media growing fastest



Source: AA/WARC Expenditure Report actuals and forecast for UK. Display excludes audio and Search excludes classifieds.

Both display and search advertising grew strongly in 2021, at 53% and 39% respectively.[28] The growth of online shopping during the Covid-19 lockdowns helped shopping search reach 30% of total search spend in 2021.[29]

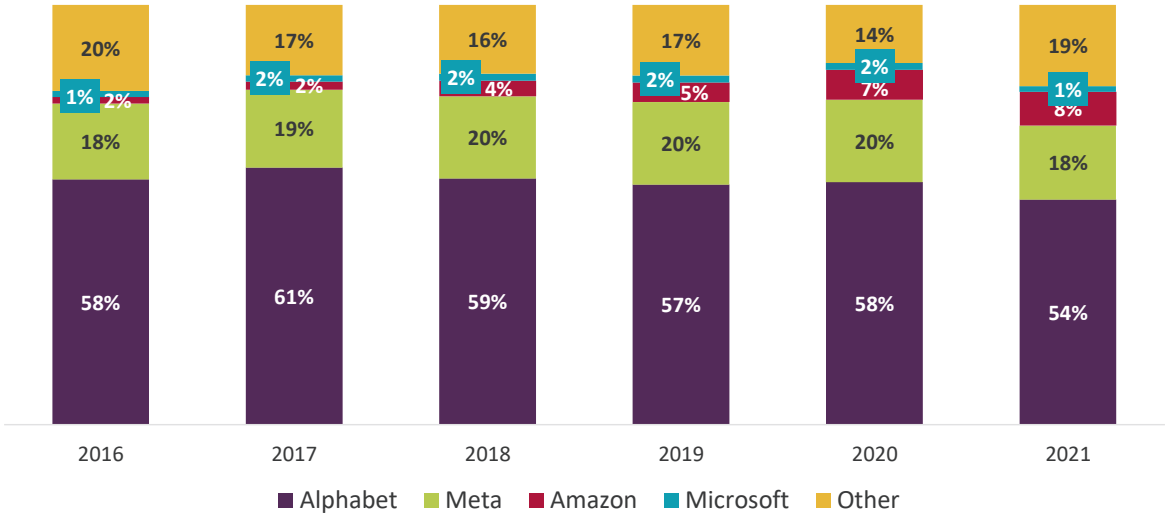
Audio and recruitment classified advertising are showing strong growth

Advertising revenues have also grown strongly beyond traditional search and display segments. The audio and podcast segment increased 51% to reach £157m. [30] Classified and directory services had their first year of growth in 5 years increasing revenues by 8% when compared to 2020. Recruitment classified recovered very strongly, growing 37% in 2021 compared to a 32% decline in 2020. BVoD (broadcast video on demand) increased by 40% in 2021 compared to the previous year and generated revenues of £733m.[31]

Alphabet maintains the largest share of UK online advertising revenues, followed by Meta. Amazon's share is growing, likely due to the increase in shopping search advertising.

[28] AA/WARC Expenditure Report, 28 April 2022.
[29] IAB UK / PwC Digital Adspend Study 2022.
[30] AA/WARC Expenditure Report, 28 April 2022.
[31] AA/WARC Expenditure Report, 28 April 2022.

Figure 1.16: Estimated UK online advertising revenue share, by year



Source: Ofcom estimates based on data from IAB UK/PwC Digital Adspend Study, company financials and Ofcom modelling. Excludes BVoD (broadcast video on demand). Estimates may vary from other sources due to company revenue definitions and Ofcom assumptions.

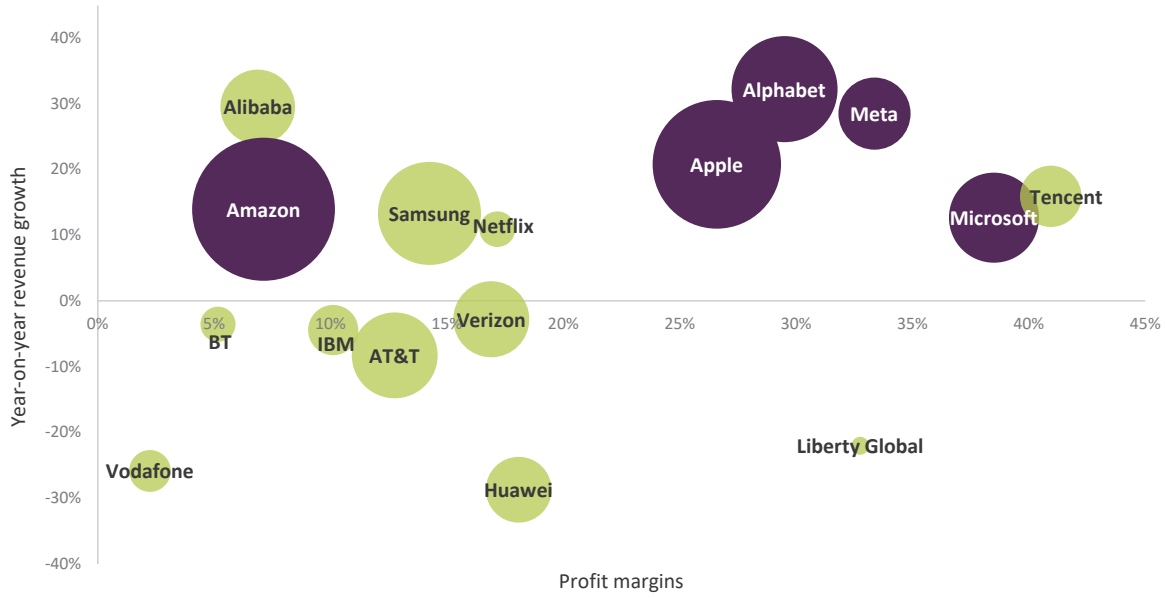
Areas of focus of the five largest online companies

The largest online companies by revenue in the UK are Meta, Apple, Microsoft, Amazon, and Alphabet ('MAMAA companies'[32]). In 2021 they continued to expand the revenue streams and functionality of their core products, as well as expanding into new areas, with record investment in research and development and another year of significant merger and acquisition activity. In 2021, MAMAA companies collectively accounted for about three-quarters of the top 40 online revenue-generating companies' UK online revenues (as in 2020). MAMAA companies spent over £100bn globally in research and development (similar to 2020) and globally acquired 40 companies (compared to 44 in 2020). Each company has a leading position in at least one online sector and most have multiple leading positions in either a particular sector or the supporting ecosystem.

Having a significant leadership position and / or multiple strong positions in various parts of the ecosystem can aid companies in defensive moves against challengers and support expansion activities into new ones.

[32] Meta, Apple, Microsoft, Amazon, and Google's parent company Alphabet, Fortune, Facebook's faceplant on Wall Street could be just the beginning for some tech stocks, 29 October 2021.

Figure 1.17: MAMAA global revenues, growth rates and profitability, vs others



Source: Company financials and stock market data from S&P Market Intelligence platform. Ofcom analysis and conversion to GBP. Relative size of circles represents size of 2021 revenue in GBP, YoY growth rate calculated in GBP.

Online platforms originating in the US and China are the high margin and growth companies of 2021

MAMAA companies are the biggest, fastest-growing and most profitable companies. Chinese companies are the closest challengers, with Tencent's high margins and AliBaba's high growth rates. ByteDance, TikTok's owner, is not shown on the graph above as it is a private company with limited public financial reporting. Reuters reported that in 2021 Bytedance increased its revenues by 70% to reach £42.5bn, following a reported 100% revenue increase in 2020.[33] TikTok is popular in both China and Western markets and is an exception to the general trend of major US and Chinese platforms, operating in different geographic markets and not competing head-to-head.

Following a major rise in market value of each of the MAMAA companies during the Covid-19 pandemic, in the early months of 2022 investor confidence waned. This was most evident for Meta, which had a fall in market capitalisation of 40% in Q1 2022, reflecting concerns about potential stagnation in total global user growth. However, YouTube and TikTok both grew faster in revenue terms, so competition may also be a factor.

Apart from advertising, an area for investor concern about future growth is the streaming video-on-demand services. By April 2022, Netflix's share price was down 62% since the beginning of 2022. Saturation of consumer demand and increasing competition have been identified as the main reasons for this.[34]

[33] Reuters, TikTok owner ByteDance's 2021 sales growth 70%, slows yr/yr -sources, 20 January 2022.
[34] Bloomberg, Netflix shares plunge 30% after massive subscriber loss, 21 April 2022.

Platform expansion continues, with 40 merger and acquisition deals in 2021 (vs 44 in 2020)

There were 40 merger and acquisition (M&A) deals by MAMAA companies in 2021; four less than in 2020. Microsoft had the most activity in this area, with 16 announcements in 2021 compared to 11 deals in 2020. The Activision announcement is excluded, as it happened in January 2022. The purchase of Nuance Communications[35] includes products like Dragon Medical One, a cloud-based speech recognition technology, and importantly, gives Microsoft access to the existing customer base of 10,000 healthcare customers and further strengthens Microsoft's 'cloud for healthcare' platform. It builds on the many new strategic partnerships with health-care players, most recently CVS healthcare in December 2021, with Forbes describing Microsoft as "one of the most powerful forces in health care".[36]

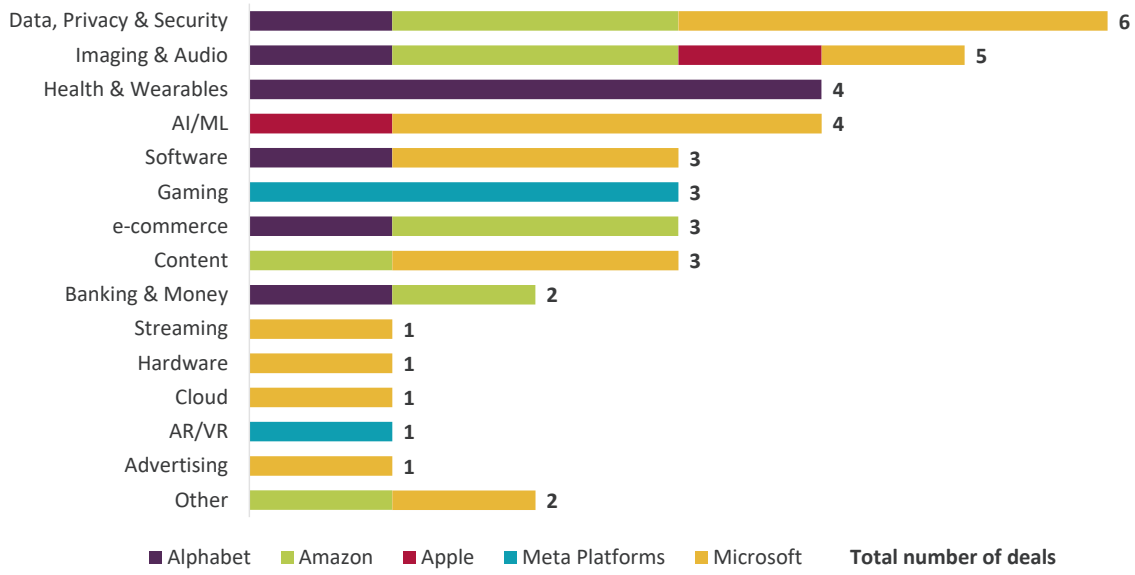
Alphabet expanded in the health and wearables sector in 2021 with the purchase of Signal Path, a clinical management system.[37] Three other purchases – of Dysonics, Pring and CompilerWorks – covered 3D audio, a money transfer app and data management respectively.

Meta's M&A transactions in 2021 were focused on VR gaming, with the purchase of Downpour Interactive,[38] Unit 2 Games[39] and BigBox VR.[40] Meta also purchased the virtual reality fitness app company Within Unlimited.

Amazon completed its second-ever largest deal with the purchase of MGM Studios for more than £6bn in 2021. It said that it hoped to leverage MGM's storied filmmaking history and wide-ranging catalogue of 4,000 films and 17,000 TV shows to help bolster Amazon Studios, its film and TV division.[41]

[35] TechCrunch, Microsoft is acquiring Nuance Commmunications for $19.7B, 12 April 2021.
[36] Forbes, Microsoft has become one of the most powerful forces in healthcare, with no signs of slowing down, 30 December 2021.
[37] Verily, Verily completes acquisition of SignalPath, expanding company's clinical research capabilities and marking company's first major acquisition, 31 August 2021.
[38] Meta Quest, Welcoming downpour interactive to Facebook, 30 April 2021.
[39] Facebook gaming blog, Welcome Unit 2 Games to Facebook Gaming, 4 June 2021.
[40] Meta Quest, Welcoming Bigbox VR to Facebook, 11 June 2021.
[41] About Amazon, MGM joins Prime Video and Amazon Studios, 17 March 2022.

Figure 1.18: Sector grouping of MAMAA M&A deals in 2021

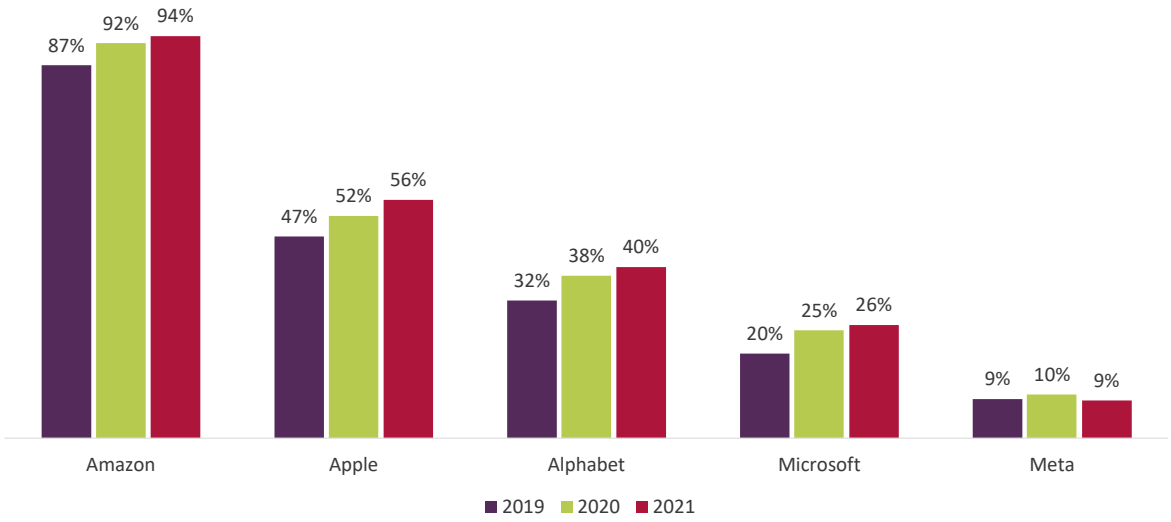


Source: S&P Capital IQ Merger and acquisitions by MAMAA companies in 2021.

The major platforms are steadily expanding their direct billing relationship with online adults

Unsurprisingly, Amazon leads the way in its direct billing relationships with online adults: its e-commerce and paid entertainment services are used by 94% of UK online adults.

Figure 1.19: Proportion of people buying products or services directly from the platform, by year



Source: Ofcom analysis of online adults via Money Dashboard app data of 30k+ people aged 15+.

MAMAA energy consumption

MAMAA companies consume huge amounts of electricity through their data centres. The combined power use by Amazon, Google, Microsoft, Facebook and Apple is more than 45 terawatt-hours a year, comparable to the total usage of New Zealand.[42]

The MAMAA companies have all pledged to meet a corporate net-zero greenhouse gas emissions target by a specific date: Meta, Microsoft, Apple and Alphabet by 2030, and Amazon by 2040.[43] A significant part of the strategy to achieve net-zero emissions is in renewable energy, which MAMAA companies have been investing in over the past ten years.[44] In 2019 Facebook announced its first direct investment, in a 300 MW solar panel plant in Andrews County, Texas.[45]

MAMAA companies' energy costs are very high and therefore there is a business need to become more energy efficient, as well as the environmental consideration. The investments that MAMAA companies have put into the green energy sector could help stimulate the sector.

Amazon has a larger energy consumption than other MAMAA companies, as alongside the energy required to power its data centres, it has to fuel its delivery network. This may be one reason why its target for net zero is ten years later than other tech companies. Amazon Web Services (AWS) provides cloud computing services to many of the larger technology companies. Use of cloud services can be a more efficient use of energy, although the benefits of this may not be long-lasting as cloud services become cheaper and therefore more heavily used.

Search

Google Search had a daily UK online adult reach of 78% in September 2021[46]

Google remains the highest-reaching search engine, reaching nearly all UK online adults in September 2021. However, six other search engines each have more than a million UK adult users.[47] Some of these, such as DuckDuckGo, differentiate themselves from Google Search by having a strong privacy focus. More detail on these privacy-focused search engines can be found in the case studies below.

[42] FT, How tech went big on green energy, 10 February 2021.
[43] Company press releases.
[44] FT, How tech went big on green energy, 10 February 2021.
[45] Facebook, 2020 Sustainability Report, p18.
[46] © Ipsos, Ipsos iris Online Audience Measurement Service, Search engine: Google, 1 September 2021 – 30 September 2021, adults age: 15+, UK.
[47] © Ipsos, Ipsos iris Online Audience Measurement Service, Category: search engines, 1 September 2021 – 30 September 2021, adults age: 15+, UK.

Figure 1.20: UK online adult reach of top seven search engines: September 2021

Rank	Parent company	Media	Headquarters	Total adult reach in September	Online adult reach in September	Time spent in September per visitor (hrs:mins)
1	Alphabet	Google	US	49.5m	99%	7:03
2	Microsoft	Bing	US	16.2m	33%	0:21
3	DuckDuckGo	DuckDuckGo	US	5.7m	11%	0:11
4	Yandex LLC	Yandex	Russia	4.7m	10%	0:03
5	Apollo Global Management	Yahoo!	US	2.7m	5%	0:06
6	System1	Info.co.uk	UK	1.8m	4%	0:01
7	Apollo Global Management	AOL	US	1.5m	3%	0:30

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, Ranking report, Category: search engines, 1 September 2021 – 30 September 2021, adults age: 15+, UK. Note: Custom defined list by Ofcom.

Privacy-focused search engines

Mojeek[48]

A UK-based private search engine launched in 2004, Mojeek has a no-tracking privacy policy. It provides users with search results based on keywords typed into its search engine. The results are ranked according to what its algorithm considers the highest quality and most relevant'.[49] Mojeek is funded by individual capital investment and advertising based on search queries and location.[50]

DuckDuckGo

Launched in the UK in 2018, DuckDuckGo generates revenue from display advertising based on search terms and keywords. Three billion searches a month are undertaken on the platform, which has 166 employees.[51] In comparison, Google's parent company, Alphabet, had 156,000 employees as of December 2021, and Google has over 200 billion searches a day.[52] [53] DuckDuckGo, the third most-visited search engine by UK adults,[54] generated over £73.3m in global revenues in 2020 (latest figures available) compared to Google's search revenue of £109bn in the same year.[55]

UK search revenue grew 38% in 2021, with shopping-related advertising accounting for almost a third of the total

UK search market revenues increased by £3.2bn (38%) in 2021. Revenues have been augmented by the continued emergence of search shopping adverts, which accounted for 30% of search in 2021. These adverts appear in both traditional search engines and as sponsored listings on online marketplaces.[56] AA/WARC describes this trend as "the hallmark of a new era in advertising".

Search shopping is especially important in the UK. With an online retail spend of £1,940 per head, the UK has the world's highest spend per shopper.[57] Alphabet, the largest company in this segment, reported its global search revenue growth was 43% in 2021. The UK is a more mature online market than many other global markets, contributing to slower growth.

[48] Ipsos iris data for Mojeek unavailable due to not meeting reporting threshold.
[49] Mojeek official blog, Search that doesn't follow you around, 8 October 2018.
[50] Mojeek official blog, About Mojeek; Business model, surveillance, and privacy, 8 December 2020.
[51] DuckDuckGo, About DuckDuck Go, accessed 24 March 2021.
[52] Alphabet Alphabet announces fourth quarter and fiscal year 2021 results, accessed 5 May 2022.
[53] Oberlo, 10 Google Search Statistics, 2 January 2022.
[54] © Ipsos, Ipsos iris Online Audience Measurement Service, DuckDuckGo, 1 September 2021 – 30 September 2021, adults age: 15+, UK.
[55] TechRepublic How DuckDuckGo makes money selling search, not privacy, Google source: Ofcom modelling.
[56] IAB UK/PwC Digital Adspend Study 2021, April 2022.
[57] AA/WARC Expenditure Report, 28 April 2022. Ofcom conversion of USD to GBP.

Figure 1.21: Total annual UK search revenues

UK	2016	2017	2018	2019	2020	2021
Annual revenue	£5.1bn	£5.9bn	£6.8bn	£7.8bn	£8.4bn	£11.7bn
Annual growth	23%	16%	14%	15%	8%	38%
Mobile share	38%	45%	51%	57%	56%	56%

Source: Ofcom estimates and analysis based on online advertising data from IAB UK/PwC Digital Adspend Studyand company reports and public filings.

Social media

Since September 2021 Twitter's UK adult reach has been in decline while TikTok's continues to increase

Facebook, including Messenger, remains the highest-reaching social media platform among UK adults, with more than nine in ten UK adults visiting it in September 2021. UK online 15-24-year-olds are avid users of social media, and over half of them are visiting five social media platforms: 90% visited Instagram in September 2021, 90% visited either Facebook or Facebook Messenger, 70% visited Snapchat, 70% visited Twitter and 64% visited TikTok. Snapchat's popularity is youth-orientated; it was visited by 35% of 25-34s and 20% of 35-44s in September 2021. TikTok is less popular with those aged over 24, but still had at least one in four 25-54s visiting it in September 2021: 42% of 25-34s, 33% of 35-44s, and 25% of 45-54s.[58]

Figure 1.22: UK online adult reach of top ten social media sites/apps: September 2021

	Media	Parent company	Total adult reach in September	Online adult reach in September	Average daily adult audience in September 2021
1	**Facebook and Messenger**	Meta	46.7m	94%	34.3m
2	**YouTube**	Alphabet	45.6m	92%	20.9m
3	**Instagram**	Meta	36.3m	73%	17.6m
4	**Twitter**	Twitter	30.8m	62%	11.4m

[58] © Ipsos, Ipsos iris Online Audience Measurement Service, Social Media, 1 September 2021– 30 September 2021, adults age: 15+, UK.

	Media	Parent company	Total adult reach in September	Online adult reach in September	Average daily adult audience in September 2021
5	**LinkedIn**	Microsoft	18.8m	38%	4.6m
6	**Pinterest**	Pinterest	16.6m	33%	2.7m
7	**TikTok**	Bytedance	15.4m	31%	5.4m
8	**Reddit**	Reddit Inc	14.1m	28%	2.9m
9	**Snapchat**	Snap	11.8m	24%	6.9m
10	**Nextdoor**	Nextdoor	9.2m	18%	2.4m

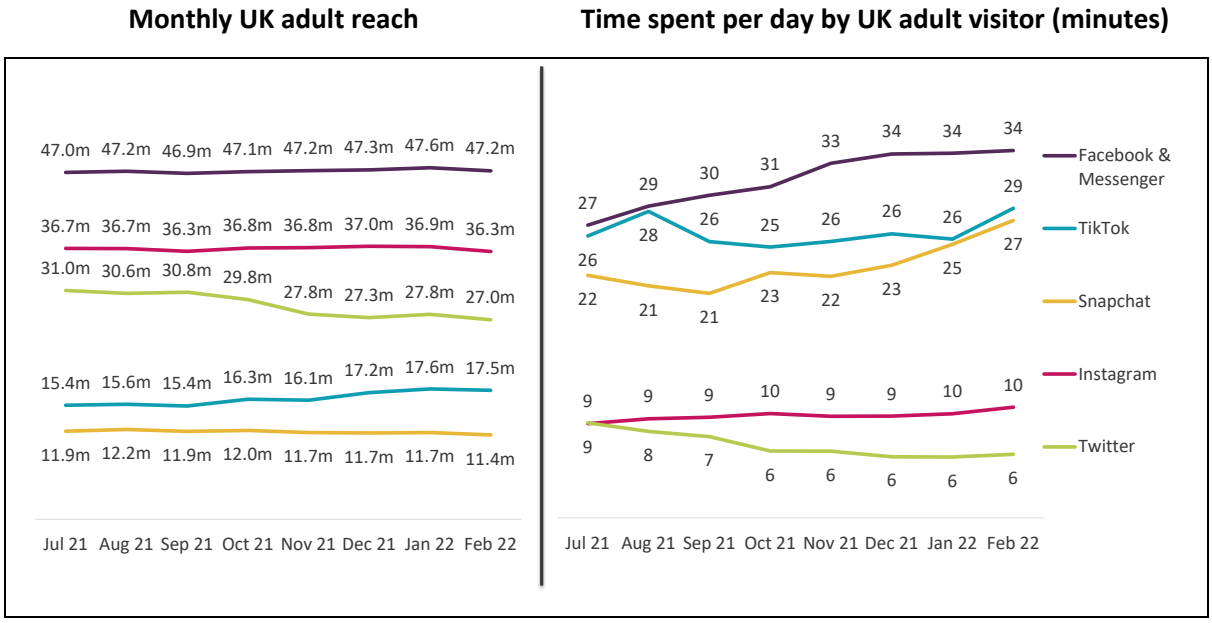
Source: © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September – 30 September 2021, social media, adults age: 15+, UK. Note: TV set and smart display use not included. Custom-defined list by Ofcom.

UK adult TikTok visitors spent 29 minutes per day on the platform in February 2022, almost as much as Facebook visitors spent on Facebook (34 mins) [59]

Meta's Facebook and Instagram monthly UK adult reach remained fairly stable between July 2021 and early 2022. In February 2022 the five million UK 15-24-year-old TikTok visitors spent almost an hour (56 minutes) on TikTok per day, while the five million 15-24 Snapchat visitors spent 49 minutes per day. In comparison, visitors aged 15-24 to Facebook/Messenger and Instagram spent 25 and 21 minutes per day respectively.[60] Meta, in its Q1 2022 earnings call, said that Reels (Meta's version of short-form video) would be core to its business strategy and future growth. The company highlighted that 20% of the time spent on Instagram globally was spent on Reels, and video overall makes up 50% of the time that people spend on Facebook. Meta is investing in developing artificial intelligence (AI) that will choose pieces of content for users, regardless of any social connection to the viewer. Currently Reels is not monetised to the same extent as the Feed;[61] Meta says that it expects Reels to take several years to reach Feed-level monetisation.[62] Online video advertising is one of the fastest-growing segments in the UK, reaching £5.4bn in 2021; a 56% increase on the previous year.[63]

[59] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 February 2022– 28 February 2022, adults age: 15+, UK.
[60] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 February 2022– 28 February 2022, adults age: 15-24, UK.
[61] Feed is the constantly updating list of stories in the middle of the home page of Facebook. Feed includes status updates, photos, videos, links, app activity and likes from people, Pages and groups that that the user follows on Facebook. On Instagram it includes posts from accounts the user follows, suggested posts and ads from businesses.
[62] Meta, Meta Q1 2022 Earnings call transcript, 27 April 2022.
[63] IAB UK/PwC Digital Adspend Study, April 2022.

Figures 1.23: Social media reach and time spent by UK adult visitors, by platform: July 2021–February 2022



Source: © Ipsos, Ipsos iris Online Audience Measurement Service, Monthly: 1 July 2021 – 28 February 2022, adults age: 15+, UK. Note: Due to methodology enhancements there may be a break in trend from January 2022.

UK social media revenues grew 46% in 2021, with YouTube and TikTok growing faster than the market average

Advertising makes up 91% of social media revenues, with subscriptions comprising the rest. Within advertising the fastest-growing segment is video, which includes the 'online video - pre/mid/post roll' segment. These are the adverts that are inserted before, in the middle and at the end of videos and which reached UK revenue totals of £2.2bn in 2021, up by 75% since 2020.

Meta's combined social media properties remain by far the largest of any company, using any measure, including revenue. However, globally-reported US dollar revenue results from Alphabet show that YouTube revenues grew by 43% in 2021, while Meta reported 37% revenue growth for the same period. TikTok's parent company Bytedance reported a 70% increase.

Figure 1.24: Total annual UK social media revenues

UK	2016	2017	2018	2019	2020	2021
Annual revenue	£1.8bn	£2.5bn	£3.2bn	£4.0bn	£4.7bn	£7.0bn
Annual growth	37%	38%	28%	24%	18%	48%

Source: Ofcom estimates based on data from IAB UK/PwC Digital Adspend Study and publicly available company filings.

In April 2022 Elon Musk agreed to purchase Twitter for £35.5bn.[64] In Q1 2022 Twitter reported global revenue of £750m - an increase of 16% since Q1 2021. The majority of this was from advertising revenue of £810m.[65]

News

The BBC is the online news service with the highest reach across all the nations of the UK

On average, three in ten (30%) UK online adults visited the BBC online news service daily in September 2021. This was followed by The Daily Mail (Mail Online) and The Sun, both visited by 8% of UK adults daily. The Guardian was visited by 7% daily, and the Mirror by 6%.[66]

Although the BBC commands the top spot for the news site with the highest online adult reach in all nations of the UK (as seen in Figure 1.25), national titles also have high levels of reach. In September 2021, the Daily Record site was accessed by 42% of online adults in Scotland, Wales Online by 60% of online adults in Wales and Belfast Live by 47% of online adults in Northern Ireland. In Scotland, 24% of online adults access the Scottish Sun, which is just under half of the 53% visiting the UK-wide The Sun site or app, suggesting that the national version of the paper is popular, but does not account for the majority of overall visits to the service. The online news services appearing in the top ten all offer some, if not all, of their content free of charge to users.[67] The Guardian is the only online broadsheet paper to appear in the top ten; the Times, The Daily Telegraph and the Financial Times all have a paywall which may constrain their reach. News brands overall continued their migration to digital with online revenues reaching £620m and comprising 46% of total revenues in 2021 up from 40% in 2020.

The majority of adult BBC News visitors also visit other online news services

In Wales, 85% of online adults who visited Wales Online and 88% who visited The Guardian also visited BBC News.[68] In Scotland, 85% of online adults who visited the Daily Record and The Scotsman also visited BBC News, and 64% of online adults who visited the Scotsman also visited the Daily Record site.[69] This indicates that, typically, online adults visit various online news sources, rather than getting their news from a single source.

The Apple news aggregator service, which brings together news stories from a variety of sources, has its highest reach among adults in England (42%), compared to Scotland (35%), Northern Ireland (35%) and Wales (29%).[70]

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[64] BBC, Elon Musk strikes deal to buy Twitter for $44bn, 26 April 2022.
[65] Twitter, Twitter Q1 2022 earnings release, 28 April 2022.
[66] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021 – 30 September 2021, adults age: 15+, UK.
[67] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021– 30 September 2021, adults age: 15+, UK nations.
[68] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021 – 30 September 2021, adults age: 15+, Wales.
[69] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021 – 30 September 2021, adults age: 15+, Scotland.
[70] © Ipsos, Ipsos iris Online Audience Measurement Service, apple news, 1 September 2021 – 30 September 2021, adults age: 15+, Scotland.

Figure 1.25: UK online adult reach to top ten online news services, by UK nation: September 2021

	UK		England		Scotland		Wales		Northern Ireland	
Rank	Brand	Reach	Brand	Reach	Brand	Reach	Brand	Reach	Brand	Reach
1	BBC	71%	BBC	72%	BBC	70%	BBC	70%	BBC	75%
2	The Sun	46%	The Sun	46%	The Sun	53%	Wales Online	60%	Belfast Live	47%
3	Mirror	44%	Mirror	43%	Mirror	45%	Mirror	50%	Mirror	41%
4	Mail Online	42%	Mail Online	43%	Daily Record	42%	The Sun	44%	Belfast Telegraph	37%
5	Apple	40%	Apple	42%	Mail Online	42%	Mail Online	39%	The Sun	37%
6	The Guardian	37%	The Guardian	37%	The Guardian	38%	The Guardian	39%	Mail Online	37%
7	Daily Express	35%	Yahoo!	36%	Apple	35%	The Independent	36%	Apple	35%
8	Yahoo!	35%	Daily Express	36%	Daily Express	35%	Yahoo!	34%	Daily Express	30%
9	Metro	31%	Metro	31%	Metro	32%	Daily Express	33%	The Guardian	29%
10	The Independent	31%	The Independent	30%	The Scotsman	32%	Metro	30%	Daily Star	26%

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, Ranking report, 1 September 2021 – 30 September 2021, adults age: 15+, UK.

Figure 1.26: Annual UK online news revenue

UK	2016	2017	2018	2019	2020	2021
Annual revenue	£1.0bn	£1.1bn	£1.2bn	£1.3bn	£1.2bn	£1.4bn
Annual growth	5%	14%	7%	6%	-4%	16%

Source: Ofcom estimates based on data from IAB UK/PwC Digital Adspend Study, PwC Global Entertainment and Media Outlook: 2020-2024 and 2021-2025, http://www.pwc.com/outlook, AA/WARC Expenditure Report, and company reports and public filings.

Shopping

Online retail and commerce

Almost nine in ten UK online adults visited Amazon, the most-visited e-commerce platform, in September 2021[71]

On average, 32% (15.9 million) of UK online adults visited Amazon and 19% (9.3 million) visited eBay each day in September 2021.[72] Amazon's Q1 2022 global results reported a 3% drop in global online sales – the first decline since 2015.[73] Apple's global sales rose 9% year on year to £71.3bn, and profits climbed more than 10% to £18bn. Etsy, the vintage and crafts e-commerce online marketplace, grew rapidly in 2020; growth continued after the UK lockdown and peaked at 18.9 million UK adult visitors in December 2021.[74]

Figure 1.27: UK online adult reach to top ten retail and commerce platforms: September 2021

Rank	Retail and commerce	Total adult reach in September	Total adult reach in September
1	**Amazon**	44.6m	89%
2	**eBay**	33.3m	67%
3	**Apple**	23.1m	46%
4	**Argos**	19.3m	39%
5	**Tesco**	16.1m	32%

[71] © Ipsos, Ipsos iris Online Audience Measurement Service, Brand: Amazon, 1 September 2021 – 30 September 2021, adults age: 15+, UK.
[72] © Ipsos, Ipsos iris Online Audience Measurement Service, Brand: Amazon and eBay, 1 September 2021 – 30 September 2021, adults age: 15+, UK.
[73] Amazon Investor Relations, Amazon.com Announces First Quarter Results, 28 April 2022.
[74] © Ipsos, Ipsos iris Online Audience Measurement Service, Brand: Etsy, 1 December 2021 – 31 December 2021, adults age: 15+, UK.

Rank	Retail and commerce	Total adult reach in September	Total adult reach in September
6	**Google Shopping**	14.0m	28%
7	**Etsy**	13.6m	27%
8	**Boots**	13.4m	27%
9	**Sainsbury's**	12.9m	26%
10	**Marks & Spencer**	12.5m	25%

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, Group brand, Category: Retail & commerce, 1 September 2021 – 30 September 2021, all adults age 15+, UK. Average September spend is the average total of online and offline spend across a sample of 30k adult users aged 15+ from Money Dashboard.

Online supermarkets

Seventy-five per cent of UK online adults visited one of the top ten (by reach) online supermarket services in September 2021[75]

Shopping online has decreased since its lockdown peak, but home-delivered groceries continued to be popular in 2021.[76] A quarter of UK online adults visited Sainsbury's online in September 2021, with a similar proportion visiting Asda.

Amazon opened its first Amazon Fresh 'just walk out' till-less grocery store in the UK in 2021, and by early 2022 it had 16 stores.[77] In the 'just walk out' stores the customer scans a QR code generated by the shopping app when they enter the store. A series of sensors, cameras and weight-sensitive shelves record what a customer puts in their basket, and the bill is automatically charged to the shopper's app account when they leave. In November 2021 Sainsbury's became Amazon's first international third-party customer to use Amazon's 'just walk out' technology, with the opening of its Smartshop Pick & Go in Q4 2021.[78] Tesco opened a similar service, GetGo, in Q4 2021.[79] Both the Sainsbury's and the Tesco stores opened in Holborn, London.

[75] © Ipsos, Ipsos iris Online Audience Measurement Service, Profiling report, Brand group, Category: Grocery/Supermarket shopping, 1 September 2021 – 30 September 2021, adults age: 15+, UK.
[76] BBC, Kantar: Shoppers return to supermarkets for festive feasts, 5 January 2022.
[77] Retail Technology Innovation Hub, Amazon hits Southwark, London as it opens 16th UK Amazon Fresh store, 2 March 2022.
[78] Amazon News, Sainsbury's becomes first international third-party customer to use Amazon's Just Walk Out technology, 29 November 2021.
[79] Tesco Plc, Tesco opens new checkout-free store, 'GetGo', 19 October 2021.

Figure 1.28 UK online adult reach and time spent of top ten grocery/supermarket services, ranked by reach: September 2021

Rank	Grocery/supermarket	Total adult reach in September	Online adult reach in September	Average time spent per adult visitor (mins:secs)
1	Sainsbury's	12.9m	26%	15:17
2	Asda	12.0m	24%	19:18
3	Tesco	11.6m	23%	28:01
4	Marks & Spencer	11.3m	23%	09:21
5	Lidl UK	10.0m	20%	13:50
6	Morrisons	8.6m	17%	14:17
7	Aldi	7.9m	16%	06:28
8	Waitrose	4.4m	9%	11:27
9	Co-op Food	4.0m	8%	05:30
10	Ocado	3.9m	8%	29:30

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, Ranking report, Brand group, Category: Grocery/Supermarket shopping, 1 September 2021 – 30 September 2021, adults age: 15+, UK

On-demand grocery delivery services

2021 saw several new entrants to the on-demand grocery delivery market

A number of online-only grocery stores, offering grocery delivery within as little as 10 minutes, have emerged in the past two years. Deliveroo and UberEats, which started delivering the UK in 2013 and 2016 respectively, started offering grocery deliveries in the first half of 2020, when the UK was in lockdown.[80] Getir launched in the UK in January 2021, and Gopuff in November 2021.[81] [82] [83] Consolidation of these services has already started taking place: Getir acquired Weezy in November 2021 and Gopuff acquired Fancy and Dija before its UK launch in January 2021.[84] These companies mainly operate in large UK cities, whereas the longer-established players Deliveroo and UberEats have wider coverage. Some, such as Getir, Gorillas and Gopuff, operate from 'dark stores' which are

[80] The Grocer, Asda partners with Uber Eats for 30-minute grocery delivery, 8 July 2020.
[81] Gopuff, Instant Needs Pioneer Gopuff Launches in the UK; Establishes Immediate Presence Across London and Nine Major Cities, 9 November 2021.
[82] UK Tech News, Getir, 10-minute grocery delivery service enters London, eyes to expand in more cities in UK, 2 February 2021.
[83] Guardian, Aldi partners Deliveroo for 30-minute grocery delivery service, 18 May 2020.
[84] TechCrunch, Turkey's instant grocery giant Getir grabs UK's Weezy in latest delivery consolidation, 23 November 2021.

retail outlets and distribution centres that cater exclusively for online shopping. US-based Gopuff announced a partnership with UK supermarket Morrisons in March 2022 to offer Morrisons products on its app, with Morrisons acting as the wholesaler providing Gopuff's 'dark stores'.[85] Companies such as Deliveroo and UberEats operate using couriers who collect groceries from supermarkets and convenience stores and deliver direct to the consumer.

Figure 1.29 Timeline of UK launches of on-demand grocery delivery services



Source: Ofcom desk research

Getir

The super-fast grocery delivery company, Getir, was founded in Turkey in 2015 and launched in the UK in early 2021. By March 2022 it was operating in 48 cities across the UK, Europe and the US, as well as 81 cities in Turkey. In February 2022, 1.4 million UK adults visited Getir: 703k of them were aged 18-34, half its online UK adult visitor base.[86] In March 2022 Getir secured an additional £581.7m in funding, taking its value to over £8bn.[87]

As of April 2022, Getir delivered in London, Birmingham, Manchester, Brighton, Bristol, Cardiff, Liverpool, Southampton, Sheffield, Portsmouth, Nottingham, Bradford, Leeds, Cambridge and Leicester. London-based customers comprised a very large proportion of Getir's total users, and Leicester has a high number of users for its population (see figure 1.30).

Figure 1.30: UK adult reach of Getir, by customer location: February 2022

UK Location	London	Birmingham	Leicester	Liverpool	Manchester
Adult reach	641k	30.9k	20.8k	17.7k	16.6k

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, Profiling report, Getir, 1 February 2022 – 28 February 2022, adults age: 15+, UK

[85] Retail Insight Network, Morrisons and Gopuff partner to offer rapid delivery across UK, 25 March 2022.
[86] © Ipsos, Ipsos iris Online Audience Measurement Service, Profiling report, Getir, 1 February 2022 - 28 February 2022, adults age: 15+, UK.
[87] Evening Standard, Super-fast grocery delivery startup Getir worth $11 billion in funding deal, 17 March 2022.

Personal finance

PayPal was the online financial service with the highest reach to UK adults in September 2021, visited by 59% of UK online adults[88]

About one in five UK adults visited the Barclays, NatWest and Nationwide online banking services in September 2021.[89] Online-only bank Monzo is visited most by 25-34-year-olds (18%), compared to only 1.5% of those aged 65+.[90] American Express is also most likely to be visited by 25-34s (13%), and least likely to be visited by 18-24s (3%), probably because a smaller proportion of this group have credit cards.[91]

A third (32%) of online adults in Scotland visited the Bank of Scotland in September 2021, while 20% visited Royal Bank of Scotland (RBS).[92] In Northern Ireland, 9% of online adults visited Ulster Bank in September 2021.[93]

Figure 1.31: UK adult reach and time spent to top ten personal finance services, ranked by reach: September 2021

Rank	Online personal finance service	Adult reach in September	Online adult reach in September	Average time spent per visitor in September (mins:secs)
1	PayPal	29.1m	59%	07:31
2	Barclays	10.0m	20%	18:24
3	Nationwide	8.8m	18%	30:32
4	NatWest	8.4m	17%	36:09
5	Halifax	8.2m	16%	18:24
6	Lloyds Bank	7.5m	15%	19:48
7	HSBC	7.2m	14%	31:30
8	Santander	5.8m	12%	16:15
9	Tesco	4.7m	9%	15:28
10	Monzo	4.3m	9%	37:59

[88] © Ipsos, Ipsos iris Online Audience Measurement Service, PayPal, 1 September 2022 - 30 September 2022, adults age: 15+, UK.
[89] © Ipsos, Ipsos iris Online Audience Measurement Service, Category: banking, 1 September 2021 – 30 September 2021, adults age: 15+, UK.
[90] © Ipsos, Ipsos iris Online Audience Measurement Service, Monzo, 1 September 2021 - 30 September 2021, adults age: 15+, UK.
[91] © Ipsos, Ipsos iris Online Audience Measurement Service, AMEX, 1 September 2021 - 30 September 2021, adults age: 15+, UK.
[92] © Ipsos, Ipsos iris Online Audience Measurement Service, Category: banking, 1 September 2021 - 30 September 2021, adults age: 15+, Scotland.
[93] © Ipsos, Ipsos iris Online Audience Measurement Service, Ulster Bank, 1 September 2021 - 30 September 2021, adults age: 15+, Northern Ireland.

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, Category: banking, 1 September 2021 – 30 September 2021, adults age: 15+, UK

Buy now, pay later

Six per cent of UK adults visited BNPL service Klarna in September 2021[94]

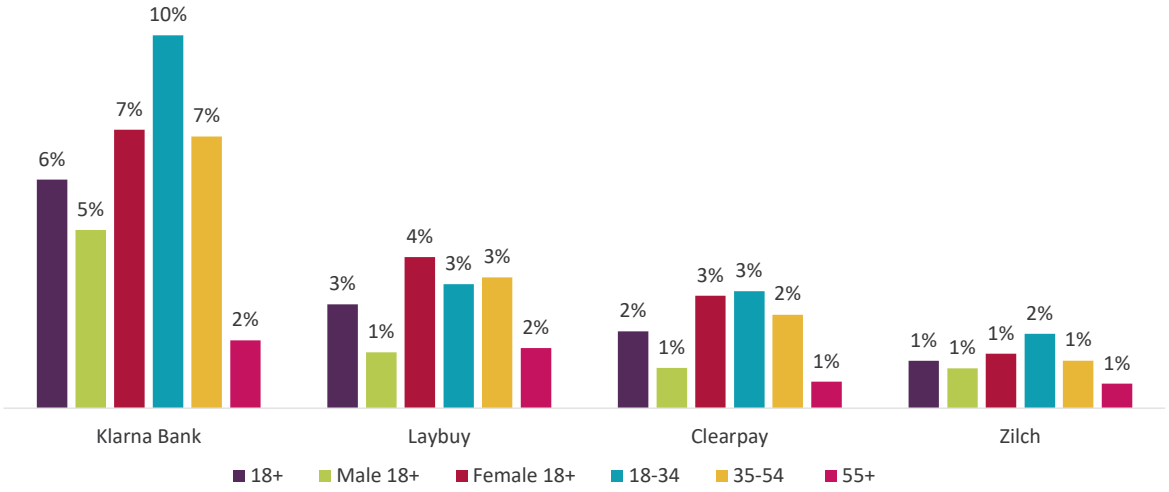
Buy-now-pay-later (BNPL) services are short-term money-lending agreements similar to store credit schemes; they enable customers to purchase goods on credit and pay for them after a set interest-free period, or in instalments.[95] Klarna and Laybuy are examples of BNPL services. Revenue for BNPL service providers usually comes from charging retailers a percentage of the transaction fee. Data from Money Dashboard shows that the average payment via the biggest BNPL in the UK, Klarna, was £39.61 in 2021, meaning that if the customer chose to pay in three instalments the total transaction would be about £140.[96] BNPL sites tend to be more popular with younger age groups, although not exclusively; BNPL's highest-growth sector is the 50-69 age group, as more people use the service as an alternative to traditional forms of credit.[97]

BNPL companies have started to expand into traditional credit facilities, while digital-first banks are expanding into BNPL options. In January 2022 Klarna launched a credit card that allows users to delay payments for up to 30 days.[98] Klarna was Europe's most valuable start-up in 2021, valued at £35.5bn after its recent funding round, and it has 16 million customers and 20,000 merchants in the UK.[99] Digital-only banks Monzo (valued at £3.3bn)[100] and Revolut (valued at £24bn)[101] have launched their own versions of BNPL services.[102] In March 2022 NatWest became the first high-street bank to announce that it was launching a BNPL service that will allow customers to split purchases into several repayments.[103]

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[94] © Ipsos, Ipsos iris Online Audience Measurement Service, Klarna, 1 September 2021 - 30 September 2021, adults age: 15+, UK.
[95] Money Helper, What are Buy Now Pay Later purchases?, accessed 16 May 2022.
[96] Money Dashboard, Klarna, averaged spend per transaction 2021.
[97] BBC, More than 17 million have used buy now, pay later services, 29 November 2021.
[98] Klarna, Klarna brings transparent, sustainable credit to instore payments everywhere with launch of a physical card, 26 January 2022.
[99] This is Money, Boss of buy-now, pay-later giant on his troubled childhood and expansion masterplan: 'We want Klarna to be old style bank manager – for digital age', 22 April 2022.
[100] Reuters, Monzo valuation jumps to $4.5 billion after fresh funding round, 8 December 2021.
[101] TechCrunch, Revolut confirms a fresh $800M in funding at a $33bn valuation to supercharge its financial services super app, 15 July 2021.
[102] City AM Hot on the heels of Revolut, Monzo targets buy now pay later, 10 September 2021.
[103] NatWest, NatWest Buy Now Pay Later, accessed 22 March 2022.

Figure 1.32 UK online adult reach of selected BNPL services, by gender and age: September 2021



Source: © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021 – 30 September 2021, adults age: 18+, UK.

Zilch case study

Zilch is a UK-based BNPL company, launched in 2018. It allows consumers to delay their payment for goods online wherever Mastercard is accepted.[104] This differentiates Zilch from other BNPL providers such as Klarna, which have deals with retailers. Zilch does not charge late fees for missed payments but will prevent these customers from using the service until payment is made. Zilch acquired the US-based commercial fintech lender NepFip in August 2021 as part of establishing itself in the US market.[105] In November 2021 Zilch closed a £81m Series C funding round led by Ventura Capital and Gauss Ventures, making it the fastest privately-owned company in Europe to reach a valuation of £1.5bn.[106]

Zilch has a partnership with the supermarket Iceland, whereby customers have the option to split payments, interest free, over six weeks. It has also promoted home deliveries of food and drink, such as takeaway pizzas and coffee, using the BNPL service.[107] This suggests that BNPL is being used for a variety of transactions, not just fashion or high-value foods. As a UK-based company, Zilch is one of the few BNPL companies regulated by the Financial Conduct Authority (FCA).

[104] Evening Standard, Zilch: London buy now, pay later startup scores $2bn valuation and plans US rollout, 10 November 2021.
[105] Zilch, Zilch gears up for U.S. launch and bolsters international presence with acquisition of NepFin , 13 August 2021.
[106] Business Leader, UK fintech Zilch becomes fastest European 'double unicorn' following $110m Series C funding round 16 November 2021.
[107] The Guardian, Buy now, pay later grocery schemes are a 'debt trap' for struggling families, 29 January 2022.

Future online landscape

Cryptocurrency

Cryptocurrency is digital or virtual currency that is secured by cryptography

Cryptocurrencies became increasingly relevant in 2021; Google Trends data shows that 'cryptocurrency' as a search term in the UK peaked in May 2021[108] and they have become less obscure as they connect more closely with familiar parts of society such as football through advertising and sponsorship.

Cryptocurrencies are decentralised networks based on blockchain technology – peer-to-peer electronic transaction systems – that keep track of all transactions; the first blockchain-based cryptocurrency was Bitcoin. Cryptocurrencies or crypto tokens are denoted by coins or tokens and are usually not issued by a central authority. Cryptocurrencies have their own blockchain, whereas crypto tokens are built on an existing blockchain.[109] Cryptocurrencies can be mined or purchased on cryptocurrency exchanges. Cryptocurrency can provide cheaper and faster money transfers as they do not require the use of third-party intermediaries and can be difficult to counterfeit, but there are downsides; these include price volatility, high energy consumption for mining activities (see below) and criminal activity.

Stablecoins are a type of cryptocurrency backed by 100% real-world reserves and pegged to traditional currencies, normally the US dollar, so that they do not fluctuate in price in the same way as other cryptocurrencies. In April 2022 the UK Government set out its plan for stablecoins to be recognised as a valid form of payment and for Britain to be a "global hub for cryptoasset technology and investment".[110] The Government's plans include introducing a 'financial market infrastructure sandbox' and "establishing a Cryptoasset Engagement Group to work more closely with the industry". There are also plans for the Government to work with the Royal Mint on a non-fungible token (NFT), which would be available for sale by summer 2022.

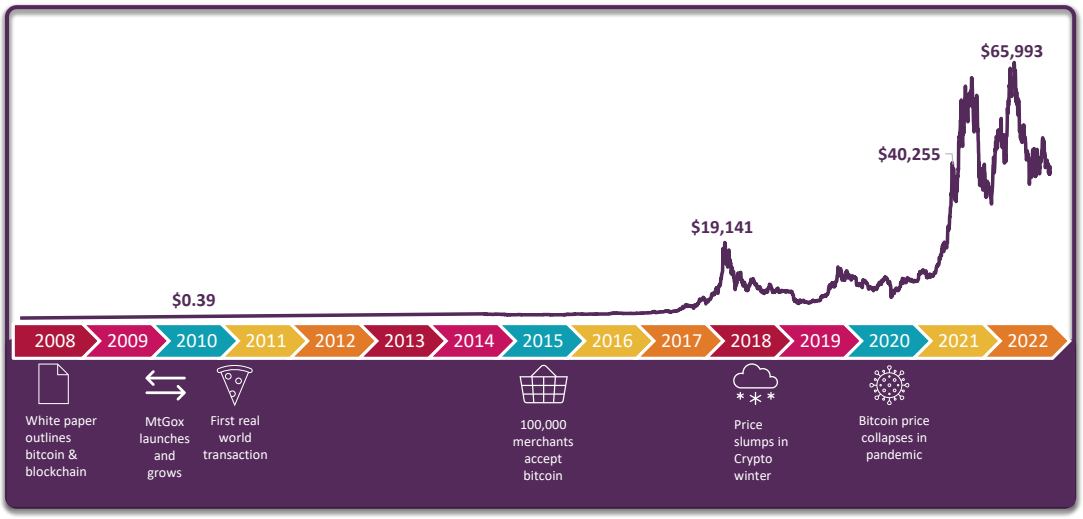
Cryptocurrencies have attracted interest as trading instruments;[111] figure 1.33 below shows the monetary growth of Bitcoin from its inception in the late 2000s to its price collapses during the Covid-19 pandemic.[112]

At the end of January 2022 Meta confirmed that it sold the assets from its cryptocurrency venture, Diem, to Silvergate, a crypto-focused bank. The plan for a cryptocurrency was launched by Facebook as 'Libra' in 2019, and was rebranded as Diem in December 2020, in order to demonstrate organisational independence ahead of regulatory approvals.[113] In a statement released by Diem on the sale of assets, it indicated that federal regulators had prevented the project from going ahead.[114]

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[108] Google Trends, Explore: Topic - Cryptocurrency, accessed 14 April 2022.
[109] Cryptopedia, Digital Assets: Cryptocurrencies vs. Tokens, 17 May 2021.
[110] Gov.UK, Government sets out plan to make UK a global cryptoasset technology hub, 4 April 2022.
[111] Investopedia, Cryptocurrency, 11 January 2022.
[112] The Verge, Libra cryptocurrency project changes name to Diem to distance itself from Facebook, 1 December 2020.
[113] Diem, https://www.diem.com/en-us/, accessed 12 April 2022.
[114] Diem, Statement by Diem CEO Stuart Levey on the sale of the Diem group's assets to Silvergate, 31 January 2022.

Figure 1.33 Bitcoin timeline and closing prices in USD



Source: Ofcom desk research, Bitcoin prices from 2014 from Yahoo! Finance[115]

Seven per cent of UK online male 18-34-year-olds visited cryptocurrency trading platform Coinbase in September 2021[116]

Coinbase launched in 2012; it is the largest cryptocurrency exchange platform in the US by trading volume.[117] In September 2021 just under 3% of UK online adults visited the platform: half a million (7%) UK online men aged 18-34, compared to 1.4% of UK online women in the same age group.[118]

Figure 1.34 Top cryptocurrency trading platforms by UK online adult reach: September 2021

		UK adults 15+		Male 15-34		Female 15-34	
Rank	Media	Audience	Online adult reach	Audience	Online adult reach	Audience	Online adult reach
1	Coinbase	1,276k	2.56%	495k	7.08%	97k	1.43%
2	Binance	496k	1.00%	233k	3.33%	38k	0.56%
3	Crypto	301k	0.60%	66k	0.94%	31k	0.46%
4	Kraken	105k	0.21%	31k	0.44%	Not available*	Not available*
5	The Block	100k	0.20%	18k	0.26%	2k	0.04%

[115] Yahoo!, Bitcoin USD (BTC-USD), 17 September 2014 to May 5 2022.
[116] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021 - 30 September 2021, adults age: 15+, UK.
[117] Bloomberg News, Coinbase expands institutional services with Tagomi purchase, 27 May 2020.
[118] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021– 30 September 2021, adults age: 15+, UK.

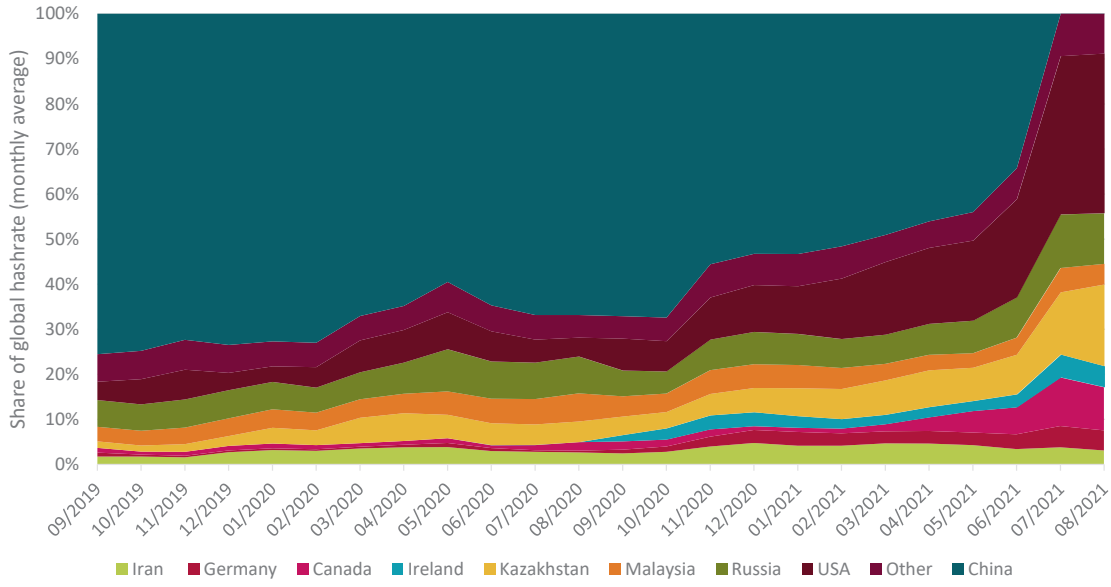
*Source: © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021 - 30 September 2021, adults age 15+, UK. Note: *Data for Kraken female 15-34 unavailable due to not meeting reporting threshold.*

Mining Bitcoin uses huge amounts of electricity

The process to create Bitcoin, known as mining, requires high electricity consumption; globally, the electricity used to mine bitcoins exceeds the energy consumption of Sweden.[119] New bitcoins are created or 'mined' in the process of adding a set or 'block' of data to a transaction record known as a blockchain. To add a new block to the blockchain, Bitcoin miners must solve a complex equation generated by the blockchain, and once they do this the set of rules written into Bitcoin's chain awards the miner a quantity of bitcoins. People use mining rigs, which are computers, to solve the equations more quickly, and therefore the more computing power a miner has, the more easily and quickly they can mine bitcoins. Bitcoin was designed to become more difficult to mine as more people start to do it, so that the finite supply of Bitcoin is not mined too quickly, with the result that the energy required to mine one bitcoin is steadily increasing.[120]

For the past few years, most Bitcoin mining has been happening in China, although this changed when the Chinese Government banned the mining of bitcoin in 2021. Since then, the US has become the biggest producer, followed by Kazakhstan.[121] As Bitcoin requires large amounts of electricity to mine, this is more likely to be done in countries where the cost of electricity is relatively low, which goes some way to explain why Bitcoin is not mined in any great quantity in the UK. In August 2021, the average UK monthly share of global hashrate was 0.25%. A hashrate is how many guesses or attempts to solve the 'equation' a mining rig can manage per second (the UK population as a share of global population is about 0.85%).[122]

Figure 1.35 Evolution of countries' share of Bitcoin mining



[119] Cambridge Bitcoin Electricity Consumption Index.
[120] PC Mag, How does Bitcoin Mining work?, 9 December 2021.
[121] CCAF, Bitcoin mining map.
[122] CCAF, Bitcoin mining map, ONS Population statistics.

*Source: Cambridge Bitcoin Electricity Consumption Index, Cambridge Centre for Alternative Finance * To our knowledge, there is little evidence of large mining operations in Germany or Ireland that would justify these figures. Their share is likely significantly inflated due to redirected IP addresses via the use of VPN or proxy services. UK figures are too small to feature in the chart.*

Meta is reportedly exploring creating virtual coins as part of its metaverse development

Meta is reportedly creating a suite of products to reduce its reliance on advertising, as it looks to the future of its metaverse. Meta's financial arm Meta Financial Technologies is leading on the creation of the products. These products include 'social tokens' or 'reputation tokens' which users could use as rewards. Another product which would be used by influencers on Instagram is 'creator coins'.[123]

[123] Financial Times, Facebook owner Meta targets finance with 'Zuck Bucks' and creator coins, 6 April 2022.

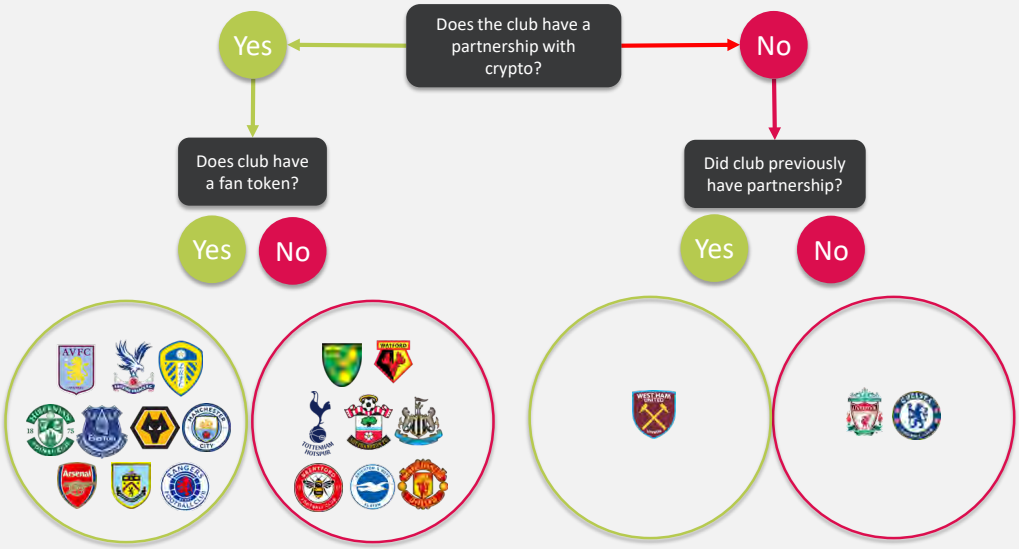
Football cryptocurrency case study

As of December 2021, 17 of the 20 football clubs in the English Premier League had signed deals with cryptocurrency exchange platforms. Several high-profile players and former players have personally endorsed cryptocurrencies and advertised them on their social media accounts. Several clubs have launched 'fan tokens', some in association with the app Socios. Fan tokens can be viewed as a digital share of the football club and allow token buyers to vote on decisions such as the pre-match music.[124]

Bitcoin and other cryptocurrencies have also been used for monetary transactions in 2021, including for players and sponsorship. In January 2021 Spanish club DUX Internacional de Madrid became the first club to pay for a player, David Barral, using Bitcoin. The club is sponsored by a crypto selling platform, Criptan.[125] Watford FC announced in July 2021 that its sponsorship deal with the online betting company Stake was paid for using cryptocurrency, and at the time of transfer did not disclose details of which cryptocurrency was used or the equivalent value in pounds.[126]

There has been a degree of controversy over the increased collaborations between football clubs and players with crypto companies, and the promotions associated with these connections. In December 2021 the Advertising Standards Authority said that the promotion of Arsenal football club's 'fan tokens' which ran online in August 2021 were irresponsible and breached the CAP (the UK Code of Non-broadcast Advertising and Direct & Promotional Marketing).[127]

Figure 1. Football clubs with a crypto partnership



Source: Ofcom desk research, press releases. Fan tokens refer to official football club-branded 'fan tokens' promoted by the club. Correct as of February 2022.

The metaverse

The metaverse is anticipated to become the next generation of the internet

Metaverses, in their broadest sense, are persistent 3D virtual spaces in which users can interact with computer-generated environments and other users. They can be viewed through conventional interfaces such as mobile phones, TVs and monitors, but also through immersive technologies such as augmented and virtual reality (AR and VR). AR technology lets users superimpose digital content onto a real-world environment. This digital content might include any combination of sound, video, text or graphics. VR technology uses headsets to immerse users within entirely computer-generated environments. Scenes and objects can be viewed, as well as interacted with, through peripherals such as controllers, and by using spatial and motion-tracking technologies. Metaverses do not require the spaces to be exclusively accessed via VR or AR. It is anticipated that at some point there will be a shift away from the current 2D use of the internet (i.e. websites and browsers) to a 3D metaverse internet.

To realise the full ambition of what a metaverse might have to offer, four key sectors are seeking to build and develop their own types of metaverse experiences:

(1) **Gaming-led metaverses:** Social games that democratise game creation but are often self-contained and centralised experiences controlled and operated by one platform. Examples include *Fortnite*, *Roblox* and *Minecraft*. (See Gaming chapter.)

(2) **Social-led metaverses:** Where companies like Meta and Snap look to leverage their existing expertise in social platforms to build social 3D virtual worlds. Examples include Horizon Worlds and Venues by Meta.

(3) **Decentralised metaverses**: Built from the ground up, the control of the platform lies with the community rather than with a central authority. This enables users to control the way the metaverse is built and operates. Examples include Decentraland, a 3D world platform, and The Sandbox, an Ethereum-based virtual world where users can buy and sell digital assets such as NFTs (non-fungible tokens).

(4) **Enterprise metaverses:** covering education and work domains, these metaverse spaces are focused on virtual collaboration, remote support, design, modelling and visualisation, as well as training tools.[1] Examples include Microsoft Mesh and Horizon Workrooms by Meta. (See Communications Services chapter)

Many companies have been working on developing a metaverse infrastructure, including Epic Games with its *Fortnite* game, *Roblox*, *Rec Room* and *Snap*. However, in October 2021 Mark Zuckerberg increased awareness of the metaverse in society by announcing that the metaverse

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[124] The New Statesman, Football cryptocurrencies herald a dystopian future where fandom isn't free, accessed 24 March 2022.
[125] Daily Mail, Third division Spanish side make transfer history by becoming first professional team ever to buy a player with BITCOIN as ex-Real Madrid B striker David Barral joins Inter Madrid, 19 January 2021.
[126] BBC, Watford FC: New shirt sponsor deal paid in cryptocurrency, 22 July 2021.
[127] BBC, Arsenal fan token posts broke advertising rules, says watchdog, 22 December 2021.

would be a strategic focus for Facebook over the next ten years, and that Facebook was to be rebranded as Meta, thereby igniting a conversation about how the metaverse might affect people's everyday lives.[128] Before this announcement, Meta had already been developing the metaverse for a number of years; in 2014 it bought the VR headset developer Oculus for £1.5bn,[129] in 2021 it spent £7.3bn on Meta Reality Labs, its Metaverse division,[130] and in 2022 it was reported that it had already spent £2.7bn in the first quarter of the year. See Gaming chapter for information on VR headsets.

Gaming was an early adopter of metaverse technology, using advancing technologies to enable expansion of the gaming industry and to intensify the user experience. Live-service games such as *Second Life*, *Fortnite*, *Roblox* and *Minecraft* have been regarded as early or proto-metaverses in that they have leveraged, but not fully realised, many of the potential technologies and uses. Previous limitations due to cost and the relative immaturity of the technology are gradually being addressed through advances in areas such as cloud delivery, sensors, processing power and efficiency. In conjunction with the increasing number of possible uses beyond gaming, such as social, communication, entertainment, work, and education, this could enable further growth of the industry by creating broader and more compelling user experiences. Meta expects the immersive digital world to impact what the future online landscape looks like for the UK and globally, affecting user interactions and industry trends. Meta forecasts that the metaverse will reach a billion people by the next decade.[131]

Figure 1.36: Examples of activities in the metaverse



[128] Meta, Mark Zuckerberg, Founder's letter 2021, 28 October 2021.
[129] Meta, Facebook to acquire Oculus, 25 March 2014.
[130] Meta, Meta investor relations, 2 February 2022.
[131] Meta, Mark Zuckerberg, Founder's letter 2021, 28 October 2021.

Avatars will provide users with a 3D graphical representation of themselves in the metaverse. Using Mesh, Microsoft plans to enable users to customise their own avatars, which can then join a team meeting in 2D or 3D instead of using a static image or video. This might provide an engaging alternative if users do not want to turn on their cameras. Virtual workspaces could allow users to skip the commute but still "mix and mingle, collaborate on projects and experience those serendipitous encounters".[132] Virtual fitting rooms are another use case for avatars: users' avatars match their body measurements and thereby help them find the best-fitting clothes. This could impact the fashion industry, enhancing the online shopping experience, with virtual fitting rooms for fashion retailers becoming the norm.[133]

We can expect to see increased competition and new market entrants in developing metaverses

In December 2021 Meta launched Horizon Worlds in North America. This is a free virtual reality space, available to those aged 18 and over, in which users can explore, play, and create with others in VR. Users can design and build the VR community.[134] In the virtual world people will be able to buy virtual items and effects within the world, such as accessories in a fashion world, or to pay for access to a new part of a world.[135] It has been reported that since Horizon Worlds was rolled out to all Quest users in the US and Canada, its monthly user base has grown by a factor of ten, to 300,000 people.[136] In 2022 Meta plans to release a web version of Horizon Worlds, which will help attract users to the metaverse as they will not need to acquire a headset.[137]

Meta is not the only technology company working on a metaverse strategy; others, including Alphabet, Apple and Microsoft, are also innovating in this space. Apple is rumoured to be launching an Apple AR/VR headset in 2022,[138] while Alphabet expects to release its AR headsets in 2024,[139] and Sony plans to release its PlayStation VR2.[140] See the Gaming chapter for more market developments in the virtual reality headset space.

In the communications services sector, Microsoft has announced plans to introduce a metaverse feature in Microsoft Teams. Microsoft Mesh will allow people to join shared holographic experiences while using Teams' productivity workplace tools.[141] VRChat permits users to interact with other users and can be used on various devices including Meta's Quest & Steam VR headsets, and can also be used in desktop mode. See the Communications Services chapter for further discussion.

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[132] Microsoft – Innovation Stories, Mesh for Microsoft Teams aims to make collaboration in the 'metaverse' personal and fun, 2 November 2021.
[133] The PHA Group, The technology powering virtual fitting rooms , 4 February 2022.
[134] Meta, Opening Horizon Worlds to Everyone 18+ in the US and Canada, 9 December 2021.
[135] Meta, Testing New Tools for Horizon Worlds Creators To Earn Money, 11 April 2022.
[136] The Verge, Meta's social VR platform Horizon hits 300,000 users, 17 February 2022.
[137] Meta, Meta Q1 2022 Earnings call transcript, 27 April 2022.
[138] Tech Advisor, Apple AR/VR headset: Everything you need to know, 8 March 2022.
[139] Forbes, The Metaverse set off a battle between tech giants Google, Apple, Microsoft and Meta to build virtual and augmented reality headsets, 21 January 2021.
[140] Sony at CES 2022.
[141] Microsoft, Mesh for Microsoft Teams aims to make collaboration in the 'metaverse' personal and fun, 2 November 2021.

As metaverses develop, safety measures will need to be developed alongside them

Meta has created personal Safe Zones which can be accessed through the wrist menu of its VR headsets. When users enter the personal safe zone they can mute, block or report people and content around them. Meta states that when the users mute, block or report someone, a trained safety specialist, who will not appear as an avatar, may remotely observe and record the situation to ensure their safety. The safety specialist can submit additional evidence for Meta to review, and can temporarily ban someone from Horizon while Meta reviews reports.[142]

In 2022 Meta introduced Personal Boundary for Horizon Worlds, a distance of approximately 4 feet between the user's avatar and others', that will remain on by default for non-friends. Users will be able to adjust their personal boundary in the settings menu to apply the 4-foot distance to everyone or to remove it for everyone, but there will still be a small personal boundary to prevent unwanted interactions.[143] VRChat and Rec Room also offer personal space boundaries. See the Gaming chapter for more on safety measures.

A report in February 2022 found that a researcher, when posing as a 13-year-old girl in VR Chat, (the minimum age requirement for VRChat), was able to witness "grooming, sexual material, racist insults and a rape threat" on the platform.[144] Just as safety measures need to be considered for 2D internet, as the virtual reality internet space develops, users' safety will need to be addressed.

[142] Meta, Facebook Horizon welcomes its first virtual explorers, 27 August 2020.
[143] Meta, Introducing a personal boundary for Horizon Worlds and Venues, 4 February 2022.
[144] BBC News, Metaverse app allows kids into virtual strip clubs, 23 February 2022.

2. The online experience

Introduction

Key metrics

Figure 2.1: Proportion of UK internet users aged 13+ who agree with the statements on the benefits of being online

Statement	Proportion who agree
Accessing goods and services online is more convenient for me	83%
I feel I have a good balance between my online and offline life	74%
It gives me space to pursue my hobbies and interests in a way I couldn't do offline	62%
I can share my opinions and have a voice online more easily or effectively than I can offline	45%
Being online has an overall positive effect on my mental health	43%
I feel more free to be myself online	36%

Source: Ofcom, Online Experiences Tracker 2021. Q3. To what extent, if at all, do you agree or disagree with the following statements about being online? Base: UK internet users aged 13+ (6,619)

Figure 2.2: UK internet users' experience of any potential harms online in the last four weeks, by demographic

Gender		Age		Ethnicity	
Male	64% ↑	**13-17**	65%	**White**	61%
Female	60% ↓	**All adults**	62%	**Minority ethnic group**	67% ↑
		18-34	65% ↑	**Mixed ethnicity**	74% ↑
		35-54	64%	**Black**	70% ↑
		55+	57% ↓	**Asian**	65%

Source: Ofcom, Online Experiences Tracker 2021. Q8. Which, if any, have you seen or experienced online in the last four weeks? Base: UK internet users, aged 13+ UK internet users, aged 13+ (6,619). Arrows indicate a figure that is significantly higher or lower than the average for all internet users, tested at 95% confidence level. See Methodology for groups included in the ethnicity categories.

The integration of online and offline life

For many internet users, particularly the young, online and offline life are increasingly integrated

As online technologies and services become more embedded in people's day-to-day activities and habits, it is increasingly hard, and increasingly less meaningful, to draw a distinction between online and offline life. Through our longitudinal Children's Media Lives research, we have seen that the online and offline experiences of children in this study have become increasingly 'blurred' or

'integrated'.[145] An average teenager is likely to see no real difference between talking to friends over WhatsApp and talking to them at school. The internet touches nearly every aspect of people's lives: working, socialising, entertainment, shopping, finding out information, accessing services and engaging as a consumer and a citizen. As such, although this chapter is about people's attitudes to and experiences of being online, online experiences are becoming just experiences, integrated into their lives without any distinction between connected experiences and disconnected ones. As innovation continues in technology, and particularly if immersive metaverse-type services are more widely adopted by society, the border between online activity and 'in real life' (IRL) may break down further.

This chapter reports on data from multiple sources, but primarily from Ofcom's Online Experiences Tracker, a new tracking study examining the positive and negative online experiences of UK users. Fieldwork for the Online Experiences Tracker was conducted in November-December 2021 among a UK-representative sample of 6,640 online users aged 13 to 85.[146] Unless otherwise specified, the UK online users referred to in this chapter fall within this age group. Ofcom's Adults' Media Literacy Tracker and Children's and Parents' Media Literacy Tracker are also referred to in this chapter.

User attitudes to the risks and rewards of using the internet

The balance of positive and negative

Overall, UK users[147] feel that the benefits of being online outweigh the risks…

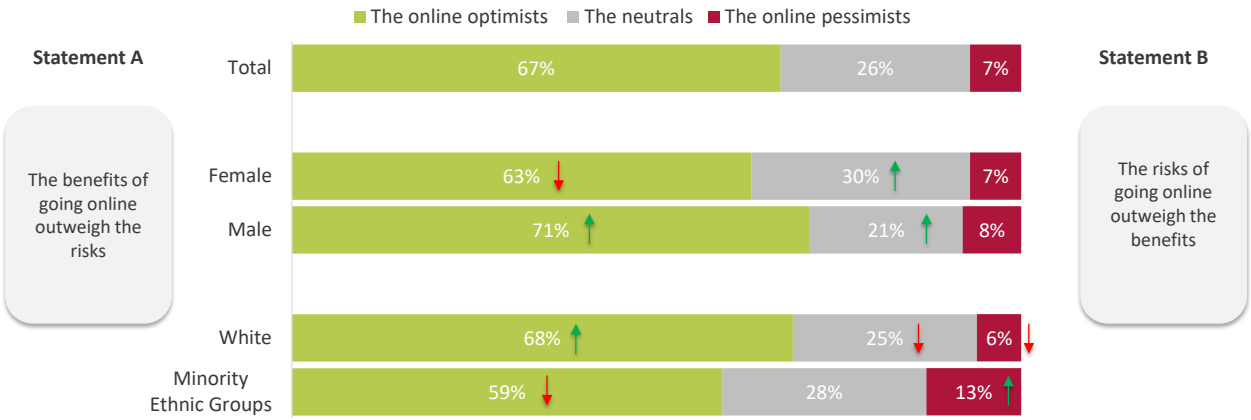
User attitudes towards the internet are complex; internet users are able to distinguish between the practical and social advantages of being online while acknowledging its potential risks to both individuals and society as a whole. Over eight in ten agree that "accessing goods and services online is more convenient for me"[148] and three-quarters of adults agree that using social media, video and messaging apps "helps me to keep in touch with my friends and family".[149] Overall, the majority of internet users (67%) feel the benefits of being online outweigh the risks, compared to just 7% who believe the opposite.[150] And more than four in ten (43%) also agree that being online has an overall positive impact on their mental health, over three times the number that disagree with this statement (14%).

The 'neutral' response from a quarter of UK users indicates that a sizeable proportion are undecided or unsure about issues of online safety and risk. Slightly less than a quarter (23%) gave a neutral

[145] Ofcom, Children's Media Lives, 2022.
[146] Thirteen is the minimum age requirement on many apps and sites which have user-generated content, as well as some online services. This includes Facebook, Instagram, TikTok, YouTube, Twitter, Snapchat, Reddit, Spotify, Quora, Google+ and Ask.fm. The minimum age for use of WhatsApp is 16.
[147] 'Users' is used throughout to refer to users of the internet aged 13+.
[148] Ofcom, Online Experiences Tracker 2021. Unless otherwise stated, all data in this section is taken from the Online Experiences Tracker.
[149] Ofcom, Adults' Media Literacy 2021: Online Behaviours and Attitudes survey.
[150] Findings from Ofcom's Adults' Media Literacy Tracker 2021 found a slightly lower figure: 58% of internet users aged 16+ agreed that the benefits of being online outweigh the risks, compared to 14% who disagreed. The disparity may be influenced by differing methodologies: the Adults' Media Literacy Tracker used a combined online panel, post-to-web and post-to-paper methodology, so it is likely to have reached respondents who use the internet less.

response when asked to choose between statements about the sufficiency of common sense in avoiding potentially harmful content online, suggesting that they did not agree with either of the statements more strongly than the other. More than a quarter were neutral when asked to choose between statements weighing up the importance of supporting online free speech vs protecting users from offensive views. This may indicate that a significant minority of UK internet users are either ambivalent or undecided about some aspects of internet safety.

Figure 2.3: Proportion of UK users agreeing with one of two statements about benefits vs risks of being online



Source: Ofcom, Online Experiences Tracker 2021. Q1. Below are listed several pairs of statements. In each case, please indicate [on a scale of 1 to 10] which statement is closest to your own opinion on a scale, where 0 means complete agreement [with Statement A and 10 complete agreement with Statement B]. Base: UK internet users, aged 13+ (6,619). 'Online optimists' = respondents giving a response of 0, 1, 2 or 3. 'Neutrals' = respondents giving a response of 4, 5 or 6. 'Online pessimists' = respondents giving a response of 7, 8, 9, 10.

…but some groups are less likely than average to be positive about the internet and the impact of being online on their mental health

Internet users who are younger, female or from a minority ethnic group are more likely to believe that the risks of being online outweigh the benefits. Women,[151] and people aged 18-34 are more likely than average to *disagree* that being online has an overall positive effect on their mental health (16% and 18% compared to an average of 14%). Users with a minority ethnic background are more likely to agree that being online has an overall positive effect on their mental health, whereas white users are more likely to feel neutral about this. Women are also *less* likely than average to be 'online optimists' who feel that the benefits of going online outweigh the risks (63% for women vs 71% for men). Asian and Black users are more likely than average to be 'online pessimists' who believe that the risks outweigh the benefits (14% and 12% respectively) and users in minority ethnic groups are twice as likely as white users to share this opinion (13% vs 6%).

Boys aged 13-17 are the group most likely to agree that being online has a positive effect on their mental health: 61% agreed with this statement, compared to 51% of girls aged 13-17, 45% of men over the age of 18 and 40% of women over 18. In contrast, women aged 18-34 were more likely than

[151] Throughout this chapter female internet users aged 13+ are referred to as 'women' and male internet users aged 13+ are referred to as 'men'.

any other group to report a negative overall impact on mental health, with 23% of this group disagreeing with the statement.

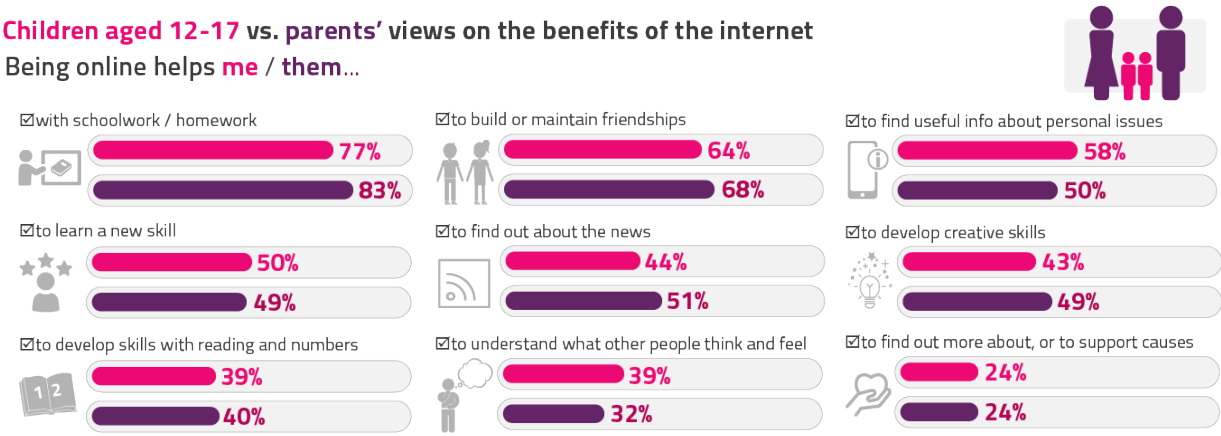
Differences also arise in relation to specific ethnicities. Nearly a quarter (23%) of Black women disagree that being online has a positive effect on mental health, almost twice as high as among Asian women (12%) and also higher than white women (16%) and women from a mixed ethnicity background (16%).[152]

Heavy users of the internet[153] are more likely to be online optimists (73%) and more likely to agree that being online has a positive effect on their mental health (50%). The same is also true of broad users[154] of the internet (those who report having used many new sites and apps in the past month) of whom 75% are online optimists and 55% agree that being online has a positive effect on their mental health.

Many children and parents agree that online services can bring benefits

The majority (59%) of children aged 8-15 report that that using social media, and messaging sites and apps, makes them happy *all* or *most* of the time, and 60% say that using these platforms makes them feel closer to their friends.[155] More than three-quarters of children aged 12-15 said that being online can help with their school/ homework, while half said it can be used to learn a new skill. Parents of 12-15s expressed similar opinions. [156]

Figure 2.4: Parents' and children's use of the internet to learn and build social skills



Source: Ofcom, Children's and Parents' Media Literacy Tracker 2021: Parents Only survey and Online Knowledge and Understanding survey. QC13. Being online can help you do many different things. Which of these does it help you with? Base: Children aged 12-15 who go online (1,245) QP53. Thinking about what your child does online, which – if any – of these applies to them? Being online helps them... Base: Parents of children aged 12-15 who go online (940)

[152] Ofcom, Online Experiences Tracker 2021.
[153] 'Heavy' use is defined as those who spend 22 hours or more a week online for personal reasons (that is, not for work, school or university).
[154] 'Broad internet users' is defined as those who report having used many new sites and apps in the past month.
[155] Ofcom, Children's and Parent's Media Literacy 2021: Online Knowledge and Understanding survey.
[156] Ofcom, Children's and Parent's Media Literacy 2021: Online Knowledge and Understanding survey.

Self-expression online

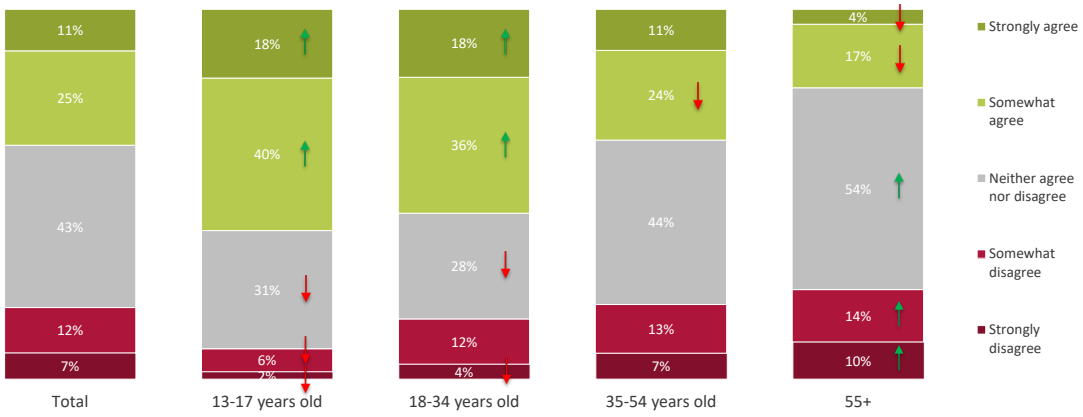
Being online allows people to connect with others, sometimes in ways they may not be able to do offline

Online technologies allow users to connect with others around the world to share their interests and outlooks, and potentially to reach a large online audience when they speak out. Sixty-two per cent of users agree that being online "gives me space to pursue my hobbies and interests in a way I couldn't do offline", while 45% agree that "I can share my opinions and have a voice online more easily or effectively than I can offline" and 36% agree that "I feel more free to be myself online".

Ofcom's research shows that some groups of people benefit particularly from the self-expression enabled by being online. For example, the proportion of users agreeing that they "feel more free to be myself online" is significantly higher among gay, lesbian and bisexual users than heterosexual users. Similarly, bisexual, gay and lesbian users are more likely to agree that being online allows them to "share my opinions and have a voice", with 58% and 48% respectively agreeing with the statement.

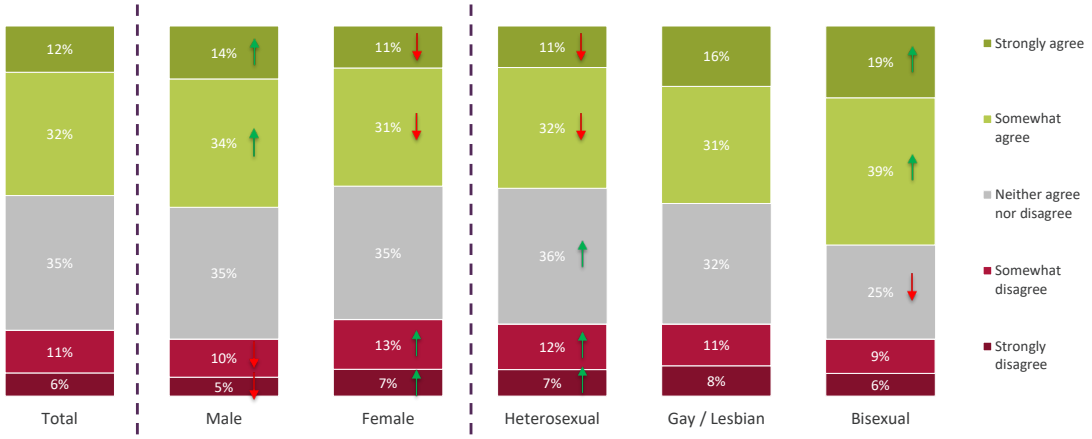
The self-expression benefits of being online are also more strongly felt by younger users. Users aged 13-34 are more likely than average to feel that they are "more free to be themselves online", and that they can "share their opinion and have a voice", whereas users aged 55 and over are more likely to disagree with these statements. Users with a minority ethnic background are also more likely than white users, on average, to agree with these statements.

Figure 2.5: Agreement with statement 'I feel more free to be myself online', by and age



Source: Ofcom, Online Experiences Tracker 2021 – Q3. To what extent, if at all, do you agree or disagree with the following statements about being online? Base: UK internet users, aged 13+ (6,619). Arrows indicate a figure that is significantly higher or lower than the average for all internet users, tested at 95% confidence level.

Figure 2.6: Agreement with statement "I can share my opinions and have a voice", by gender and sexuality



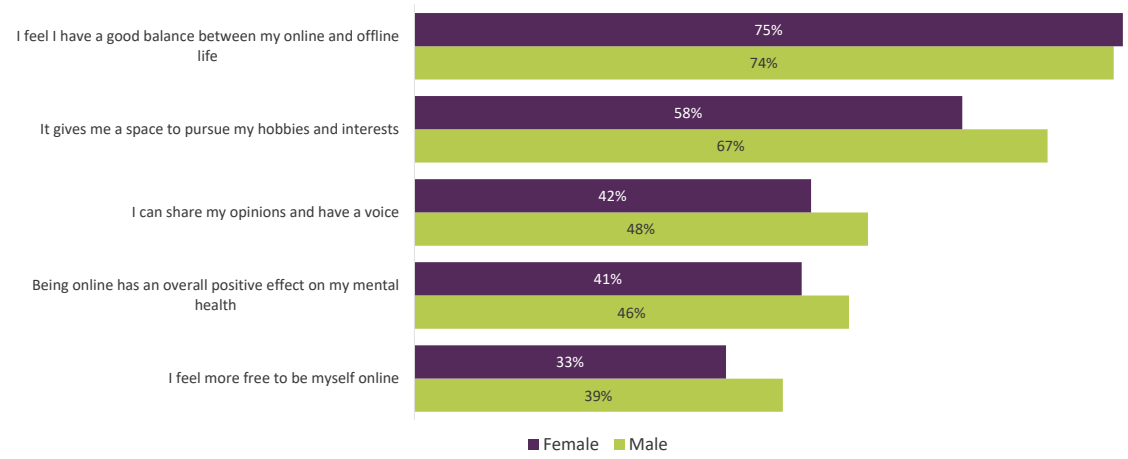
Source: Ofcom, Online Experiences Tracker 2021 – Q3. To what extent, if at all, do you agree or disagree with the following statements about being online? Base: UK internet users, aged 13+ (6,619). Arrows indicate that the figure is significantly higher/lower than the average, at 95% confidence.

The offline space is part of, not separate from, society; and what happens offline is often brought online

The integration of online life into 'real life' means that the internet is not isolated from wider society, but a part of it. This means that online life can replicate harmful discriminatory dynamics or behaviours that exist in wider society: what happens offline is brought online. For example, when comparing gender, women are significantly less likely than men to feel that being online allows them to share their opinions and have a voice (42% of women vs 48% of men). Women are also significantly less likely than men to agree that they feel "more free to be myself" online, although for both genders only a minority agreed, at 33% and 39% respectively.[157]

[157] Ofcom, Online Experiences Tracker 2021.

Figure 2.7: Proportion of UK users agreeing with positive statements about being online, by gender



Source: Ofcom, Online Experiences Tracker 2021 – Q3. To what extent, if at all, do you agree or disagree with the following statements about being online? Base: UK internet users, aged 13+ (3,244 male; 3,361 female)

Social media take-up and use

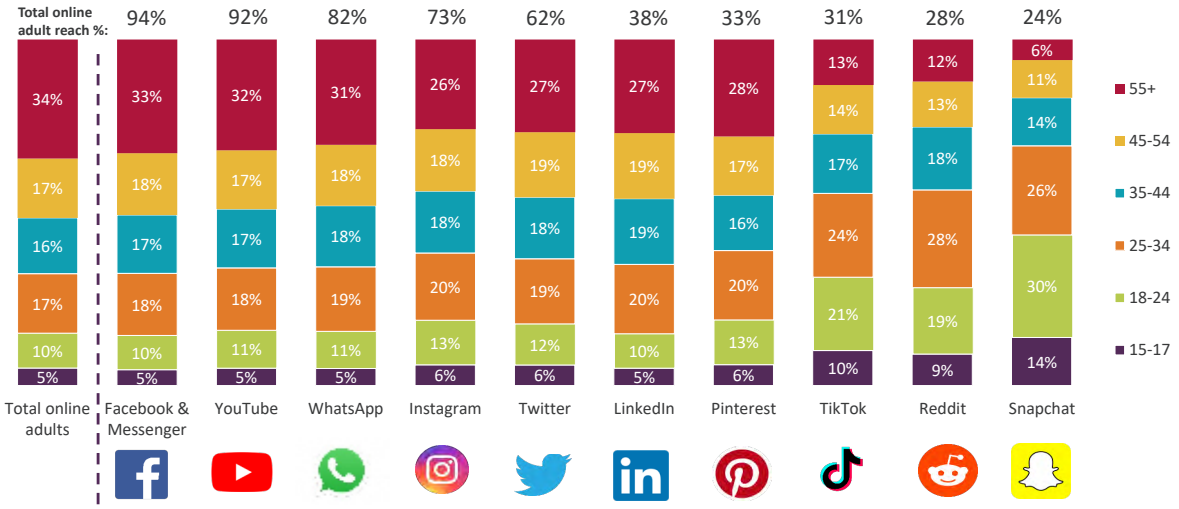
TikTok and Snapchat have a younger adult user base than the other top reaching social media platforms

For most of the social media platforms with high adult reach, their audience composition is in line with the UK online adult audience composition. However, the audiences for Snapchat and TikTok skew towards younger adults. Over half of both Snapchat's and TikTok's UK adult visitors were aged 15-34 in September 2021 (51% and 52% respectively). Meanwhile, UK adult visitors to Reddit are more likely than average to be male and aged 18-24 (33% of Reddit visitors were 18-24 males in September 2021).[158]

The following sections explore experiences and attitudes to online platforms such as social media as well as other online services. In addition to larger platforms such as YouTube and Facebook, we also include analysis of UK-established social video services which fall under the current regulation of video-sharing platforms (VSPs).[159] This includes platforms such as OnlyFans, which reached 4% of UK online adults in September 2021, Vimeo, which reached 6% and BitChute, and Brand New Tube and Imgur which each reached less than 1% of the UK online adult population. We also discuss communication services such as Telegram, which reached 3% of UK online adults in September 2021, and Discord, which reached 10%.[160]

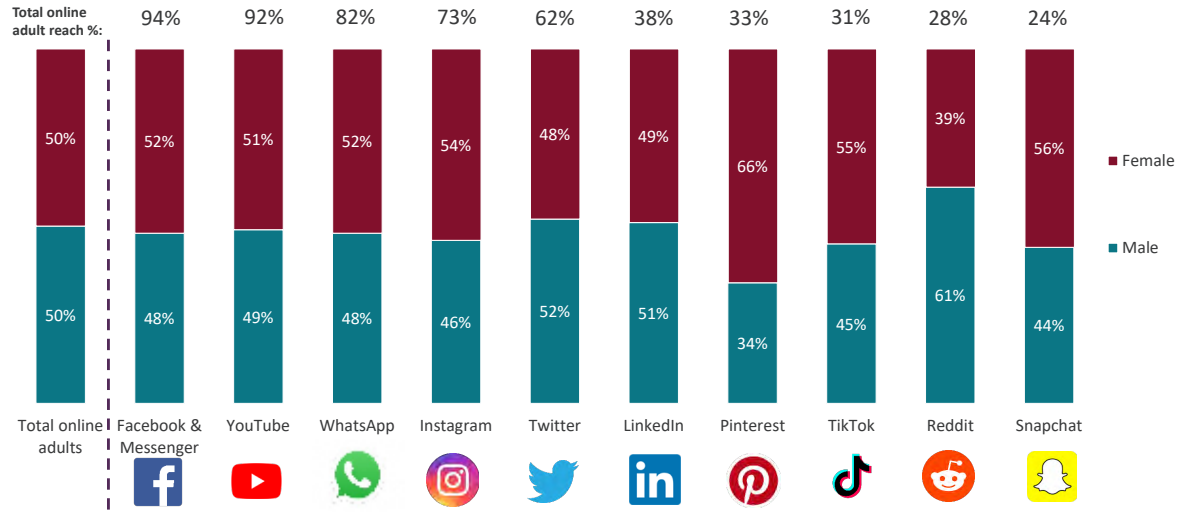
[158] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021 - 30 September 2021, all adults age 15+, UK.
[159] For more information on Ofcom's role in VSP regulation see: Video-sharing platform (VSP) regulation - Ofcom.
[160] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021 - 30 September 2021, all adults age 15+, UK.

Figure 2.8: Top ten social media platforms by UK adult reach, adult audience composition by age: September 2021



Source: © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021- 30 September 2021, adults age: 15+, UK. Note: The platforms shown in the chart represent the top ten social media platforms by UK adult reach. See the Online Landscape chapter.

Figure 2.9: Top ten social media platforms by UK adult reach, audience composition by gender: September 2021



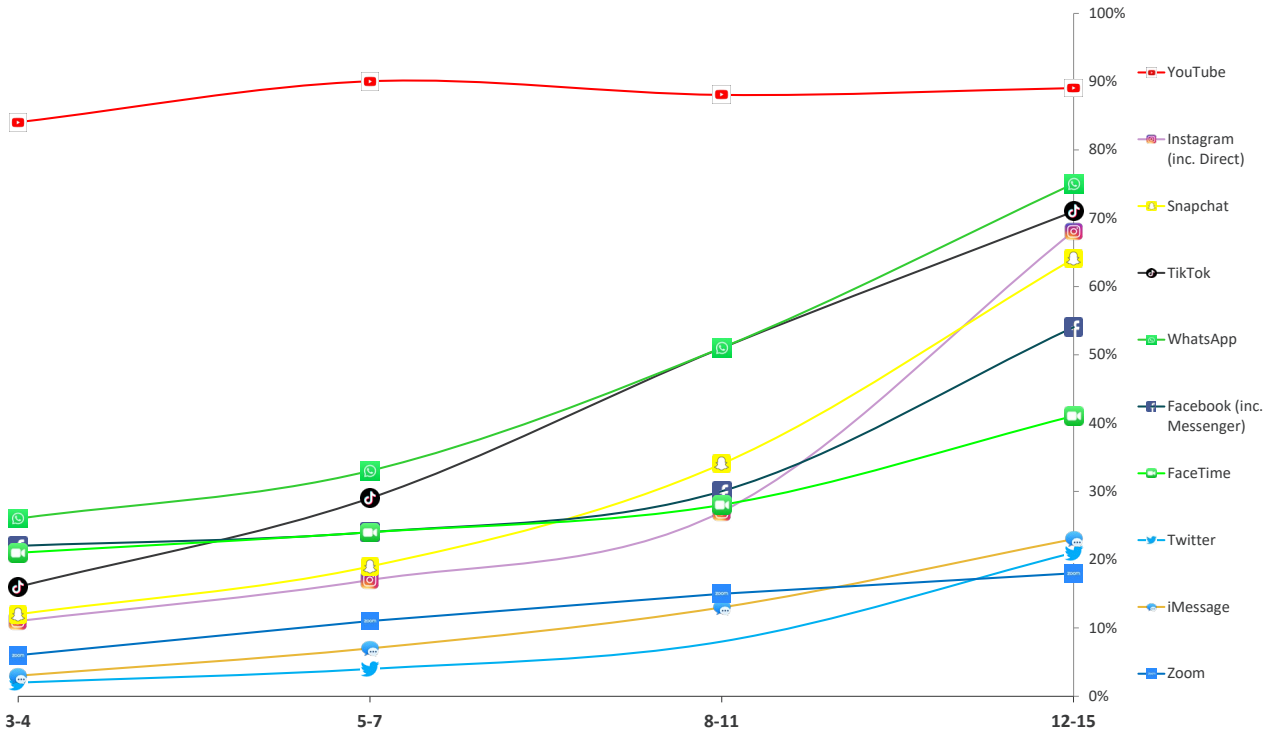
Source: © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021- 30 September 2021, adults age: 15+, UK. Note: The platforms shown in the chart represent the top ten social media platforms by UK adult reach.

58% of 3-15-year-old children use a social media platform, despite most not meeting the minimum age requirement

The most popular social media platforms have a minimum age requirement (usually 13 years old). However, Ofcom's Children's and Parents' Media Literacy Tracker 2021 shows that 98% of children

aged 3-15 go online and 58% use social media. Four in ten parents of 8-12-year-olds said they would allow their child to use social media before they reached the minimum age.[161]

Figure 2.10: Top ten most-used online platforms among children aged 3-15



Source: Ofcom Children Media Literacy Tracker 2021: Children's Online Behaviours and Attitudes survey, QP4/QC3, QP5/QC4, QP13/QC13, QP10/QC9. Summary to show the top apps/ sites used by children aged 3-17 across all categories of use (responses from parents of 3-7-year-olds and from children aged 8-15) chart shows all apps/ sites used by 5% or more of all children aged 3-15. Base: All children aged 8-15 and parents of children aged 3-7 (5,861)[162]

Potentially harmful online experiences

Although most people believe that the benefits of being online outweigh the risks, the online environment also has the potential to cause harm. Not all incidences of content or behaviour which have the potential to cause harm actually result in harm being caused; for this reason, in the following discussion they are referred to as '*potential* harms'. The discussion will also refer to *'most recently encountered potential harm'* which is the potentially harmful content or behaviour the user most recently encountered in the four weeks before their survey response.

[161] Ofcom, Children's and Parent's Media Literacy 2021: Online Behaviours and Attitudes survey. Thirteen is the minimum age to use most apps and sites which rely on user-generated content, as well as some online services. This includes Facebook, Instagram, TikTok, YouTube, Twitter, Reddit, Spotify, Quora and Ask.fm. Google requires users to be 13 to have a Google+ account and to access Gmail, but the search engine can be used by those under 13. Snapchat has a minimum age of 16.

[162] The figures shown here for YouTube include both the main YouTube app (minimum age requirement 13) or the YouTube Kids app. Ofcom's data shows that 28% of children aged 3-11 who use YouTube *only* use the YouTube Kids app, compared to 72% who use the main YouTube app at least some of the time, and 53% who *only* use the main YouTube app.

Over six in ten users have encountered at least one potential harm online in the last four weeks

When looked at individually, most potentially harmful pieces of content and behaviour are encountered by a relatively low proportion of UK users (see figure 2.12). When potential harms are considered collectively, however, 62% encountered at last one form of potentially harmful content or behaviour in the last four weeks.[163] The average number of potential harms experienced in the last four weeks was three. Contact harms and content harms are more likely to be experienced than commercial harms.

Figure 2.11: Overview of the 'three C's': content, contact and commercial harms



Source: Ofcom, Online Experiences Tracker 2021 – Q8. Which, if any, of the following have you seen or experienced online in the last 4 weeks? Base: UK internet users, aged 13+ (6,619)

By far the most common commercial harm, and the most common potential harm of all, is scams, fraud and phishing, encountered by 27% of users in the past four weeks; this is also the only potential harm which those aged 55+ experience at a higher level than the average and is one of the two potential harms (alongside unwanted sexual messages) which a significant proportion of users encountered via email.

[163] Ofcom, Online Experiences Tracker 2021. Fieldwork was conducted in October-November 2021. All data in this section, unless otherwise stated, is sourced from the Online Experiences Tracker.

Figure 2.12: Top 20 online potential harms encountered by UK users in the past four weeks



Potential harm	*% of users experiencing in last four weeks*
Scams, fraud and phishing	27%
Misinformation	22%
Generally offensive or 'bad' language[164]	21%
Unwelcome friend/follow requests or messages	20%
Content encouraging gambling	16%
Trolling	15%
Hateful, offensive or discriminatory content that targets a group or person based on specific characteristics	11%
Content depicting violence	9%
Content which objectifies, demeans or otherwise negatively portrays women	8%
Bullying, abusive behaviour or threats	8%
Unwanted sexual message	8%
Content relating to negative body image, excessive dieting and/ or eating disorders	8%
Animal cruelty	7%
Paid-for/sponsored content which was not clearly marked as such, e.g. astroturfing	7%
Fake or deceptive images/videos, e.g. 'deepfakes'	7%
'Content glamourising unhealthy or abusive lifestyles, e.g. binge drinking, drug taking	7%
Sexual/pornographic content inappropriate for the site/app	7%
Group shaming, boycotting, or excluding someone based on their views, opinions on actions, including online 'pile-ons'	6%
People pretending to be another person (e.g. catfishing)	6%
Content negatively affecting self-esteem	5%

Source: Ofcom, Online Experiences Tracker 2021 – Q8. Which, if any, of the following have you seen or experienced online in the last 4 weeks? Base: UK internet users, aged 13+ (6,619). Pink = content harms; yellow = contact harms; purple = commercial harms.

Almost half (47%) of internet users report coming across a potential harm while using social media

Social media was more likely than average to be the type of platform in use when users encountered group-shaming, boycotting or excluding someone based on their views (72%),[165] hateful, offensive or

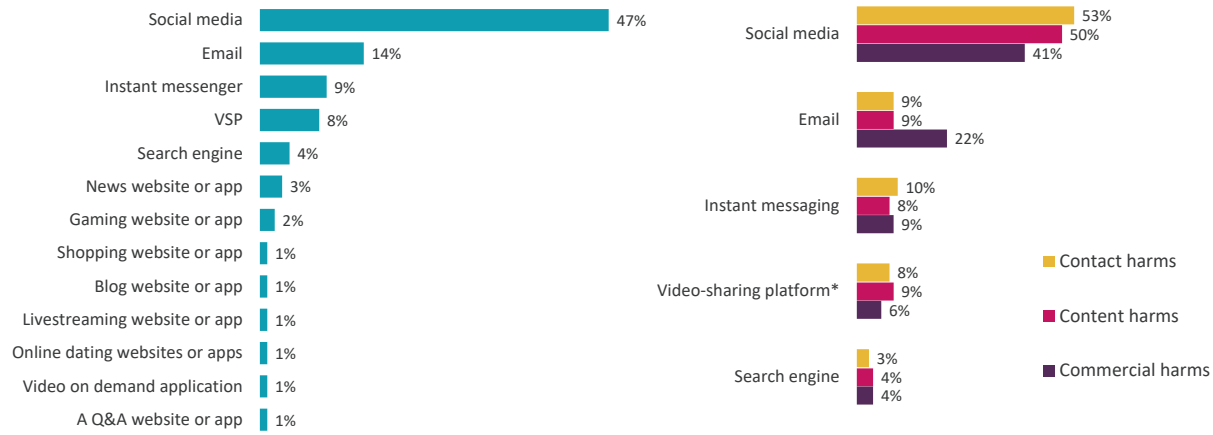
[164] Generally offensive or 'bad' language could include swearing, rudeness or language which is offensive to the user but does not meet the requirements of other codes. Bad language in itself is unlikely to cause harm to most users, although 19% of those who experienced this potential harm most recently reported being bothered or offended by it, including 4% who were said that "It really bothered me or I found it extremely offensive".

[165] CAUTION: LOW BASE (<100). 'Group shaming' is used to describe the phenomenon in which a particular person is 'called out' for their actions or beliefs online, with potentially negative psychological and social consequences. This is sometimes referred to as 'cancelling' or referred to as a 'pile-on'.

discriminatory content (64%), animal cruelty (62%), generally offensive or 'bad' language (62%), content which negatively impacted on a user's self-esteem (61%)[166] and misinformation (61%).

Social media was the most common source of potential harm for nearly all the content and behaviours respondents were asked about, with the exception of two types – scams, fraud and phishing and unwanted sexual messages – for which the most common source was email.[167]

Figure 2.13: Type of service in use when users encountered their most recent potential harm

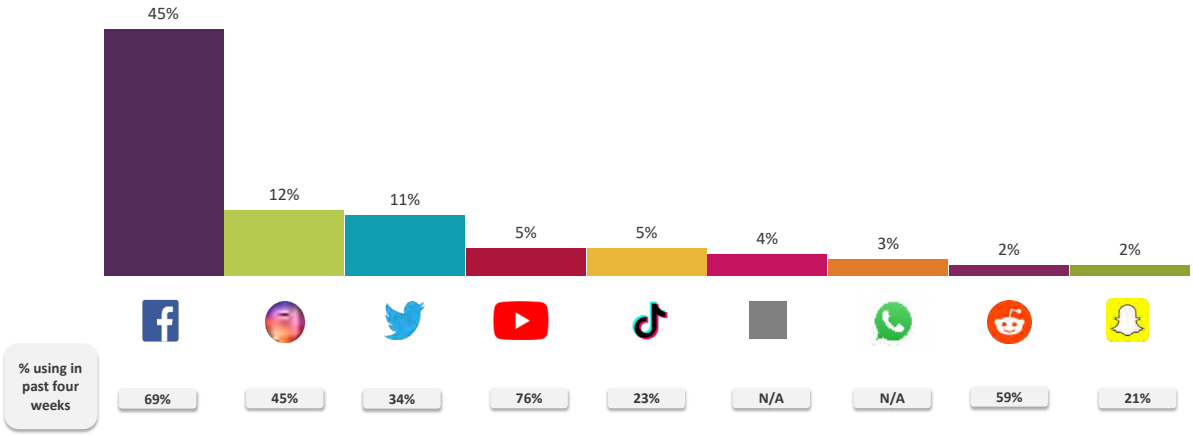


*Source: Ofcom, Online Experiences Tracker 2021 – Q21. What type of site or service were you using when you experienced…? Base: UK internet users, aged 13+ experiencing potential harm most recently (3,843). * A video-sharing platform is a type of online video service where users can upload and share videos. Examples include YouTube and TikTok.*

Users were more likely to have encountered their most recent potential harm on Facebook than on any other website or app: 45%, over three times the proportion as on the second most likely site/app, Instagram (12%). Despite YouTube being the most-used app among the sample of UK users surveyed (78%), only one in 20 (5%) of all the most recently encountered potential harms was encountered on YouTube.[168]

[166] CAUTION: LOW BASE (<100).
[167] This excludes some low-incidence potential harms with base sizes under 50. See the Communications Services chapter for more on email services.
[168] Ofcom, Online Experiences Tracker 2021.

Figure 2.14: Platform on which most recently encountered potential harm was experienced



Source: Ofcom, Online Experiences Tracker – Q22-Q28. Combined experience of potential harms across platforms. Base: UK internet users, aged 13+ experiencing [ANY POTENTIAL HARM] most recently on any type of website or app (2,728). N.B. Google refers to Google search only.

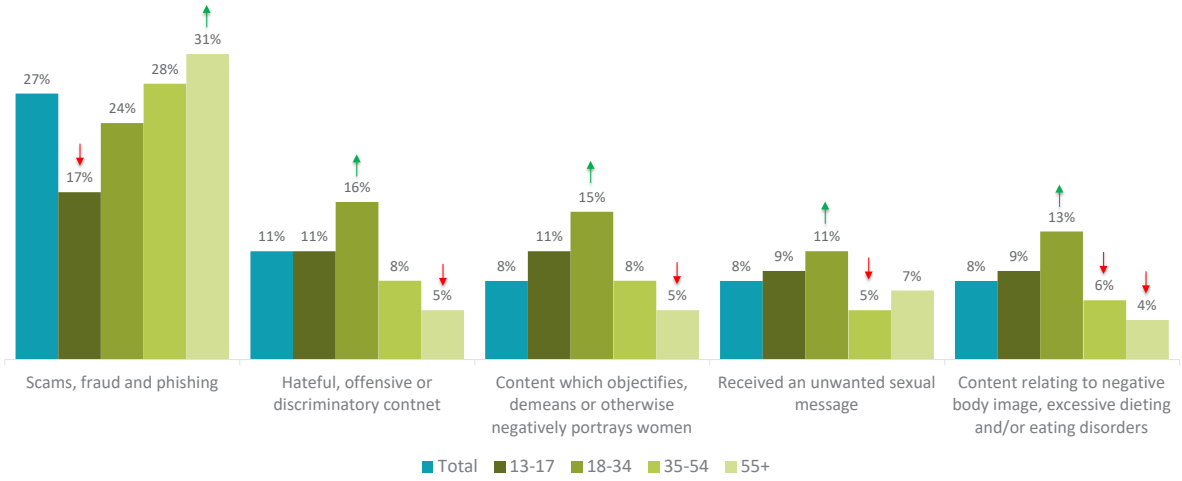
Young adults are at the highest risk of encountering potential harms

Young adults aged 18-34 are more likely than average to have most recently experienced at least one potential harm (65% vs an average of 62% for all users), whereas users aged 55+ have a lower overall risk of encountering a potential harm (57%). Certain age groups are more likely to encounter certain types of potentially harmful content or behaviour. For example, young people aged 18-24 are significantly more likely to encounter hateful, offensive or discriminatory content (17% vs an average of 11%); whereas users aged 55+ have a higher risk of encountering scams, fraud and phishing (31% vs an average of 27%).[169] But many factors besides age can influence the likelihood of experiencing harmful content or behaviour. A key factor is how much people use the internet: heavy users of the internet[170] are more likely to experience potential harms.

[169] For a full list of potential harms that are more commonly experienced by certain age groups, see accompanying data tables and interactive report.

[170] Heavy users of the internet are defined in the Online Experiences Tracker as those who spend over 22 hours a week online, excluding time spend online for work, school or university. This could include time using social media and messaging, watching films, TV programmes and videos online, playing games online or on video calls. Medium users of the internet are those spending between 5 and 22 hours a week. Light users spend less than 5 hours a week.

Figure 2.15: Experience of selected potential harms, by age group[171]



Source: Ofcom, Online Experiences Tracker 2021 – Q8. Which, if any, of the following have you seen or experienced online in the last 4 weeks? Base: UK internet users, aged 13+ (6,619). Arrows indicate that the figure is significantly higher/lower than the average at 95% confidence.

Almost three-quarters of mixed ethnicity and Black internet users had encountered at least one online potential harm recently

Mixed ethnicity and Black internet users are more likely than both Asian and white users to have encountered potential harms in the last four weeks (74% and 71% compared to 63% and 61% respectively). Users from Black, Asian, and mixed ethnicity backgrounds are more likely than average to encounter a range of different potential harms. Black men are significantly more likely than almost all other groups to have experienced at least one potential harm (74%).[172]

Women from a minority ethnic background (and Black, Asian and mixed ethnicity women specifically[173]) are more likely than white women to have experienced at least one potential harm in the last four weeks (67% vs 61%).Women from a minority ethnic background are also more likely than white women to have experienced some specific harms: for example, they are almost twice as likely to have received an unwanted sexual message (11% vs 6%), three times as likely to have seen or experienced sharing of intimate images without consent (3% vs 1%), and four times as likely to have received an unwanted or unsolicited sexual/nude image or video (8% vs 2%).

[171] Covers harms experienced in the past four weeks. Potential harms chosen by Ofcom for illustrative purposes.
[172] Significantly more likely than: white men (66%), white women (61%), men from any minority ethnic background (72%), women from any minority ethnic background (71%), Asian women (67%) and Asian men (67%). *CAUTION: LOW BASE SIZE (<100)
[173] 79% of women from a mixed ethnicity background*, 74% of Black women and 67% of Asian women experienced at least one potential harm in the last four weeks. *CAUTION: LOW BASE SIZE (<100)

Figure 2.16: Proportion of UK users encountering potential harms in past four weeks, by ethnicity

Potential harm	All	White	Mixed ethnicity	Asian	Black
Any potential harm	**62%**	**61%** ↓	**74%** ↑	**63%** ↑	**70%** ↑
Misinformation	22%	22%	29% ↑	19%	25%
Hateful, offensive or discriminatory content	11%	9% ↓	22% ↑	16% ↑	18% ↑
Content depicting violence	9%	9%	13%	9%	14% ↑
Unwanted sexual messages	8%	7%	14% ↑	10% ↑	17% ↑
Bullying, abusive behaviour or threats	8%	8%	10%	9%	12% ↑
Content glamourizing unhealthy or abusive lifestyles, e.g. binge drinking, drug taking	7%	7%	17% ↑	6%	8%
Sexual or pornographic content inappropriate for the site or app	7%	6% ↓	7%	11%	18%
Fake or deceptive images/videos	7%	7% ↓	6%	10% ↑	12% ↑
Group shaming, boycotting, or excluding someone based on their views, opinions or actions	6%	6%	10% ↑	5%	7%
People pretending to be another person, e.g. 'catfishing'	6%	5% ↓	9%	7%	13% ↑
Collection or use of data without knowledge or permission	4%	4%	8% ↑	5%	7%
Sale or advertisement of illegal goods	4%	4% ↓	4%	6% ↑	5%
People sending unwanted/unsolicited sexual or nude images or videos, e.g. 'cyberflashing'	3%	3% ↓	10% ↑	7% ↑	11% ↑
Intentional harassment during gaming, e.g. 'griefing'	3%	2% ↓	5%	4% ↑	5%
Private conversations shared without consent	3%	2% ↓	2%	5% ↑	8% ↑
Unintentionally spending money on in-app purchases or gifts	3%	2% ↓	4%	4% ↑	5%
Content encouraging extremism, radicalisation or terrorism	2%	2%	3%	4% ↑	3%
Pressure to send photos or personal information to someone	2%	2% ↓	5% ↑	4% ↑	5% ↑
Stalking, cyberstalking or intrusive behaviour	2%	2% ↓	4%	5% ↑	2%
Private/intimate information made public, e.g. 'doxxing'	2%	1% ↓	2%	4% ↑	6% ↑
Sharing of intimate images without consent	1%	1% ↓	2%	3% ↑	5% ↑
Content depicting the sexual abuse of children	1%	1% ↓	1%	3% ↑	3% ↑
Promotion of FGM	1%	1% ↓	1%	2% ↑	2% ↑

Source: Ofcom, Online Experiences Tracker 2021 – Q8. Which, if any, of the following have you seen or experienced online in the last 4 weeks? This includes any images, videos, audio or text, either comments, posts or messages you have seen and/or those shared directly to you. Please select all that apply. Base: UK users aged 13+ (Total 6,619; white 5,656; NET minority ethnic group 896; mixed ethnicity 163; Asian 476; Black 218) Only ethnicities with a base size of >50 are shown.

Animal cruelty and hateful, offensive or discriminatory content are the potential harms which are more likely to bother or offend users

While exposure to any type of potentially harmful content or behaviour may negatively affect users' online experience, our research shows that not all potentially harmful online content or behaviour has the same degree of negative impact. Some groups of users feel more impacted than others when encountering potential harms. As part of our research into online experiences, Ofcom asked UK online users to rate how badly they were affected by the potential harm they had experienced most recently, on a scale from 1, "It didn't bother me at all / It didn't offend me" to 5, "It really bothered me / I found it extremely offensive."

The content and behaviours most likely to bother or offend users are: animal cruelty (84%); hateful, offensive or discriminatory content that targets a group or person based on specific characteristics (78%); group-shaming, boycotting or excluding someone based on their views, opinions or actions (73%);[174] content which objectifies, demeans or otherwise negatively portrays women (71%);[175] and bullying, abusive behaviours and threats (68%).[176]

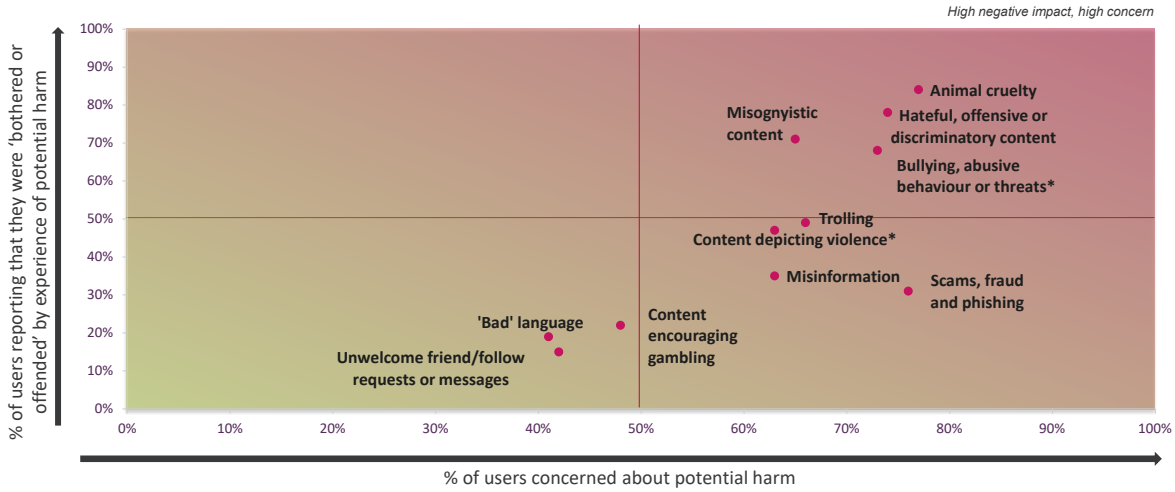
Some potential harms may have a negative impact that is cumulative; a one-off experience may cause little harm, but the combination of many such experiences may cause significant harm. Conversely, some users may have experienced negative impact or harm when encountering a potential harm for the first time, but then may have become desensitised to it after repeated exposure. Those who were *not* bothered or offended by their most recently experienced potential harm were more likely to have encountered that potential harm ten times or more.

The impact of potential harms correlates with the level of concern users have about them

Even if users have not encountered potentially harmful content themselves, they may still be concerned about its presence on the internet, and the possibility that they or others will come across it in the future. Ofcom research finds that internet users have the highest level of concern about content depicting child sexual exploitation and abuse (CSEA; 86% were fairly or very concerned), content encouraging extremism, radicalisation and terrorism (79%), promotion of female genital mutilation (FGM; 77%), animal cruelty (77%) and scams, fraud and phishing (76%).

[174] CAUTION: LOW BASE SIZE (<100).
[175] CAUTION: LOW BASE SIZE (<100).
[176] Only potential harms which were experienced most recently by at least 50 respondents are shown. Some potential harms with very low incidence are not reported as their base sizes are too low to be statistically reliable.

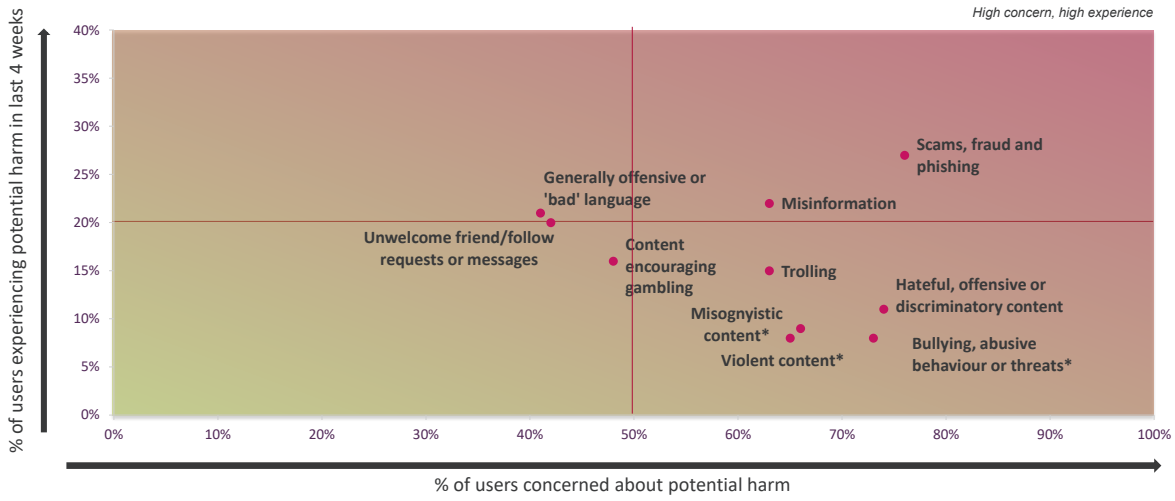
Figure 2.17: Impact of potential harm compared to concern



Source: The Online Experiences Tracker Wave 1 – Q8. Which, if any, of the following have you seen or experienced online in the last 4 weeks? Q 14. On a scale of 1 to 5, where 1 means 'It didn't bother me at all/It didn't offend me' and means 'It really bothered me/I found it extremely offensive', when you last saw or experienced ..., would you say the content or experience was...? Base Q8: UK internet users, aged 13+ (6,155). Base Q14: All those experiencing [potential harm] most recently (3,843). This chart shows the top ten potential harms by negative impact. Only potential harms with base sizes of >50 are shown.

When the level of concern about a potential harm is compared with reported exposure to it, two types of potentially harmful content have both high levels of concern and relatively high levels of exposure: misinformation; and scams, fraud and phishing.[177]

Figure 2.18: Concern about potential harms compared with incidence of experience



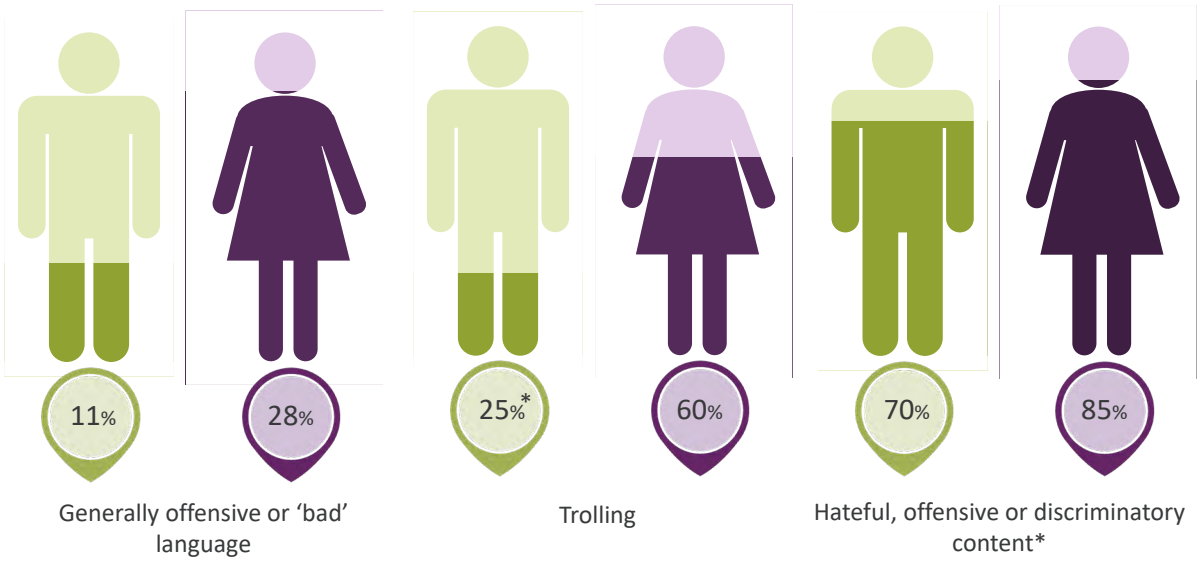
Source: Ofcom, Online Experiences Tracker Wave 1 – Q7. Below is a list of things that someone may come across on the internet. Please tell me on a scale of 1 to 5, where 1 means 'mildly concerned' and 5 means 'very concerned', how concerned you are about each. Q8. Which, if any, of the following have you seen or experienced online in the last 4 weeks? Base: UK internet users, aged 13+ (6,619). This chart shows the top ten potential harms by incidence, as well as the top five potential harms by concern.

[177] 'Relatively high levels of exposure and concern' are defined here as >50% of users being fairly or very concerned about this potential harm *and* >20% of users reporting exposure in the past four weeks.

Women are more likely than men to say that they were harmed by certain online content or behaviour

There are clear differences in the degree of negative impact experienced by users depending on their age and gender. Women are significantly more likely than men to say that they were bothered or offended by their most recently encountered potential harm (41% vs 28%). The youngest people we surveyed, aged 13-17, were also more likely than average to say that they were bothered or offended (45% compared to 38% average and 33% among users aged 55+) by their experience. Women are particularly likely to be negatively affected by hateful, offensive or discriminatory content and trolling when compared to men.

Figure 2.19: Proportion of users saying that they were bothered or offended by potential harm, by gender



*Source: Ofcom, Online Experiences Tracker 2021 – Q14. On a scale of 1 to 5, where 1 means 'It didn't bother me at all/It didn't offend me' and means 'It really bothered me/I found it extremely offensive', what level of offence did the content or experience cause you? Base: UK internet users, aged 13+ experiencing…most recently at Q9 (generally offensive or 'bad' language male, 205; (generally offensive or 'bad' language female, 182; trolling male, 74; trolling female, 124; hateful, offensive or discriminatory content, male 67; hateful, offensive or discriminatory content female, 79) *CAUTION: Low base size (<100)*

More than half of all users in minority ethnic groups were negatively impacted by their most recently encountered potential harm

Users with any minority ethnic background – and from Black (56%), mixed ethnicity (51%), and Asian (49%) backgrounds specifically – were more likely than white users (36%) to report that they had been bothered or offended by their most recently encountered potential harm. Users from an ethnic minority background were also significantly more likely than average to report the highest level of negative impact (25% vs 14%).[178] Black men in particular were likely to do this: 63% were bothered

[178] That is, giving an answer of 5, 'It really bothered me / I found it extremely offensive'.

or offended by their most recent potentially harmful experience, compared to 30% for white male counterparts and an average of 38% for all genders and ethnicities.

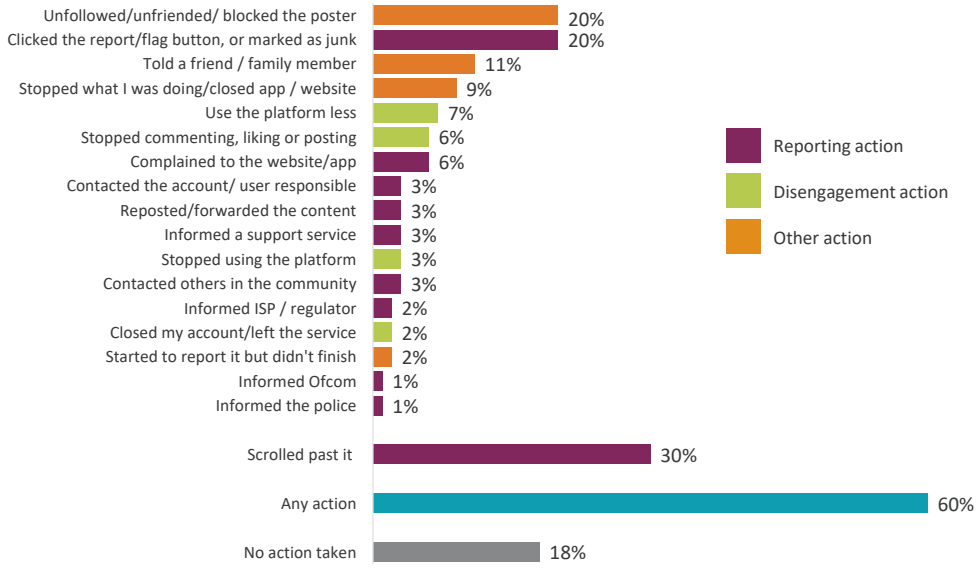
Action taken after encountering potentially harmful online content or behaviour

Internet users' experience of reporting content

Over three-quarters (77%) of those who were bothered or offended by their experience took some form of action[179]

Users were more likely to take action after encountering potential harms which had a high negative impact on them. Overall, six in ten users who had encountered a potential harm reported taking some sort of action as a result of their most recent experience. Actions taken ranged from fairly limited responses, such as scrolling past the content, to more proactive reporting behaviour such as clicking the flag, report or junk button, or contacting charities. The most common types of proactive action after encountering a potential harm were unfollowing, unfriending or blocking the poster or perpetrator, and clicking the report or flag button or marking it as junk, both enacted by a fifth of users who took action.[180] A fifth of users reported or flagged the potentially harmful content or behaviour they encountered.

Figure 2.20: Action taken after most recently experienced potential harm



Source: Ofcom, Online Experiences Tracker 2021 – Q15. When you saw ... on that occasion, which of the following actions did you take, if any? Base: UK internet users, aged 13+ experiencing any potential harm most recently at Q9 (3,843).

[179] Ofcom, Online Experiences Tracker 2021. All data in this section, unless otherwise stated, is taken from the Online Experiences Tracker 2021.

[180] On some sites and apps, users have the option to use the flagging and reporting functions bring potentially harmful content to the attention of a platform's moderators and moderation systems, so that it can be assessed against the platform's terms and conditions and action potentially taken if there is a breach.

A fifth of users said that as a result of having encountered the potential harm they either disengaged or engaged in a different way online. This included 9% who closed the app or website after having encountered the potential harm, 7% who said they used the platform less after having encountered a potential harm, and 6% who said they stopped commenting, liking or posting on the platform as a result. Three per cent of users who had experienced a potential harm said they stopped using the platform altogether.

Users in a minority ethnic group were more likely than white users to take some form of action (68% vs 59%) and were also more likely to report or flag the item (37% vs 31%). They were also more likely to disengage or change their engagement behaviour as a result of having encountered a potential harm (27% vs 19%).

The youngest users in our sample, aged 13-17, were more likely than average to disengage or change their behaviour after encountering a potential harm online (27% vs an average of 20% for all ages), and they were more than twice as likely to say they had stopped using the platform altogether after such an experience (7% vs 3%). However, this age group was *less* likely than average to click the reporting or flagging button, or to mark content as junk, with only 14% doing this compared to an average of 20% across all age groups.

Of those who reported or flagged content, a fifth said that the content had been removed

Half of those who had reported content said that nothing had happened since doing so, whereas a fifth (21%) said that the content had been removed, and one in ten (9%) said that they had been asked to provide further information. Slightly less than half (47%) were at least somewhat satisfied with the reporting process as a whole, compared to 24% who were dissatisfied.

Figure 2.21: Reporting behaviours and outcomes following users' most recently encountered online potential harm



Source: Ofcom, Online Experiences Tracker 2021. Q15. When you saw ... on that occasion, which of the following actions did you take, if any? Base: UK internet users 13+ who experienced any potential harm most recently (3,843) Q17. You

mentioned you reported the .... What happened as a result? Base: UK internet users 13+ who experienced any potential harm most recently and reported the potential harm (792).

Slightly more than a fifth (22%) said that they did not take action because they didn't think that doing so would make a difference

The most common reason for not taking action was that the user 'didn't see the need to do anything'. Half of users who did not take action after encountering a potential harm did not do so for reasons relating to low impact or concern. A quarter (26%) said that they did not take action because they were not directly affected, and the same proportion (26%) said they "didn't see the need to do anything". A fifth (19%) said that "I didn't like it, but I didn't consider it bad enough to do something about", and 17% said that they "didn't consider the content or behaviour to be harmful, disturbing or offensive".

Children are relatively unlikely to use reporting and flagging to inform platforms of potentially harmful content or behaviour they have seen

Of the 93% of 8-17s who would tell someone if they saw something worrying or nasty online, only 8% would tell the website/app where they encountered the harmful content/behaviour about what they had seen. This may be partly because of low awareness of the function itself: only a third of 12-17s said that they knew how to use a reporting or flagging function, and of those only 14% said they had used it before. Evidence from our qualitative Children's Media Lives 2022 study suggests that attitudes to reporting and flagging may also play a part in this low use. Some children in our sample reported having a very high bar for using these functions, and expressed a general feeling that flagging or reporting content or behaviour was getting involved in something which is "none of my business".[181]

Platforms' reporting of content moderation

Some online platforms have procedures in place to detect and take action against potentially harmful content on their service

Many social media platforms have terms and conditions and acceptable use policies that set out the types of content that are and are not permitted on their service. They can then use various methods (or a combination of these) to detect and act against potentially harmful content or content which violates their rules. These include automated content detection and removal, review by human content moderators, reducing how often content appears in recommendation lists, making content harder to search for, and providing and offering flagging and reporting tools for the user community. Certain platforms publish data in transparency reports about the content they have removed for violating their policies (among other things).

[181] *Children's Media Lives 2022.*

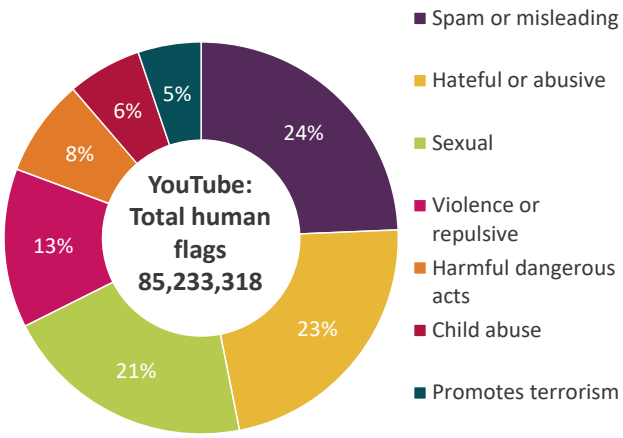
Transparency reports indicate that most of the content removed by the popular social media platforms was detected using their automated tools

Data from the transparency reports of Facebook, YouTube and TikTok indicate that the majority of content that was removed from the platforms in Q3 2021 was detected by the platform first, with a smaller proportion being flagged or reported by users.[182]

In Q3 2021, TikTok removed 91.4 million videos, with 95% being detected by the platform and 5% having been flagged or reported by users.[183] Meta acted on 153 million pieces of content on Facebook in Q3 2021, with 4% of content removals made after users' reporting.[184]

YouTube reported that it removed 6.2 million videos globally in Q3 2021. This was a decrease of 21% compared to Q3 2020. The higher number of removals in 2020 may have been caused by increased reliance on automated removals due to staff shortages during the pandemic, and moderation of content during the US elections and misinformation around Covid-19. Of the videos removed in Q3 2021, 95% were detected by YouTube's automated tools and 5% had been flagged by a user or moderator.[185] The total number of human flags on YouTube was 85.2 million, down slightly (3%) year on year in Q3 2021. However, users flagged more content than ever before: 17.9 million YouTube unique videos received at least one flag in Q3 2021, an increase of 13% since Q3 2020.[186] Almost a quarter of the human-flagged videos on YouTube were categorised as 'spam or misleading' and 'hateful or abusive', followed by a fifth which were flagged as 'sexual content'.[187]

Figure 2.22: Human flags on YouTube, by category of harm: Q3 2021



Source: YouTube, YouTube Community Guidelines enforcement, Q3 2021. Note: Videos can receive multiple flags and be flagged for different harms – 17.9 million videos were flagged by humans at least once. Almost all these flags came from

[182] Note: Many organisations follow an online content moderation workflow that might include one or both of the following: 1) Pre-moderation: when the uploaded content is moderated before publication, typically using automated systems. 2) Post- or reactive-moderation: when content is moderated after it has been published and it has been flagged by other users or automated processes as potentially harmful, or which was removed previously but requires a second review upon appeal. Source: Ofcom and Cambridge Consultants, Use of AI in content moderation, report produced by Cambridge Consultants on behalf of Ofcom, 2019.
[183] TikTok, TikTok Community Guidelines Enforcement, Q3 2021.
[184] Meta, Facebook Community Standards Enforcement Report, Q3 2021. Removal figures exclude fake accounts and spam.
[185] YouTube, YouTube Community Guidelines enforcement, Q3 2021.
[186] Flagging a video does not necessarily lead to its removal.
[187] YouTube, YouTube Community Guidelines enforcement, Q3 2021.

users, and an extremely small proportion (<1%) came from Trusted Flaggers, government agencies or non-governmental organisations.

In some cases when a piece of content is removed by the platform, users can appeal the decision and the platform will decide whether to restore the content. In Q3 2021 Facebook reported 3 million content removal appeals, of which around 16% were successful. In the same period, 37% of 244k of appeals on YouTube were successful.[188]

Figure 2.23: Content moderation transparency global data published by selected platforms, Q3 2021

		Facebook[189]	YouTube[190]	TikTok[191]
Content removal	Number of pieces of content taken down by platform	153,200,000	6,229,882 (Videos only)	91,445,802 (Videos only)
Detection by platform	Proportion of removed content that was detected by platform	96.00%	94.72% (Videos only)	95.09%
Detection by user	Proportion of removed content that was flagged or reported by users	4.00%	3.75% (Videos only)	4.91%
Turnaround time	Proportion of content removed within 24 hours of upload	N/A	N/A	93.86%
Appeals	Pieces of removed content, appealed	3,008,200	244,080	N/A

Source: Publicly available transparency reports published by each platform. All figures are global. The figures for Facebook (excludes Instagram as the data for this platform is reported separately) do not include spam or fake accounts. The Facebook totals and proportions that were detected by platform/user have been calculated by Ofcom from the splits by harm provided in Meta's public reports.

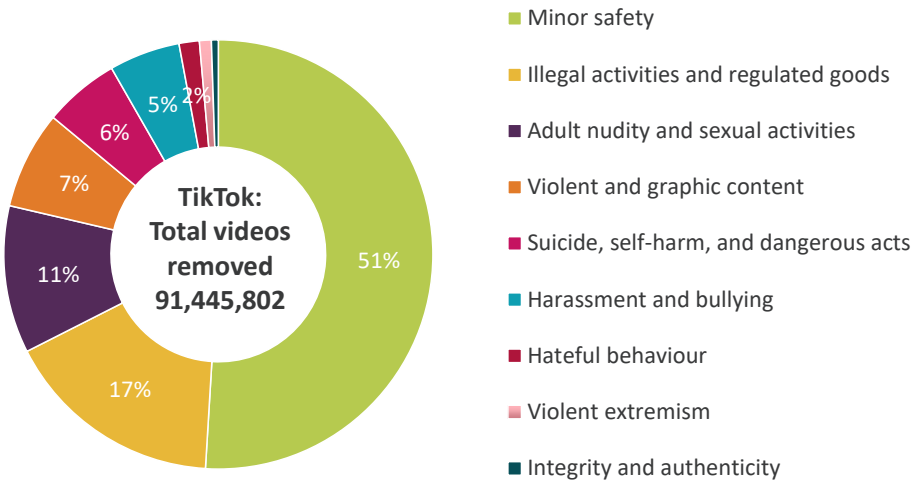
Content that violates child safety policies is the most-removed content from YouTube and TikTok, while adult and nudity content is the most-removed from Facebook and Instagram

Platforms report on differing content categories. Content categorised by YouTube as violating child safety policies is the content most often removed from that platform, making up 32% of removals in

[188] Percentages are calculated by Ofcom based on the number of appeals and the number of restorations after appeal, as reported by the platforms. They are indicative only: appeals received and restorations may relate to take-downs in previous quarters. Platforms can also decide to restore content without having received an appeal.
[189] Meta, Community Standards Enforcement Report, Q3 2021.
[190] YouTube, YouTube Community Guidelines enforcement, Q3 2021.
[191] TikTok, TikTok Community Guidelines Enforcement, Q3 2021.

Q3 2021.[192] TikTok reports on 'minor safety',[193] which is consistently the highest proportion of videos removed from the platform, making up 51% of removals in Q3 2021. It is also the category with the quickest removals on TikTok; 97% of content is removed within 24 hours, and most content is removed before it has been viewed by any user (95%).[194] Meanwhile, adult and nudity content is the most-removed type of content for Facebook and Instagram (23% for each platform).[195]

Figure 2.24: Proportion of videos removed on TikTok, by category of harm: Q3 2021



Source: TikTok, TikTok Community Guidelines Enforcement, Q3 2021

Misinformation is another key moderation focus for online platforms

Some online platforms have policies to tackle misinformation on their platform. Some, such as Twitter, TikTok and Pinterest, publish information on their enforcement of this type of content. In Q3 2021 almost 17,000 pieces of 'Covid-19 misleading information' were reportedly removed from Twitter.[196] On TikTok, Covid-related videos can be tagged or labelled in an attempt to prevent the spread of misinformation and to guide users to trustworthy information, namely the platform's Covid hub[197] which is an information centre that contains authoritative information regarding Covid-19. In Q3 2021 there were almost 3 million visits to TikTok's Covid hub, and over 3.5 million banners added to videos – these were viewed 22.6 million times.[198] Platforms can publish additional information as well as their regular reporting. Most recently, TikTok published an update on its moderation of harmful misinformation in the context of the conflict in Ukraine. Between 24

[192] Note that YouTube has a broad definition of the 'child safety' category which overlaps with other categories: any content that endangers the emotional and physical well-being of minors – sexualisation, harmful, emotional distress, misleading family content, cyberbullying. Source: YouTube, YouTube Help, 14 April 2022.
[193] TikTok defines 'minor safety' as "prohibiting activities that perpetuate the abuse, harm, endangerment, or exploitation of minors on TikTok. Any content, including animation or digitally created or manipulated media, that depicts abuse, exploitation, or endangerment of minors". This includes "sexual exploitation of minors, grooming behaviour, nudity and sexual activity involving minors, harmful activities by minors, physical and psychological harm of minors and crimes against children." Source: TikTok, Community Guidelines, 7 April 2022.
[194] TikTok, TikTok Community Guidelines Enforcement, Q3 2021.
[195] Meta, Community Standards Enforcement Report, Q3 2021.
[196] Twitter, Twitter Transparency Center - Covid-19 misinformation report, Q3 2021.
[197] TikTok, Covid-19 hub, "Resources for our community", accessed 6 May 2022.
[198] TikTok, TikTok Community Guidelines Enforcement, Q3 2021.

February and 31 March 2022 TikTok's safety team focused on the Ukraine war removed 41,191 videos, 87% of which violated TikTok's policy against harmful misinformation. The majority (78%) of these were identified proactively. [199]

Pinterest removed almost 1.2 million 'pins' or pieces of content labelled as misinformation in Q2 2021. These included civic and medical misinformation, as well as conspiracy theories. However, for all misinformation sub-categories, at least two-thirds of the pins were removed before anyone viewed them.[200] The platform has also recently implemented a policy to remove false or misleading climate change information, to combat the spread of information "that denies the existence or impact of climate change" or that contradicts "well-established consensus". This ban applies to users' content as well as advertisements.[201]

User attitudes to safety measures and free speech

Although half of adult internet users believe that further safety measures are needed online, there is no consensus about how best to balance free speech with protecting users

Less than one in four UK users (23%) believe that the current level of online safety measures is sufficient. Women, young people and those in a minority ethnic group are more likely than average to say that they think more safety measures are needed, and they are also more likely to report being negatively impacted by a potentially harmful online experience.

However, there is no consensus among UK online users about whether platforms should prioritise free speech, or protection of their users from potentially offensive views. When asked to choose between two statements on the issue, 34% agreed more strongly with the statement "The internet has an important role in supporting free speech, even when some users might find the content offensive". This compares to 38% who said they agreed more with the statement "It is important for sites to monitor and delete offensive views to protect other users." Women are more likely than men to prioritise user protection (44% vs 33% men), whereas men are more likely to prioritise free speech (41% vs 28%).

Data from our Adults' Media Literacy Tracker, however, suggests that opinions may be shifting in favour of protection of users. The proportion of adult internet users who agreed that "internet users must be protected from seeing inappropriate or offensive content" increased from 61% to 65% between 2020 and 2021. For the first time in 2021, a majority of users (55%) *disagreed* with the statement "I think it is important that people can say what they want online even if it is controversial or hurtful to others", up from 47% in 2020.[202]

More than four in ten agree that responsibility for what is posted on a website or app lies with the platform itself rather than the individual

Although a significant minority (43%) agreed that "It is the responsibility of the website or app to control what is posted on their website", compared to just 23% who agreed that "It is the

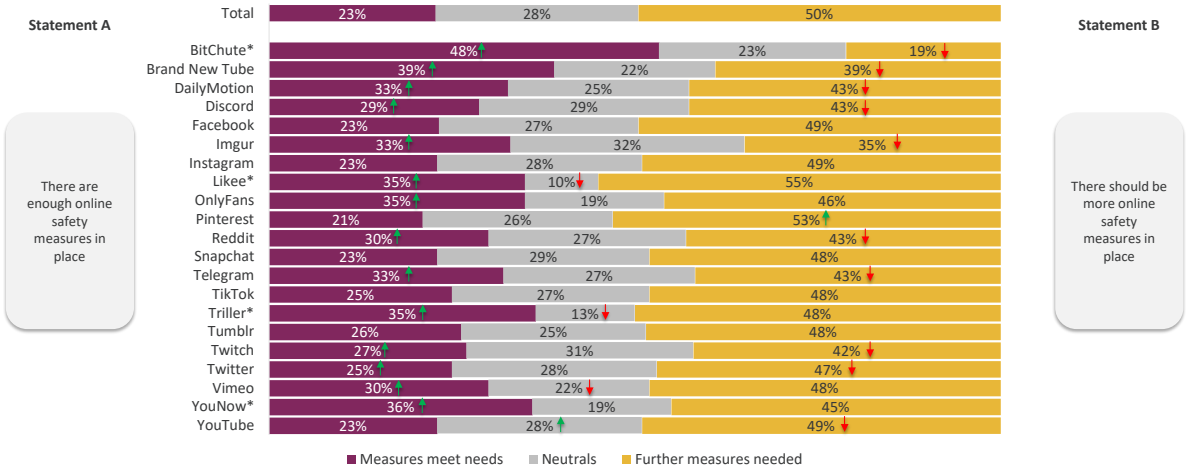
[199] TikTok, Bringing more context to content on TikTok, 12 April 2022.
[200] Pinterest, Transparency report, Q2 2021.
[201] Pinterest, Combating climate change misinformation on Pinterest, 6 April 2022.
[202] Ofcom, Adults' Media Literacy 2021: Core survey (see above) and Adults' Media Literacy Tracker 2020.

responsibility of the individual to ensure what they are posting is appropriate for other users", a substantial minority (34%) did not agree with either statement. This may suggest indecision or uncertainty as to where the responsibility lies, or it could indicate that respondents believe that the responsibility is shared equally.

Users of some smaller platforms are significantly more likely than users of large platforms to lean towards protecting free speech rather than strengthening user protection

Attitudes to online safety issues differ significantly among users of different platforms. Our Online Experiences Tracker shows that among users of the video-sharing platform BitChute the proportion who think that the current level of online safety measures is sufficient is more than twice as high as the average (48% vs 23%).[203] This proportion was also higher among the user base of Brand New Tube (55%), OnlyFans (35%), Imgur (33%), Telegram (33%), Vimeo (30%) and Discord (29%). Users of these platforms were also significantly more likely than average to agree that "the internet has an important role in supporting free speech" rather than a similar statement about prioritising the protection of users.

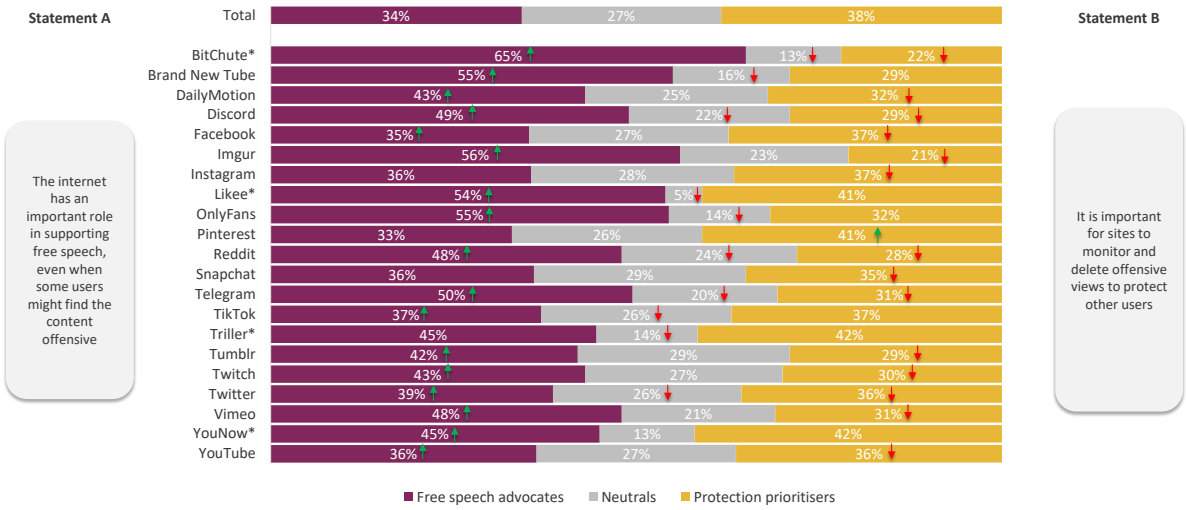
Figure 2.25: Proportion of UK users agreeing with opposing statements about sufficiency of current online safety measures[204]



Source: Ofcom, Online Experiences Tracker – Q1. Below are listed several pairs of statements. In each case, please indicate [on a scale of 1 to 10] which statement is closest to your own opinion on a scale, where 0 means complete agreement [with Statement A and 10 complete agreement with Statement B]. Base: UK internet users, aged 13+ (6,619). 'Measures meet needs' = respondents giving a response of 0, 1, 2 or 3. 'Neutrals' = respondents giving a response of 4, 5 or 6. 'Further measures needed' = respondents giving a response of 7, 8, 9 or 10. Arrows indicate that the figure is significantly higher/lower than the average, at 95% confidence.

[203] CAUTION: LOW BASE (<100). Data should be taken as indicative only.
[204] Platforms chosen by Ofcom for illustrative purposes, including some smaller platforms with significant difference from the average.

Figure 2.26: Proportion of UK users agreeing with opposing statements about balance between free speech and protection of users[205]



Source: Ofcom, Online Experiences Tracker – Q1. Below are listed several pairs of statements. In each case, please indicate [on a scale of 1 to 10] which statement is closest to your own opinion on a scale, where 0 means complete agreement [with Statement A and 10 complete agreement with Statement B]. Base: UK internet users, aged 13+ (6,619). 'Free speech advocates' = respondents giving a response of 0, 1, 2 or 3. 'Neutrals' = respondents giving a response of 4, 5 or 6. 'Protection prioritisers' = respondents giving a response of 7, 8, 9 or 10. Arrows indicate that the figure is significantly higher/lower than the average, at 95% confidence.

[205] Platforms chosen by Ofcom for illustrative purposes, including some smaller platforms with significant difference from the average.

3. Gaming

Introduction

Figure 3.1: UK gaming: 2021 key metrics

Key metrics	2021
UK adults aged 16+ who play games online	39%[1]
UK children aged 3-15 who play games online	56%[2]
Average time spent gaming in the last week by UK gamers aged 13-64 (Q4 2021)	7 hours 33 minutes[3]
UK gamers aged 13-64 subscribed to a gaming subscription service (Q4 2021)	58%[3]

Source: [1]Ofcom Adults' Media Literacy Tracker 2021: Core survey. [2]Ofcom's Children's and Parents' Media Literacy Tracker 2021: Online Behaviours and Attitudes survey. Base: All children aged 8-15 and all parents of children aged 3-7 (5,774). [3]Ampere Games – Consumer, Q4 2021, gamers aged 13-64, UK.

The increased time spent at home during the Covid-19 lockdown periods over the past couple of years has led to an increase in gaming activity. The pandemic increased the take-up of gaming across all demographics, but as the pandemic begins to abate the permanence of these gains will be tested. Globally, gaming has increased incrementally year on year, in numbers of gamers, revenue generated, and industry value. According to games market analysts NewZoo, in 2021 there were 3 billion gamers in the world, a 5.3% increase on 2020,[206] suggesting that the lockdown increases may be here to stay.

Gaming has grown in many ways, from traditional single and local multiplayer experiences, to online multiplayer gaming connecting users across the world, to the advent of live-service games[207] delivering frequent content updates to maximise engagement. A subsequent market has appeared around livestreaming, 'let's-play',[208] and discussions of games on services like Discord and Twitch.

This chapter sets out the online gaming landscape in the UK, before exploring online gaming communities, which are virtual groups of individuals brought together on an online platform to interact within games or discuss video games. These communities bring people with a shared interest together but can also lead to community members potentially experiencing harm. We examine the online business models and the rise of gaming subscription services, and conclude by exploring virtuality reality gaming (see the Online Landscape chapter for an overview of the metaverse).

[206] NewZoo, Global games market report, 2021.
[207] Live service games have a constant stream of new content added to the game post launch of game in order to maintain continue gameplay, unlike traditional single-player games, which can be completed in a set number of hours. Fortnite is an example of a live-service game.
[208] Let's Play is a video (or screenshots accompanied by text) documenting the playthrough of a video game, usually including commentary and/or a camera view of the gamer's face.

This chapter uses data from Ofcom's Adults' Media Literacy research and Children's and Parents' Media Literacy research, where people in the UK were asked about their gaming habits, whether on a console, a smartphone or another device. We also draw on third-party data, including Ampere's research. We use a broad definition of gaming and gamers, encompassing video games, apps and sites on phones, and desktop and virtual reality gaming. We do not cover casino, poker or other forms of gambling games that require wagering something of value, usually real money (rather than virtual currency) to win a prize.

Take-up and use

Gamers

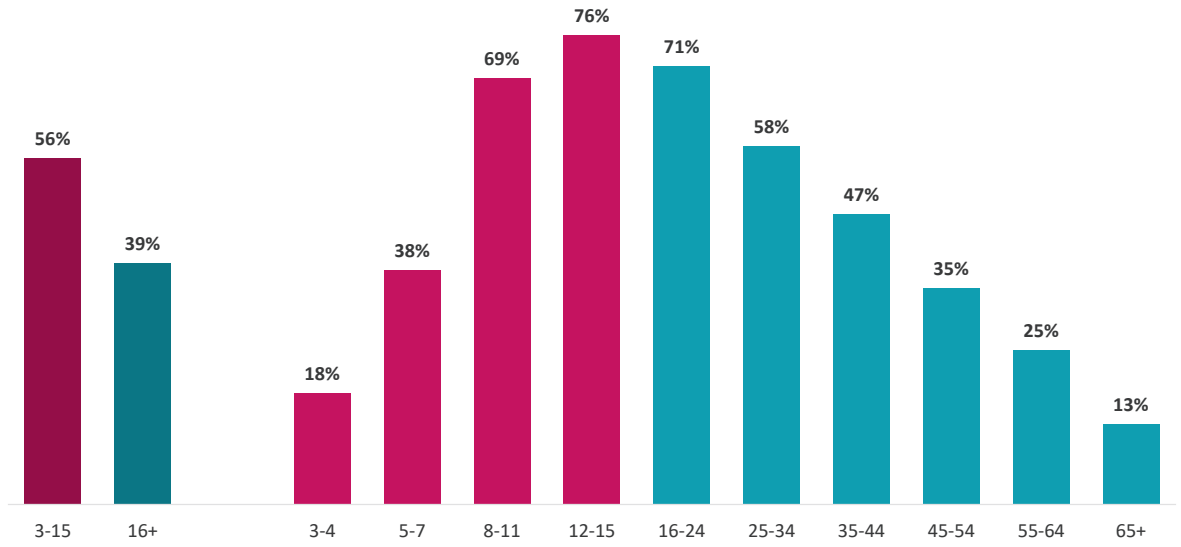
Thirty-nine per cent of UK adults aged 16+ play games online, as do 56% of UK children aged 3-15[209]

Fieldwork for Ofcom's Media Literacy research ran from October to December 2021, when lockdown restrictions had largely eased and other face-to-face social activities once again became possible. Nonetheless, the research found that gaming remained popular with 60% of UK adults aged 16+ and 91% of 3-15-year-olds stating that they played games on console, desktop or smartphone devices either on- or offline. Among gamers, most UK gamers play games online: 56% of UK adult gamers play games online, as do 66% of child gamers.[210]

UK Safer Internet Centre research found that for 65% of 8-17-year-olds, playing games online was an important part of their life in 2021, and that 70% of young people who played online games said they had enjoyed doing so more than ever in the past year.[211]

[209] Adults' Media Literacy Tracker 2021: Core survey; Children's and Parent's Media Literacy Tracker 2021: Online Behaviours and Attitudes.
[210] Adults' Media Literacy Tracker 2021: Core survey; Children's and Parent's Media Literacy Tracker 2021: Online Behaviours and Attitudes.
[211] UK Safer Internet Centre, All fun and games? Exploring young people's experiences of respect and relationships in online games, 8 February 2022.

Figure 3.2: UK individuals who play games online



Source: 3-15-year-olds: Ofcom Children's and Parent's Media Literacy Tracker 2021 – Online behaviours and attitudes. Base: All children aged 3-15 (5,861). 16+: Ofcom Adults' Media Literacy Tracker 2021: Core survey. G3A. Do you play games online? (single coded). Base: All adults (excluding those that did not give a response at the postal survey) (3656)

Time spent gaming

UK gamers aged 13-64 spent 7 hours 33 minutes a week gaming

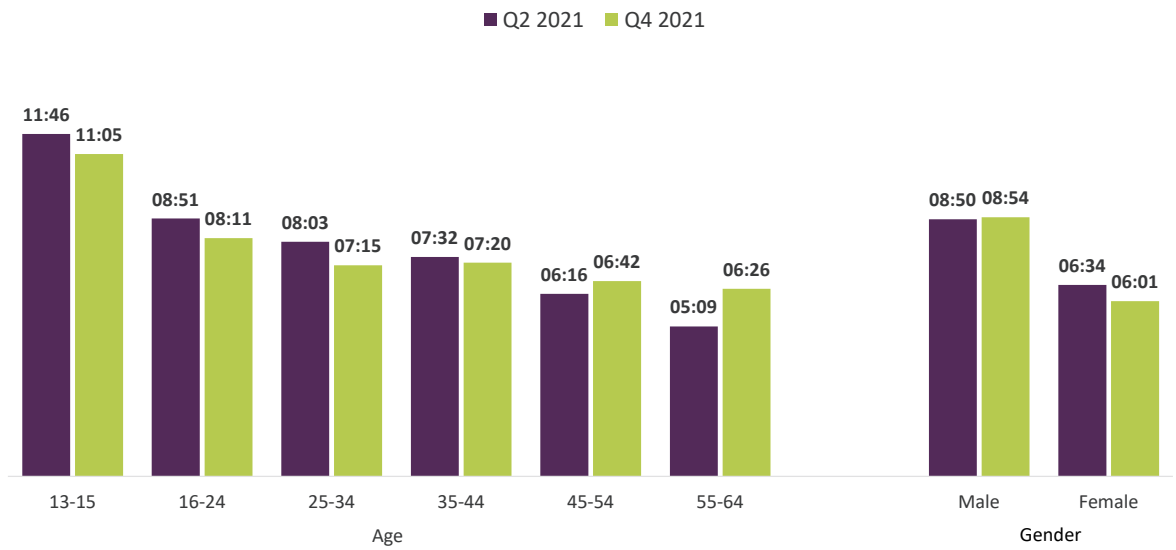
The time that gamers reported they spent gaming declined slightly from an average of 7 hours 43 minutes a week in Q2 2021 to 7 hours 33 minutes in Q4 2021. Compared with Q2 2021, younger gamers are spending less time gaming. In contrast, older gamers are playing for longer, with UK gamers in the 55-64 age group reporting an increase of 25% in the time they spent playing games in the previous week in Q4 2021 compared to Q2 2021.[212]

UK Safer Internet Centre research found that online gameplay had become increasingly important to children aged 8-17 during the pandemic. The vast majority (85%) of parents of children aged 8-17 said their child spent more time playing games online in 2021 than previously.[213]

Most adult gamers are comfortable with the amount of time they spend gaming, but 17% of adult gamers said they spent too much time playing games.[214]

[212] Ampere Games – Consumer, Q2 2021 & Q4 2021, gamers aged: 13-64, UK.
[213] UK Safer Internet Centre, All fun and games? Exploring young people's experiences of respect and relationships in online games, 8 February 2022.
[214] Ofcom Adults' Media Literacy Tracker 2021: Online Behaviours and Attitudes survey.

Figure 3.3: Average time spent gaming in the past week, UK (hours:minutes)



Source: Ampere Games – Consumer, Q2 2021 & Q4 2021, gamers aged: 13-64, UK.

Gaming devices

Smartphones are the leading gaming device among adults, while games consoles lead among children[215]

Thirty-seven per cent of UK adults use smartphones to play games; their near-ubiquitous adoption brings wide access to games apps and websites. Thirty per cent of adults use games consoles, which are more commonly used by younger adults: 60% of 16-24-year-olds use one, compared to 2% of those aged 65+.[216] Ninety-one per cent of children aged 3-15 play games on any device. Consoles are the leading gaming device among children aged 3-15 (59%), followed by tablet (54%); smartphone (53%); PC (31%); smart TV (10%) and 1% use a VR headset. Console usage among children is most common among 8-11-year-old boys (89%). Boys are significantly more likely than girls to play games on consoles (73% of boys, vs 44% of girls), desktops, laptops or netbooks (34% vs 29%) and virtual reality headsets (7% vs 3%).[217]

Research by CHILDWISE in 2021 found that 14% of children aged 5-16 have a Microsoft Xbox Series X or an Xbox Series S. Boys are twice as likely as girls (18% vs 9%) to have one at home, with ownership highest among 11-16-year-olds (20%). One in ten children have access to a PlayStation 5 at home, twice as many as last year (10%; 5% last year). Boys are again more likely than girls (12% vs 8%) to have access, and this also varies by age. One in three (34%) console-owning households have a Nintendo Switch (including Switch Lite). Boys and girls are equally likely to have access at home.[218]

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[215] Ofcom Adults' Media Literacy Tracker 2021: Core survey and Children's and Parent's Media Literacy 2021: Parents Only survey.
[216] Ofcom Adults' Media Literacy Tracker 2021: Core survey.
[217] Children's and Parent's Media Literacy 2021: Parents Only survey.
[218] CHILDWISE Monitor report 2022, fieldwork September 2021 to November 2021. For more information, please see: http://www.childwise.co.uk/.

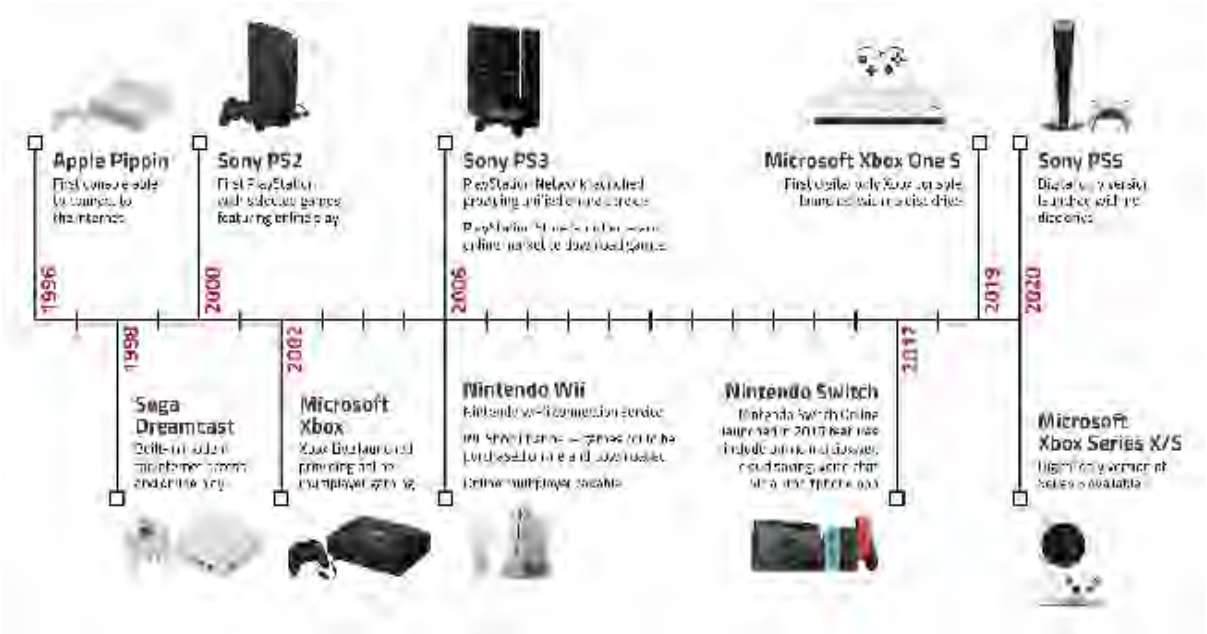
Digital-only versions of consoles, such as the PlayStation 5 or Xbox Series S, do not have a disc drive and therefore need an internet connection to buy digital games or access games on a streaming service.

Figure 3.4: Devices used to play games, by adult age and gender

			Age						Gender	
		Total	16-24	25-34	35-44	45-54	55-64	65+	Men	Women
	Base	3657	436	603	652	566	571	802	1749	1830
	Mobile phone/ smartphone	37%	50%	50%	47%	47%	28%	11%	33%	41%
	Games console/ player	30%	60%	55%	41%	23%	11%	2%	39%	22%
	Tablet	19%	18%	20%	22%	21%	19%	14%	16%	21%
	Laptop	14%	29%	19%	15%	11%	10%	6%	18%	11%
	Desktop computer	12%	23%	18%	15%	8%	7%	4%	18%	6%
	Smart TV	4%	7%	8%	7%	3%	1%	1%	5%	3%
	Virtual reality gaming headset	3%	6%	4%	6%	2%	1%	0%	4%	2%
	PLAYS GAMES ON ANY DEVICE	60%	88%	79%	73%	62%	47%	26%	63%	56%

Source: Ofcom Adults' Media Literacy 2021: Core survey and Children's and Parent's Media Literacy 2021: Parents Only survey
G1. Do you play games at home or elsewhere in any of these ways? (multi coded).
Base: All adults aged 16+ (excluding those that did not give a response at the postal survey) – 3657. All parents of children aged 3-15 (2,006)
Coloured boxes show differences (99% level) by age compared to all adults and between men and women

Figure 3.5: Timeline of online features introduced to games consoles



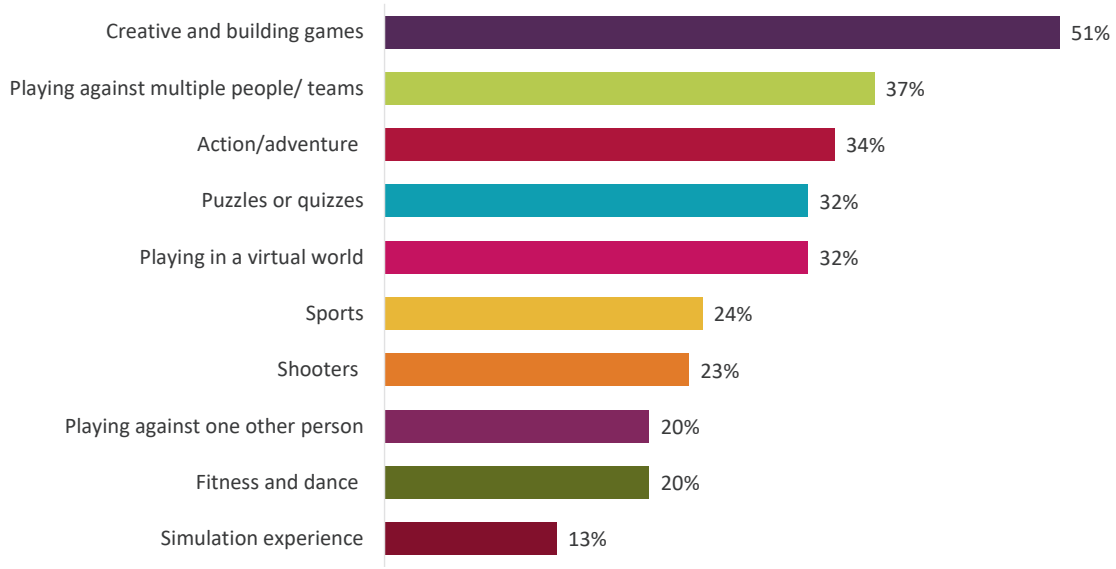
Source: Ofcom, from publicly available information

Genres

Half of the UK children who play games play creative and building games,[219] with *Minecraft* being the most popular game[220]

Creative and building games such as *Roblox* and *Minecraft* are the most popular games among children. This peaks among 8-11-year-old gamers, of whom 57% play such games, but declines to 47% by the age of 12-15.[221] Research by CHILDWISE found that *Minecraft* was the most popular game among 7-16-year-olds, with 40% stating that they had played the game in the past week. Fifty-two per cent of boys compared to 27% of girls said that they had played *Minecraft* in the past week. Play is highest among 9-10-year-olds (at 52%), with two in three boys this age playing (66%). Thirty-eight per cent of 7-16-year-olds said they had played Roblox in the past week, followed by 28% saying they played *Among Us*, the multiplayer social deduction game.[222]

Figure 3.6: Types of games 3-15-year-old child gamers play



Source: Ofcom Children's and Parents' Media Literacy 2021 – Online Behaviours and Attitudes survey. QP24/ G2. Which of the following types of games do they play? Base: All children aged 8-15 who play games and all parents of children aged 3-7 who play games (5,389).

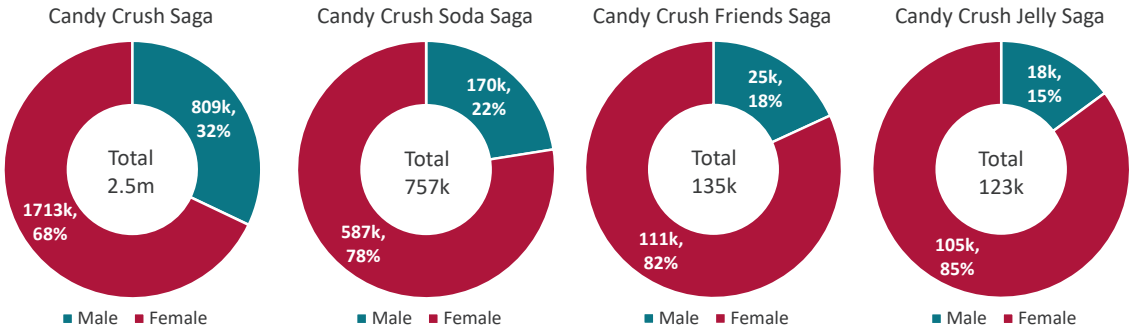
[219] Ofcom Children's and Parents' Media Literacy 2021: Online Behaviours and Attitudes survey.
[220] CHILDWISE Monitor report 2022, fieldwork September 2021 to November 2021. For more information, please see: http://www.childwise.co.uk/.
[221] Ofcom Children's and Parents' Media Literacy 2021: Online Behaviours and Attitudes survey.
[222] CHILDWISE Monitor report 2022.

Games apps and websites

Candy Crush Saga, released ten years ago, is the top-reaching games app, visited by an average of 1.2 million UK adults a day in February 2022[223]

Candy Crush Saga, the free-to-play puzzle video game released in April 2012, is the top-reaching games app on mobile devices in the UK. Free-to-play games are those which players do not have to pay to play; they are monetised through advertising or in-app purchases. In 2021, 20% of British adults said they played free-to-play games at least monthly.[224] *Candy Crush Saga,* the original Candy Crush game, was visited by 2.5 million adults in February 2022. It is popular with women; in February 2022 1.7 million women visited the app, making up 68% of its total UK adult visitors that month.[225] Since *Candy Crush Saga's* launch, other games have been released in the series; these have an audience reach of less than a million (see figure 3.7). In 2020 Candy Crush had more than 200 million monthly users globally and generated £921m in revenue.[226] In 2022 Microsoft agreed to buy the owner of Candy Crush, Activision Blizzard, for £51bn, the largest-ever sale in the gaming industry.[227]

Figure 3.7: UK mobile adult reach of Candy Crush franchise apps, by gender: February 2022



Source: © Ipsos, Ipsos iris Online Audience Measurement Service, Mobile app, 1 February – 28 February 2022, adults age: 15+, UK.

[223] © Ipsos, Ipsos iris Online Audience Measurement Service, Candy Crush Saga app, 1 February 2022 - 28 February 2022, adults age: 15+, UK.
[224] IPA TouchPoints 2021. Base: GB adults, age: 15+.
[225] © Ipsos, Ipsos iris Online Audience Measurement Service, Candy Crush Saga app, 1 February 2022 - 28 February 2022, adults age: 15+, UK.
[226] Activision Blizzard, Annual report 2020.
[227] Microsoft News Center, Microsoft to acquire Activision Blizzard to bring the joy and community of gaming to everyone, across every device, 18 January 2022.

Figure 3.8: Top ten games apps, by UK adult reach: February 2022

Rank	Gaming app	Total adult reach in February	Online adult reach in February	Average daily adult audience in February	Release date
1	**Candy Crush Saga**	2.5m	5.0%	1,211k	2012
2	**Pokemon Go**	1.6m	3.1%	725k	2016
3	**Roblox**	1.5m	3.0%	322k	2012
4	**Wordscapes**	1.4m	2.8%	579k	2017
5	**Solitaire - Grand Harvest**	1.4m	2.7%	660k	2017
6	**Google Play Games**	1.2m	2.3%	100k	2013
7	**Coin Master**	1.1m	2.1%	552k	2010
8	**Words with Friends – word game**	1.1m	2.1%	636k	2010
9	**8 Ball Pool**	1.0m	2.0%	313k	2010
10	**Royal Match**	0.8m	1.6%	400k	2020

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, Mobile app, 1 February 2022 – 28 February 2022, adults age: 15+, UK.
Note: Custom-defined list by Ofcom.

Wordle

In January 2022 the New York Times acquired Wordle "for a price in the low seven figures",[228] and in February took over the running of the game from its creator Josh Wardle.

Wordle is a free-to-play (at the time of writing) website-based word game, launched in October 2021. The game challenges players to guess a five-letter word, with only six attempts to get the correct answer. Only one word can be guessed each day, and the word is the same for every player. Wordle became popular after players began sharing their scores by text, email or on social media – in particular Twitter. The ability to share results without revealing the word of the day has fostered a Wordle community.

In the UK 8.4 million adults (17% of UK online adults) visited the game site in February 2022, with an average of 1.8 million daily adult visitors – about 4% of total daily internet adult users.[229] Powerlanguage.co.uk, the original game's URL, featured in the top 20 daily websites for audience reach.[230] The game has a higher reach among women (19% of UK online female adults) than men (15%).[231] Off the back of Wordle's popularity various spin-off versions have entered the market: Quordle, Nerdle, Worldle, Heardle, Taylordle, to name a few. The success of Wordle and the launch of spin-offs indicates that there is space for website-based games in the online market.

Gaming communities

Multiplayer games

60% of online adult gamers play with or against another gamer[232]

Gamers can play with or against other gamers online via consoles, or via apps and websites on smartphones or other internet-connected devices. More than seven in ten (72%) children aged 3-15 who play games online do so with or against other gamers whom they know, or have met in person, and 31% play with or against strangers or people they have not met in person.[233] The proportion of children playing games with or against strangers increases with age, peaking at 37% among 12-15s.[234] The ability to play with known people often depends on the gamer's contacts having access to the same game and device platform. Many games are increasingly using cross-play – a mechanism by which players on different platforms can play together (interoperability), reducing the friction of having access to a specific platform. *Final Fantasy XI* was the first game to allow gamers across

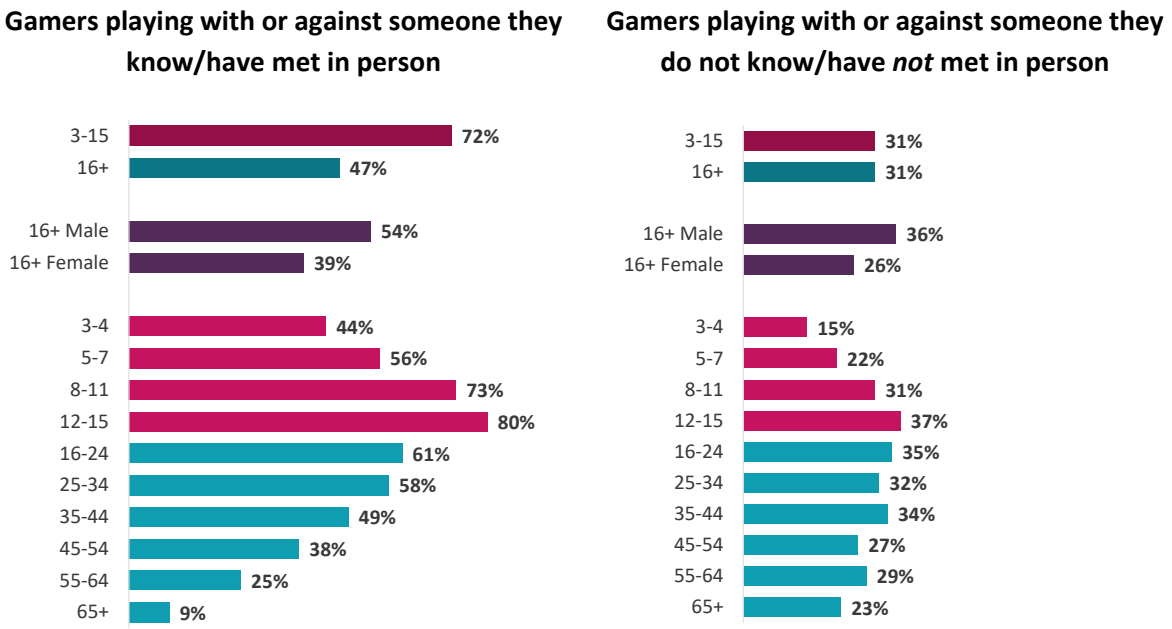
[228] The New York Times, The New York Times Buys Wordle, 31 January 2022.
[229] © Ipsos, Ipsos iris Online Audience Measurement Service, New York Times - Wordle, 1 February 2022 – 28 February 2022, adults age: 15+, UK.
[230] © Ipsos, Ipsos iris Online Audience Measurement Service, Daily dashboard, Powerlanguage.co.uk, 31 January 2022 – 8 February 2022, adults age: 15+, UK.
[231] © Ipsos, Ipsos iris Online Audience Measurement Service, New York Times - Wordle, 1 February 2022 – 28 February 2022, adults age: 15+, UK.
[232] Ofcom Adults' Media Literacy Tracker 2021: Online Behaviours and Attitudes survey.
[233] Ofcom Children's and Parents' Media Literacy 2021: Online Behaviours and Attitudes survey.
[234] Ofcom Adults' Media Literacy 2021: Online Behaviours and Attitudes survey and Ofcom Children's and Parents' Media Literacy 2021: Online Behaviours and Attitudes survey.

multiple platforms (Xbox 360, PS2 and PC) to play together.[235] *Fortnite* and Player Unknown's *Battleground* (PUBG) also use cross-play.

Just under a third of both online adult[236] and child gamers aged 3-15[237] play with someone they do not know. In multiplayer video games this is usually done using a player matchmaking process to connect players together for online play sessions. Fifty-three per cent of adult console gamers say that they play games with or against someone else. This is most likely among younger adults: 67% of 16-24-year-old console gamers say that they play with or against someone else, as do 35% of 55-64s. Adult console gamers are more likely to play with someone they have met in person rather than with a stranger (44% vs 31%).[238] Figure 3.9 shows gamers who play on consoles, PCs, mobiles or TV sets, and who play with people they have met, or not met, in person.

Playing games with others online can provide an opportunity to socialise and connect with others, which can have a positive impact on wellbeing. UK Safer Internet Centre's research in 2021 found that 70% of parents think online games have helped their child connect with their friends, and 60% of children aged 8-17 years old said that playing online games made them feel less lonely.[239]

Figure 3.9: Proportion of UK online gamers playing with or against other people

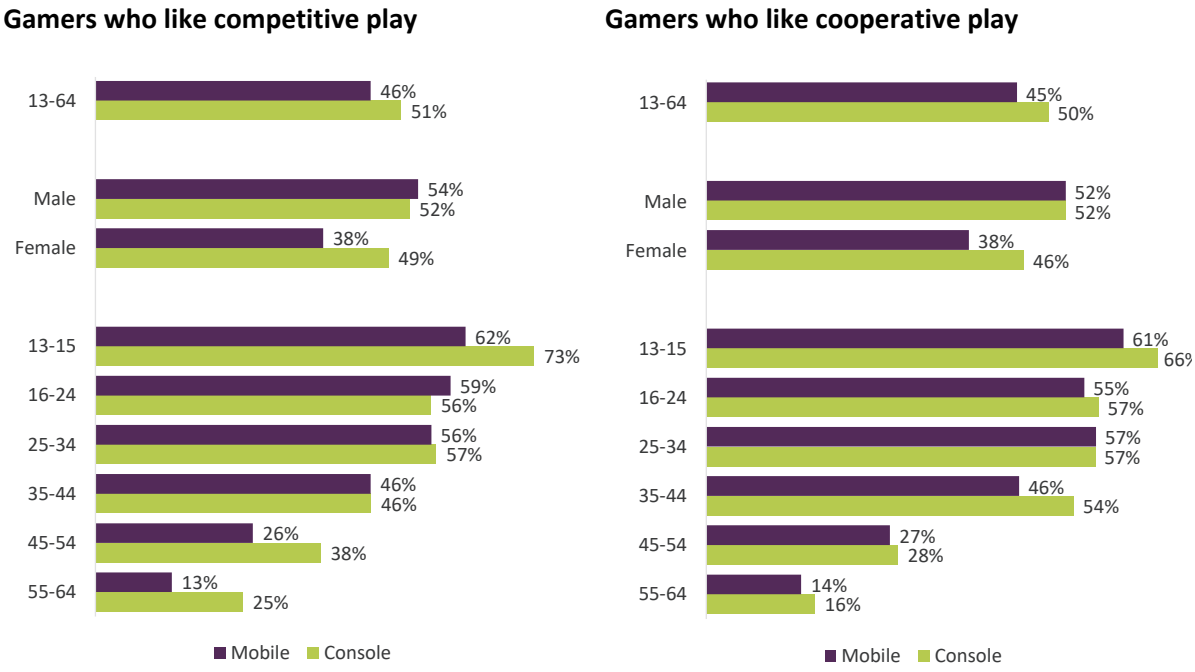


Source: Ofcom Adults' Media Literacy Tracker 2021: Online Behaviours and Attitudes survey and Children's and Parents' Media Literacy Tracker 2021: Online Behaviours and Attitudes survey (3,067)
G3B. When you play games online, which of these describe how you play? (MULTI CODE)
Base: All respondents who play games online (3101)

[235] Guinness World Records, First cross-platform online role-playing game, accessed 27 May 2022.
[236] Ofcom Adults' Media Literacy Tracker 2021: Online Behaviours and Attitudes survey.
[237] Ofcom Children's and Parent's Media Literacy 2021: Online Behaviours and Attitudes survey.
[238] Ofcom Adults' Media Literacy Tracker 2021. See interactive report for data by age.
[239] UK Safer Internet Centre, All fun and games? Exploring young people's experiences of respect and relationships in online games, 8 February 2022.

Playing with other gamers online can help build life skills. Competitive and cooperative games can, for instance, develop strategic thinking, teamwork, communication, leadership, and problem-solving. Forty-three per cent of UK gamers aged 13+ like competitive play, and the same is true for cooperative play (also 43%). Competitive play is particularly liked by 13-15-year-old gamers who use consoles, at 73%, while 66% of 13-15-year-old gamers who use consoles like cooperative play.[240] UK Safer Internet Centre's research in 2021 found both children and parents agreeing that online gaming can help children build skills. Specifically, 61% of parents and 66% of 8-17-year-olds agreed that playing games online has helped them to develop transferable skills, including concentration, teamwork, determination and problem solving.[241]

Figure 3.10: UK gamers aged 13-64 who like different types of play



Source: Ampere Games – Consumer, Q4 2021, gamers aged 13-64, UK. Note: Device use not exclusive.

Video streaming

58% of UK individuals aged 13-64 watch video-game-related content[242]

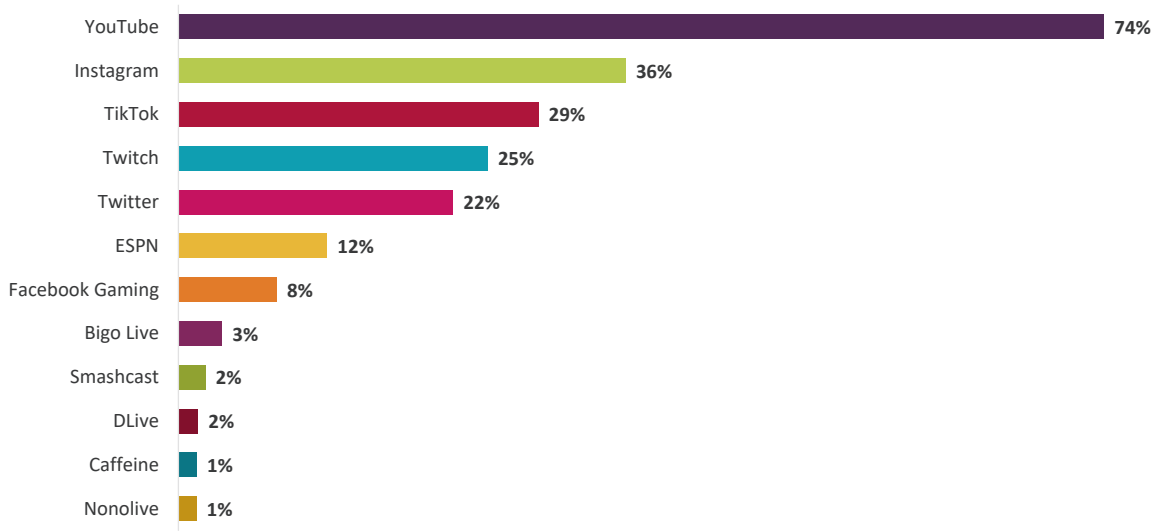
Gaming communities use a broad spectrum of adjacent platforms to reach out and interact with other gamers. Using social media to discover games, sharing and viewing gaming content, and engaging with influencers and other players all play a large part in the social gaming ecosystem.

Teenagers and young adults are the most likely to watch video-game-related content: 84% of 13-15-year-olds and 90% of 16-24-year-olds say that they do this.[243] Thirty-seven per cent of UK 13-64-

[240] Ampere Games – Consumers, Q4 2021, gamers aged: 13-64, UK. Note: Device usage not exclusive.
[241] UK Safer Internet Centre, All fun and games? Exploring young people's experiences of respect and relationships in online games, 8 February 2022.
[242] Ampere Games – Consumer, Q4 2021, age: 13-64, UK.
[243] Ampere Games – Consumer, Q4 2021, age: 13-64, UK. See interactive report for age breaks.

year-olds who use video platforms to watch games-related content do it to feel part of a gaming community; 54% of 16-24 years old viewers stated this as a reason.[244] YouTube, Instagram and TikTok – platforms with a wide range of content – are the most used for gaming content, ahead of the gaming-first platform Twitch. In December 2021 YouTube announced that the 12 years' worth of content on its platform relating to the Microsoft-owned video game *Minecraft* had been viewed one trillion times, making it the most-watched game on the platform.[245] For publishers, there is potential in leveraging an audience of advocates to build buzz around games and increase engagement.

Figure 3.11: Video platforms used for gaming content (% of those who watch video game content including esports)



Source: Ampere Games – Consumer, Q4 2021, age 13-64, UK
Base: % of those who watch video game content including esports

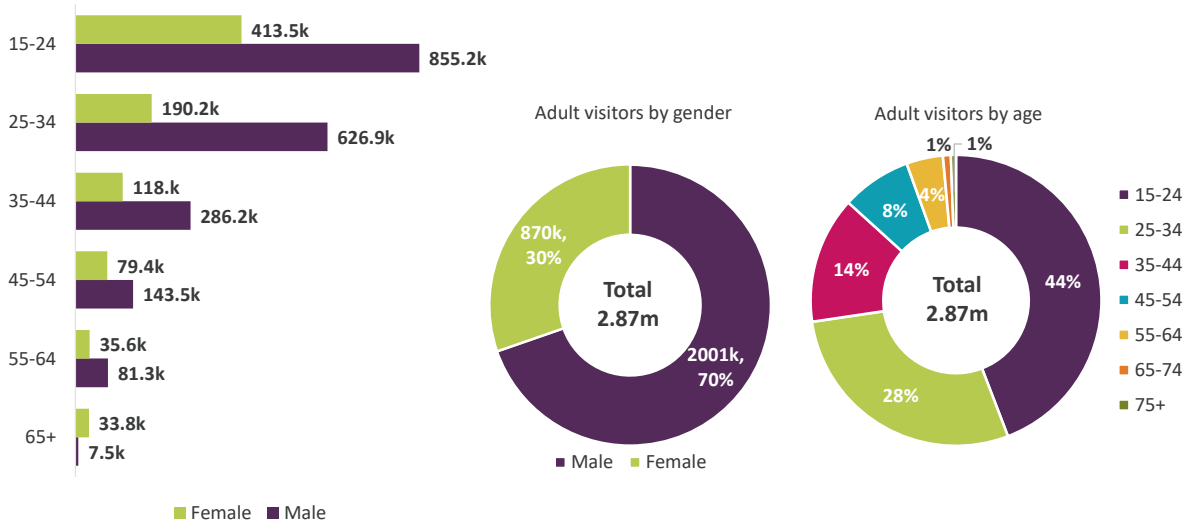
2.9 million adults visited Twitch in September 2021[246]

Twitch is the live video-streaming service focusing on video game live streaming, including broadcasts of esports competitions, but also offering music and other creative broadcasts. Unlike YouTube, Instagram and TikTok, Twitch also offers monthly free games and in-game items and is integrated with Amazon Prime gaming.[247] Twitch had 8.5 million channels streaming monthly in 2021; 1460 billion minutes of content was viewed on Twitch globally in 2021, up by 31% since 2020.[248] UK adults using Twitch spent an average of 1 hour 39 minutes on the platform via desktop, laptop or mobile devices in September 2021; 70% of its UK adult audience are male (see figure 3.12),

[244] Ampere Games – Consumer, Q4 2021, age: 13-64, UK.
[245] YouTube Culture and Trends, One trillion Minecraft views, 15 December 2021.
[246] © Ipsos, Ipsos iris Online Audience Measurement Service, Mobile app, 1 September – 30 September 2021, adults age: 15+, UK.
[247] Prime gaming, accessed 22 March 22.
[248] TwitchTracker, Twitch achievements through the years, accessed 22 March 22.

although Twitch's female audience spend more time on the platform: women spent an average of 2 hours 8 minutes in September 2021 compared to 1 hour 27 minutes spent by UK men.[249]

Figure 3.12: UK online adult reach for Twitch in September 2021



Source: © Ipsos, Ipsos iris Online Audience Measurement Service, Twitch (WG), 1 September – 30 September 2021, adults age: 15+, UK.

Steam, a video game distribution service, also offers video streaming and social networking. Of the 2.6 million UK adults who visited Steam in September 2021 (5% of UK online adults), 80% were male.[250]

Gaming communication

Communication platform Discord, popular for games-related chat, was visited by 11% of UK online adults in September 2021[251]

Discord is a group-chat platform, originally built for gamers, that has become a general-use platform for many kinds of communities. Discord is divided into servers, each of which has its own members, topics, rules, and channels.[252] The vast majority of servers are private, invitation-only spaces for groups of friends and communities. There are also larger, more open communities, generally centered around specific topics such as popular games like *Minecraft* and *Fortnite*. All conversations are opt-in, to give users control over who they interact with.[253] Game developers also use Discord to communicate directly with players.[254] In the UK, Discord was visited by 11% of online adults in

[249] © Ipsos iris Online Audience Measurement Service, Twitch (WG), 1 September – 30 September 2021, all adults age: 15+, UK.
[250] © Ipsos, Ipsos iris Online Audience Measurement Service, Steam (BG), 1 September – 30 September 2021, all adults age: 15+. UK.
[251] © Ipsos, Ipsos iris Online Audience Measurement Service, Discord Inc (ORG), 1 September – 30 September 2021, all adults age: 15+. UK.
[252] Business Insider, What is Discord? A guide to the popular group-chatting app, 24 March 2021.
[253] Discord, What is Discord?, accessed 23 March 2022.
[254] Discord, How To Build An Active And Engaged Indie Game Community With Discord, 7 December, 2016.

September 2021 and is particularly popular with online 15-24-year-olds, of whom 32% visited the platform.[255]

Reddit is a collection of discussion forums where users can share news and content or comment on other users' posts. It is divided into many communities, known as subreddits, each covering a different topic. Gaming is the fourth most subscribed-to subreddit with 32 million global subscribers.[256] In the UK 14.1 million adults visited Reddit in September 2021; 61% of its audience were male and 39% female.[257]

75% of online gamers aged 8-17 chat in a game to other people who are playing, through messaging or by using a microphone / headset

The activity of chatting with others increases with age, with 70% of 8-11-year-old online gamers saying they do this, compared to 80% of 16-17-year-old gamers. Eighty-eight per cent of the gamers aged 8-17 who chat with other people chat to friends, or people they know outside the game, while 44% chat to people that they only know through playing the game.[258] In 2021 61% of 8-17-year-olds described how playing games online has helped them to spend more time with their friends online than in real life, and 70% of parents agree that online games have helped their child to connect with their friends over the past year.[259]

PlayStation and Xbox also have their own apps which can be used for messaging and voice chats. 1.1 million and 1.0 million UK online adults respectively visited the PlayStation and Xbox apps on smartphone or tablets in September 2021. The majority of the adult users of these two apps were male (80% PlayStation and 74% Xbox).[260]

Gaming and wellbeing

Gaming can be used to regulate mental health, but it does have pitfalls

As well as providing entertainment, gaming can provide stress relief or be used as a form of escapism. A study conducted by Oxford University in 2020 found that time spent playing games is positively associated with wellbeing.[261] UK Safer Internet Centre's research found that the majority of young people reported positive and enjoyable experiences of online gaming. Over half of 8-17-year-olds (58%), say that playing games online changes their mood positively, 59% say it makes them

[255] © Ipsos, Ipsos iris Online Audience Measurement Service, Discord Inc (ORG), 1 September 2021 – 30 September 2021, adults age: 15+, UK.
[256] Metrics for Reddit, Top Subreddits, accessed 21 March 2022.
[257] © Ipsos, Ipsos iris Online Audience Measurement Service, Reddit Inc (ORG), 1 September 2021 – 30 September 2021, adults age: 15+, UK.
[258] Ofcom Children's and Parent's Media Literacy: Online Behaviours and Attitudes survey.
[259] UK Safer Internet Centre, All fun and games? Exploring young people's experiences of respect and relationships in online games, 8 February 2022.
[260] © Ipsos, Ipsos iris Online Audience Measurement Service, PlayStation app and Xbox app, 1 September 2021 – 30 September 2021, adults age: 15+, UK.
[261] Oxford University, Video game play is positively correlated with well-being, November 2020.

feel good about themselves and 71% of children who play online games say doing so makes them feel relaxed and happy.[262]

However, many young people who play online games have also had a negative gaming experience: 68% have experienced offensive or mean comments from other players and 67% say they have had rude comments from people they don't know.[263]

Some video game streamers do it as their full-time job and earn via direct advertising revenue, such as product placements or sponsorships, merchandising, tips/gifts from viewers and/or from the platforms themselves. But concerns have been raised about the length of time some streamers spend broadcasting and the impact on their mental health. One Twitch streamer reported that spending 60+ hours a week streaming led to anxiety, a loss of confidence and symptoms of agoraphobia. In January 2022 Twitch stated that it was "developing targeted programming to support Twitch streamers with challenges like burnout, boundary-setting, and other pressures that come with a career in online content creation."[264]

Ofcom's Online Experience Tracker research of UK people aged 13+ found that 2% of those who had experienced a potential harm online experienced their most recent potential harm on a gaming website or app.[265] The most common potential harms experienced on gaming websites or apps were generally offensive or 'bad' language (e.g. swearing or rudeness) followed by intentional harassment during gaming, sometimes known as griefing.[266]

Market context and business model

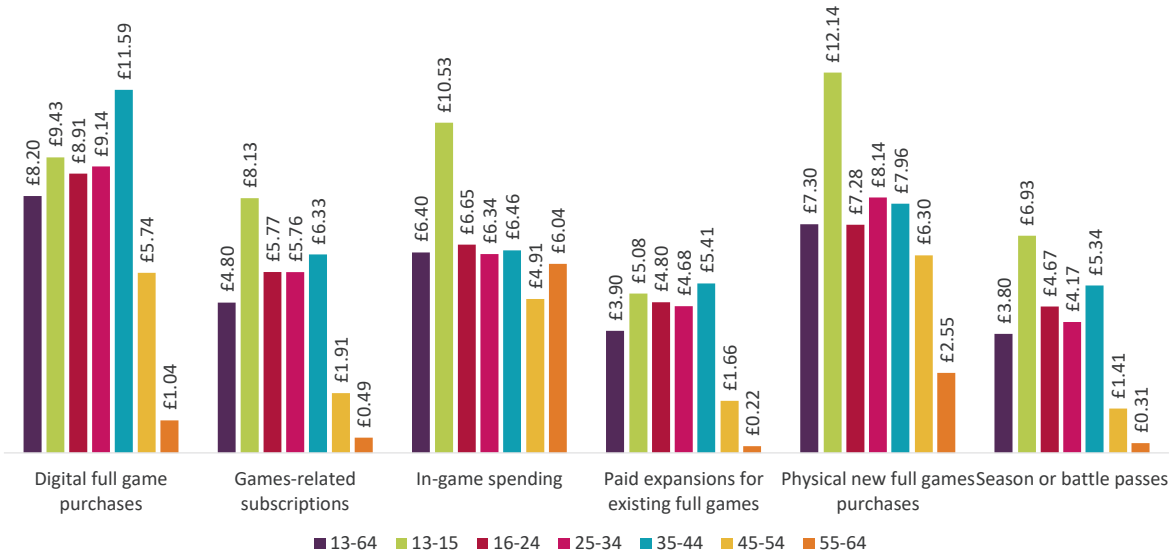
Gaming revenue in the UK reached £7.16bn in 2021

The UK consumer games market was valued at £7.16bn in 2021, up 2% from £7bn in 2020.[267] UK gamers are on average spending more on digital than physical game purchases. Research by Ampere found that UK gamers aged 13-64 spent on average just under £30 on digital games related purchases in the 30 days leading up to the survey. Digital games are purchased online via a digital store and downloaded, in contrast to physical games on discs or cartridges. This indicates the increasing need to access the internet in order to play games, whether to buy games, for in-game spending or to play with other gamers via subscription services. 13-15-year-old gamers on average spent almost £11 on in-game spending during the month, almost double the average for UK gamers.[268]

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[262] UK Safer Internet Centre, All fun and games? Exploring young people's experiences of respect and relationships in online games, 8 February 2022.
[263] UK Safer Internet Centre, All fun and games? Exploring young people's experiences of respect and relationships in online games, 8 February 2022.
[264] BBC News, Twitch: Concerns over streamers' mental health, 28 January 2022.
[265] Ofcom, Online Experiences Tracker. Q21. What type of site or service were you using when you experienced…?
[266] Ofcom Online Experience Tracker 2021. CAUTION: low base (<100). A griefer is a player in a multiplayer video game that goes out of his or her way to annoy other players.
[267] Annual valuation report released by trade body, the Association for U.K. Interactive Entertainment (Ukie)
[268] Ampere Games – Consumer, Q4 2021, gamers aged: 13-64, UK.

Figure 3.13: UK 13-64-year-old gamers' average spend on games and related products in the past month: Q4 2021



Source: Ampere Games – Consumers, Q4 2021, gamers aged 13-64, UK

58% of UK gamers aged 13-64 subscribe to a gaming subscription service[269]

Cloud gaming is a method of playing video games using remote servers in data centres; the games do not need to be downloaded or installed on a PC or console. The streaming services use an internet connection to send the gaming information to an app or browser installed on the recipient's device. The game is rendered and played on the remote server, but the gamer sees and interacts with everything locally on their own device.[270] By the end of 2021 there were 2.1 million UK paying subscribers to cloud services capable of streaming games (this figure increases to 2.9 million users when including those who access the free GeForce Now and Google Stadia tiers).[271] Microsoft in its Q3 earnings call said that globally 10 million people had streamed games over Xbox Cloud Gaming which is available as part of its Xbox Game Pass Ultimate tier.[272] Subscription service PlayStation Now is the most popular cloud gaming subscription service in the UK.[273]

Figure 3.14: Reach to UK gamers aged 13-64, by subscription type

Content streaming only	Content download only	Content download and streaming	Platform (online multiplayer)	PC in the cloud
8%	20%	12%	23%	4%

[269] Ampere Games – Consumers, Q4 2021, gamers aged: 13-64, UK.
[270] Digital trends, What is cloud gaming?, 29 March 21.
[271] Ampere Games – Subscription. Cloud services included: Xbox Game Pass Ultimate, PlayStation Now, Google Stadia & Nvidia GeForce Now.
[272] Microsoft, Microsoft Fiscal Year 2022 Third Quarter Earnings Conference Call , 26 April 2022.
[273] Ampere Games – Consumers, Q4 2021, gamers aged: 13-64, UK.

Source: Ampere Games – Consumer, Q4 2021, gamers aged 13-64, UK. See figure 3.15 for examples of subscription service types. PC in Cloud subscriptions lets users access a virtual computer where they can install their existing games from existing digital distribution platforms, and play them remotely example includes GeForce Now.

Amazon's Prime Games service, where users can download and install games, was the highest-reaching subscription service in Q4 2021 that was not linked to a games console ownership.[274] In March 2022 Amazon launched Amazon Luna, its cloud-based gaming subscription service, in the USA after being available by invite only for the past couple of years. Amazon Luna offers games through its channels, and its subscribers can broadcast live to Twitch.[275] Cloud-gaming subscription services that are not tied to a console could make gaming more accessible, as it removes the requirement to purchase a dedicated gaming device and can instead be accessed through connected devices such as Fire TV using an iPhone or Android phone as the controller.

Another example of leveraging internet connected devices came from Samsung at the Consumer Electronics Show 2022, where Samsung showcased its *Samsung Gaming Hub* – a section of the menu system on some of its 2022 smart TV models that will include the gaming libraries of Google Stadia, Nvidia GeForce Now and Utomik.[276]

In November 2021, Netflix made several mobile games accessible to all its customers at no extra cost, which in the UK equates to it being available in 16.5 million households.[277] Ofcom's video-on-demand survey, conducted in February 2022, found that 54% of people aged 13+ who have used Netflix in the past three months are aware that Netflix offers games, 8% have played a Netflix game, and 5% say they have played one of the *Stranger Things* games.[278]

Apple also offers mobile-first games. For £4.99 per month, Apple Arcade offers 200 premium games and can be shared by the subscriber with up to five other family members, using Family Sharing with one all-inclusive subscription.[279] Apple Arcade games do not include advertising or any in-app microtransactions.[280] Most of the iOS app store revenue is generated from games, so Apple's move into gaming could be lucrative.

PlayStation Plus was the most popular paid-for gaming subscription in the UK with 3.2 million subscribers at the end of 2021, followed by Xbox Game Pass (all versions) (2.6 million), Xbox Live Gold (1.5 million) and Nintendo Switch Online (1.49 million).[281] PlayStation announced that in June 2022 it would expand its PlayStation Plus service, merging PlayStation Now and offering three tiers of PlayStation Plus: Essential, Extra, and Premium. The Essential version is the PlayStation Plus that

[274] Ampere Games – Consumers, Q4 2021, gamers aged: 13-64, UK.
[275] Amazon, Amazon Luna Cloud Gaming Service Now Available to Everyone in Mainland U.S. with Unique Offer for Amazon Prime Members, 1 March 2022.
[276] Samsung at CES 2022, YouTube: A next-level experience: Samsung gaming hub and odyssey ark, 5 January 2022.
[277] BARB Establishment survey Q4 2021.
[278] Ofcom VoD survey February 2022. Full research to be published alongside Ofcom's Media Nations report in August 2022.
[279] Apple Newsroom, Apple services enrich peoples' lives throughout the year, 10 January 2022.
[280] Apple, Apple Arcade, accessed 8 April 2022.
[281] Ampere Games–Subscription.

subscribers know today, offering two monthly downloadable games, cloud storage, and access to online multiplayer.[282]

Figure 3.15: Reach of top ten gaming subscription services to UK 13-64-year-olds: Q4 2021

Rank	Subscription type	Service	UK 13-64-year-old reach
1	Online console multiplayer gaming	PlayStation Plus	14%
2	Online console multiplayer gaming	Nintendo Switch Online	10%
3	Content and cloud streaming	PlayStation Now	7%
4	Content	Xbox Game Pass (Console)	6%
5	Content and cloud streaming	Xbox Game Pass Ultimate	6%
6	Content	Prime Gaming	6%
7	Content	EA Play for Xbox	5%
8	Cloud streaming	Google Stadia / Stadia Pro	5%
9	Online console multiplayer gaming	Xbox Live Gold	5%
10	Content	Apple Arcade	3%

Source: Ampere Games – Consumer, Q4 2021, age: 13-64, UK. Note: see interactive report for further services.

Just over a quarter of 13-64-year-old gamers said they had unsubscribed from a games subscription service

Twenty-six per cent of 13-64-year-old gamers said they had unsubscribed from a games subscription service which offered a games catalogue, such as Apple Arcade. The most-cited reason for doing this was due to friends being on other services; 37% of 13-64-year-olds who had unsubscribed to such services cited this as their reason. Of those who unsubscribed from Apple Arcade, 31% gave this as their reason. In contrast, those who cancelled their subscriptions for online multiplayer/platform services linked to consoles (PS Plus, Xbox Live Gold, Switch Online) did so because they were not using the service (24%), and for platform and content services (e.g. PS Now, Game Pass) the most-cited rationale was that they "couldn't afford it" (23%).[283]

Virtual reality gaming

42% of 13-64 year old gamers have played VR games using a headset. PlayStation VR is the most popular VR headset in the UK[284]

Metaverses, in their broadest sense, are persistent 3D virtual spaces in which users can interact with computer-generated environments and other users. Today's live-service games such as *Fortnite*, *Roblox*, and *Minecraft* have been regarded as early or proto metaverses as players have freedom to explore and interact at their own pace, in a virtual world that evolves through frequent developer updates or is shaped by players building their own content and experiences to share with other

[282] PlayStation Blog, PlayStation Plus and PlayStation Now come together; players can choose from three flexible options, 29 March 2022.
[283] Ampere Games – Consumer, Q4 2021, age: 13-64, UK.
[284] Ampere Games – Consumer, Q4 2021, gamers aged: 13-64, UK.

players. Metaverses seek to build upon these games by providing tools and technologies to facilitate the building of new use cases for a broader audience.

Augmented reality (AR) is technology that overlays digital content onto a real-world environment. This digital content can include a combination of video, text, and graphics. In 2021, 5% of British adults said they played AR games at least monthly.[285] Microsoft HoloLens, Snapchat and Pokemon Go are examples of products and services that leverage AR technology.

In contrast, virtual reality (VR) employs headsets to immerse users within entirely computer-generated environments, with scenes and objects that can be viewed, as well as interacted with, through controllers, and spatial and motion-tracking technologies. Three per cent of adults play games on a VR headset.[286] Tethered VR headsets require a constant connection to an external processing device such as a computer or video game console. For example, PlayStation VR must be tethered to a PlayStation 4 or 5 console, while the Oculus Rift and HTC Vive must be tethered to a PC. The PlayStation VR headset, launched in 2016, is currently the UK market leader, having been used by 14% of UK gamers, while 10% of gamers have used the Meta-owned Quest headset.[287]

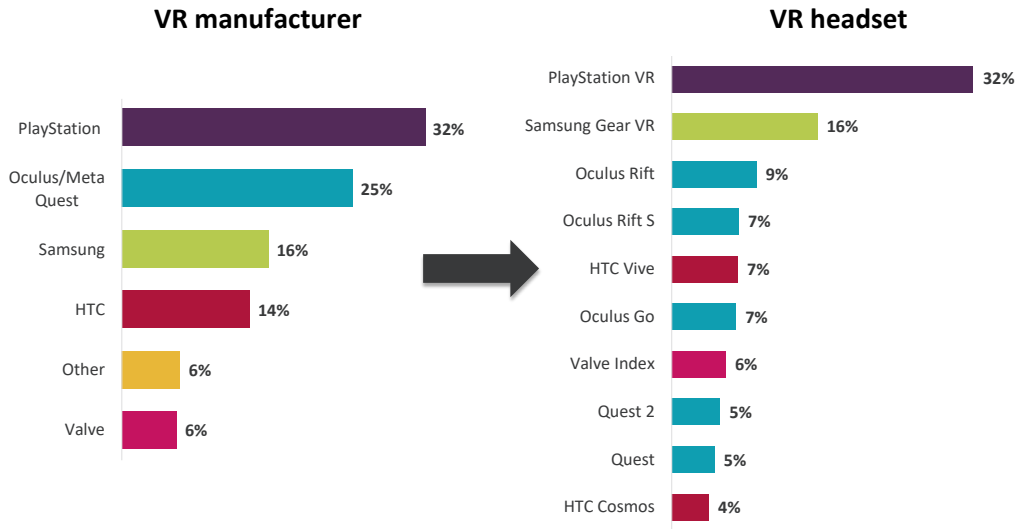
There are two types of untethered headsets. Firstly, there are standalone VR headsets, which do not require a computer or smartphone to deliver the VR experience but instead have purpose-built hardware with all the necessary components such as the screen, processor, and sensors built into the headset itself. Secondly, mobile VR users can attach their smartphones into the headset case, using the smartphone screen, sensors, and processing capability as a virtual reality headset. Examples include Google Cardboard and Samsung GearVR. Due to the ubiquitous nature of smartphones, this can make VR more accessible; mobile VR headsets are cheaper than tethered or standalone VR headsets. Twenty-five per cent of UK gamers use a tethered VR headset, while 7% use untethered headsets like the Quest 2 and Samsung Gear VR.[288]

Among VR gamers, 32% use the PlayStation VR headset, up by 6 percentage points since Q4 2020, overtaking Oculus headsets which were the most popular in Q4 2020.[289] However, adoption has been slow; less than 5% of PlayStation 4 and 5 owners have a PSVR headset.[290] This may change, as Sony announced at the Consumer Electronics show 2022 that it would be releasing the PlayStation VR2.[291] Consumer adoption of VR headsets is still in its infancy, which could be due to various factors: the current absence of compelling games; headsets not reasonably fitting all users well and therefore being potentially uncomfortable to use; and tethered headsets being an additional cost on top of a console or another computing device. However, with the largest online companies investing in gaming and the metaverse, this is an area that may experience increase take-up and attract new entrants. 2022 will see the release of Meta's higher-end VR headset – Meta Quest 2 Pro, Apple is

[285] IPA TouchPoints 2021. Base: GB adults, age: 15+.
[286] Ofcom Adults' Media Literacy Tracker 2021: Core survey.
[287] Ampere Games - Consumer, Q4 2021, gamers aged: 13-64, UK.
[288] Ampere Games - Consumer, Q4 2021, gamers aged: 13-64, UK.
[289] Ampere Games - Consumer, Q4 2020 & Q4 2021, VR gamers aged: 13-64, UK.
[290] Ampere Games - Consumer, Q4 2021, 13-64-year-olds, UK.
[291] Sony at CES 2022.

rumoured to be launching an Apple AR/VR headset in 2022[292] and Google is reportedly working on its AR headset, internally codenamed Project Iris.[293]

Figure 3.16: VR manufacturers and VR headsets for gaming, by reach to UK VR gamers: Q4 2021



Source: Ampere Games – Consumer, Q4 2021, 13-64-year-olds, UK. Base: UK VR gamers. Note: Meta has rebranded Oculus to Meta Quest

As metaverses develop, user safety may need to be addressed

The terms of service for the Meta Quest headset require users to be aged 13 or over. Similarly, the PlayStation VR states that it is not for use by children under the age of 12.[294] In March 2022 Meta Quest announced that it would begin rolling out VR parental supervision tools for all its Quest headsets, with the plan to provide "platform-level controls for parents and teens ages 13+". Meta plans to expand the functionality of its existing unlock pattern on Quest headsets. An 'unlock pattern' operates like a password; the headset user draws a pattern to unlock their device or access certain features and prevent others without permission from accessing the device or saved passwords.[295] The unlock pattern can be used to lock specific apps directly from VR. Once a given app is locked, the headset user will need to draw the set unlock pattern to unlock and launch it. This provides parents with a tool to prevent teens aged 13+ from accessing games and experiences that are not age-appropriate, using an unlock pattern to lock access to those apps. In addition, Meta Quest will automatically block teens aged 13+ from downloading or purchasing age-inappropriate rated apps in the Quest Store.[296] However, age inappropriate and potentially harmful behaviour by other users can occur even on platforms which have a low age rating.

[292] Tech Advisor, Apple AR/VR headset: Everything you need to know, 8 March 2022.
[293] The Verge, Google is building an AR headset, 20 Jan 2022.
[294] PlayStation, PlayStation VR, accessed 8 April 2022.
[295] Meta Quest, Managing your unlock pattern with Meta Quest 2 and Quest headsets, accessed 12 May 2022.
[296] Oculus Blog, Introducing future VR parental supervision tools to help support families, March 2022.

The Lego Group and Epic Games announced in April 2022 that they had formed a partnership to create a place for children to play in the metaverse. The announcement stated that the companies had agreed to ensure that they create digital spaces that protect children's right to play by making safety and wellbeing a priority, safeguarding children's privacy and providing children and adults with tools that give them control over their digital experience.[297]

[297] Epic Games, The LEGO Group and Epic Games Team Up to Build a Place for Kids to Play in the Metaverse, 7 April 2022.

4. Communications services

Introduction

Figure 4.1: UK online communications services: 2021 key metrics

	2021
Adults (16+) who use online platforms to send messages or make calls	94%[1]
Children (3-15) who use online platforms to send messages or make calls	77%[2]
UK WhatsApp adults aged 15+ – reach in September 2021	82% (41 million)[3]
UK online adults aged 15+ – reach of email platforms in September 2021	82%[3]
UK online adults aged 15+ – reach of dating platforms in September 2021	10%[3]

Sources: [1]Ofcom Adults' Media Literacy 2021: Online Behaviours and Attitudes survey. Base: All adult internet users aged 16+, Wave 1 - 3552, Wave 2 – 3014. [2] Ofcom Children's and Parents' Media Literacy 2021: Online Behaviours and Attitudes survey (5,861)*; [3] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021- 30 September 2021, all adults age: 15+, UK.*

Online communications services comprise a wide range of apps and websites, including messaging and call platforms like WhatsApp and Telegram, email like Gmail and Hotmail, and dating services like Tinder and Bumble. Many of these services offer functions that are not available through traditional telephony, such as group chat or message boards, and they can also be lower-cost alternatives to phone calls or text messages. Since the start of the Coronavirus pandemic, the use of online communications services to keep in touch with friends and family, and for work and education, has increased.

While these services are an intrinsic part of our daily interactions, challenges exist in relation to the interoperability of the services and ensuring user safety. The ability to connect immediately with strangers via random chat and online dating sites, although playing an important role in building connections, also creates safety risks. Additionally, the move towards greater levels of encryption within many online communications services has implications for some existing measures taken to protect consumers, raising questions on how best to balance user privacy and security with user safety.

This chapter focuses on the online services that consumers use to communicate as an alternative to more traditional fixed and mobile communications services. Here, we define an online communications service as a service which is used to communicate directly with a specific person or group of people and has at least one of the following features: online voice calling, video calling, or other direct instant messaging functionality (such as text, photos, videos or voice messages), and web-based email. Communication services known to be used for gaming chat, such as Discord, are discussed in the Gaming chapter.

Figure 4.2: Summary of selected* online communications services' functionalities

Parent company	Service	Voice calling	Video calling	Text messages or chat	Group chat/calling	Image/video messages
Alphabet	Google Chat	✓	✓	✓		✓
Alphabet	Google Meet	✓	✓			✓
Alphabet	Google Messages			✓		✓
Apple	Facetime	✓	✓		✓	
Apple	iMessage			✓		✓
Bytedance	TikTok			✓		
Discord Inc	Discord	✓	✓	✓	✓	✓
Meta	Facebook Messenger	✓	✓	✓	✓	✓
Meta	Instagram	✓	✓	✓	✓	✓
Meta	WhatsApp	✓	✓	✓	✓	✓
Microsoft	Microsoft Teams	✓	✓	✓	✓	✓
Microsoft	Skype	✓	✓	✓	✓	✓
Signal Technology Foundation	Signal	✓	✓	✓	✓	✓
Snap	Snapchat	✓	✓	✓	✓	✓
Telegram	Telegram	✓	✓	✓	✓	✓
Rakuten	Viber	✓	✓	✓	✓	✓
Zoom	Zoom	✓	✓	✓	✓	✓

*Source: Publicly available information as of March 2022. Note: other features may also be available. *Selection includes Meta, Apple, Microsoft, Alphabet services and the top ten ranking services by UK adult reach in September 2021, as reported by Ipsos iris, see figure 4.6.*

Messaging- and calling-capable services

Use of online communication services is ubiquitous in the UK

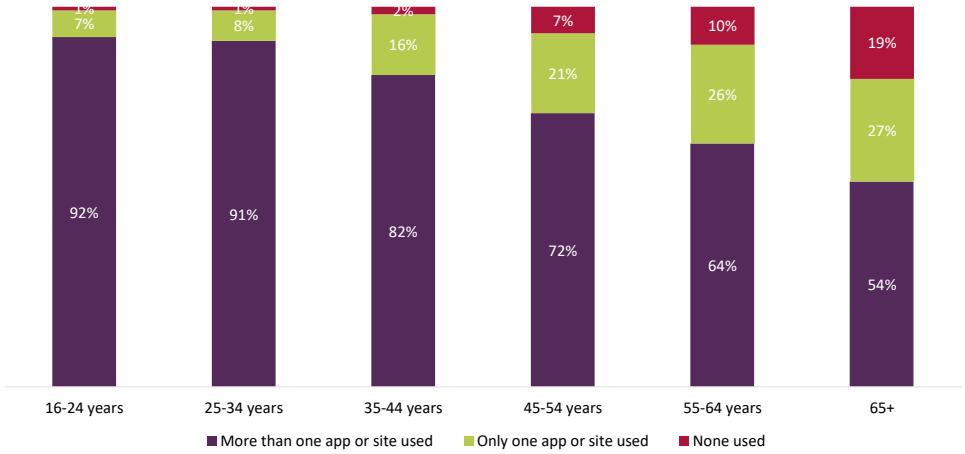
Our Adults' Media Literacy Tracker 2021 research found that 94% of UK internet users aged 16+ used an online communications service for making voice/ video calls or sending messages. The popularity of these communication methods applies across all age groups, including older consumers, among whom 90% of internet users aged 55-64, and 81% aged 65+, used them.[298] Ofcom's Children's and Parents' Media Literacy Tracker 2021 found that 69% of children aged 3-15 used an online communications service for making voice/video calls or sending messages.[299]

Many adults use more than one online communications service to connect with their networks. Younger adults are more likely to use a greater number of services or apps, with 92% of internet users aged 16-24 using more than one site or app, compared to 54% of those aged 65+.[300] Unlike telephony services, most online communication services are not interoperable, i.e. it is not possible to call or send a message to someone on a different service; for example, it is not possible to call a WhatsApp user using Apple's FaceTime app. Currently, online any-to-any connectivity between different online communication services is generally limited to email; users of online calling and messaging services can generally only communicate with other users of the same service.

This may be one reason consumers use more than one online communication service. However, this may be about to change – under the EU Digital Markets Act, the largest messaging services (such as WhatsApp, Facebook Messenger and iMessage) will have to open up and interoperate with smaller messaging platforms, if they request it. This means that users of communication services such as WhatsApp would be able to exchange messages, send files or make video calls across messaging apps, thereby giving them more choice.[301]

[298] Ofcom Adults' Media Literacy 2021: Online Behaviours and Attitudes survey.
[299] Ofcom Children's and Parents' Media Literacy 2021: Online Behaviours and Attitudes survey.
[300] Ofcom Adults' Media Literacy 2021: Online Behaviours and Attitudes Survey.
[301] European Parliament, Deal on Digital Markets Act: ensuring fair competition and more choice for users | News | European Parliament, 24 March 2022.

Figure 4.3: Number of communication apps/sites used to send messages, chats and voice/video calls

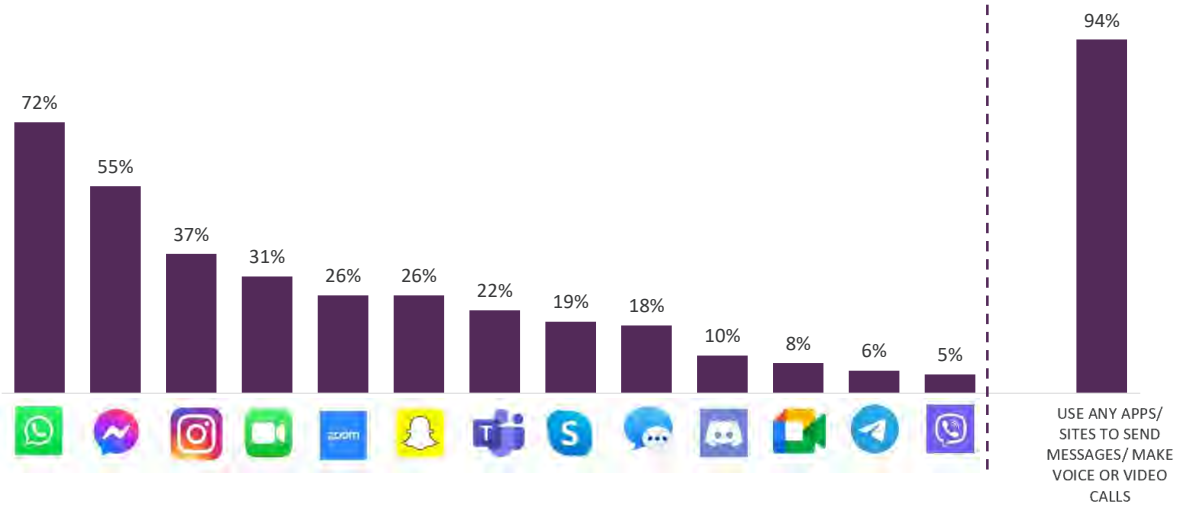


Source: Ofcom Adults' Media Literacy Tracker 2021: Online Behaviours and Attitudes Survey. IN6. Which, if any, of these apps or sites do you use to send messages or make video or voice calls? (multi coded). Base: All adult internet users aged 16+, Wave 1 - 3552, Wave 2 – 3014.

WhatsApp remains the most popular platform used to send messages or make calls, used by more than seven in ten UK online adults

Among all online over-16s, WhatsApp, Facebook Messenger and Instagram (all owned by Meta) were the most popular online communication services in 2021. While WhatsApp was the most popular service for users in all other age groups, among those aged 16-24 Instagram was the most popular, reaching 75%; WhatsApp was used by 74%. Snapchat was also favoured by younger age groups: it was used by 73% of 16-24-year-olds, compared to just 7% of internet users aged 55-64 and 1% of those aged 65+.[302]

Figure 4.4: Online services used to send messages or make video or voice calls



Platforms listed from left to right: WhatsApp, (Facebook) Messenger, Instagram (Direct), Facetime, Zoom, Snapchat, Microsoft Teams, Skype, iMessage (by Apple), Discord, Google Chat / Google Meet / Google Duo, Telegram and Viber.

[302] Ofcom Adults' Media Literacy 2021: Online Behaviours and Attitudes survey.

Source: Ofcom Adults' Media Literacy 2021: Online Behaviours and Attitudes Survey. IN6. Which, if any, of these apps or sites do you use to send messages or make video or voice calls? (multi coded). Base: All adult internet users aged 16+, Wave 1 - 3552, Wave 2 – 3014. Only sites/ apps with use of 5% or more among all adult internet users are shown. TikTok was not surveyed as a messaging service.

One in five UK adults use all three Meta-owned communication services,[303] with 23 million accessing WhatsApp daily in September 2021[304]

Eighty-seven per cent of adults used any of Meta's services to send messages or make calls in 2021. Older users were more likely to say they only used Facebook, and neither WhatsApp nor Instagram, with 17% of adults aged 65+ saying this, compared to 3% of 16-24-year-olds. Thirty-six per cent of 25-34-year-olds used all three Meta services for communication, making this age group the most likely to do this, compared to 5% of those aged 65+. Twenty-six per cent of women use all three services, compared to 16% of men.[305]

Figure 4.5: Adults' use of Meta-owned communication services



Source: Ofcom Adults' Media Literacy 2021: Online Behaviours and Attitudes Survey
IN6. Which, if any, of these apps or sites do you use to send messages or make video or voice calls? (multi coded)
Base: All adult internet users aged 16+, Wave 1 - 3552, Wave 2 - 3014

One in five UK adults accessed Zoom in September 2021

Beyond the large Meta-owned platforms, a variety of online communications services are available in the UK which have a smaller reach. Alphabet-owned services YouTube and Google Search are among the highest-reaching online services (see Online Landscape chapter), yet in the messaging

[303] Ofcom Adults' Media Literacy 2021: Online Behaviours and Attitudes Survey. See interactive report for demographic data.
[304] © Ipsos, Ipsos iris Online Audience Measurement Service, Monthly: 1 September 2021– 31 September 2021, adults age: 15+, UK.
[305] Ofcom Adults' Media Literacy 2021: Online Behaviours and Attitudes Survey. See interactive report for demographic data.

and calling market, Alphabet's UK adult userbase of Google Messages, Google Duo, Google Chat and Google Meet are significantly lower than its competitors; for example, video-calling service Google Meet reached just 0.6% of the UK online adult population in September 2021, compared to Zoom which reached 21%.[306] Some online platforms, such as social media services like Instagram and Snapchat, are predominantly focused on sharing communications publicly but also have multiple functionalities which may include direct messaging and/or voice/video calling. These are not listed in the table below.

Figure 4.6: UK online adult reach of platforms focused on messaging or calling, September 2021

Rank	Communication services	Total adult reach in September	Online adult reach in September	Average daily adult visitors in September
1	**WhatsApp**	41.1m	82.4%	23.2m
2	**Facebook Messenger app***	31.8m	63.7%	15.5m
3	**Zoom**	10.6m	21.2%	1.20m
4	**Google Messages app**	7.2m	14.5%	3.70m
5	**Discord**	5.3m	10.6%	1.70m
6	**Google Duo app**	3.1m	6.2%	0.22m
7	**Skype**	2.6m	5.3%	0.42m
8	**Telegram**	1.7m	3.5%	0.51m
9	**Signal**	1.5m	3.0%	0.39m
10	**Viber**	0.8m	1.5%	0.22m
11	**Kik**	0.7m	1.4%	0.23m
12	**Google Chat⁺ app**	0.5m	1.1%	0.13m
13	**WeChat**	0.3m	0.6%	0.98m
14	**Google Meet app**	0.3m	0.6%	0.02m
15	**Imo**	0.2m	0.5%	0.04m

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021– 30 September 2021, adults age: 15+, UK.
*Note: Custom list of entities defined by Ofcom. *Facebook messaging service can be accessed via the main Facebook platform which is not counted here. Data for Apple iMessage and FaceTime not measured. Microsoft Teams not included as desktop app use not measured. ⁺Google Chat formerly known in September 2021 as Google Hangout.*

Half of 3-15-year-olds use WhatsApp, despite the minimum age requirement of 16

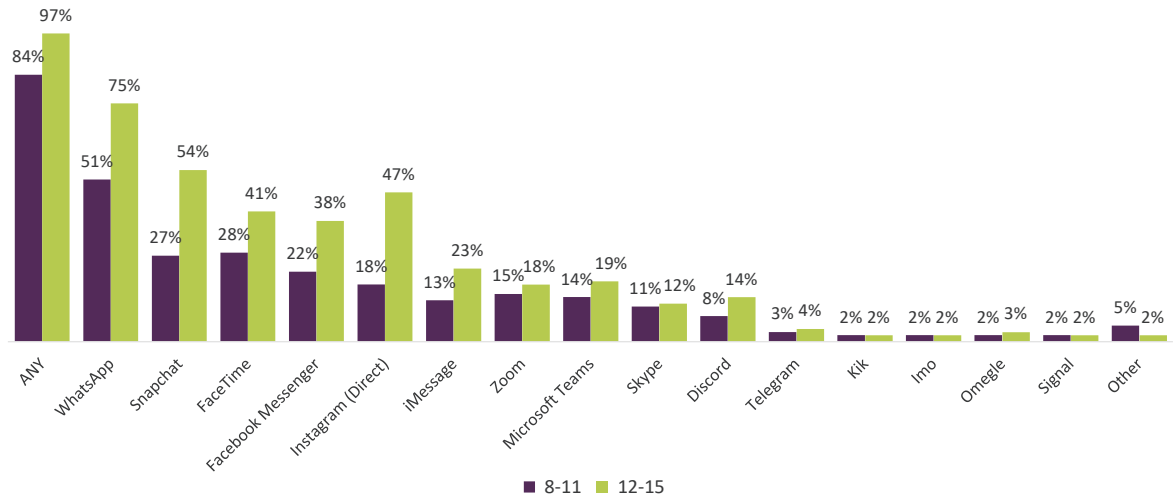
Online communications services often have a minimum age requirement, typically 13 years, although some have a minimum age of 16. Despite having a minimum age requirement of 16,

[306] © Ipsos, Ipsos iris Online Audience Measurement Service, 1 September 2021 – 30 September 2021, adults age: 15+, UK.

introduced in 2018,[307] WhatsApp was the most popular online communications service among children in 2021 for sending messages or making video and voice calls, used by 50% of children aged 3-15.

Half (51%) of 8-11-year-olds used WhatsApp in 2021, rising to 75% of 12-15s. But the remaining Meta services did not dominate the top three for children, as they did for adults. The second and third highest-reaching services for communication were Snapchat and FaceTime, each reaching 30% of children aged 3-15. However, a significant minority of children also used services which are less mainstream. Fourteen per cent of 12-15-year-olds used Discord, a social gaming communications platform (see the Gaming chapter for further information), and 2% used Signal.[308]

Figure 4.7: Online communications services used by children aged 8-15



Source: Ofcom Children Media Literacy Tracker 2021: Children's Online Behaviours and Attitudes Survey Wave 1 and Wave 2. QP4/ QC3. Which, if any of these apps or sites does your child use to send messages or make video or voice calls? Base: All children and parents of children aged 8-15 (3,197)

Nine per cent of UK internet users aged 13+ who had experienced an online potential harm in the last four weeks, encountered their most recent potential harm on an instant messaging platform

Of those aged 13+ who had received a recent unwelcome friend request, follow request, or message, for 22% this was via an instant messaging service.[309]

[307] WhatsApp General, Security and Privacy, About minimum age to use WhatsApp, accessed 9 March 2022.
[308] Ofcom, Children's and Parents' Media Literacy 2021: Online Behaviours and Attitudes survey.
[309] Ofcom, Online Experiences Tracker 2021.

Figure 4.8: Type of harm experienced by UK users experiencing their most recent potential harm over instant messaging services



Unwelcome friend or follow requests, or messages	Received an unwanted sexual message	People pretending to be another person, e.g. catfishing*	Content depicting violence*	Bullying, abusive behaviour or threats*
22%	22%	14%	10%	10%

*Source: Ofcom, Online Experiences Tracker – Q21 What type of site or service were you using when you experienced…? Base: All users aged 13+ experiencing… most recently (3,843; unwelcome friend or follow requests, or messages 520; received an unwanted sexual message 134; people pretending to be another person 65; content depicting violence 99; bullying, abusive behaviour or threats 69). *CAUTION: LOW BASE (<100).*
Note: Only potential harms experienced by 50 users or more are shown.

Email

Email services had a daily UK online adult reach of 51% in September 2021[310]

Email remains widely used, with 82% (41 million) of UK online adults visiting an email service in the month of September 2021. Google Gmail was the highest-reaching email service among adults in September 2021, reaching 53% of UK online adults, closely followed by Microsoft's email services (Hotmail and Outlook) which reached 47%. But although Gmail was the highest-reaching email service for UK online adults aged 25+, Microsoft's email services were the highest-reaching services among UK online 15-24-year-olds (65%).[311] The top four email services all have a daily use ratio of about half or more of their userbase.

Figure 4.9: Top ten email services by UK online adult reach: September 2021

Rank	Email service	Total adult reach in September	Online adult reach in September	Average daily audience in September
1	**Google Gmail**	26.4m	53.0%	13.35m
2	**Microsoft Outlook & Hotmail**	23.2m	46.6%	11.51m
3	**Yahoo Mail**	4.8m	9.5%	2.83m
4	**Samsung Email**	4.0m	8.0%	2.31m

[310] © Ipsos, Ipsos iris Online Audience Measurement Service, Category: Email, 1 September– 30 September 2021, adults age: 15+, UK. Note: Excludes desktop apps.
[311] © Ipsos, Ipsos iris Online Audience Measurement Service, Ranking report, 1 September– 30 September 2021, adults age: 15+, UK.

Rank	Email service	Total adult reach in September	Online adult reach in September	Average daily audience in September
5	**Apple Mail**	3.3m	6.7%	0.20m
6	**AOL**	1.8m	3.6%	0.67m
7	**Mail.com**	0.3m	0.7%	0.07m
8	**Postageapp**	0.2m	0.4%	0.08m
9	**Sony Email**	0.2m	0.4%	0.05m
10	**Gmx**	0.1m	0.2%	0.03m

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, Ranking report, 1 September 2021– 30 September 2021, adults age: 15+, UK.

Scams, fraud and phishing are the most commonly-encountered potential harms on email services

Scams, fraud and phishing are the most commonly experienced potential harms, encountered by 27% of UK online users in the past four weeks (see the Online Experience chapter). Of those experiencing a potential harm, 14% encountered it on an email service, with scams, fraud and phishing being the most experienced potential harms on this type of service. Older users aged 55+ are more likely than average to have encountered their most recently experienced potential harm via email: (25% compared to an average of 14%). The opposite was true of younger users: only 5% of 18-24s had encountered their most recent hazard while using email.[312]

Figure 4.10: Types of harm experienced by UK users encountering their most recent potential harm on email services



Scams, fraud and phishing	Received unwanted sexual message	People pretending to be another person, e.g. catfishing*	Content encouraging gambling	Sexual or pornographic content inappropriate for the site/app*
58%	32%	11%	8%	4%

*Source: Ofcom, Online Experiences Tracker – Q21 What type of site or service were you using when you experienced…? Base: All users aged 13+ experiencing… most recently (3,843; scams, fraud and phishing 672; received an unwanted sexual message; people pretending to be another person 65; content encouraging gambling 269; unwelcome friend or follow requests, or messages 520; sexual or pornographic content inappropriate for the site/app 85). *CAUTION: LOW BASE (<100). Note: Only potential harms experienced by 50 users or more are shown.*

[312] Ofcom, Online Experiences Tracker 2021.

Online dating

One in ten UK online adults visited an online dating service in September 2021[313]

Online dating services provide users with the opportunity to form romantic connections directly online via messaging and calls. Adults aged 25-34 in the UK are most likely to use online dating services; 19% of this online age group visited a dating platform in September 2021.[314] US company Match Group owns and operates the largest global portfolio of online dating services, including Tinder, Hinge, OKCupid, Match.com, Plenty of Fish and OurTime, together reaching 6% of UK online adults in September 2021.[315]

Tinder remains the most popular dating site with younger age groups, visited by 8% of online adults aged 18-34. Sixty-two per cent of Tinder's adult audience is male, versus 38% female, whereas for Bumble, where women message their matches first, its audience is split evenly between men and women.[316] Plenty of Fish was the most popular dating site for UK online 55-64s, with 1% visiting its site or app.[317] OurTime, a dating service for the over-50s, was visited by 1% of those aged 65+, making it the most-visited service among this age group.[318]

Figure 4.11: Top 15 UK online adult reach of dating services: September 2021

Rank	Dating services	Total adult reach in September	Online adult reach in September	Average daily adult visitors in September
1	**Tinder**	1,949k	3.91%	816k
2	**Bumble**	1,222k	2.45%	470k
3	**Hinge**	966k	1.94%	439k
4	**Grindr**	820k	1.64%	379k
5	**Shag**	747k	1.50%	34k
6	**Squirt**	734k	1.47%	105k

[313] © Ipsos, Ipsos iris Online Audience Measurement Service, Category: Online dating, 1 September 2021– 30 September 2021, adults age: 15+, UK.

[314] © Ipsos, Ipsos iris Online Audience Measurement Service, Category: Online dating, 1 September 2021– 30 September 2021, age: 25-34 UK. Note: see interactive report to see rankings by age group.

[315] © Ipsos, Ipsos iris Online Audience Measurement Service, Match Group, 1 September 2021– 30 September 2021, adults age: 15+, UK.

[316] © Ipsos, Ipsos iris Online Audience Measurement Service, Category: Online dating, Tinder and Bumble, 1 September 2021– 30 September 2021, adults age: 15+, UK.

[317] © Ipsos, Ipsos iris Online Audience Measurement Service, Match Group, 1 September 2021– 30 September 2021, adults age: 15+, UK.

[318] © Ipsos, Ipsos iris Online Audience Measurement Service, OurTime, 1 September 2021– 30 September 2021, adults age: 15+, UK.

Rank	Dating services	Total adult reach in September	Online adult reach in September	Average daily adult visitors in September
7	**Plenty of Fish**	495k	0.99%	149k
8	**Badoo**	360k	0.72%	142k
9	**OurTime**	180k	0.36%	20k
10	**Match**	176k	0.35%	42k
11	**LuckyCrush**	162k	0.33%	9k
12	**Zoosk**	161k	0.32%	43k
13	**OkCupid**	126k	0.25%	26k
14	**eHarmony**	119k	0.24%	8k
15	**Secretbenefits**	94k	0.19%	5k

Source: © Ipsos, Ipsos iris Online Audience Measurement Service, Ranking report, 1 September 2021 – 30 September 2021, adults age: 15+, UK. Note: See interactive report to see rankings by age group.

'Random chat room' services

Random chat room platforms are digital spaces where platform users, who do not know each other in advance, are connected for real-time messaging or calls. They may not require the user to have a profile or for the user to provide identifying information. In some cases, users may be connected based on shared interests or characteristics, although this is not always the case. Omegle and LuckyCrush[319] are examples of random chat room services.

Launched in March 2009, Omegle is a free online chat website that randomly pairs users on live video calls. Users chat anonymously and no registration is required. Users can add their 'interests' before connecting to the chat, in order to be paired with those with similar interests. In September 2021 187k UK online adults visited Omegle and 52% (98k) of Omegle's adult audience were aged 15-24.[320] The website has both moderated and unmoderated sections, and specifies that users must be either over 18, or over 13 with parental supervision, but does not ask users to verify their age.[321] Omegle has attracted criticism as some investigations have identified instances or child sexual exploitation[322] and other forms of harmful and exploitative sexual practices on the platform.[323]

Launched in 2019, Lucky Crush is a browser-based dating site which connects users with a random user of the opposite sex located anywhere in the world. In September 2021 Lucky Crush reached 162k UK online adults, with an average daily audience of 9,000 users.[324] Under its terms and conditions, users of Lucky Crush must be 18 or over and they are prohibited from exchanging contact information with other users or engaging in illegal or harmful behaviour.[325]

In 2022, UK Finance reported that two in five people who dated someone they met online had been asked for money

Since the start of the pandemic, there have been increasing reports of 'sweetheart' or romance scams, where users of online dating services are manipulated by fraudsters into sending them money or goods. In 2022, UK Finance reported that two in five people (38%) who had dated someone they met online[326] were asked for money, with 57% of them saying that they gave it or lent it. The three most common reasons people were asked for money were: to pay for an emergency (37%); to pay for the person's travel to meet them (36%); and to make an investment (29%). The average amount of money people were asked for was £345, although 6% reported being asked for more than £1,000.[327] There have also been reports that perpetrators of dating scams are using AI-powered deepfake videos to convince victims that the person they have met online looks like the

[319] Data for random chat service Chatroulette was unavailable on Ipsos iris.
[320] © Ipsos, Ipsos iris Online Audience Measurement Service, Omegle, 1 September 2021– 30 September 2021, adults age: 15+, UK.
[321] Omegle, Terms of Service, accessed 28 March 2022.
[322] BBC News, Omegle: Children expose themselves on video chat site, 18 February 2021.
[323] BBC News, Omegle: 'I'm being used as sex-baiting bot' on video chat site, 14 April 2021.
[324] © Ipsos, Ipsos iris Online Audience Measurement Service, LuckyCrush, 1 September 2021– 30 September 2021, adults age: 15+, UK.
[325] LuckyCrush, General Terms and Conditions, 10 January 2021.
[326] Not limited to dating sites, for instance could include social media or gaming platforms.
[327] UK Finance, Nearly 40 per cent of people looking for love online were asked for money, 10 February 2022.

person they claim to be.[328] Ofcom's Online Experiences research found that 11% of the people who had experienced 'someone pretending to be someone else', also known as 'catfishing', had encountered this most recently on an online dating service.[329]

Business models

Many online communications services rely on the monetisation of consumer data

Online communication services are typically available to download and use without payment. Where payment is required, it is typically for access to enhanced functionality, security, or privacy features (such as Zoom's premium features)[330] or services which are targeted at business users (such as Cisco Webex).

Until 2016, WhatsApp was free for the first year, with a 99p fee charged for every subsequent year, although long-term users of the iOS version were given free use for life. In 2016, the fee requirement was removed, with Meta (then Facebook) instead opting to earn revenue by monetising communication between businesses and individuals.[331] In Meta's Q4 2021 earnings call, COO Sheryl Sandberg stated that Meta was largely focusing its monetisation effort on *Click to Messaging* ads, where users click on an ad in their Facebook or Instagram feed and it opens a chat with the business in Messenger, Instagram Direct or WhatsApp. More than 150 million users globally view business product catalogues on WhatsApp each month.[332] In Facebook's Q1 2021 earnings call, CEO Mark Zuckerberg stated that there were nearly a million businesses using Click to WhatsApp ads.[333]

Figure 4.12 below outlines some of the other monetisation techniques used by messaging, voice and video calling services. Where online communications services are free of charge, they typically rely on monetisation of the data collected from the user's device or account. The data collected may be used to facilitate targeted search or display advertising, based directly on the user's online activity, or by identifying connections or contacts between consumers through the creation of a social graph.[334] The services may generate revenue directly from these strategies, by sharing data with other services or companies within its wider corporate group, or in some cases by sharing with third parties, enabling other companies or services to develop their products and services.

[328] iNews, Valentines Day: Online romance fraud nearing an 'industrial scale' as criminals embrace deepfake technology, 14 February 2022.
[329] Ofcom, Online Experiences Tracker 2021.
[330] Zoom, Zoom Video Conferencing Plans & Pricing | Zoom - Zoom, accessed 28 March 2022.
[331] WhatsApp Blog, Making WhatsApp free and more useful, 18 January 2016.
[332] Meta Q4 2021 earnings call, Meta Q4 2021 Earnings Call Transcript, 2 February 2022.
[333] Facebook, Inc., First Quarter 2021 Results Conference Call, 28 April 2021.
[334] A social graph is a representation of the interconnection of relationships in an online social network (Social graph – Wikipedia).

Figure 4.12: Monetisation techniques used by messaging, voice and video calling services

Monetisation type	Description	Examples
Online advertising	Third-party sellers pay the communication provider to advertise on its service, which may be based on the number of adverts displayed ('impressions') and/or the number of times a user clicks on an advert ('pay per click'). Adverts are often targeted at consumers based on the data the service monitors from the user.	Facebook Messenger[335] and Snapchat[336]
In-app purchases	Purchases are made from inside the application, typically to access special features or functionalities of the service.	Snapchat[337] and iMessage[338]
Sponsored content	Providers are paid to include content from third parties, such as advertising or messages.[339]	Telegram[340]
'Conversational Commerce' business services[341]	Some online communications service providers offer business services to third-party retailers. By signing up to these services, online retailers can provide in-app offers, promotions, sales or customer service through the communications service.[342]	Facebook Messenger,[343] Instagram and WhatsApp[344]
Donations	Signal is funded solely by donations received via the Signal Foundation to fulfil its stated mission to "develop open-source privacy technology that protects free expression and enables secure global communication".[345] It collects no data on its users.	Signal

[335] Facebook, Facebook Messenger Ads: Your Ads on Messenger | Meta for Business, accessed 28 March 2022.
[336] Snapchat, Snapchat Ads | Snapchat for Business, accessed 28 March 2022.
[337] Snapchat, Snapchat on the App Store, accessed 6 April 2022.
[338] Apple, Use iMessage apps on your iPhone, iPad and iPod touch – Apple Support (UK), accessed 28 March 2022.
[339] Facebook, Sponsored Messages - Messenger Platform, accessed 28 March 2022.
[340] Telegram, Telegram Ads, accessed 6 April 2022.
[341] Apocalypse Retail, Conversational Commerce: Everything you need to know to implement it in 2022, 11 July 2021.
[342] WhatsApp, WhatsApp Business App, accessed 30 March 2022.
[343] Meta, LEGO: Facebook ads case study | Meta for Business, accessed 30 March 2022.
[344] WhatsApp, WhatsApp Business App, accessed 6 April 2022.
[345] Signal Foundation, Signal Foundation, accessed 30 March 2022.

The most popular UK email services use a range of monetisation techniques, including targeted advertising

Gmail earns revenue directly through display advertising on email accounts and collects subscription fees from users who take its premium G-suite package. Advertising on Gmail accounts is targeted based on users' online activities while signed into Google, but not on the content of messages.[346]

Microsoft Hotmail does not require any direct financial payment, while Microsoft Outlook is provided with Office 365, which requires a paid license. Consumers can alternatively use outlook.com as a standalone service, either free of charge or by purchasing a premium version which includes enhanced security and privacy options.[347] The free version relies on online advertising shown on the account inbox screen; however, like Google, Microsoft does not use the content of emails for targeted advertising. In contrast to other large online platforms, much of Microsoft's revenue comes from business customers and it is more focused on communications services that are integrated into its suite of business software. In addition to its business subscriptions, Microsoft has reported over 56 million Office 365 consumer subscriptions.[348]

Popular dating services earn revenue primarily through offering paid subscriptions that unlock additional functionality

Popular dating services such as Tinder and Bumble offer a basic free service as well as premium paid subscription services with additional features and features available through one-off purchases.[349] Platforms may encourage free users to upgrade to paid subscriptions by limiting features available in the free service. Daily 'swipe' or 'like' limits[350] [351] are common examples of this. Not all platforms publish the number of limits, and limits can be personalised based on the individuals use of the service, but it is estimated that non-paying users of Bumble are permitted 25 swipes,[352] and Hinge allows eight likes per day.[353]

Match Group generated £2,186m in global revenue in 2021, of which £2,142m was direct customer revenue, including subscriptions and microtransactions. Its most popular service, Tinder, generated over half of Match Group's direct customer revenue, globally generating nearly £1.25bn in direct revenue in 2021, up 22% since 2020.[354] Tinder offers three paid subscription options, with monthly costs ranging from £4.99 to £18.14.[355] Tinder Platinum, the most expensive option, includes features such as being able to message before matching, and to see the likes that users have recently sent.[356] Match group earned £13m in advertising revenue in 2021. A Which? Investigation found that the

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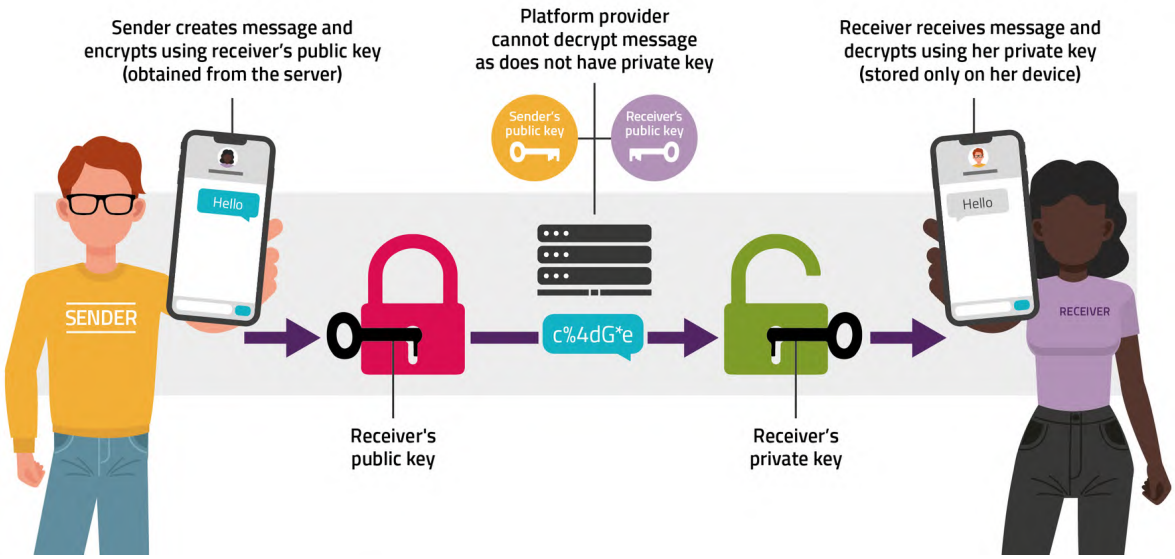
[346] Google, How Gmail ads work - Gmail Help, accessed 30 March 2022.
[347] Microsoft, Premium features in Outlook.com for Microsoft 365 subscribers, accessed 6 April 2022.
[348] Microsoft, FY22 Q2 - Press Releases - Investor Relations - Microsoft, 25 January 2022.
[349] The Match Group's CEO revealed in 2019 that 70% of Tinder's revenue comes from subscriptions. Source: NYT, Wait, People Pay for Tinder?, 6 August 2019.
[350] Platforms often limit the amount of times users can 'swipe' or 'like', which means to make a choice on whether to pursue or dismiss each personal profile they see.
[351] Bumble, Does Bumble have a swipe limit?, accessed 12 April 2022.
[352] Techzillo, Does Bumble have a swipe limit?, 30 June 2021.
[353] Hinge, How many likes can I send per day and when do they reset?, accessed 12 April 2022.
[354] Match Group, Letter to shareholders, Q4 2021, 1 February 2022.
[355] Tinder Plus costs £4.99 per month, Gold costs £13.99 and Platinum costs £18.14, as of February 2022.
[356] Tinder, Subscription tiers, accessed 12 April 2022.

price of Tinder+ in the UK, one of Tinder's subscription plans, can vary depending on the age of the subscriber, with 18-29-year-olds paying less. Which?'s investigation found that a year's access to Tinder Plus ranged from £26.09 to £116.99. Tinder confirmed to Which? that it offers discounts in 'some geographies'.[357] Bumble, which owns Badoo and became a public company in 2021, generated £554m globally in 2021, a 41% year-on-year increase. Bumble app's global paid users increased by 358k to 1.5 million by the end of 2021.[358]

The most popular online communications services continue to add new features aimed at providing user security and privacy

Many online communication platforms use encryption: a process of encoding information or data to protect it from unauthorised access. End-to-end encryption (E2EE) and client-to-server encryption (C2SE) are examples of this. With C2SE, the data is encrypted before it is transmitted to the server, but the service provider can access the message data. In contrast, E2EE converts the original sent message data using specific keys that are known only by the devices participating in the communication. The service provider cannot access data from the message, as it does not have the necessary keys to decipher it. E2EE is intended to prevent data being read or secretly modified other than by the true sender and recipient(s). E2EE has been the default setting on WhatsApp since 2016 and is available as an option on Messenger.[359] WhatsApp also enables E2EE for message backups.[360] Snapchat only encrypts photos taken within the app with E2EE.

Figure 4.13: Diagram of end-to-end encryption process



[357] Which?, Tinder's unfair pricing algorithm exposed, 27 January 2022.
[358] Bumble, Bumble Inc. Announces Fourth Quarter and Full Year 2021 Results, 8 March 2022.
[359] Meta, Updates to End-to-End Encrypted Chats on Messenger, 27 January 2022.
[360] Meta, How WhatsApp is enabling end-to-end encrypted backups, 10 September 2021.

Various other security and privacy features can also be used. Often, having a phone number or an email account is a requirement, so that this service can be used to confirm identity and authorise access. Multi-factor authentication (MFA; encompassing authentication, or Two-factor authentication, along with similar terms) is an electronic authentication method by which a user is granted access to a website or application only after successfully presenting two or more pieces of evidence (or factors) to an authentication mechanism: knowledge (something only the user *knows*), possession (something only the user *has*), and inherence (something only the user *is*).

Figure 4.14: Privacy and security features on selected communications services

	End to End encryption	Phone number required	Email required	Cloud backup	Two-factor authentication
WhatsApp	✓	✓		✓	✓
iMessage	✓		✓		✓ optional
Facebook Messenger	✓ optional		✓	✓	✓ optional
Instagram	✓ optional		✓		✓ optional
Google Message	✓ optional[361]	✓	✓	✓	✓ optional
Google Chat			✓		✓ optional
Telegram	✓ optional	✓			✓ optional
Signal	✓	✓		✓	✓ optional
Viber	✓	✓		✓	✓ optional

Source: Publicly available information as of March 2022

E2EE communications protect users' privacy and provide data security, keeping people safe from having their data hacked and used by criminals. However, it has implications for other aspects of online safety, as it prevents platforms from being able to identify harmful content and it reduces the

[361] Google, Use end-to-end encryption in Messages - Messages Help (google.com), accessed 31 March 2022.

ability of law enforcement agencies to gather evidence about the dissemination of illegal content, such as terrorist communication or child sexual abuse material.

In January 2022, a government-funded coalition which includes several prominent child protection agencies launched the No Place to Hide campaign, calling on online service providers to restrict the use of E2EE, at least until such time as effective measures are in place to ensure that children will not be put at greater risk of, for instance, sexual exploitation and grooming.[362] The Information Commissioner's Office highlighted that the potential risks of E2EE should be considered alongside the benefits, such as E2EE enhancing children's online safety by protecting their data privacy as well as preventing criminals accessing their pictures or location; and enabling businesses to share information securely.[363] The ongoing debate highlights the challenges faced in effectively balancing consumers' online privacy and security with their safety.

In April 2022 Apple announced that a safety feature using AI technology to scan messages sent to and from children would soon be available on British iPhones. The feature, referred to as 'communication safety in Messages', allows parents to turn on warnings for their children's iPhones. When enabled, all photos sent or received by the child using the Messages app will be scanned for nudity. If nudity is found in photos received by a child with the setting turned on, the photo will be blurred. The child will see a warning that the photo may contain sensitive content and nudged towards resources from child safety groups. If nudity is found in photos sent *by* a child, similar protections kick in, and the child is encouraged not to send the images and given an option to 'Message a Grown-Up'. All the scanning is carried out 'on-device', meaning that the images are analysed by the iPhone itself, and Apple does not see either the photos being analysed or the results of the analysis.[364]

Virtual reality communication

Online communications services are preparing for the metaverse

Recent metaverse-type developments may give some insight into how online communications services may evolve in the future. In March 2021, Microsoft announced that it was taking steps towards creating a mixed reality environment, with the roll-out of its Microsoft Mesh[365] platform, which it said would enable developers to build immersive, multi-user, cross-platform mixed reality apps. Microsoft anticipates that customers will use Mesh to enhance virtual meetings, conduct virtual design sessions, learn together virtually and host virtual social gatherings and meet-ups. In November 2021, Microsoft announced plans to integrate Mesh into Microsoft Teams, combining its mixed reality work with meetings and video calls in which users can participate using an animated avatar.[366]

[362] No place to hide campaign, accessed 6 May 2022.
[363] ICO, ICO in the media | ICO– full response, 21 January 2022.
[364] The Guardian, Apple to roll out child safety feature that scans messages for nudity to UK iPhones, 20 April 2022.
[365] Microsoft, Microsoft Mesh, 2 March 2021.
[366] Microsoft – Innovation Stories, Mesh for Microsoft Teams aims to make collaboration in the 'metaverse' personal and fun, 2 November 2021.

In August 2021, Meta launched Horizon Workrooms in beta; a free download for its Meta Quest 2 VR headset. Workrooms uses VR to bring users together to work in the same virtual room. Users can join a meeting in VR as an avatar, or dial into the virtual room from their computer by video call. Horizon Workrooms uses features like mixed-reality desk and keyboard tracking, hand tracking, remote desktop streaming, video conferencing integration, spatial audio, and Oculus Avatars.[367]

Discussions around dating in the metaverse are also taking place. Match Group CEO, Renate Nyborg, stated in an interview that there have been internal discussions about "a Tinderverse, which is more about blurring the boundaries between offline and online". Bumble also stated during its November 2021 earnings call that it wants to prepare for "whatever emerges in the metaverse." [368]

While the concept of a unified, interoperable metaverse may have the potential to revolutionise online communications, it is still largely an untested concept. The current use of immersive virtual online spaces is already presenting challenges for ensuring user privacy and safety, for example in protecting users from inappropriate behaviour.[369] With Ofcom research showing that 3% of UK adults currently use a VR headset,[370] it will be important to monitor future developments in this field.

See the Online Landscape and Gaming chapters for further discussion on the metaverse.

[367] Meta, Introducing Horizon Workrooms: Remote Collaboration Reimagined, August 2021.
[368] Reuters, Welcome to the Tinderverse: Tinder's CEO talks metaverse, virtual currency, 2 December 2022.
[369] BBC, Metaverse app allows kids into virtual strip clubs, 23 February 2022.
[370] Ofcom's Adults' Media Literacy 2021: Online Behaviours and Attitudes survey.

A1. Methodology

Ofcom research sources

Ofcom Adults' Media Literacy Tracker 2021

The Adults' Media Literacy Tracker is an annual survey providing evidence on media use, attitudes and understanding among UK adults aged 16 and over.

This year, the Tracker comprised four surveys:

- Online behaviours and attitudes: Two waves a year, delivered via an online panel, with a total sample of 6,566 adults aged 16+ (3,552 in wave 1 and 3,014 in wave 2). The fieldwork for wave 1 was conducted in June-July 2021, and for wave 2 in September-October 2021. This survey explored the topics of social media, gaming and online attitudes.
- Online knowledge and understanding: One wave a year, delivered via an online panel, with a sample of 3,095 adults aged 16+. The fieldwork was conducted in November-December 2021. This survey explored the topics of critical understanding, personal data, trust and online advertising.
- Core survey: One wave a year, delivered via a mix of post-to-web, post-to-paper and online panel methodology, with a sample of 3,660 adults aged 16+. The fieldwork was conducted in October-December 2021. This survey explored the topics of breadth of internet use and device use and attitudes.
- Media Literacy CATI Omnibus Survey: This year, we also conducted an additional CATI (telephone) omnibus survey in November-December 2021 with a sample of 3,143 adults aged 18+, replicating a similar Technology Tracker study carried out in February-March 2021. This survey aimed to provide detailed evidence on use of the internet at home or elsewhere and ask further questions of those without home internet access to understand their reasons for and experience of being offline.

Ofcom Children's and Parents' Media Literacy Tracker 2021

The Children's and Parents' Media Literacy Tracker provides evidence on media access, use, attitudes and understanding among children and young people aged 3-17. The survey also asks parents for their views about their children's media use, and how parents of children and young people aged 3-17 monitor and manage their children's use.

The Tracker comprises three surveys:

- Online behaviours and attitudes: Two waves a year, delivered via online panels, with a sample of c. 3,300 children per wave aged 8-17 and parents of children aged 3-17. This survey was conducted across two waves so that we could capture children's use of rapidly changing media, such as social media, live streaming and video-sharing platforms. The fieldwork for the first wave was conducted in July-August 2021, and for the second wave in September-October 2021.

- Online knowledge and understanding: One wave a year, delivered via online panels, with a sample of c. 2,100 children aged 8-17. The fieldwork was conducted in November-December 2021.
- Parents only: One wave a year, delivered via a mix of online panels and post-to-web surveys, using a sample of c.2,400 parents of children aged 3-17. The mixed methodology enabled us to reach a broader sample of respondents. The fieldwork was conducted in October-December 2021.

Further details on the methodology of the Children's and Parents' Media Literacy Tracker 2021 can be found in the 2021 Technical Report.

Ofcom Children's Media Lives 2022 – Wave 8

The Children's Media Lives project follows, as far as possible, the same group of children aged 8 to 18, conducting filmed interviews each year to learn about their media habits and attitudes.

It provides evidence about the motivations and the context for media use, and how media is a part of their daily life and domestic circumstances. The project also provides rich details of how children's media habits and attitudes change over time, particularly in the context of their emotional and cognitive development.

This year, we increased the sample from 18 to 21, to allow us to explore the media lives of children in a wider range of circumstances, including additional vulnerabilities.

Ofcom Online Experiences Tracker 2021

About the Online Experiences chapter

The Online Experience chapter brings together data from industry, passive monitoring research and quantitative surveys to build a holistic picture of online experiences among UK users.[371] We combined previously published research from the Ofcom's Adults' and Children's and Parents' Media Literacy Trackers with new data from Ofcom's Online Experience Tracker.

About the Online Experiences Tracker survey

The Online Experiences Tracker is a quantitative tracking survey providing evidence on UK users' use and experiences of, and attitudes towards, online platforms and services. It is conducted using an online panel methodology with a sample of over 6,000 UK internet users aged 13+, with boosts applied for UK nation, ethnicity and religion (see below). Fieldwork for Wave 1 was conducted in October - November 2021.

Boosting ensured a minimum sample size of 100 respondents for most ethnicities and religious groups, or 50 in the case of hard-to-reach groups. Further details, including the sample sizes for each subgroup, can be found in the accompanying Online Experiences Tracker technical report.

[371] Passive monitoring is a research method which uses software securely and anonymously collect information about the apps and websites that respondents visit on their smartphones, tablets and computers. The resulting data is aggregated and anonymous to ensure data privacy.

In order to reflect the differentiated experiences of each subgroup, we detail differences between individual groups, or individual groups and the average, where these exist. However, where significant differences do not exist at the subgroup level but do exist when groups are netted, we report on netted subgroups. The makeup of subgroups for ethnicity is outlined below.

Minority ethnic background	Black	Asian	Mixed ethnicity	Other ethnic group
All Black backgrounds All Asian backgrounds All mixed ethnicity backgrounds Other ethnic group	Black Caribbean Black African Any other Black / African / Caribbean background	Indian Pakistani Bangladeshi Chinese Any other Asian background	White and Black Caribbean White and Black African White and Asian Any other mixed/multiple ethnic background	Arab Any other ethnic background

Researching online experiences poses methodological challenges above and beyond those found when researching linear or 'traditional' media. This is partly as a result of the factors mentioned above, and as a result of the highly personalised nature of online experiences, with each user having a mix of different expectations, sensitivities and understandings of the phenomena studied, researching online experiences poses methodological challenges above and beyond those found when researching linear or 'traditional' media.

Ofcom Technology Tracker CATI Omnibus 2021

Due to the Covid-19 pandemic, Ofcom took the decision to suspend all face-to-face fieldwork from March 2021 onwards, across all consumer research projects. This decision was made to protect the safety of everyone involved in the research. Ofcom's Technology Tracker was affected by this decision. As a result, the 2021 survey, with fieldwork conducted between 14 January and 31 March 2021, used a mixed-mode methodology. This included an online and a postal survey, as well as a small subset of questions that were placed on Ipsos MORI's weekly CATI omnibus survey, to ensure that we had a nationally representative sample and that representative proportions of offline participants were included. The total sample for this CATI survey was 3,126 people aged 18+ (rolled across three waves). Quotas were set on age, gender, working status and geographical regions. The GB sample was supplemented with interviews with households in Northern Ireland.

Ofcom Digital Exclusion Survey

The Digital Exclusion Survey was conducted as an ad-hoc piece of research during a Covid-19 lockdown, aiming to reach those who are offline and to understand their reasons for being so. Fieldwork was conducted in January 2021 using the random-probability NatCen Panel with the option to complete the survey via telephone. The NatCen Panel is formed of people recruited from the random-probability British Social Attitudes (BSA) survey.

Ofcom VoD survey February 2022

Ofcom commissioned this survey to explore use of and attitudes towards video-on-demand services. This was a quantitative survey among an online sample of 2,000 UK nationally representative people aged 13+ (with a boost to reach at least 150 respondents per nation), via Yonder's online panel. This survey was conducted in February 2022. The full research will be published alongside Ofcom's Media Nations report in August 2022.

Third-party research sources

Ipsos - Ipsos iris

Launched in early 2021, Ipsos iris is the UKOM-endorsed currency for the measurement of audiences of online content among UK adults aged 15+ who use the internet at least once a month.

Ipsos iris uses a hybrid methodology with several data sources including:

- A passive single-source panel of over 10,000 adults who use the internet. The panellists install passive tracking software onto their personal digital devices that access the internet (smartphones, computers and tablets), with data collected continuously. The panel is recruited to be representative of the internet population demographically, geographically and by type of device used.
- Census measurement of publisher websites and apps to collect measurements of visitor time spent and page views at a total level.
- The Establishment Survey to produce universe targets. The Ipsos iris panel is then weighted to the internet population of UK adults aged 15+ and demographic sub-groups.
- External first-party data from accredited and approved sources with additional website or app-level targets.

Reporting on daily and monthly data, all sources are fused together to create a synthetic dataset with more than one million records to represent the UK online infrastructure of websites and apps. These can be analysed and reported at many demographic and geographic levels. As this is a synthetic dataset, it is not possible to provide confidence intervals/ranges for extrapolated population estimates. However, it should be noted that all extrapolated population figures provided are estimates that will have some margin of error.

The term 'visitor' is used to represent UK adults who open a website or app. Visitors do not represent account holders where websites or apps offer account logins for their service.

For the reports used here, we have mainly used Ipsos iris monthly data from September 2021. The passive panel for this month covered a continuously measured sample of 10,950. The panel size by nation is shown below. As this is a continuous panel, the reporting profile for other months will be similar. More detail on the Ipsos iris methodology can be found here.

Nation	Sept 2021 Ipsos iris panel size	Proportion of total panel
England	9,131	83%
Scotland	995	9%
Wales	579	5%
Northern Ireland	245	2%
Total	10,950	100%

Please note:

- In January 2022 Ipsos removed desktop apps from the 'other internet' category resulting in a 34% decrease in time spent. This was to address challenges in reliably measuring active online usage of these applications. Therefore, time spent would have been inflated at a total internet level prior to January 2022.
- For analysis within this report where September 2021 total time spent is referenced, Ipsos has generated a custom file specifically for September 2021 removing desktop app time spent at total internet level. Therefore readers should expect to not be able to recreate all data points included in the report for September 2021.
- In January 2022 improvements were made to demographic modelling and embedded browser content was introduced from additional sources such as Linkedin and Google News. This has introduced step changes in monthly data from these areas.

Ampere Games – Consumer survey

Ampere Analysis is a research and data analysis company which focuses on media and communications. The Ampere Games – Consumer survey is run in 12 global markets, and this report uses UK data.

There are two survey waves each year, in Q2 and in Q4. Two surveys are run within each wave:

- A survey of 2,000 respondents aged 16-64 which is nationally representative of the UK online population.
- A smaller survey of UK 13-15-year-olds (120) which is not nationally representative.

Where age groups are not defined, the two sets of responses have been combined.

Platform transparency data

Several online platforms publish data about the enforcement of their Terms of Service and/or community guidelines. The information is publicly available on the platforms' own websites (usually published annually, biannually or quarterly). Examples of information included in transparency reports are:

- the number of content take-downs;
- the use of automated detection and moderation tools;
- the proportions of content views that were of violative content;

- the amounts of content reported by users, governments or other flaggers;
- the number of appeals received from users;
- the number of legal requests for user data; and
- commentary about changes to policies or trends in the data.

In some cases data is split by harm category, as defined by the platform. Ofcom conducts its own monitoring and analysis of this data.

UK Safer Internet Centre

The UK Safer Internet Centre published its report on 8 February 2022: All fun and games? Exploring young people's experiences of respect and relationships in online games. The quantitative survey was conducted online by Censuswide in November 2021, with a representative sample of 2,013 parents of children aged 8-17 years old and their children aged 8-17 years old (4,026 in total). Censuswide is a full-service research consultancy specialising in consumer and B2B research. The research was conducted on Censuswide's education network and participants under the age of 16 were contacted via their parents or guardians. Qualitative research was also conducted by Childnet with over 50 young people, aged 8-18 years old, in focus groups.

CHILDWISE

The CHILDWISE Monitor Report 2021 is based on data collected from September to November 2021, from 2,727 children and young people aged between 5 and 16 years, from 84 schools across the UK. Schools were drawn from the CHILDWISE Schools Panel and selected to give a representative mix of demographics (e.g. urban/ suburban/ rural, range of abilities, across nations). Children completed online surveys in school, lasting for 20-25 minutes, and focusing on children and their media, the child as a consumer, and children's attitudes and activities. Final data were weighted to restore representation by age and gender and grossed to be indicative of the total number of 5- to 16-year-olds in the UK (in 1,000s).

Industry sectors: data sources and methodology

Ofcom has conducted data collection, analysis and broader sector insight for key UK online sectors from 2015 to 2021: search, e-commerce, directories, media and audio-visual entertainment, gaming, news and social media. UK figures are provided for each sector by revenue stream (advertising, subscription, transactional and public funding).

Figures are based on estimates from publicly-available company reports and industry sources including the IAB UK/PwC Digital Adspend Study, PwC Global Media and Entertainment Outlook: 2020-2024 and 2021-2025, Office for National Statistics, Ampere Analysis, AA/WARC Expenditure Report and Enders Analysis, or modelled where applicable and appropriate. The figures presented should be treated as indicative only. They are designed to provide a general context of online markets in the UK and may differ from other estimates in the industry due to differences in sector definition or other methodological differences. This report is not intended to act as an economic analysis exercise and the categories defined in it are subjective and may overlap.

Ofcom has changed to current pricing in this report instead of constant pricing as used in previous years. This is for two reasons: to align with the view that applying UK inflation to online industries does not improve long-term trend comparisons; and to ensure consistency with industry sources and company results which almost entirely operate on a current price method.

Ofcom used a top-down approach, starting with data from industry sources such as IAB UK, PwC, Ampere, ONS and Enders, to estimate sector or segment sizes. This was coupled with a bottom-up approach, focusing on the revenues of the largest market participants, to fill sectoral gaps and quality-assure other industry estimates.

The combined total of each of the applicable revenue streams gave the market size for that sector, and the combined totals of all revenue streams gave the total market size. The e-commerce sector (UK-only) was considered separately to other industry sectors, and figures from e-commerce (consumer spend) are not included in total market size.

Industry sources used to estimate online industry sector data include the following:

IAB UK/ PwC Digital Adspend Study

IAB UK is the online advertising trade association of the UK and publishes an annual advertising spend study sizing the online advertising market. The Digital Adspend study 2021 (produced with PwC) is used in *Online Nation* as the primary source for UK online advertising revenues covering search, display (comprising both video and non-video), audio and classified advertising formats. It is used to consider the digital advertising market individually, a key revenue stream of many online businesses, and is also one of the sources used for the analysis and modelling of industry data across several sectors.

AA/WARC

The Advertising Association is a trade body representing the advertising industry in the UK. WARC is a marketing intelligence firm that supports advertisers, agencies and media platforms. They collaborate on an annual Expenditure Report, providing data and analysis on the UK advertising market. Data was used primarily to estimate the advertising revenues for digital magazines (entertainment and audiovisual media sector) and online news brands (news sector) in the UK.

PwC Global Media and Entertainment Outlook (GEMO)

Global professional services network PwC conducts data analysis across a wider range of areas. GEMO is one of the sources used for the analysis and modelling of sectoral online industry data for this report. It provides historical and forecast data and commentary for various segments of the entertainment and media industry globally and for the UK, including advertising, free and paid-for video, music, news and gaming. We have used data from both GEMO 2020-2024 (for the years 2015-19) and GEMO 2021-2025 (for 2020 and 2021) in this report. The data for 2015-2019 have been adjusted by Ofcom so they are consistent with currency exchange rates used in GEMO 2021-2025.

Enders Analysis

Enders Analysis is a research and data analysis company which focuses on media and telecommunications in Europe. Its data on the classified advertising market was a primary source used to model the online directories market, in combination with other industry and modelled data.

Ampere Analysis

Ampere Analysis is a research and data analysis company which focuses on media and communications. Its data was used in *Online Nation* to estimate the UK video segment of the entertainment and audiovisual media sector, primarily paid-for (subscription and transactional) revenues. Ampere Analysis also provided some data on users of subscription gaming services.

Money Dashboard

Money Dashboard is a consumer financing app that provides users with various free banking services including consolidation of accounts, budgeting tools and cost-saving offers in exchange for permissioned anonymized data analysis of their data. Ofcom has generated a cohort of over thirty thousand users with three years of financial history to generate consumer spend insight in various online categories. We use the consumer spend amounts, including all debit cards, credit cards and banking transactions. This excludes cash transactions, but these are assumed to be minimal for online services. Individual transactions are allocated to online sectors and filtered by demographics including age, gender, income and nation.

Office for National Statistics

The ONS is a non-ministerial department of the UK government which collects statistics related to the UK economy and society. The Retail Sales Index internet sales data formed the basis for the estimates and analysis on the e-commerce sector in the UK presented in this report. Ofcom used the ONS average weekly sales data (seasonally adjusted) for different store types, including food and drink, and household, to estimate monthly and annual sales total for e-commerce.

References to other third-party sources

Ofcom references publicly-available information and third-party data sources throughout the report. These include press releases, blogs, earnings reports, transparency reports and other publicly-available corporate information. Other third-party providers cited in *Online Nation 2022* include:

- Amazon
- Apocalypse Retail
- Apple
- Apple Newsroom
- ASA
- BARB Establishment Survey Q4 2021
- BBC
- BitChute
- Business Insider
- Business Leader
- Business of Apps
- Cambridge Bitcoin Electricity Consumption Index
- CCAF
- City A.M.
- Daily Mail
- Digital Trends
- Discord
- DuckDuckGo
- Ethereum
- European Parliament
- Evening Standard
- Facebook/Meta
- Fortune
- Google
- Guinness World Records
- iNews
- IPA TouchPoints
- Klarna
- Lucky Crush
- Microsoft
- NatWest
- Newzoo Global Games Market Report
- Oberlo
- Omegle
- Oxford University
- Pay Zilch
- PC Mag
- PlayStation Blog
- Prime Gaming
- Retail Technology Innovation Hub
- Reuters
- Consumer Electronics Show 2022
- Search Engine Watch
- Signal Foundation
- Snapchat
- TechCrunch
- TechRepublic
- TechZillo
- The Guardian
- The New Statesman
- The Verge
- TikTok
- Twitch Tracker
- UK Finance
- VRChat
- Washington Post
- WhatsApp
- Which?
- WIK-Consult
- Wikipedia
- Yahoo! Finance
- YouTube
- Zoom
- UK Geographics
- Retail Think Tank

The Planning Inspectorate

Appeal Decision

Site visit made on 17 November 2020

by M Cryan BA(Hons) DipTP MSc MRTPI

an Inspector appointed by the Secretary of State

Decision date: 4 December 2020

Appeal Ref: APP/G5750/W/20/3249160
Stansfeld Road, Newham, London E16 3TZ

- The appeal is made under section 78 of the Town and Country Planning Act 1990 against a refusal to grant planning permission.
- The appeal is made by MBNL against the decision of the Council of the London Borough of Newham.
- The application Ref 19/02151/FUL, dated 31 July 2019, was refused by notice dated 25 September 2019.
- The development proposed is the installation of a 20m monopole, 12 no. antenna apertures, equipment cabinets, the removal of the existing 11.7m monopole, 3 no. antennas, redundant equipment cabinets and development ancillary thereto.

Decision

1. The appeal is allowed and planning permission is granted for the installation of a 20m monopole, 12 no. antenna apertures, equipment cabinets, the removal of the existing 11.7m monopole, 3 no. antennas, redundant equipment cabinets and development ancillary thereto. at Stansfeld Road, Newham, London E16 3TZ in accordance with the terms of the application, Ref 19/02151/FUL, dated 31 July 2019, subject to the following conditions:

   1) The development hereby permitted shall begin not later than 3 years from the date of this decision.

   2) The development hereby permitted shall be carried out in accordance with the following approved plans:

      - 002 Site Location Plan (Issue C)
      - 100 Existing Site Plan (Issue C)
      - 150 Existing Site Elevation A (Issue C)
      - 215 Max Configuration Site Plan (Issue C)
      - 265 Max Configuration Elevation (Issue C)

   3) No above ground development shall commence until details of the finished colour of the equipment hereby permitted have been submitted to and approved in writing by the local planning authority. Development shall be carried out in accordance with the approved details.

Procedural Matter

2. The Council's officer report and decision notice referred to the emerging London Plan (the ELP), specifically Policies D1, D2 and D7 of *The Draft London*

Plan – consolidated changes version which was published in July 2019. Between the planning application being determined and this appeal being lodged in March 2020, the Mayor of London published *The London Plan – Intend to Publish version*[1]. Policy D2 was renumbered D4, and Policy D7 was renumbered D8, but aside from this the three policies cited remained substantially the same between the two versions of the ELP. The appellant's statement referred to the December 2019 version of the ELP, and I have also had regard to that most recent version in determining this appeal. Although the ELP does not yet form part of the development plan, in accordance with the requirements of Paragraph 48 of the National Planning Policy Framework (the Framework) I afford it substantial weight.

Main Issue

3. The main issue is the effect of the proposed development on the character and appearance of the area.

Reasons

4. The appeal site is within the footway on the east side of Stansfeld Road, on the inside of a long sweeping bend. It lies adjacent to Beckton District Park, which forms much of the eastern boundary of Stansfeld Road, with Newham City Farm on the other side of the road. At present the site contains a monopole telecommunications mast set at the kerb edge, with four associated equipment cabinets at the back of the footway. The proposal is to remove the existing mast and erect a new taller monopole mast and base cabinet at the back edge of the footway approximately 10m to the south. Three of the existing cabinets would be removed, and a further eight equipment cabinets installed along the back of the footway on either side of the new mast.

5. The character of the area immediately surrounding the appeal site is predominantly defined by the trees and open spaces of the park. While the existing installation by no means adds to the visual quality of the area, from many viewpoints it is either screened by or set against a backdrop of the trees and shrubs immediately north east of the appeal site. The proposed installation would be further from the trees and shrubs, in a more open setting next to an area of grassland. Although it would be a relatively slender structure, the proposed mast would be taller than that currently in place, with more equipment cabinets required to support its operation. Overall, the development would be a more prominent feature, and more intrusive in its parkland surroundings. As a result it would make a negative contribution to the visual quality, and thus to the character and appearance, of the area.

6. There are already tall infrastructure features with a strong vertical emphasis in the surrounding area. As well as the mast and other equipment on the appeal site, there is another mobile communications base station around 40m to the north, and an electricity pylon around 100m to the south east within the park. Given this, the proposed installation would not be an entirely alien addition to the area. Some further visual clutter is caused by the several large bins and containers which make up a small recycling collection point on the footway a short way south of the appeal site. Furthermore, the positioning of the mast at the rear of the footway rather than at the kerb edge as at present would

[1] The London Plan Intend to Publish (showing changes in response to the Inspectors' recommendations), published December 2019

reduce its visual impact in some longer views along Stansfeld Road, as well as making it slightly easier for people to navigate the footway than at present. Taking these factors into account, I consider that the harm caused by the proposed development would be limited.

7. Nevertheless, I conclude that there would be some harm to the character and appearance of the area. The proposal would therefore conflict with Policies SP1, SP3 and SP8 of the 2018 Newham Local Plan (the NLP), Policies 7.1, 7.4, 7.5 and 7.6 of the 2016 London Plan (the LP16)[2], and Policies D4 and D8 of the ELP. Among other things these policies together seek to ensure that development is well-designed, responds well to local character, and contributes to creating an attractive public realm. The proposal would also conflict with Policy SP7 of the NLP, which seeks to improve the public realm of Quality Movement Corridors and Linear Gateways within the Borough, including Stansfeld Road.

8. Notwithstanding the conflict with NLP Policy SP8 I have found, the appellant has submitted a declaration that the proposed installation would comply with International Commission on Non-ionizing Radiation Protection standards, as required by that policy. There would be no conflict with NLP Policies SP2, which seeks to create healthy neighbourhoods, or S5, which among other things seeks to secure economic growth in Beckton. I also find no conflict with ELP Policy D1, which although it refers to understanding the character of areas is principally aimed setting out the issues which the Mayor of London wishes to see boroughs' development plans address in planning for growth.

Planning Balance

9. Paragraph 112 of the Framework states that advanced, high quality and reliable communications infrastructure is essential for economic growth and social well-being and planning decisions should support the expansion of electronic communications networks, including next generation mobile technology such as 5G. Paragraph 113 indicates that the number of masts, and the sites for such installations, should be kept to a minimum consistent with the needs of consumers, the efficient operation of the network and providing reasonable capacity for future expansion. It also encourages the use of existing masts, buildings and other structures for new electronic communications capability.

10. The proposed development would upgrade existing infrastructure to provide additional network coverage and capacity for two network operators, including the introduction of new 5G services. There are significant benefits to the public at large from being able to access high quality mobile communications, which in my view carry considerable weight in favour of the proposal.

11. The appellant has stated that the existing mast on the site is not tall enough to provide an acceptable 5G service to the surrounding area, nor would it in any case be capable of bearing the load of the antennas necessary to provide the full range of 2G, 3G, 4G and 5G services for two operators. The proposed siting of the new mast and other equipment slightly to the south of the existing installation has been dictated by the presence of various underground services and the need to avoid interference with the other base station further north on

[2] The London Plan: The Spatial Development Strategy for London consolidated with alterations since 2011 (published March 2016)

Stansfeld Road. Possible alternative sites in the vicinity have been assessed by the appellant and discounted as unsuitable for various reasons, and I note that the Council has not disputed the appellant's conclusions in this regard, nor has it suggested any other alternatives itself. I acknowledge also that the existing mast on the site will be removed and there will therefore be no overall increase in the number of masts or sites as a result of this proposal.

12. I therefore find that whilst there would be limited harm to the character and appearance of the area the benefits which would arise from the proposed development, as well as the fact that there would be no increase in the number of mobile communication masts in the area, are sufficient to outweigh this harm. Accordingly, I find that material considerations indicate that the appeal should be determined other than in accordance with the development plan in this case.

Conditions

13. As well as the standard time limit condition, a condition specifying the approved plans is necessary to provide certainty. The colour of the proposed equipment was not specified in the planning application, and in order to protect the character and appearance of the area a condition requiring this matter to be agreed is also necessary.

Conclusion

14. For the reasons given above the appeal is allowed subject to conditions.

M Cryan

Inspector

The Planning Inspectorate

Appeal Decision

Site visit made on 21 January 2020

by J Williamson BSc (Hons) MPlan MRTPI

an Inspector appointed by the Secretary of State

Decision date: 03 February 2020

Appeal Ref: APP/P4605/W/19/3242513
A47, Streetworks 209507, Coleshill Road, Ward End, Birmingham B34 6BN

- The appeal is made under section 78 of the Town and Country Planning Act 1990 against a refusal to grant planning permission.
- The appeal is made by EE Ltd & Hutchinson UK Ltd against the decision of Birmingham City Council.
- The application Ref 2019/04469/PA, dated 24 May 2019, was refused by notice dated 18 July 2019.
- The development proposed is telecommunications upgrade, proposed phase 7 monopole, C/W wrapround cabinet at base and associated works.

Decision

1. The appeal is allowed and planning permission is granted for telecommunications upgrade, proposed phase 7 monopole, C/W wrapround cabinet at base and associated works at A47, streetworks 209507, Coleshill Road, Ward End, Birmingham B34 6BN in accordance with the terms of the application, Ref 2019/04469/PA, dated 24 May 2019, subject to the following conditions:

    1) The development hereby permitted shall begin no later than three years from the date of this decision.

    2) The development hereby permitted shall be carried out in accordance with the following approved plans: 002 Site Location Drawing, 100 Existing Site Plan, 150 Existing Elevation A, 003 Access Plan, 215 Maximum Configuration Site Plan, 265 Maximum Configuration Elevation and 005 Cherry Picker/Crane Location(s).

Procedural Matters

2. I note that the applicant's name, the site address and the date of the application have been redacted from the application form. I have therefore taken the address from the Council's Decision Notice, which corresponds with documents submitted by the appellant. I have taken the appellant's name from their appeal form, as it does not appear on the Decision Notice. I have used the date given on the appeal form, which corresponds with the 'date received' stamp on the application form.

Main Issue

3. The main issue is the effect of the proposal on the street scene and character and appearance of the area, with particular regard to siting and size.

Reasons

4. The site comprises a grass verge at the edge of a public house car park. The proposed development would be around 3 m from the site of an existing telecommunications pole and associated cabinets. The site is located adjacent to a footpath just off a busy roundabout on the A47 Coleshill Road. Although the site is close to the gable end of a dwelling, No 296 Stechford Road, the proposed equipment would actually be around 3 m further from the dwelling than the existing equipment. The immediate surroundings of the site comprise the public house car park to the north-east and east, open amenity space comprising grassland and trees to the north and west and residential properties to the south-west, south-east and east of the public house car park.

5. There are 4 roads off the roundabout all of which have street furniture adjacent to them, mainly streetlights and highway signs with a few advertisement signs erected on upright posts. In addition, there is another telecommunications pole and associated cabinets located within a grass verge on the opposite side of the public house car park to the proposed site.

6. The Council has evidently considered the location to be acceptable in principle for the installation of telecommunications equipment. I appreciate that the proposed monopole would be around 8 m higher than the existing pole and, following the removal of existing equipment, that there would be more cabinets than currently exists. However, except for views one would have when close to the pole, when viewed from most of the surrounding vantage points and approaches to the roundabout, the proposal would be perceived as appropriate within its context. Therefore, I conclude that the proposed development would not harm the street scene or character and appearance of the area, with particular regard to siting and size.

7. As such, the proposal would accord with saved Policy 8.55 of The Birmingham Plan: Birmingham Unitary Development Plan (2005) and guidance in the Telecommunications Development: Mobile Phone Infrastructure Supplementary Planning Guidance (2008) and the National Planning Policy Framework. Collectively, and among other things, these policies and guidance require operators to share sites where possible, and design equipment to minimise its impact on the visual amenity of the area, taking account of factors such as the existing structures, masts and buildings in the area and the height of the equipment relative to its surroundings.

Other Matters

8. I note that concerns have been raised regarding emissions from the equipment proposed. I understand the concerns. However, the appellant has submitted documentation confirming the proposal's compliance with the International Commission on Non-Ionizing Radiation Protection public exposure guidelines (ICNIRP). As such, the proposal does not raise any concerns regarding emissions and public health.

9. Representation was received by the Council suggesting that Birmingham Airport should be consulted on the proposal. I have not been provided with any

evidence that the Council has not followed any statutory publicity requirements.

Conditions.

10. I have had regard to the conditions suggested by the Council, and I have attached a condition specifying plans for the avoidance of doubt.

Conclusion

11. For the reasons outlined above, I conclude that the appeal is allowed.

J Williamson

INSPECTOR

The Planning Inspectorate

Appeal Decision

Site visit made on 29 August 2018

by Rory MacLeod BA MRTPI

an Inspector appointed by the Secretary of State

Decision date: 17 October 2018

Appeal Ref: APP/L1765/W/18/3197522
Land at junction of Andover Road and Athelsan Road, Winchester SO23 7RY

- The appeal is made under section 78 of the Town and Country Planning Act 1990 against a refusal to grant approval required under Schedule 2, Part 16 , Class A of the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended).
- The appeal is made by CTIL & Vodafone Ltd against the decision of Winchester City Council.
- The application Ref 17/01930/TCP, dated 21 July 2017, was refused by notice dated 13 September 2017.
- The development proposed is installation of a 17.5m pole, supporting 3 no antenna, associated ground based equipment cabinets and ancillary development thereto.

Decision

1. The appeal is allowed and approval is granted under the provisions of Schedule 2, Part 16 , Class A of the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended) for the siting and appearance of a 17.5m pole, supporting 3 no antenna, associated ground based equipment cabinets and ancillary development at land at the junction of Andover Road and Athelsan Road, Winchester SO23 7RY in accordance with the terms of the application Ref 17/01930/TCP, dated 21 July 2017 and the plans submitted with it.

Main Issues

2. The main issues are the effect of the proposal on the character and appearance of the area and, in the event that any harm is identified, whether that harm would be outweighed by the need to site the installation in the location proposed having regard to the potential availability of alternative sites.

Reasons

Character and appearance

3. Within certain limits, the General Permitted Development Order (GPDO) grants permission for the development of telecommunications equipment subject to a prior approval procedure. Planning Practice Guidance explains that this is a "*light-touch*" process compared to an application for planning permission. There is no dispute between the parties that the proposal falls within the remit of Schedule 2, Part 16, Class A. Therefore, in accordance with the provisions of Class A.3 (3), there is a requirement to assess the impact of the proposal's siting and appearance on the local area.

4. The site is located on Andover Road, a busy road with rising land levels to the north of the site and with falling land levels to the south towards Winchester. The surrounding area is of mixed character including an open car park and residential areas to the east and a retail park and railway line to the west. The proposal would be sited within a section of the footway where the kerb has been built out alongside a pedestrian crossing on Andover Road. The pole would be located within the kerb build out whilst the two cabinets would be sited on the back edge of the footway.

5. There are several vertical structures along this part of the road including street lamps, telegraph poles, street signs and traffic lights, but at 17.5m, the pole would be considerably higher than any of these. Its additional width compared with other structures would also result in the pole appearing as a conspicuous feature. Whilst from some viewpoints a backdrop of trees would soften the appearance of the pole, from other locations along Andover Road, it would appear as a prominent feature. Its siting on the kerb build out close to the road carriageway would add to this prominence when viewed from positions closer to the site. Although such poles and associated cabinets are becoming more commonplace, the height of the proposed pole and its prominent siting would not assist its assimilation into the street scene when viewed from close quarters. There would therefore be some harm to the character and appearance of the area.

6. The Council's appeal statement refers to Policy WIN3 of the Winchester Local Plan Part 2 (2017) (LPP2), a policy not included in the decision notice, relating to important views including of Winchester Cathedral and St Catherine's Hill. Whilst the pole would be seen against the skyline, there is not an uninterrupted view of these features from the approach to the appeal site. Given the separating distances and that buildings, trees and other similar vertical structures also filter views towards these features, the proposal would not have a significant effect on any important views that Policy WIN3 seeks to protect.

7. There would be a pinch point of about 1.2m in the width of the footway between one of the cabinets and the southern edge to the kerb build out. To the south of this the footway would have a width in excess of 2m whilst to the north, where the kerb is built out, the width would be about 4m. The site is by a pedestrian crossing and near to a school and play ground, so there may be occasions when there are many pedestrians and some with prams or push chairs passing the site. But even allowing for such heavy pedestrian flows, the limited extent of the narrowing of the footway would not result in a significant obstruction, particularly given the much wider footways that would remain to either side of the proposal.

8. The appellant has drawn to my attentions several allowed appeal decisions in which there has been an assessment of the effect of a telecommunications pole on the character and appearance of the area. The height of the pole proposed and the characteristics of the areas surrounding these development sites vary from site to site. The circumstances of each proposal have to inform the assessment of the individual merits of each case. Whilst mindful of these decisions, my findings are that the siting and appearance of the pole proposed in this appeal would nonetheless result in some harm to the character and appearance of the area due to its contrast in scale in relation to other linear features nearby and the pole's prominent siting.

Benefits and planning balance

9. The Government places a high priority on the provision of high quality communications. The National Planning Policy Framework (the Framework) at Paragraph 112 states, "*Advanced, high quality and reliable communications infrastructure is essential for economic growth and social well-being. Planning policies and decisions should support the expansion of electronic communications networks, including next generation mobile technology (such as 5G) and full fibre broadband connections*". In this instance, the proposal is not so much seeking to provide significantly higher standards but to maintain recent local provision of 2G, 3G and 4G services as a result of a notice to quit from a nearby site that was providing these services. The Council has commented that service provision would be 'adequate' without the proposal, but the appellant has an obligation to provide not only appropriate coverage but also capacity for the network. I attach significant weight to the public benefit arising from the continuation of local service provision.

10. It is then relevant to consider available evidence as to whether these benefits could be achieved by siting a telecommunications pole and cabinets elsewhere with lesser harm to the character and appearance of the area, and without significant harm arising in other respects. The appellant has installed a temporary mast farther north along Andover Road on the corner with Bereweeke Road. This is currently maintaining service provision, but the appellant has commented that this site would provide insufficient coverage and capacity for a permanent installation.

11. I note that following the withdrawal of an earlier application for an installation at the appeal site, there followed a site meeting and dialogue between the Council and the appellant on alternative sites for the required facility. The Council suggested a rooftop installation at Elizabeth Court, but the building turned out not to be available. The appellant has submitted a list of alternative sites investigated including on railway land, on street and at green field sites, but all have been discounted. The Council has not challenged these findings or suggested any additional sites to investigate. There has been opportunity for dialogue on this issue and I have no evidence to suggest that there is a more viable option than the appeal site for the required facility.

12. The question then arises could a development with a lesser impact reasonably be provided on the site other than that proposed? The appellant has demonstrated that the pole's height would be necessary to clear obstructions to signal from trees and buildings. Its width would be the minimum necessary to support the antennae at the top of the pole. The cylindrical shroud to contain the antennae would be the widest part of the structure, but would nonetheless have a compact form, sufficient to meet operational requirements. Furthermore, it would also have the benefit of supporting the networks of two mobile phone companies. Such mast sharing is consistent with the Government's aim to keep the number of sites for such installations to a minimum consistent with the needs of consumers.

13. Having regard to all relevant considerations, including national planning policy and the potential availability of alternative sites, my findings are that the proposal's public benefit in maintaining and enhancing local telecommunication coverage and capacity would outweigh the limited harm arising to the character and appearance of the area.

14. Policy DM22 of the LPP2 is the only local planning policy expressly dealing with telecommunication matters. As the proposal would facilitate site sharing, and minimise the local impact of the pole and associated cabinets, there would not be any substantive conflict with this policy. The proposal would also be compatible with Policy CS13 of the Winchester District Local Plan Part 1 relating to high quality design and with Policies DM15 and DM16 of the LPP2 in relation to local distinctiveness and site design criteria.

Other Matters

15. There have been several representations against the proposal from local residents, mainly raising issues that I have addressed above. Some have expressed concerns about the impact on visual amenity for the nearest residential buildings in Athelstan Road. Having regard to the separation distances, the orientation of these buildings and the presence of intervening trees, there would not be a materially detrimental impact on living conditions or on outlook at these dwellings.

16. Concerns have been raised about the potential effect on health arising from the monopole's proximity to residential properties and to schools and a play area. The appellant has provided a certificate to confirm that the proposal has been designed to comply with the guidelines published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). In these circumstances the Framework advises that health safeguards are not something for a decision maker to determine.

Conclusion

17. Whilst I acknowledge that there would be limited harm to character and appearance of the area from the siting of the pole, this would be outweighed by the public benefits arising from the proposal. For the reasons given, and having regard to all other matters raised, the appeal is allowed subject to the standard conditions set out in Paragraph A.2 to Part 16 of the GPDO.

Rory MacLeod

INSPECTOR



APRIL 2020

THE GREATER MANCHESTER DIGITAL BLUEPRINT

GREATER MANCHESTER
DOING THINGS DIFFERENTLY

THIS IS THE DIGITAL PLACE

Here we set out the next chapter in our ambition to be recognised as a world-leading digital city region, with an ongoing commitment to taking an open, innovative and connective approach to delivering that ambition.

We remain committed to being a digital city-region with a difference. By putting people at the heart of our plans we aim for a more inclusive approach that builds on our greatest asset.



ANDY BURNHAM

Mayor of Greater Manchester



CLLR SEAN FIELDING

Leader of Oldham Council

GMCA Employment, Skills and Digital Portfolio Lead



LOU CORDWELL

Founder and CEO, MagneticNorth

Co - Chair, Greater Manchester Local Enterprise Partnership (LEP)

LEP Digital Lead

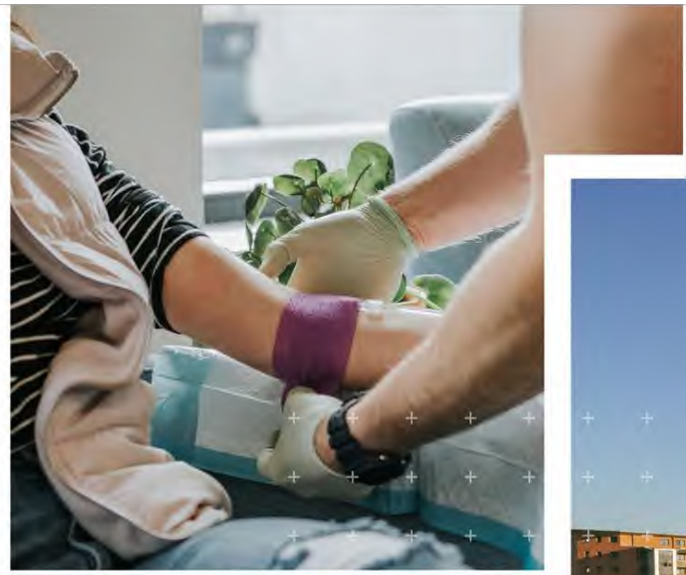
THIS IS THE PLACE WHERE DIGITAL CONNECTIVITY MAKES THINGS BETTER FOR PEOPLE.

Where a lack of digital skills is never a barrier to social mobility and employment, and public services are intuitive, joined up and available to all.

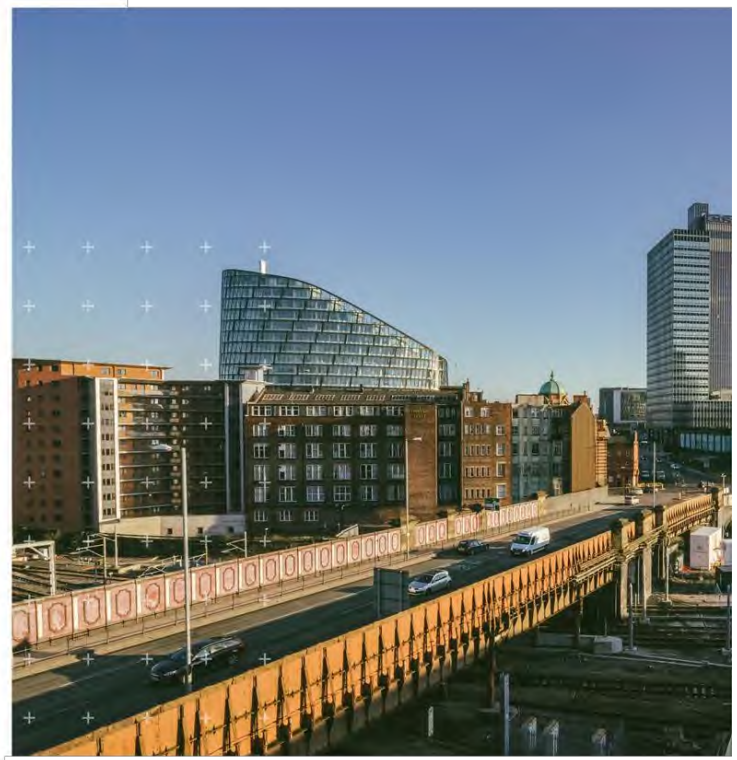
THIS IS THE PLACE WITH A FAST-GROWING £5BN DIGITAL ECO-SYSTEM.

Where communities, business, academia and public services work together to create opportunity, innovate and invent; and where growth benefits everybody.

OUR AMBITION IS FOR GREATER MANCHESTER TO BE A TOP FIVE EUROPEAN DIGITAL CITY-REGION AND RECOGNISED GLOBALLY FOR ITS DIGITAL INNOVATION.







THIS IS THE PLACE
THAT MAKES THINGS HAPPEN.

Driven by a clear civic vision, leadership and mandate that fosters collaboration and enables everyone to do well and lead fulfilled lives.

THIS IS THE PLACE
WHERE BUSINESSES OF ALL TYPES AND SIZES CAN COME AND THRIVE.

Benefiting from top-level physical infrastructure, and a highly-skilled, ready-to-go digital workforce.

THIS IS THE PLACE THAT DOES DIGITAL DIFFERENTLY.







HOME OF THE DIGITAL CITIZEN

WE HAVE UPDATED THE 2018 GREATER MANCHESTER DIGITAL STRATEGY, PLACING THE CITY REGION'S PEOPLE MORE FIRMLY AT THE HEART OF OUR PLANS.

We want our citizens' lives to be bettered, and for them to be empowered by the myriad of opportunities a digitally fuelled city-region provides.

This new blueprint for Greater Manchester digital sets out a three year approach to meeting our ambitions, and will be reviewed regularly in line with the pace of digital change.





> We want the people of Greater Manchester to feel empowered and have their lives bettered by the opportunities that digital provides.
>
> This blueprint puts people at the heart of our plans and through co-design and collaboration we will ensure that the benefits of a digital Greater Manchester reach all of our communities.

CLLR SEAN FIELDING

Leader of Oldham Council, GMCA Employment, Skills and Digital Portfolio Lead



A PLACE WHERE ANYTHING DIGITAL IS POSSIBLE

HOME TO THE LARGEST DIGITAL AND CREATIVE CLUSTER OUTSIDE OF LONDON.



The digital, creative and tech sectors are the fastest growing sector in our city-region, with almost

£5 BN

of economic activity with new, high-value jobs being generated each year.



Right now Greater Manchester has over

10,000

brilliant digital and creative businesses.



Drawing vast international recognition, and employing more than

86,000

people.

We're investing heavily in digital infrastructure, connectivity and transport and we offer a breadth and depth of expertise across digital and creative services, ecommerce, technology hardware and software.

We're creating a digital place where innovators from across the globe want to tap into and a place where businesses already here can thrive.



> Greater Manchester has a £5 billion digital economy comprised of public sector, private sector and academia. We really understand the factors and components parts that are needed to make a strong digital ecosystem and for individuals and organisations to come and thrive here.
>
> We see partnership as incredibly important to our future success and increasingly this is international with organisations that want to come here and be part of the next chapter of Greater Manchester's digital story.

LOU CORDWELL OBE

Founder and CEO, MagneticNorth

Co-chair, Greater Manchester Local Enterprise Partnership



PUTTING GREATER MANCHESTER ON THE MAP FOR DIGITAL WORK AND LIFE

THE BEST PLACE IN THE UK FOR IT PROS TO LIVE AND WORK



TRAVEL TO WORK AREAS	TECH TOWN RANK	# IT JOBS ADS RANK	COST OF LIVING RANK	1 YEAR % IT JOB GROWTH RANK
MANCHESTER	1	2	1	3
BRISTOL	2	5	5	1
LEEDS	3	7	2	4
BIRMINGHAM	4	3	3	7
LONDON	5	1	10	2
CAMBRIDGE	6	4	6	5
EDINBURGH	7	6	4	8
BATH	8	10	8	6
BASINGSTOKE	9	9	7	10
READING	10	8	9	9

Manchester Tops UK Tech Town Index 2019. The best places in the UK for IT pros to live and work. Source: CompTIA UK Tech Towns Index 2019



> You've got ITV, BBC and Salford Quays but as well as the big companies in Media City you've got all those start ups doing really exciting things in the region. It's really good for TalkTalk to be a part of that and the next 10 years of Greater Manchester's investment and forward thinking.

JANE GARNSEY

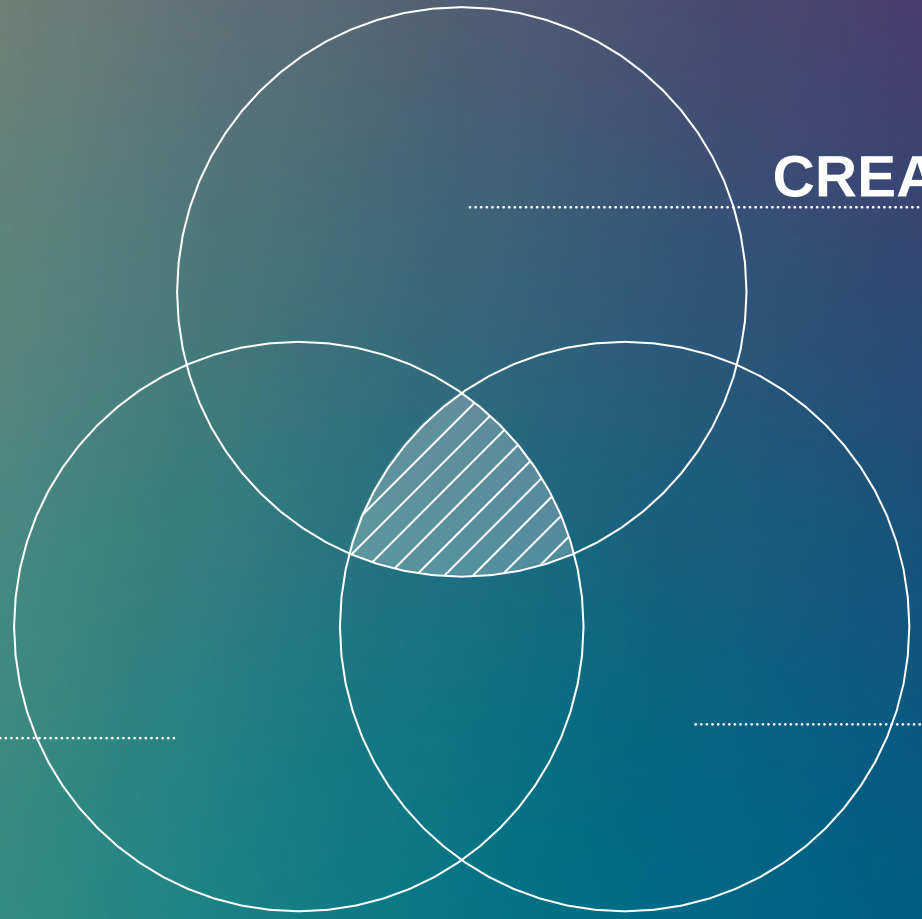
People Operations Director, TalkTalk

COLLABORATING TO SUCCEED

We have a legacy of working together as a city-region and this builds a strength and platform for our digital ambitions.

As the Greater Manchester Independent Prosperity Review showed, people and organisations in our city-region get together more than other places in the UK.

This approach dovetails with Greater Manchester's Local Industrial Strategy and the new One Public Service model. It builds on the work of the past two years and takes on board what we've learned during that time.



A MANCHESTER PRESENCE WILL ENABLE US TO BE AT THE HEART OF THE NORTH'S BUDDING TECH SCENE, IN AMONGST SOME OF THE FASTEST-GROWING TECH BUSINESSES IN THE COUNTRY.

Marc Waters, Managing Director, UK and Ireland,
Hewlitt Packard Enterprises

BREATHING SPACE FOR COLLABORATION AND INNOVATION

Greater Manchester has a vibrant events scene. In fact we get together more than any other UK city outside of London.

In Greater Manchester we have over:

60

CO-WORKING SPACES

9

ACCELERATOR PROGRAMMES







OUR CITY-REGION'S TECH ECO-SYSTEM IS INHERENTLY HUMAN AND MADE UP OF ENTREPRENEURS, INNOVATORS, ENTHUSIASTS AND INNOVATORS FROM MULTIPLE SECTORS. COLLABORATION IS THE GLUE THAT STICKS US TOGETHER.

Our 'social city' region creates competitive advantage for our tech sector, energising thought, creativity, building networks and fuelling innovation.

Although other major cities host events across a similarly broad set of areas, they do not have the depth of innovation meet-ups seen in Greater Manchester with technical innovators working together on cross-border digital projects and solutions.



Meet-up density in GB tech clusters .
Source: https://technation.io/report2019/#20-people-in-tech

A PIONEERING POWERHOUSE – ACCELERATING INVESTMENT



INNOVATION IS IN GREATER MANCHESTER'S DNA. WE ARE LEVERAGING OUR EXPERTISE IN AREAS LIKE CYBER SECURITY, DIGITAL HEALTH AND DIGITAL MANUFACTURING TO ATTRACT FURTHER INVESTMENT.

And we are home to many world-recognised businesses who come here to grow and take advantage of the city-region's liveability. Talented people want to work here, attracted by a vibrant cultural scene, good transport links, access to the countryside and a lower cost of living.

For 250 years, Greater Manchester has been at the forefront of revolutionary ideas that create and shape the future. The city-region is the birthplace of the first stored program computer and the world's first commercial computer.

And we continue to pioneer, hosting a thriving eco-system of businesses; from start-ups, social enterprises and home-grown companies to those valued at or near £1 billion underpinning an impressive strength and depth to our economy.

Sitting side-by-side in the city-region's creative and digital clusters, incubators and co-working spaces, organisations of all kinds converge, collaborate and drive innovation and social impact.





> Throughout its history Greater Manchester has had such a rich heritage of arts, science, industry and innovation. All of that comes together to make it a really vibrant community around digital and one of the great things about coming here is that we have been able to develop such a highly skilled and motivated workforce with northern voices and real enthusiasm and pragmatism to deliver great digital services.

NEIL HALL

Head of Product, BBC Sport



OUR DIGITAL PRIORITIES

What do we mean by digital?

> **APPLYING THE CULTURE, PRACTICES, PROCESSES AND TECHNOLOGY OF THE INTERNET ERA TO RESPOND TO PEOPLE'S RAISED EXPECTATIONS.**

Tom Loosemore, Public Digital

MEASURING IMPACT: 3 YEAR HEADLINE AIMS

Digital Inclusion/ Basic Digital Skills.



Ambition is to increase the number of adults who have all 5 basic digital skills to

80%

from 78% over the next three years.

Digital infrastructure/ Download speed.



By 2023, the average download speed across fibre, cable, mobile and wireless will exceed

100MPS

compared to a Q4 2017 baseline of 32Mps.

Employment and skills in Digital and Creative industries.



86,000

People employed 2019 growing to

96,000

in 2023.

Overall Economic Growth.



£5 billion

Creative Digital and Tech economy growing to by 2025

£5.5 billion

And by 2029

£7 billon

A CLEARER FOCUS

DIGITAL PRIORITIES

1 Empowering People.



2 Enabling innovative public services.



3 Digitally enabling all businesses.



4 Creating and scaling digital businesses.



5 Being a global digital influencer.



ENABLERS

A Strengthening our digital talent pipeline.

B Extending our world class digital infrastructure.

OUR PRIORITIES HAVE EVOLVED FOR A REFRESHED GREATER MANCHESTER DIGITAL BLUEPRINT, AND ARE NOW MORE CLEARLY FOCUSED ON DELIVERING BENEFITS THAT HELP THE CITY-REGION'S PEOPLE LEAD HEALTHIER, HAPPIER LIVES.

Each of our five digital priorities – co-designed and developed with the input of key stakeholders - are supported by pan - Greater Manchester public sector projects. These combine with inclusive community, local authority, private, not-for-profit and academic work.

Our plan connects the wealth of digital change that's going on, and will help us reach a shared ambition that underpins and enables both the Local Industrial Strategy and the Greater Manchester Strategy.



DIGITAL PRIORITY 1

EMPOWERING PEOPLE

We want to ensure that everyone in Greater Manchester, whatever their age, location or situation, can benefit from the opportunities digital brings.



DIGITAL PRIORITY 1



EMPOWERING PEOPLE

WE WILL:

> **Offer digital access to public services that is joined up, user-friendly and makes sense**

> Make sure everyone can get online to access public services within their community

> Help everyone to be confident internet users

> Help people avoid internet harms like online fraud

> Give plentiful opportunity to feedback, recognising the importance to people that their voices are heard

> Invest in the security and privacy of the systems that hold public data – people should have absolute confidence in what's happening to their information

MAIN PROJECTS

> **Early Years Digitisation (GMCA)**

> **Integrated Digital Healthcare Record (GM Health & Care Partnership)**

> **GM Digital Platform (GMCA and GM Health & Care Partnership)**

> **Get GM Digital (GMCA, Councils and partners)**

… Plus connecting and enabling activity across the eco-system

> **Locality projects and private, not-for-profit and academic initiatives**

> **Cross-cutting work on skills and infrastructure**

DIGITAL PRIORITY 1

MAIN PROJECT

GIVING CHILDREN THE BEST POSSIBLE START IN LIFE THROUGH DIGITAL INNOVATION

We are fully digitising early years' developmental records right across our ten boroughs, helping us better track progress of our youngest citizens and provide better quality support for parents.

New streamlined digital systems will connect over 800 Greater Manchester professionals such as health visitors, school health staff and children's services teams, enabling them to work together and deliver care that better supports the whole family.

AIM

100% health visiting digitised across all of Greater Manchester, the first place in the UK to do so by March 2021.









> It's about utilising that new rich data so that we've got a clear and accurate understanding of each child's needs and therefore we can develop better services and ensure we have the right support in place to meet the needs of our young people and strive to continue to improve their outcomes.

PETRA HAYES-BOWERS

Township Lead, Early Years, Bury

DIGITAL PRIORITY 2

ENABLING INNOVATIVE PUBLIC SERVICES

We want to apply exemplar digital ideas and practice to delivering public services in Greater Manchester, linking innovative business, academic and public sector thinking with the needs of Greater Manchester's people.



DIGITAL PRIORITY 2



ENABLING INNOVATIVE PUBLIC SERVICES

WE WILL:

> **Foster innovation by engaging with best digital practice to find better solutions to local problems**

> Use data responsibly and effectively to improve decision making, and support those people most in need

> Link key initiatives and re-use digital assets and investments

> Make non-personal data open by default where it is of value to the people of Greater Manchester

> Ensure digital services are consistently available and resilient, with clear contingency plans

> Provide open, transparent information on how we are progressing towards these aims and how decisions are being made

MAIN PROJECTS

> **GM Information Sharing Strategy (GMCA)**

> **GM Local Data Review & Office of Data Analytics (GMCA)**

> **Smart Ticketing (TfGM)**

> **NHS Digital Fund (GM Health & Care Partnership)**

> **GM Cyber and Resilience (GMCA and GMP)**

… Plus connecting and enabling activity across the eco-system

> **Locality projects and private, not-for-profit and academic initiatives**

> **Cross-cutting work on skills and infrastructure**

DIGITAL PRIORITY 2

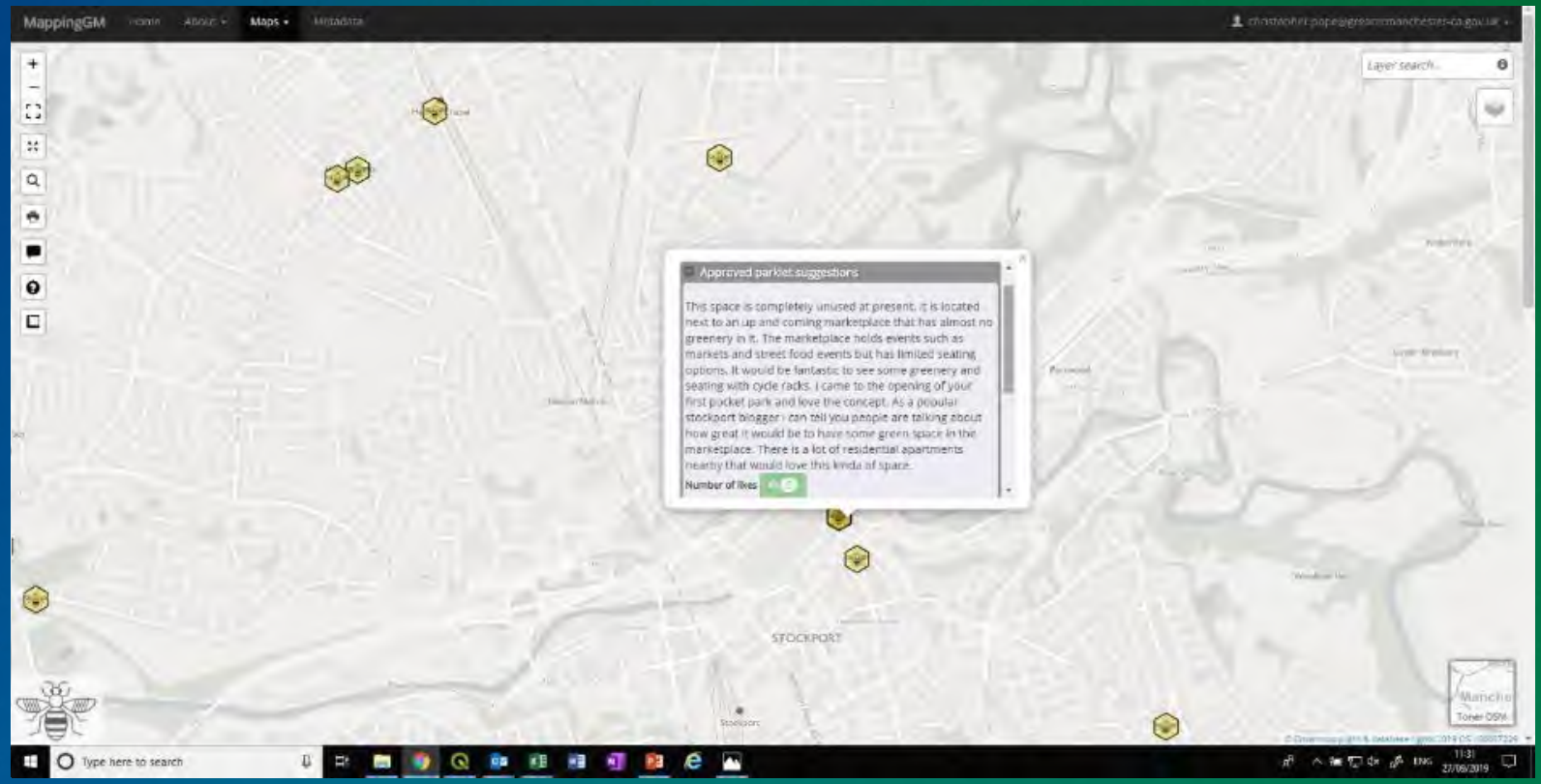
MAIN PROJECT

USING DATA INSIGHTS TO DESIGN A CITY-REGION FOR EVERYONE

We're using data to inform better decision-making and develop more accurate and user-focussed public services to suit the needs of people right across Greater Manchester.

AIM

Undertake a full Greater Manchester Local Data Review by December 2020 and address barriers to making more local data open and available with the aim of creating new commercialisation opportunities, stimulating open innovation and raising productivity.



MappingGM

The home of geospatial data in Greater Manchester

DIGITAL PRIORITY 2

MAIN PROJECT

SMART TICKETING KEEPS GREATER MANCHESTER MOVING

Fully-digitised ‘touch in, touch out’ smart ticketing has been introduced across Greater Manchester’s 100km tram network, with background data systems improving passenger experience, their financial security and helping Transport for Greater Manchester plan an improved, efficient service for **the 44m journeys** it carries every year.

AIM: To trial and develop innovative ticketing products to digitally-enable existing and future mobility around Greater Manchester.







DIGITAL PRIORITY 3

DIGITALLY ENABLING ALL BUSINESSES

Businesses of all sizes should have the means and skills to digitise their business and make the most of the opportunities that brings.



DIGITAL PRIORITY 3



DIGITALLY ENABLING ALL BUSINESSES

WE WILL:

> **Offer one place where businesses owners can get help and advice on incorporating digital into their business**

> Ensure businesses have access to trusted digital tools and providers, at the right cost

> Show how efficiency and profit opportunities can be achieved - we want businesses to be inspired to do more with digital

> Support businesses to up-skill their workforce

> Help business owners use digital practice to grow and scale, and take advantage of evolving opportunities (particularly through collaboration)

> Offer support for businesses to protect themselves from cyber crime

> Offer a voice in how Greater Manchester's digital resources are targeted, and have individual business progress recognised

MAIN PROJECTS

> **Made Smarter and Digital Enablement Service (Growth Hub)**

> **Local Growth Fund initiatives (GMCA)**

> **GM Cyber Resilience Centre (GMP)**

> **Foundational Economy Review (GMCA)**

… Plus connecting and enabling activity across the eco-system

> **Locality projects and private, not-for-profit and academic initiatives**

> **Cross-cutting work on skills and infrastructure**

DIGITAL PRIORITY 3

MAIN PROJECT

HARNESSING THE POWER OF DIGITAL WITH MADE SMARTER

Greater Manchester Combined Authority is supporting Made Smarter, a two-year pilot aimed at boosting the digital capabilities of small and medium-sized digital businesses in Greater Manchester and the wider North West region.

Around 3,000 manufacturing companies are being offered match-funded investment, support and advice on how digital technologies could revolutionise their processes, with 600 being offered intensive support, consultancy and mentoring.

The programme, delivered by The Growth Hub, aims to accelerate commercial growth for manufacturers in the region, helping them to open up new markets, increase exports and create high-value, high-paid employment.

AIM: £20m pilot to increase regional GVA by up to £115million, by increasing the adoption of industry 4.0 in the North West by 2021









> Made Smarter has the potential to kick start a new industrial revolution for our manufacturing sector and be a catalyst for new investment in the latest digital technologies.

JUERGEN MAIER

GM LEP Member, Chair of Digital Catapult, Co-Chair of Made Smarter, former CEO of Siemens

DIGITAL PRIORITY 4

CREATING & SCALING DIGITAL BUSINESSES

We’re encouraging and supporting businesses to start, grow or move to Greater Manchester, recognising the importance of the continued expansion of our digital, creative and tech sector and the opportunities this brings for our people.



DIGITAL PRIORITY 4

CREATING & SCALING DIGITAL BUSINESSES

WE WILL:

> **Continue to transform business attitudes to financing growth, and facilitate investor confidence in innovative digital developments**

> Continue to support access to skilled individuals and help companies shape competitive employment offers to attract and retain staff

> Drive investment in our high-growth sectors and draw on the experience of successes like MediaCityUK

> Continue to encourage and support businesses to have a global outlook and presence

> Develop clear paths to growth and leadership, with training and peer-to-peer learning on overcoming business-specific challenges for start-ups and scale-ups

> Make Greater Manchester the most secure place to work and grow online in the UK, incorporating sustainable priorities

MAIN PROJECTS

> **Exceed (Growth Company)**

> **Greater Connected (Growth Company)**

> **Inward investment (MIDAS)**

> **ERDP-funded digital initiatives (GMCA)**

> **Co-angel and investor support (Growth Company)**

> **Creative Industry Scaleup Programme (Growth Company)**

… Plus connecting and enabling activity across the eco-system

> **Locality projects and private, not-for-profit and academic initiatives**

DIGITAL PRIORITY 4

MAIN PROJECT

EXCEED: TRANSFORMING BUSINESS THROUGH DIGITAL LEADERSHIP

Greater Manchester's SME's are tapping into additional opportunities that improving digital systems and business support can bring.

Greater Manchester Combined Authority supports providers like The Growth Company's Business Growth Hub to work with SME's across the city-region, helping them to tap into the opportunities digital can bring to flourish, grow and do better business, setting them up for the world stage.

AIM: 100 jobs created and 45 business assisted









> We've transformed our business during the Exceed process. We went from being an integrated advertising agency to a paid-for marketing agency. We've launched whole new design sprints. We've done so much since being influenced by this programme.

SUE BENSON

Managing Director,
The Behaviours Agency

(on the Exceed programme)

DIGITAL PRIORITY 5

BEING A GLOBAL DIGITAL INFLUENCER

Greater Manchester is taking its position as an internationally recognised centre of digital innovation, research and practice.



DIGITAL PRIORITY 5

BEING A GLOBAL DIGITAL INFLUENCER

WE WILL:

> **Continue to showcase Greater Manchester across the world as a leader in digital innovation and world-class capabilities in health innovation and creative media**

> **Establish Greater Manchester as UK and European centre for cyber and digital ethics, trust and security**

> Champion Greater Manchester as a place with an incredible evolving digital eco-system

> Ensure Greater Manchester is known as an extremely attractive place to develop, grow and stay, for individuals and businesses contributing to digital innovation.

MAIN PROJECTS

> **International promotion and attraction (MIDAS and Marketing Manchester)**

> **Annual digital creative and**
> **tech festival (GMCA, Growth Company and partners)**

> **Health Innovation (Health Innovation Manchester)**

> **GM Cyber Ecosystem (GMCA and partners)**

… Plus connecting and enabling activity across the eco-system

> **Locality projects and private, not-for-profit and academic initiatives**



> The world is changing at an Unprecedented rate. That change is driving extraordinary Opportunity, innovation and progress. It's also unleashing amazing complexity, uncertainty and risk.
>
> If we want a security and intelligence mission fit for our second century, it's crucial we keep reinventing – which is why our new Manchester facility will be vital to our future success.

JEREMY FLEMING

Director, GCHQ

DIGITAL PRIORITY 5

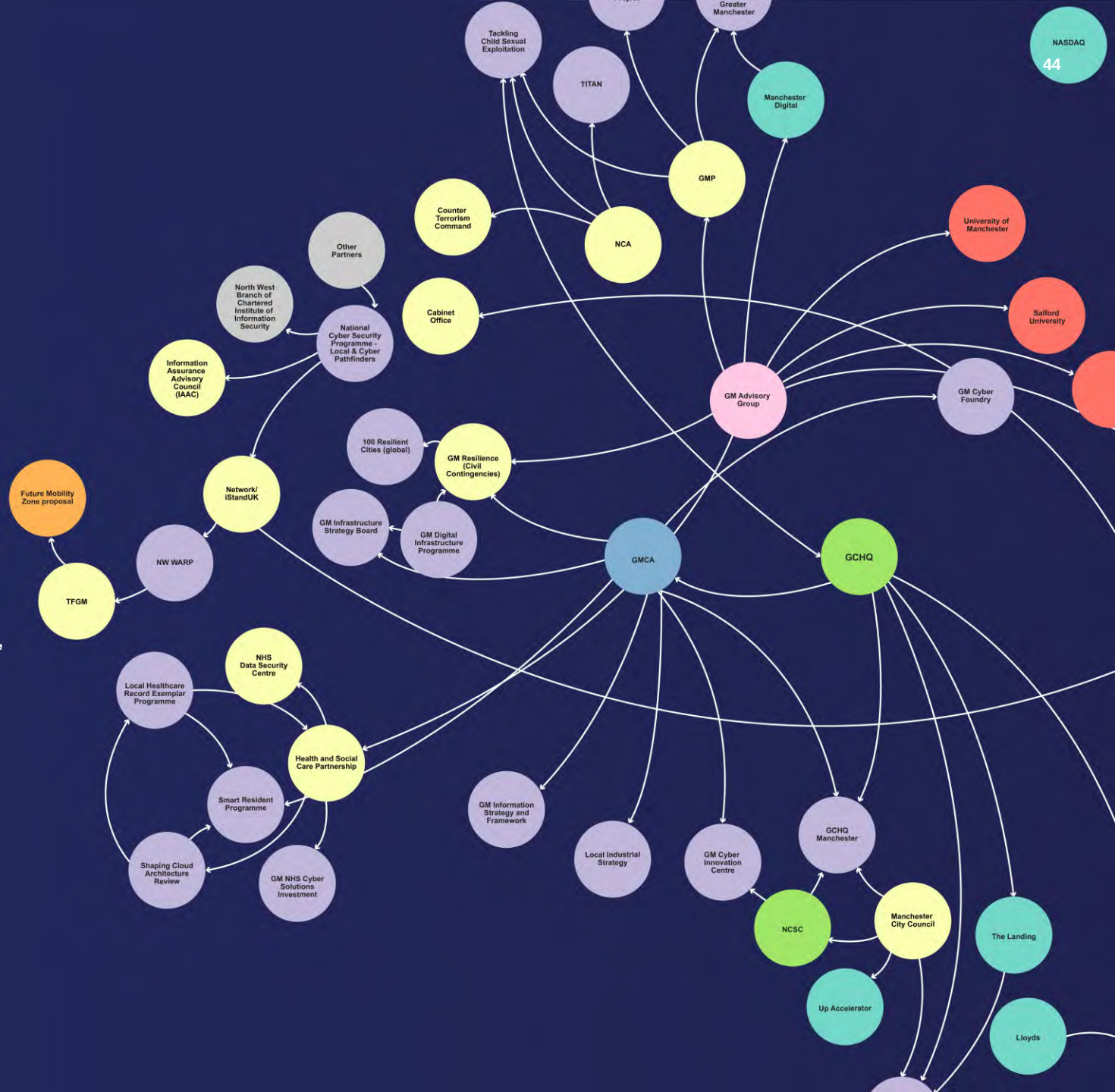
MAIN PROJECT

GM CYBER: A UNIQUE OPPORTUNITY

Greater Manchester's SME's are tapping into additional opportunities that improving digital systems and business support can bring.

A 30+ organisation partnership, collaborating for common benefit and the sharing of research and expertise that is driving a £500M+ opportunity with international reach.

Key members: Manchester Metropolitan University, University of Manchester, Lancaster University, Salford University, GMCA, GCHQ, MHCLG, DCMS, Manchester City Council, Greater Manchester Police, the GM Health & Care Partnership, Barclays, NCC, BAE System plus other leading private sector organisations





We see this as a real thriving tech hub within the UK and the aspiration for Greater Manchester to become one of Europe's top 5 digital city regions is absolutely attractive to us.

VICTORIA KNIGHT

Strategic Business Director, BAE Systems

DIGITAL PRIORITY 5

MAIN PROJECT

GREATER MANCHESTER TAKES TO THE GLOBAL STAGE WITH DISTRACTIONS

Our better connected, more collaborative digital future was put before a global audience as part of the renowned Manchester International Festival which annually attracts over 300,000 visitors to Greater Manchester.

In 2019 delegates from globally-recognised businesses, academia and the public sector came together at the Distractions event to explore and develop ideas that will help us meet our ambition to become a global digital leader.

AIM: To raise the profile of Greater Manchester's ecosystem activities through internationally-recognised events and activities.







DIGITAL PRIORITY A

STRENGTHENING OUR DIGITAL TALENT PIPELINE

Our vision is to create a critical mass of digital talent, positioning Greater Manchester as the key place for businesses seeking a digitally-skilled workforce to invest in outside of London.

A



DIGITAL PRIORITY A

STRENGTHENING OUR DIGITAL TALENT PIPELINE

WE WILL:

> **Inspire young people to think about a career in digital and give them the skills and confidence to do it**

> Future-proof the tech talent pipeline; connecting education and industry through harnessing real role models and industry mentors

> Ensure that the system of post-16 technical education in Greater Manchester provides young people with a clear pathway defined by employers into all priority digital/ tech occupations

> Address the immediate digital skills shortage and support employers to diversify their workforce through developing a new model of reskilling and retraining

MAIN PROJECTS

> **Go Digital (GMCA with Digital Advantage, Hive Learning and InnovateHer)**

> **Digital Futures (GMCA with Manchester Digital and partners)**

> **Fast Track Digital Workforce Fund (GMCA with Tech Manchester, Generation, QA, We are Digital & Tech Returners)**

> **Cyber Foundry (Collaboration with** Lancaster University, The University of Manchester, University of Salford and Manchester Metropolitan University)

… Plus connecting and enabling activity across the eco-system

> **Locality projects and private, not-for-profit and academic initiatives**

DIGITAL PRIORITY A

MAIN PROJECT

INSPIRING THE NEXT GENERATION: GO DIGITAL

Our vision is to create a critical mass of digital talent for businesses seeking a digitally-skilled workforce to invest in outside of London. This workforce will be diverse & adaptable to change.

Access to talent is cited by organisations as one of the biggest challenges they face and this starts with inspiring young people at school.

Go Digital is an industry-led digital skills programme, working with 50 GM schools over two years to address the gaps in the digital talent pipeline. This includes building the confidence of young girls to enter STEM, building opportunities for SEND students and inspiring young people into the digital and creative careers through digital making opportunities.

AIM: to **inspire 10,000 young people across 50 schools** to explore a career in the digital and creative industries and give them the skills and confidence to pursue that pathway.









I could actually practice skills in a real working digital environment. I've developed a couple more skills or improved a lot of the skills I already have. This entire thing was made for me, I like it so much. It's been such a great experience.

BECK CROMACK HOUGH

"Digital Inc" Student (part of Digital Advantage programme for SEND schools)

The Lancasterian School, Manchester

DIGITAL PRIORITY B

EXTENDING OUR WORLD-CLASS DIGITAL INFRASTRUCTURE

We will ensure that Greater Manchester has the digital infrastructure it needs to be a world class digital city region.

B



DIGITAL PRIORITY B

EXTENDING OUR WORLD-CLASS DIGITAL INFRASTRUCTURE

WE WILL:

> **Remove bandwidth as a barrier to our social, economic and public sector reform objectives.**

> Deliver ubiquitous high speed digital connectivity over full fibre and 4G & 5G mobile across the whole city region by 2025.

> Accelerate market investment by:

- Extending network reach by connecting over 1600 public sector sites and assets with Full Fibre across Greater Manchester
- Making public sector buildings and other assets available for infrastructure to support 5G roll out
- Driving market investment in fibre and mobile by minimizing roll out costs through a Prospectus agreed by Greater Manchester local authorities

MAIN PROJECTS

> **GM Full Fibre programme**

> **GM 5G and town centre Wi-Fi programme**

> **GM digital infrastructure 'Dig Once' prospectus**

> **Digital Infrastructure Strategy**

… Plus connecting and enabling activity across the eco-system

> **Locality projects and private, not-for-profit and academic initiatives**

DIGITAL PRIORITY B

MAIN PROJECTS

LEADING THE WAY ON 5G

Salford's MediaCityUK was the UK's first area to receive commercial 5G coverage, with the area deemed a perfect 'living lab' for 5G research and innovation by operator Vodafone who have invested in a 5G Innovation Lab at The Landing.

Greater Manchester is at the forefront of 5G rollout in the UK through collaboration with telecoms partners, local authorities and the main property holders. Our aim is to continue to be.

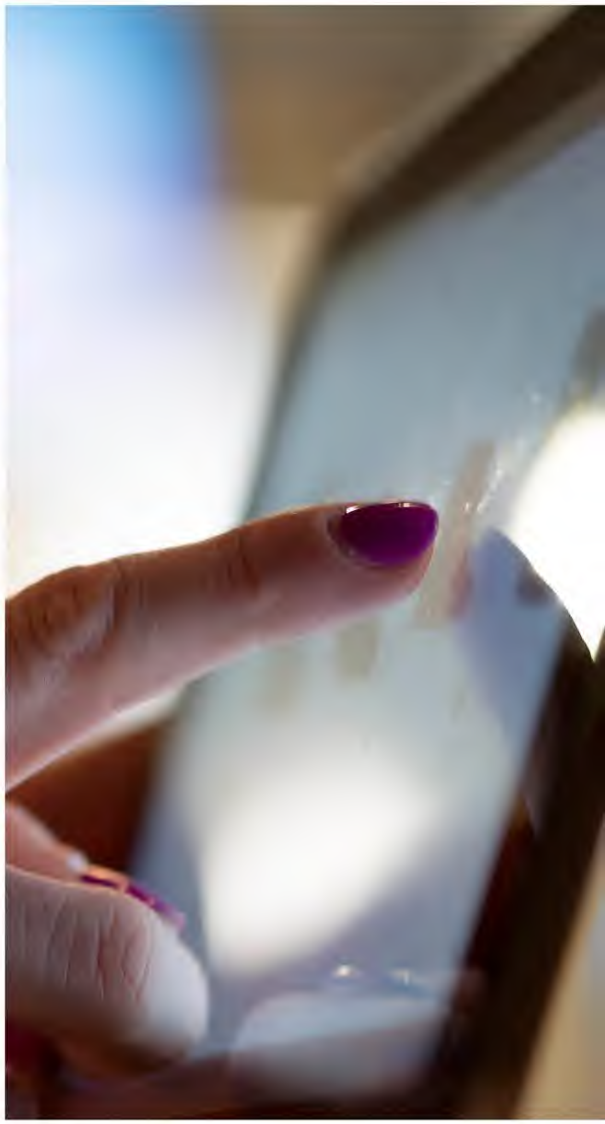
FULL FIBRE CONNECTIVITY

Alongside privately funded investment, Greater Manchester's public sector is investing in fibre broadband to over 1,600 public sites through the Full Fibre programme. This will provide better foundations for digital public services and create opportunities for wider connectivity.

Aim: Ensure access to full fibre for premises in Greater Manchester exceeds 25% by 2021.







DELIVERING GM DIGITAL



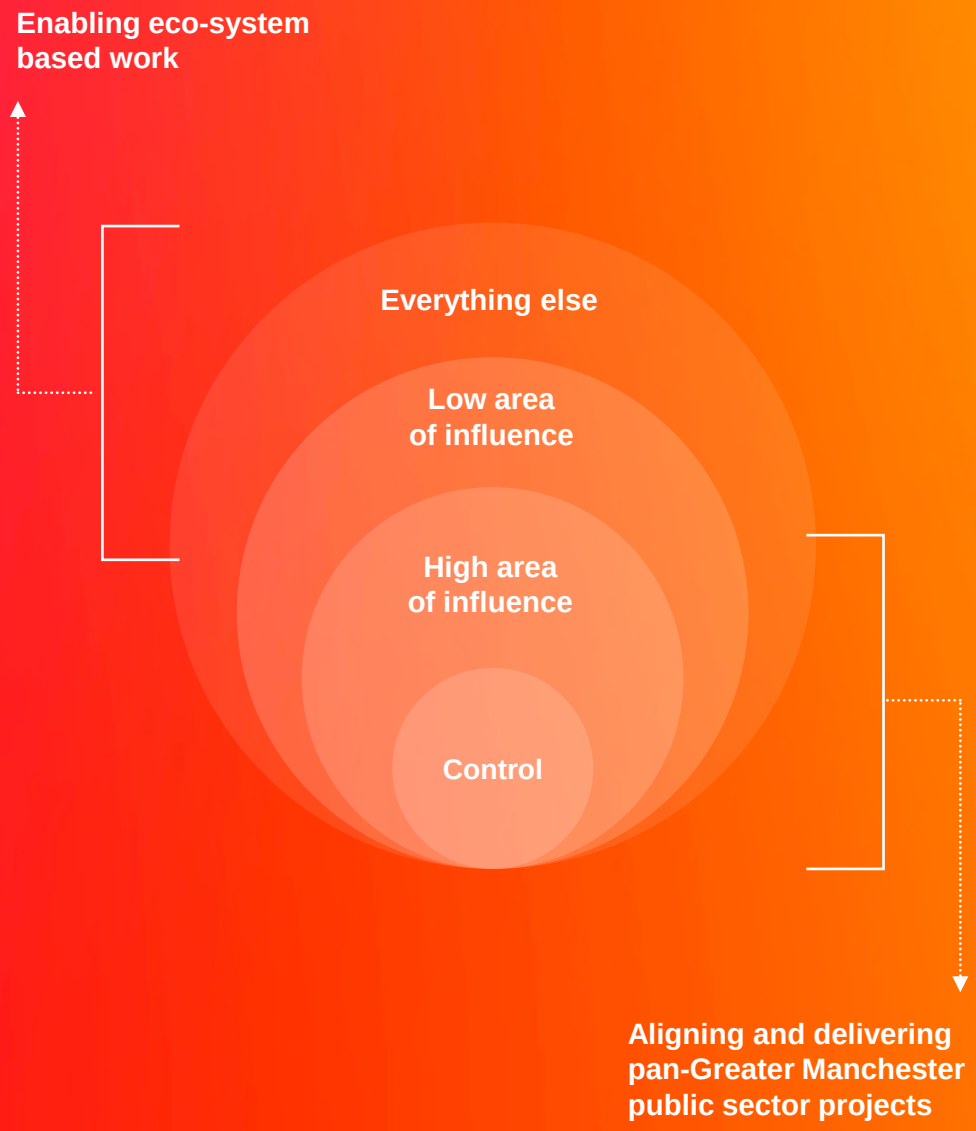
TAKING AN ECOSYSTEM APPROACH

For Greater Manchester to achieve its ambitions we need the whole digital ecosystem to pull together. This concept of collaboration is at the heart of this Blueprint.

We will further support and enable private, academic and not-for-profit sector work and identify where there are gaps and initiatives needed at a pan-GM level.

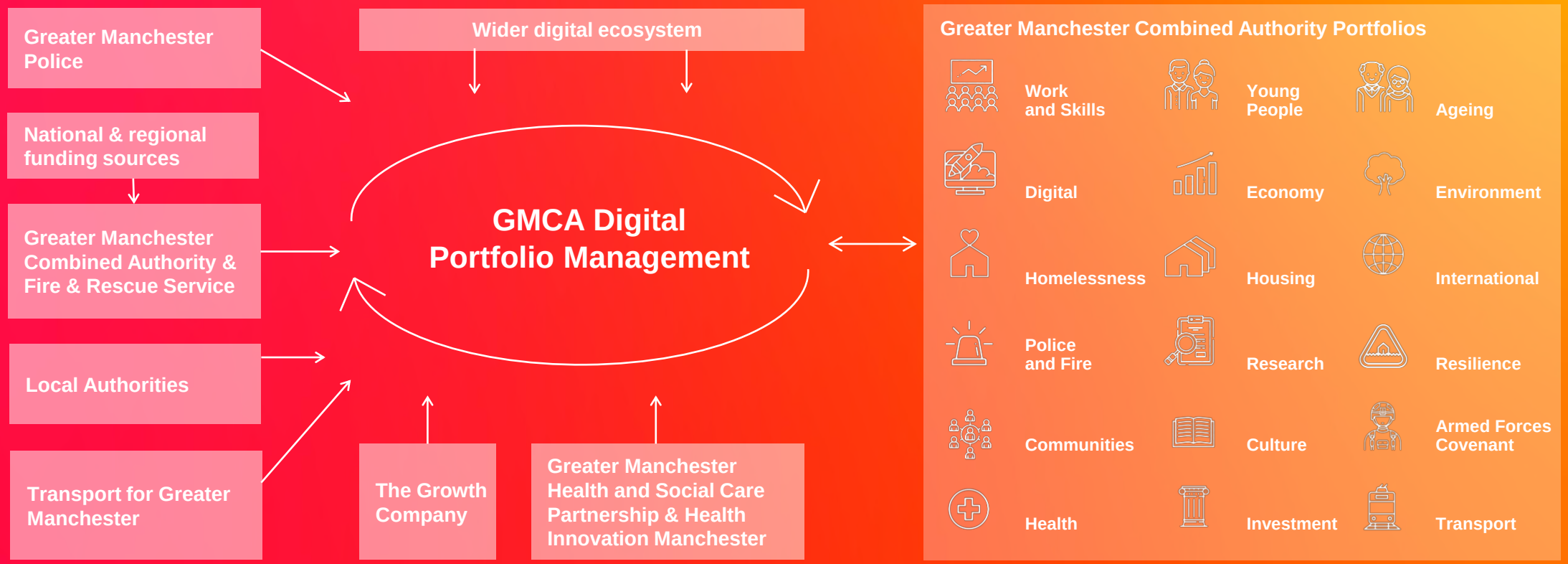
With a joined-up approach we want to ensure the digital portfolio's role across wider linked GMCA work is connected for bigger impact. Particularly with our Work & Skills, Green City-Region, Reform, Growth and Infrastructure programmes across all districts to emphasise that we are more than just the sum of our parts.

This will be supported by a refreshed and inclusive governance and engagement approach which evolves with the pace of change, reflecting local and national needs and the city-region's growth.



CO-ORDINATING DELIVERY

A joined-up and bolder approach to managing the Greater Manchester Digitial Portfolio Priorities will drive better deliver public sector transformation by maximising opportunities and resources, enable joint working on opportunities and ensuring gaps are rectified.



DOING DIGITAL DIFFERENTLY IN GREATER MANCHESTER

Big enough to matter, small enough to know each other, and driven enough to make things happen…

#GMdigital

@GMCAdigital

greatermanchester-ca@gov.uk

HM Government

INDUSTRIAL STRATEGY

Greater Manchester Local Industrial Strategy

June 2019



GREATER MANCHESTER
DOING THINGS DIFFERENTLY

NORTHERN POWERHOUSE
HM Government

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Foreword

"We can see only a short distance ahead but we can see plenty that needs to be done". - Alan Turing, Manchester, 1950.

Alan Turing's words have as much relevance today as they did then. Written in Manchester when he was pioneering work that led to the modern computing revolution, he inspired technologies across the world which are transforming the way we live our lives as workers, citizens and consumers. We do not know all the ways in which our economy and society will be impacted by these global forces, but we have a clear picture of what needs to be done to ensure that the UK and Greater Manchester are best placed to take advantage of the opportunities they create.

Our modern Industrial Strategy sets out how the UK will respond to these economic and technological changes, as well as other global forces such as an ageing society and the need to transition to clean growth, while raising productivity and earnings. Local Industrial Strategies are an essential part of our plan, allowing communities to take control of their own economic futures and ensuring that the UK takes advantage of local opportunities and the drive and ambition of people across the country.

Greater Manchester has a proud history of innovation, from the world's first passenger railway, to the world's first stored program electronic computer, to the Nobel Prize winning isolation of graphene in our own time. Greater Manchester's economic leadership has gone hand in hand with social progress: the Chartists, the Trade Union movement, the co-operative movement, and women's suffrage were all born in the city-region. England's first civic university, the University of Manchester, was established in the city-region and the area is now home to four universities that play a leading role in social and economic progress.

This pioneering and progressive spirit is demonstrated today in the Greater Manchester Local Industrial Strategy. The strategy capitalises on Greater Manchester's biggest opportunities, where it can be a 21st century global pioneer at the centre of the Fourth Industrial Revolution – including in health innovation, advanced materials, and digital and creative industries. It aims to capitalise on the local ambition to be carbon neutral by 2038, to drive improvements to environmental quality while also stimulating innovation and new industries.

And it seeks to raise productivity and pay in the foundational sectors of the economy - including in large sectors such as retail, hospitality and tourism, and social care.

Crucially, the strategy builds on Greater Manchester's best asset - its people - to continue to drive social progress. It sets out a plan for communities across the cities and towns of Greater Manchester to thrive and prosper, with good jobs being created across the city-region backed up by the infrastructure, skills and networks needed to raise productivity and earnings. It aims to ensure that everyone is supported to reach their full potential, that people have hope and optimism for the future, and that the modern economy leaves nobody behind.

This focus on frontier and foundational sectors – and the connections between them – will support the creation of a highly productive, more inclusive and prosperous city-region for all residents. It also means that the strategy will deliver more than the sum of its parts. Health innovation will create new products and services Greater Manchester can export around the world, while simultaneously improving the health of the city-region's population. Carbon neutrality by 2038 will improve the environment across the city-region, boosting quality of life for residents.

And digital transformation has the potential to create better quality, future-facing jobs in all sectors of the economy.

Led by a partnership including the Greater Manchester Mayor, the Greater Manchester Combined Authority, the Greater Manchester Local Enterprise Partnership, and national government, the Greater Manchester Local Industrial Strategy builds on over 30 years of public and private sector collaboration in the city-region. The strategy's development was a genuinely collaborative effort with stakeholders, drawing on expertise and advice from a wide range of organisations including Greater Manchester's businesses and social enterprises, local authorities, universities and colleges, trade unions and community and voluntary organisations, as well as national organisations, and government departments and agencies. It is based on a robust evidence base produced by leading experts through the Greater Manchester Independent Prosperity Review, which built on the 2016 Science and Innovation Audit. It demonstrates the successes of devolution to the city-region over the past decade, and charts a course for how this partnership will continue to develop into the future.

Greater Manchester does things differently. Plenty needs to be done and we are committed to work together to do it.



Rt Hon Greg Clark MP
Secretary of State for Business, Energy and Industrial Strategy



Mike Blackburn OBE
Chair of Greater Manchester Local Enterprise Partnership



Rt Hon Andy Burnham
Mayor of Greater Manchester and Chair, Greater Manchester Combined Authority



Professor Dame Nancy Rothwell
FRS, FMedSci, President and Vice-Chancellor of the University of Manchester



Sir Richard Leese
Leader of Manchester City Council and Deputy Mayor, Greater Manchester Combined Authority



Juergen Maier CBE
Chief Executive of Siemens plc

Executive Summary

Greater Manchester's ambitious Local Industrial Strategy is designed to deliver an economy fit for the future, with prosperous communities across the city-region and radically increased productivity and earning power.

This Local Industrial Strategy represents a strong partnership between local leaders and government, setting out an ambitious plan to achieve the aspirations of the national Industrial Strategy and to continue to contribute to Greater Manchester's prosperity.

The strategy is based on the robust evidence provided by the 2019 Independent Prosperity Review, and the 2016 Science and Innovation Audit.

It has been developed from the ground up with local and national stakeholders, including business and social enterprises, trade unions, universities and colleges, and community and voluntary organisations.

Greater Manchester fit for the 21st century

Greater Manchester's success is central to the government's vision of a prosperous Northern Powerhouse.

The city-region's economy is robust, diverse and growing. With over 124,000 businesses, it is already a great place to live and work for many. Employment growth has been strong for a decade and there are reasons for optimism for the future: a growing skills base, significant rises in business start-ups, and major infrastructure investments are planned. Innovative forms of cooperation between Greater Manchester's private and public sector mean it continues to be an example of effective leadership for the Northern Powerhouse, the UK, and the world.

Greater Manchester is building on a decade of strong investment in businesses, infrastructure, and in new forms of government. Since 2009, a Combined Authority has been formed, a Mayor elected, and six devolution deals signed, giving the city-region greater influence over billions of pounds of spending. Working with government, Greater Manchester has developed the UK's largest and most successful light-rail system, invested in institutions that provide an unrivalled critical mass of graphene and 2D materials research and commercialisation expertise, and

successfully supported the long-term unemployed back into work through the nationally acclaimed Working Well programme. This Local Industrial Strategy maintains the momentum.

The Independent Prosperity Review identified that there are barriers to be overcome to improve economic performance.

These include population health, education and skills, infrastructure, innovation and leadership and management. The Greater Manchester Local Industrial Strategy will tackle these barriers, while also responding to global changes affecting us all including climate change, technological change and the Fourth Industrial Revolution, and an ageing society.

Working to agree this Local Industrial Strategy

This Local Industrial Strategy sets out how Greater Manchester will forge its future.

As well as setting out a number of specific actions, it also sets out Greater Manchester's long-term aspirations and the specific outcomes local partners are aiming to achieve. These will help guide future action and evaluate progress. These locally led and ambitious outcomes are the product of extensive consultation with local leaders, business and civil society. They are also underpinned by the work of the Independent Prosperity Review.

Where appropriate, this Local Industrial Strategy will inform how local leaders will capitalise on the city-region's unique assets and opportunities over the long-term by aiming to:

- set Greater Manchester up to be a global leader on health and care innovation - creating new industries and jobs, improving population health and extending healthy life expectancy;
- position Greater Manchester as a world-leading city-region for innovative firms to experiment with, develop and adopt advanced materials in manufacturing;
- build on Greater Manchester's position as a leading European digital city-region; enable the digitalisation of all sectors; and capitalise on the links between digital and creative industries that feed internationally significant clusters in broadcasting, content creation and media, and maximise growing assets in cyber security;
- achieve carbon neutral living in Greater Manchester by 2038, by launching the UK's first city-region Clean Growth mission.

In addition to the specific shared commitments agreed with government, this Local Industrial Strategy also details how Greater Manchester will work with a variety of local, national and international actors to deliver the strategy's ambitions.

Key to the success of the Local Industrial Strategy will be strengthening the city-region's foundations of productivity and ensuring that growth benefits all people and places:

- **Ideas:** Greater Manchester partners will continue to work with UK Research and Innovation (UKRI) to maximise investments in innovation assets in the conurbation, increasing the take-up and impact of funding to drive applied R&D to meet the strategic needs of the Greater Manchester economy.
- **People:** working in partnership to explore areas to connect national and local policies for the post-16 skills and work system in the city-region.
- **Infrastructure:** government will join the Greater Manchester Strategic Infrastructure Board. Greater Manchester will explore options for sustainable, long-term local investment into infrastructure to sit alongside devolved funding streams.
- **Business environment:** strengthening Greater Manchester programmes that support businesses to improve productivity. The leadership and management programmes provided by Greater Manchester partners will be complemented by a new Greater Manchester Good Employment Charter and plan for the 'foundational economy', to improve productivity, wages and job quality in all sectors.
- **Places:** a thriving and productive economy in all parts of Greater Manchester will be supported by addressing barriers to participating in employment and accessing opportunities across the city-region, and by Greater Manchester continuing to redesign public services around its model of unified public services.

Seizing opportunities for the future

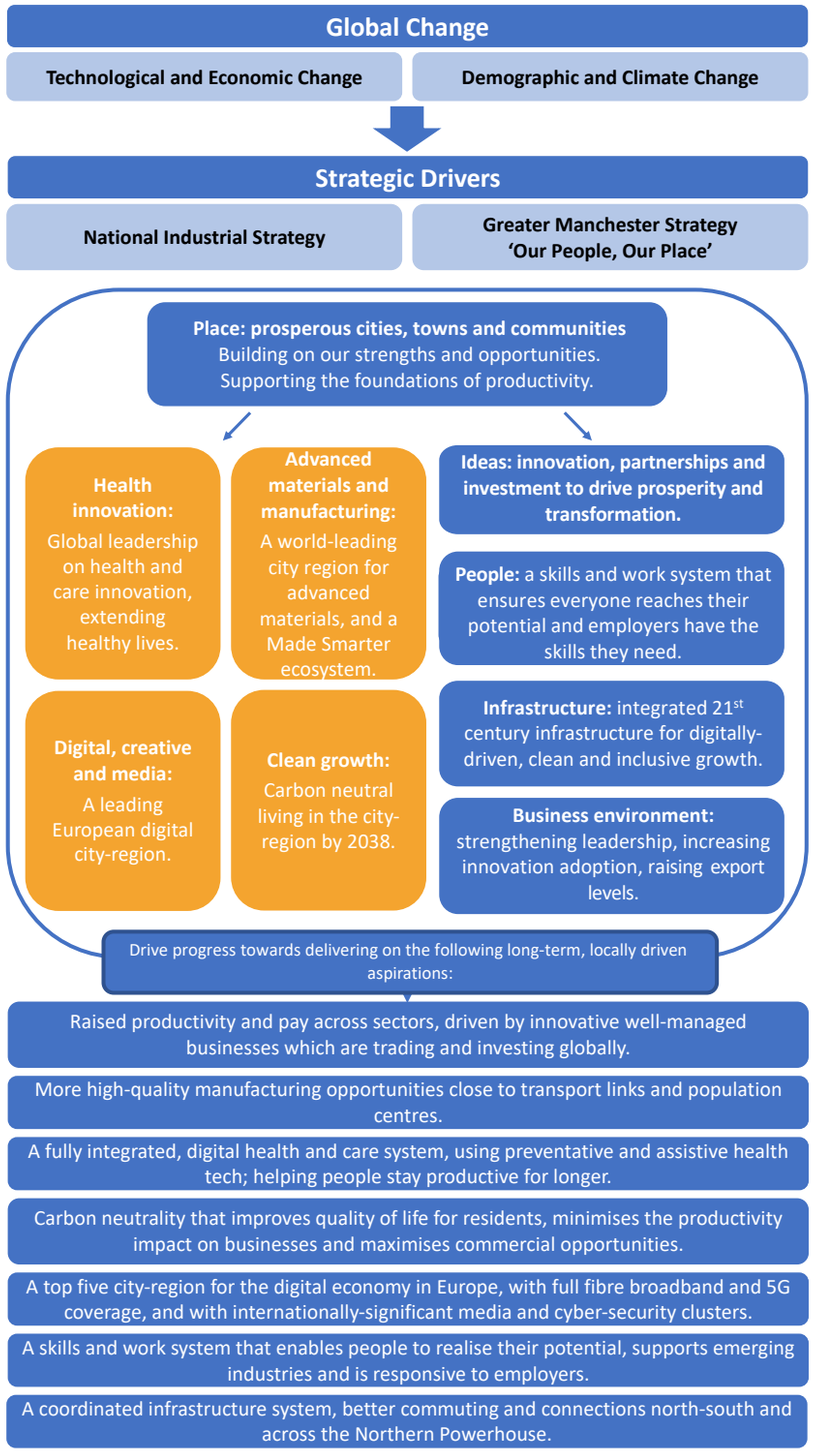
Health Innovation

The interactions between poor physical and mental health and economic growth stand out in Greater Manchester and, like all UK cities and regions, Greater Manchester's population base is ageing. By 2036, Greater Manchester will see a 75 per cent increase in the proportion of the population who are 75 and over compared to 2011.

The city-region has recognised research capabilities in health innovation and one of the largest life sciences clusters outside south east England.

Working with government, health and social care devolution has given the city-region greater control over £6bn of health and care budgets. This gives an ability for Greater Manchester to drive innovation in the health and care system to improve population health, while also creating new industries and new jobs. This makes improving the health of the local population Greater Manchester's biggest opportunity, as well as its biggest challenge.

Overview of the Greater Manchester Local Industrial Strategy



The Greater Manchester Local Industrial Strategy takes the city-region's ambitions further. It sets the ambition for Greater Manchester to be a global leader on health and care innovation, not only creating new industries and jobs, but also improving population health and extending healthy life expectancy. Greater Manchester aims to lead Britain and the world in the roll-out of new health and care technologies, and transforming health and care systems.

The Industrial Strategy's Ageing Society Grand Challenge recognises the opportunity posed by an ageing population. As the UK's first World Health Organisation Age Friendly city-region, Greater Manchester has already taken charge of capitalising on this opportunity.

This Local Industrial Strategy announces the establishment of an Innovation Partnership on Healthy Ageing, with a board comprising of representatives from Greater Manchester, the private sector and government agencies and departments. Greater Manchester will also work to identify a home for a prospective International Centre for Healthy Ageing to drive real-world testing and commercialisation of health, care and wellbeing innovations that support healthy ageing.

Advanced Materials and Manufacturing

Greater Manchester is the home of graphene and other revolutionary 2D and advanced materials. The successful commercialisation, adoption and diffusion of these materials will support an industrial renaissance in the UK and help address all four Grand Challenges. Greater Manchester has a complementary advanced manufacturing base with strengths in materials and textiles, chemicals, and food and drink, amongst others, which provides the industrial capacity to commercialise these new materials. The city-region's manufacturing industry, which employs 110,000 people and generates £8bn of economic output each year, is being transformed by the Fourth Industrial Revolution, which is driving productivity improvements through the adoption of digital technologies, artificial intelligence and efficiency improvements.

Through this Local Industrial Strategy, Greater Manchester will combine these strengths to make the city-region one of the world's leading regions for innovative firms to experiment with, develop and adopt advanced materials.

To drive progress towards achieving this priority, Greater Manchester will develop world-class sites and premises across the city-region, including the University of Manchester work to establish 'Graphene City' in the centre, and the ambitions of Greater Manchester partners for an 'Advanced Materials City' in north east Greater Manchester.

Greater Manchester will establish a new Graphene, Advanced Materials and Manufacturing Alliance to develop the city-region's advanced materials and manufacturing strategy,

with government on its board.

The city-region will build on the ongoing Made Smarter pilot to create an ecosystem that supports next generation manufacturing capabilities.

Digital, Creative and Media

Greater Manchester has the largest digital and creative sectors outside the south east, with the potential to create internationally significant clusters in broadcasting, content creation and media and cyber security, alongside new sub-sectors like e-commerce where the city-region has the potential to lead industries of the future. The explosion of the data and digital economy over the past decade is enabling growth across the economy, and has the potential to transform public services to support improved productivity. At the same time, cross-cutting digital strengths will accelerate the use of productivity-enhancing digital technologies and big data in all sectors to meet the Artificial Intelligence and Data Grand Challenge.

Through this Local Industrial Strategy Greater Manchester aims to build on its position as a leading European digital city region, to maximise growing assets in cyber security and capitalise on the links between digital, creative and other industries in the city-region that feed innovation in broadcasting, content creation and media, as well as in e-commerce, fintech and other new technologies. Greater Manchester will take a Made Smarter approach to all industries, supporting firms to adopt new digital and creative techniques and enabling the digitalisation of all sectors.

Greater Manchester will also continue to support the growth of creative and media clusters in the centre and throughout the city-region.

Greater Manchester and government have already invested in the city-region's digital infrastructure, creative and media infrastructure and committed to a new cyber security Centre of Excellence in the city-region that will create hundreds of high-skilled jobs. Greater Manchester's £3m Digital Skills Pilot, agreed at the 2018 Budget, will see the city-region and government work together to boost digital skills. Local partners will also initiate a review of local data, to identify and address barriers to making this openly available for re-use. Greater Manchester will lead a biennial international event to showcase to the world the best of the city-region's digital and creative talent, with support from government officials.

Clean Growth Grand Challenge

The transition to a carbon neutral economy is a global challenge and central to the Clean Growth Grand Challenge, which aims to ensure future growth does not come at the expense of the planet. Greater Manchester's ambition to achieve carbon neutral living in the city-region by 2038 provides a significant opportunity to deliver substantial carbon reductions, environmental and health benefits to residents, whilst also creating new green industries and jobs capitalising on Greater Manchester's research assets and large low carbon goods and services sector. This already includes 2,500 companies and employs over 45,000 people.

While significant progress has been made in improving the city-region's environment, Greater Manchester will face challenges including rapidly increasing the energy efficiency of buildings, decarbonising heating and cooling, significantly upscaling local renewable energy generation and decarbonising transport. To drive progress, Greater Manchester has already developed a 5-year Environment Plan that sets out actions to reduce carbon across all sectors of society, and is working towards a coordinated Clean Air Plan, to address poor air quality – the largest environmental risk to public health in the city-region.

Through this Local Industrial Strategy Greater Manchester is launching the UK's first city-region Clean Growth Mission to achieve carbon neutral living in Greater Manchester by 2038. Greater Manchester's 5-Year Environment Plan points to the opportunities around innovations that:

- improve the environment;
- increase the energy efficiency of homes and buildings;
- adopt new models of local renewable energy generation; and
- accelerate the implementation of energy and material efficiency measures by businesses.

Government welcomes Greater Manchester's local mission, which will support the delivery of the government's Clean Growth Grand Challenge.

Strengthening the foundations of productivity

Ideas

Innovation – the development and deployment of new ideas – is embedded throughout this Local Industrial Strategy: in health and care innovation and the development and commercialisation of advanced materials, in meeting the Clean Growth Grand Challenge and in digital and creativity. However, there are gaps in the commercialisation ecosystem and Greater Manchester's research and development spending is lower than comparable city-regions.

Increasing innovation by firms and across the public sector will be crucial to meet the Industrial Strategy target of 2.4 per cent of GDP being invested in R&D by 2027, and 3 per cent in the longer term.

Greater Manchester has already been working to reinforce the region's innovation system, by building collaboration through Knowledge Transfer Partnerships and Impact Accelerator Accounts, and coordinating activity through the Greater Manchester Innovation Board.

Greater Manchester and government will continue to maximise the impact of investments in innovation assets in the conurbation, increasing the take-up and impact of research and innovation funding in Greater Manchester and embedding connections between universities, businesses and public bodies.

Greater Manchester will also work to incentivise private sector investment in research and development. To address gaps in the innovation funding landscape, Greater Manchester will review the city-region's venture capital funding landscape in partnership with the City of London, assessing the case for an Early Stage Investment seed funding programme drawing on local funding and targeted at private investments. To exploit opportunities from latent Intellectual Property (IP) held by large UK firms and research organisations, Greater Manchester will launch a pilot programme to develop a cooperative Intellectual Property Bank to make IP available to smaller firms.

People

The city-region has made huge strides over the past decade to improve the skills base and reduce the proportion of the population without any qualifications or out of work due to ill health. However, poor health and deficits in certain types of skills and talent is restricting economic growth, and the fragmentation in the education and training system presents barriers to further progress.

Greater Manchester's ambition is to deliver ambitious improvements in skills and employment for the 2.8 million people living in the city-region. Central to this is developing a responsive city-region skills system that enables all people to achieve their full potential and provides the skills businesses need for the future.

To achieve this ambition, Greater Manchester is rolling out a new delivery model for early years based around integrated public services at neighbourhood level. Combined Authority plans to pilot free bus travel for 16-18 year olds; the interactions with employers enabled by the Bridge GM programme; the new UCAS-style careers platform; and Curriculum for Life will help all of the city-region's young people become work and life ready. Government is already working differently in the city-region through the Employment and Skills Advisory Panel and the devolution of the Adult Education Budget. Government and Greater Manchester are working together to deliver new initiatives including the Oldham Opportunity Area, Digital Skills Pilot, Self-Employment Pilot, Future Workforce Fund, National Retraining Scheme and to test new approaches to employability support.

To ensure the skills and employment system supports everyone in the conurbation, government and Greater Manchester have agreed to work together to explore opportunities to connect national and local post-16 skills and work policies in the city-region to deliver a more effective offer.

The Partnership will report within nine months; early areas for closer cooperation could include:

- ensuring greater businesses engagement in the whole system from careers to in-work progression;
- supporting institutions with their efforts to raise quality and therefore help more young people to benefit from good or outstanding learning;
- identifying what more can be done at a national and local level to support those in work on low pay to progress in work;
- supporting employers to retain older workers and those with health problems; and
- supporting more high quality apprenticeship opportunities with SMEs, securing employer commitments to provide high-quality T Level industry placements, and boosting employer investment in retraining.

Infrastructure

Greater Manchester has successfully delivered significant infrastructure improvements and investment in the past ten years. The city-region now aims to upgrade, integrate and future-proof its infrastructure, to create a 21st century city-region with extreme digital connectivity, clean and inclusive growth and – through work with others – improved access to national and global markets.

Government is already working in partnership with Greater Manchester to improve transport system performance through implementation of Greater Manchester's devolution deals, greater local influence over rail services and stations, bus reform, trialling tram-trains and regulatory reform. In line with our national Future of Mobility Grand Challenge, Greater Manchester and government will also develop a programme of transport innovation to explore digital mobility solutions. This complements existing partnership working to improve digital infrastructure in the city-region, to meet national targets of nationwide full fibre coverage by 2033 and roll-out of 5G technologies for most people by 2027.

Greater Manchester's £312.5m allocation from the Transforming Cities Fund has also supported developments to Metrolink and the 'Bee Network' (the city-region's transformative cycling and walking infrastructure plan). To continue addressing congestion and increase productivity in the short term, Greater Manchester will implement the next stage of the city-region's 2040 Transport Strategy and continue to expand the Bee network to encourage increased walking and cycling. The city-region will also work to deliver growth cases for High Speed 2 and (via Transport for the North) Northern Powerhouse Rail.

This Local Industrial Strategy announces that government will join the Greater Manchester Strategic Infrastructure Board, overseeing implementation of national and local plans and providing operational expertise to improve the performance of the city-region's infrastructure, including transport, energy, housing and digital.

To underpin the strategic and integrated approach to infrastructure the city-region has embedded, Greater Manchester will review its institutions, structures and processes to ensure continued success in delivery relating to infrastructure, and also explore options for achieving sustainable, long-term local investment to meet the ambitions set out in the draft Greater Manchester Spatial Framework.

Business Environment

Greater Manchester's economy is diverse and there is a sophisticated mix of industries and supply chains in the city-region creating huge opportunities for business growth and diversification. Frontier firms in every sector are exporting, innovating and growing investment in the city-region, but a 'long tail' of low-productivity firms exists in Greater Manchester as elsewhere, and the city-region underperforms on exports and innovation adoption.

Through the Greater Manchester Local Industrial Strategy, activity will be coordinated to radically improve the productivity of businesses across all sectors by strengthening their leadership and management capacity, increasing innovation adoption and raising levels of export and investment. This includes programmes being delivered by the Business Growth Hub; the local Good Employment Charter designed by Greater Manchester partners; and a plan to increase the productivity of big sectors in the 'foundational economy'. Together, they will improve skills utilisation, wages and job quality and management standards across the business base. A new Greater Manchester Social Enterprise Strategy will set out how the sector can support the implementation of this industrial strategy and promote good jobs in the sector.

Greater Manchester and government have worked in partnership to encourage local investment, demonstrated through the mature and extensive business support offer in the city-region and an increased local presence of the British Business Bank and the Department for International Trade, supporting work including the £400m Northern Powerhouse Investment Fund.

The Growth Hub and Greater Manchester partners will better coordinate existing business support programmes for increasing innovation and productivity, to enable more local businesses to access them, and provide more targeted support including one-to-one advice, mentoring and peer-to-peer programmes. Greater Manchester will also launch a Global Prosperity Partnerships Model to promote high value trade, technology exchange, and scale up high-growth companies to compete globally. These will be promoted by the Department for International Trade.

Places

Greater Manchester has many strengths: from the dynamic city centre, to the creative cluster around the Quays and the concentration of research excellence on the Oxford Road Corridor, to the industrial hubs in Trafford Park, Wigan, Rochdale and Bolton, and vibrant town centres across the city-region.

The Local Industrial Strategy recognises the city-region's local variation, and aims to bring prosperity to all of Greater Manchester's communities, in line with the recommendations of the Independent Prosperity Review. Each of Greater Manchester's local authorities will develop a borough-level response to the Greater Manchester Local Industrial Strategy, to identify key opportunities and barriers in each locality and ensure coordinated implementation.

The city-region will also take an integrated place-based approach to bringing forward strategic regeneration proposals in town centres and strategic sites, which integrate investment in land remediation, housing transport and other infrastructure to create sustainable employment locations. Mayoral Development Corporations will be used where appropriate to drive strategic regeneration, and Greater Manchester will continue pubic service reform.

Government will work in partnership with the city-region to deliver place-based policies that improve productivity and prosperity, including through national initiatives such as the Future High Street Fund and the Stronger Towns Fund to support and fund local areas' plans to make high streets and town centres fit for the future. Government will continue working with Greater Manchester partners to deliver the Transforming Cities Fund in ways that support the Local Industrial Strategy, and maximise the long term impact of the new UK Shared Prosperity Fund.

Introduction

Greater Manchester is known globally for its heritage and its pioneering and progressive culture, which reflects the distinctive personality of the city-region, its towns, rural communities and its people.

A rich history, including the establishment of the modern cooperative movement, and strong cultural and sporting assets give Greater Manchester a globally recognised brand that speaks of innovation, creativity and social progress. Its scientific and industrial inventions, social movements, art and design, music and sport continue to create impact throughout the world.

Greater Manchester's 2.8 million residents live in ten local authority areas: Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford and Wigan. The city-region is located at the heart of the UK, with easy access to all of its constituent nations, and is only a short distance from other major cities such as Leeds and Liverpool. Manchester Airport is the UK's third largest, with international connections to over 200 countries, over 50 of which are long-haul. The strategic location, strength, and growth potential of Greater Manchester puts it in an ideal place to act as one of the core drivers of the Northern Powerhouse.

The city-region has an institutional capacity, culture of collaborative and partnership working, and delivery track-record that makes it an example to other areas in the UK. Over the past ten years, devolution has become a reality with the election of a city-region Mayor, formation of a Combined Authority, and local strategic accountability for key services such as health and social care and transport. With support and funding from the UK government, Greater Manchester has developed the UK's largest light-rail system; invested in institutions to provide a critical mass of advanced materials expertise; and successfully supported long term unemployed residents into work through the Working Well programme. This strategy capitalises on the capacity, powers and resources that have been granted to the city-region.

The Greater Manchester Local Industrial Strategy charts the next phase of the city-region's social and economic leadership and sets out a bold vision for the future.

It is focused and ambitious, building on the existing strengths in the local economy and those areas where the city-region has the potential to excel in the future. It also recognises the challenges faced and actions required to overcome them. One of these challenges is to raise productivity across all parts of the economy by improving the quality of jobs, adopting new technologies and designing new business models, including in the foundational economy.

The aim of this strategy is to boost productivity and prosperity by setting a course for capitalising on the biggest opportunities, but at its centre is a plan for building on Greater Manchester's best asset: its people. It aims to ensure all of Greater Manchester's people thrive and prosper, that everyone is supported to reach their full potential, that young people have hope and optimism for the future, and that nobody is left behind. It is also a plan for the environment, to ensure that Greater Manchester becomes carbon neutral in ways that drive local innovation, and improves quality of life and health to benefit Greater Manchester's residents.

The strategy has been built from the ground up with local and national stakeholders, including business and social enterprise, trade unions, universities and colleges, local authorities, government departments and agencies, and community and voluntary organisations.

This included a formal six-week consultation in Autumn 2018 when over 20 events were held, attended by 500 stakeholders, which resulted in more than 120 written responses.

The Greater Manchester Local Industrial Strategy represents a true partnership between Greater Manchester and government. It will support coordinated action around a coherent vision and agreed common set of outcomes. It sets clear priorities to capitalise on the research and industrial strengths of the city-region, and to strengthen the foundations of the economy in line with the policy framework set out in the national Industrial Strategy. Both government and Greater Manchester are committed to delivering this strategy over the long term. It will continue to inform the strategic use of local funding streams and, where relevant, spending and decisions at the national level.

Greater Manchester's Industrial Strategy

This strategy is agreed by government and the leaders of Greater Manchester. It is underpinned by a shared understanding of the place and its people, and is designed to enable the city-region to go further and faster towards its ambitions than ever before, while meeting key national objectives.

The Greater Manchester Local Industrial Strategy builds on the findings of the Greater Manchester Independent Prosperity Review and its detailed analysis of the local economy and the social and environmental challenges that must be overcome.

The Greater Manchester Local Industrial Strategy will not work in isolation. It complements other national and local strategies including the national Industrial Strategy and the Greater Manchester Strategy 'Our People, Our Place'. Our People, Our Place sets a clear objective to make Greater Manchester one of the best places in the world to grow up, get on in life and grow old – where there is:

- a good start in life for everyone, with children starting school ready to learn;
- excellent opportunities for young people, who are equipped for life;
- a thriving, productive, carbon neutral economy, providing good employment and opportunities to progress and develop for all;
- world-class connectivity – digitally and through an integrated transport network – within all parts of Greater Manchester;
- safe, decent and affordable housing in stronger and safer communities;
- a high quality cultural and leisure offer for everyone in a green city-region;
- better health, and quality care and support for people to live fulfilling and healthy lives; and
- an age-friendly city-region and safer and stronger communities.

Successful implementation of the Greater Manchester Local Industrial Strategy will depend on national approaches to the Grand Challenges and wider policy, but also a number of plans being developed locally to shape the future of the city-region for generations to come. These include the draft Greater Manchester Spatial Framework, the Infrastructure Framework, the 2040 Transport Delivery Plan, the White Paper on Unified Public Services for the People of Greater Manchester, the Health and Social Care Prospectus, and the 5-Year Environment Plan.

The modern Industrial Strategy sets out government's ambition to create an economy that boosts productivity and earning power throughout the UK.

To achieve this ambition, it identifies actions around five foundations of productivity – Ideas, People, Infrastructure, Business Environment and Places – which are the essential attributes of every successful economy. It also identifies opportunities grouped under four Grand Challenges – Artificial Intelligence and Data, the Ageing Society, Future of Mobility, and Clean Growth – where the UK has the potential to be at the forefront of industries of the future. The Greater Manchester Local Industrial Strategy takes an approach that builds on local strengths and develops a city-region specific approach to tackling the foundations of productivity and capitalising on the Grand Challenges.

Shared priorities between local leaders, government, and local stakeholders

This Local Industrial Strategy has identified opportunities to capitalise on the city-region's industrial and research strengths, and the ambitions and leadership of its institutions, to harness opportunities from all four Grand Challenges and create industries of the future:

- In health innovation, Greater Manchester has internationally recognised research capabilities, one of the largest life sciences clusters outside the South East, and a devolved health and care system. But the city-region also has worse health outcomes than other UK regions, such as the South East, and the barriers that poor health creates to work and progression in work are an important explanation for slow overall growth in the last decade. These factors combined create the opportunity for the city-region to be a global leader on health and care innovation and commercialisation, while also improving the health of the population, extending healthy, independent life expectancy to take advantage of the longevity dividend and address the Ageing Society Grand Challenge, whilst also reducing inequalities and increasing productivity.
- In advanced materials and manufacturing, Greater Manchester is the home of graphene and other revolutionary 2D materials which have the potential to provide new ways of addressing all four Grand Challenges. Greater Manchester's complementary advanced manufacturing base, which is being transformed by the Fourth Industrial Revolution, provides the industrial capacity to commercialise these new technologies and create a world-leading cluster in advanced materials.

- Greater Manchester has the largest digital and creative cluster outside the South East, with the potential to create international significant clusters in broadcasting, content creation and media, and cyber security. The establishment of a Government Communications Headquarters (GCHQ) hub in the city-region will anchor the growth of an internationally important cyber and digital security cluster in Greater Manchester. At the same time, cross-cutting digital strengths offer the potential to increase the use of productivity-enhancing digital technologies, artificial intelligence and big data in all sectors to meet the AI and Data Grand Challenge whilst also driving health innovation and clean growth.
- The transition to a carbon neutral economy is a global challenge and central to the Clean Growth Grand Challenge. Greater Manchester's city-region mission for carbon neutral living by 2038 is a significant opportunity to deliver environmental and health benefits to residents, while also creating new green industries and jobs capitalising on Greater Manchester's research assets and large low carbon goods and services sector. These already include 2,500 companies, employing over 45,000 people. This will be delivered through a series of Greater Manchester-led mission-orientated projects.

By focusing on these four areas this strategy will pioneer emerging sectors.

As these new industries grow and flourish, they will create significant global competence and additional value in the economy of Greater Manchester and for the UK.

The consultation process and evidence developed also stressed the importance of the foundations of productivity. The foundations will enable growth in areas of strength and opportunity, and support productivity improvements across all sectors to benefit all parts of Greater Manchester. For Greater Manchester this will mean:

- leading industrial, social and economic transformation through innovation and the spread of ideas throughout the city-region;
- designing a skills and work system that ensures all people reach their potential and employers have the skills to deliver the Industrial Strategy;
- developing a single infrastructure plan – and identifying opportunities to fund that plan - to put in place the integrated 21st century infrastructure needed for digital driven, clean and inclusive growth; and
- transforming the productivity of businesses and all forms of enterprise by strengthening leadership and management, increasing innovation adoption, digital transformation, and raising levels of exports. The Greater Manchester Good Employment Charter will engage Greater Manchester's employers, improving productivity, wages and job quality in all sectors.

Greater Manchester will also create the optimum conditions for social enterprises and cooperatives to thrive.

- supporting all places in Greater Manchester to realise their full potential by ensuring that the conditions are in place for investment and jobs growth across the city-region; and equipping people – through improvements in skills and transport accessibility – to access jobs across the conurbation.

These proposals amount to more than the sum of their parts. For example:

- By capitalising on health innovation assets Greater Manchester will improve the health of the local population, enabling residents to fully participate in the economy, progress in their careers and age well. By providing the health and social care workforce with the skills to fulfil the new roles, the skills system will enable the increased adoption of new health and care technologies, processes and services. Improving the health of the people in Greater Manchester will also improve the productivity of the city-region's businesses and economy.
- The focus on advanced materials and manufacturing in this strategy will tackle some of the key strategic challenges the city-region and UK face, developing new technologies and designing products and services such as energy storage to support carbon neutrality, or new medical devices to support older people to stay in their homes for longer.
- To be successful in this, the city-region's innovation ecosystem should: facilitate business adoption and commercialisation of the cutting-edge innovations developed in universities and innovation, research and technology organisations; provide the technical skills industry needs, and employment opportunities across the city-region; and be supported by the right infrastructure for large-scale productivity improvements.
- Likewise, an integrated approach to digital infrastructure and improving the availability of digital skills will underpin the city-region's growing digital industries and the wider digitalisation of the whole economy. Greater Manchester's digital capabilities intersect with the city-region's dynamic creative and cultural industries, as well as its leading financial professional services sector. Harnessing these capabilities will again improve the productivity of businesses across the city-region and increase inclusivity.
- The carbon neutral clean growth mission is, by its very nature, cross sectoral and it will shape all actions in this strategy.

Collectively, these priorities create a clear place-based Industrial Strategy for the future of Greater Manchester's economy.

Understanding the Greater Manchester Economy: the Independent Prosperity Review

The success of devolution in Greater Manchester has been built on a strong evidence base – particularly through the 2009 Manchester Independent Economic Review[1].

The Greater Manchester Local Industrial Strategy continues this approach. It is built on the robust assessment of the city-region's economy, and what needs to be done to improve productivity and drive prosperity that was assembled through the Greater Manchester Independent Prosperity Review ('the Prosperity Review')[2].

Key findings

Opportunities: Greater Manchester has become one of the most economically diverse city-regions in the UK, and contains a sophisticated mix of industries and supply chains. Within this complex economy, the city-region has internationally recognised research strengths and complementary industrial specialisms in health innovation and advanced materials, as also identified in the 2016 Science and Innovation Audit[3]. These are supported by other high productivity sectors that, if not nationally unique, remain important strengths. These include manufacturing, digital and creative industries, and professional services.

The Prosperity Review recommended the Greater Manchester Local Industrial Strategy focuses on the potential for these sectors to create new, highly productive activity at the frontier of innovation.

The Prosperity Review highlighted that the transition to a carbon neutral economy is a global challenge, but Greater Manchester's leadership and ambitions have the potential to drive mission-based innovation to attract investment into new green industries and bring direct benefits to residents from quality of life improvements, such as better air quality and housing, as well as easy access to enhanced green spaces and urban planting. A mission-based approach will harness creativity from across the economy including that of the digital sector alongside education and training, to drive innovation that interacts with all citizens and businesses across the city-region.

The Greater Manchester Independent Prosperity Review

The Prosperity Review was established to undertake a detailed and rigorous assessment of the current state and future potential of Greater Manchester's economy. Ten years on from the path-breaking Manchester Independent Economic Review, it provides a fresh understanding of what needs to be done to improve productivity and drive prosperity across the city-region. Independent of local and national government, the Prosperity Review was led by a panel of six experts:

- Professor Diane Coyle (Chair): Bennett Professor of Public Policy, University of Cambridge.
- Stephanie Flanders: Head of Bloomberg Economics.
- Professor Ed Glaeser: Fred and Eleanor Glimp Professor of Economics, Harvard University.
- Professor Mariana Mazzucato: Professor of Economics of Innovation and Public Value and Director of the University College London Institute for Innovation and Public Purpose.
- Professor Henry Overman: Professor of Economic Geography, London School of Economics, and Director of the What Works Centre for Local Economic Growth.
- Darra Singh: Government and Public Sector Lead at Ernst and Young.

The Panel commissioned new cutting-edge analysis of key economic issues, including productivity and pay, supply chains and international trade, innovation ecosystems and sources of global competitiveness, education and skills, and infrastructure.

The Prosperity Review confirmed Greater Manchester's broad and relatively deep base of innovation, and the findings of the 2016 Science and Innovation Audit, produced jointly by Greater Manchester, Cheshire East and government. There are four universities with main campuses in the city-region (University of Manchester, Manchester Metropolitan University, University of Salford and University of Bolton) with over 96,000 students.

The four universities together generated almost 20,000 first-degree graduates and graduate retention rates, already strong, are rising. The city-region has globally significant and recognised concentrations of research excellence in graphene and other advanced materials and in life sciences and health innovation.

Innovation and research strengths are also present in data sciences and analytics and other aspects relating to digital technologies and applications, and in energy and industrial biotechnology. The city-region's research and innovation assets and capabilities in these areas offer scope for future international excellence.

Economic challenges: While Greater Manchester has made great strides over the past few decades to become an increasingly integrated and modern city-region, there is still significant potential to raise productivity and fulfil its potential as the UK's second growth pole. High productivity firms exist in all sectors; the challenge is to move more companies up the productivity curve in both high-skill and innovative frontier sectors, as well as in the 'long tail' of low productivity businesses in the city-region, and to deliver inclusive growth across the region.

In recent years the balance of employment has shifted towards lower productivity sectors and activities, and the share of low productivity sectors in Greater Manchester (those with lower than £30,000 GVA[4] per worker at 2013 prices) increased from 38 per cent of the economy in 2005 to 42 per cent in 2015. Retail, social care, hospitality and tourism account for the bulk of low paying jobs, in what is often called the 'foundational' economy.

At the same time, average resident earnings (taking account of inflation) have fallen and the average worker earns 81p an hour less in real terms than they did in 2006.

There have also been significant disparities in the economic performance experience across the city-region. Between 1996 and 2016, total GVA grew by 83 per cent in Manchester, 54 per cent in Salford and 52 per cent in Trafford. Comparable figures for Rochdale and Tameside were 24 per cent and 8 per cent, respectively. While the disparity in GVA performance is stark, inequality on some measures has improved across the city-region: the number of neighbourhoods that are among the 10 per cent most deprived nationally has declined from 396 in 2004 to 348 in 2015. Nevertheless, social and spatial disparities contribute to the productivity challenge and tackling their causes is fundamental to the success of this Industrial Strategy.

Greater Manchester's economy in context

In the decade prior to the 2008/09 recession, Greater Manchester's economy experienced strong growth. Between 1998 and 2008 real GVA grew by 2.6 per cent per annum, broadly in line with the UK's overall average (2.7 per cent). Over the same period, real productivity grew by 1.6 per cent per annum, the same as the UK. Population decline in the city-region, which had been more or less continuous since the 1970s, started to reverse in the run-up to and turn of the millennium; a period where employment growth was also strong.

Employment growth remained strong after the financial crisis. Between 2010 and 2016 117,000 net jobs were created, a 1.4 per cent growth per annum, almost in line with the national average (1.6 per cent per annum). But the overall rate of economic growth has slowed significantly, falling to 1.5 per cent per annum between 2010 and 2016, significantly lower than the national average (2.1 per cent per annum). Real productivity growth fell to just under 0.1 per cent per annum in the city-region compared to 0.5 per cent per annum in the UK.

More recent data suggests that Greater Manchester's performance is improving, with continued strong employment growth and sharp improvements in business start-up rates. Greater Manchester is now one of the best performing city-regions outside London for business births, at 115 births per year per 10,000 working age population compared to 85 on average for core cities.

Health challenges: The interactions between poor physical and mental health and growth stand out dramatically in Greater Manchester. The city-region continues to have worse health outcomes than other UK regions and the barriers that poor health creates to work and progression in work is an important explanation for slow overall growth in the last decade. The Prosperity Review subsequently argued that human capital should be at the heart of industrial and economic strategy in the city-region.

At the same time, the devolved structures integrating health and care in Greater Manchester provide a nationally unique opportunity to find new ways to improve the health of local residents, and link health interventions with local skills provision and other services to improve progression in work and address long-term unemployment among older age groups and people with multiple or complex needs.

Greater Manchester's scientific strengths in life sciences and health innovation also create an ability to combine progress at the productivity and innovation frontier with direct health benefits for the whole of the city-region's population.

Skills and education challenges: The Prosperity Review highlights the fundamental link between skill levels and productivity. Greater Manchester has seen significant improvements in its workforce qualification profile over the last decade, but the city-region's skills profile still lags behind national benchmarks. The Prosperity Review identified many strengths in Greater Manchester's education and skills system, but concluded that it remains fragmented and is delivering less than the sum of its parts. At the moment, too many young people are learning in institutions that are not good or outstanding, and too many people lack the functional and technical skills that employers need and that are the foundations of being able to progress in work. As well as continuing efforts to improve the supply of skills, the Prosperity Review also found that productivity is being significantly limited by low demand for skilled labour and poor skills utilisation by businesses and in the public sector. The Prosperity Review recommended taking an integrated approach, like Greater Manchester and government are already applying in health and social care, to create a single education, skills and work system for the city-region.

Infrastructure challenges: The city-region's infrastructure is not currently serving the needs of the economy well. A long term, integrated approach to infrastructure planning and funding is needed to put in place the 21st century infrastructure needed for sustainable growth and to integrate the different parts of the city-region more effectively. The Prosperity Review found that parts of Greater Manchester with lower productivity, pay and living standards need infrastructure that supports both access to jobs in the centre of the city-region and improved local job opportunities. That requires an integrated transport system providing affordable, clean and versatile access to employment, education and other economic and social opportunities located across the city-region. This also requires integration between planning for transport infrastructure, homes and jobs, and other critical utilities such as digital, water, flood risk management, energy (heat and power) and green space. The Prosperity Review supported the National Infrastructure Assessment's recommendation that an integrated strategy for infrastructure needs to be backed up with stable, substantial devolved funding.

Increasing productivity, innovation and competitiveness: A key route for improving the quality of jobs in all parts of Greater Manchester will be to identify new industrial opportunities based on what different areas are currently good at and, crucially, where they have potential to move up the value chain.

Pioneering work by the University of Cambridge explored the idea of economic complexity (the number of industries in which a particular local authority has a comparative advantage), providing a powerful new way to identify future growth prospects and options to shape the trajectory of local economies. The analysis clearly demonstrates that, at a UK and Greater Manchester level, the level of economic complexity of a district is correlated with earnings per capita and a significant predictor of future earnings growth. The analysis, based on the current industry profile and skills mix in a local authority, identifies possibilities to diversify into new specialisms and increase the level of complexity in a locality. It demonstrates that there are opportunities for new, higher productivity industries in all districts in the city-region (see Figure 2).

Figure 2. Geographical distribution of economic complexity across the UK

Local authorities with a score above 1 are 'competitive' or have 'revealed comparative advantage' in a particular industry or mix of industries.



The Prosperity Review highlights that management and leadership skills within businesses are critical to capitalising on future potential and comparative strength. Improving management quality encourages demand for, and better utilisation of, highly skilled employees and improves business processes, both of which contribute to productivity improvements. The Prosperity Review argued that the city-region's network of business advice services and the developing Good Employment Charter should be aligned with national programmes and focused on critical factors for raising skills utilisation and productivity (particularly by improving leadership and management in firms).

Equally important is a business environment where all firms are enabled to innovate, including firms in the 'long tail' and foundational sectors. The Prosperity Review considered two foundational economy sectors in detail - retail and social care - which are major employers but have concentrations of low pay and low productivity jobs. Findings indicate there are opportunities to transform these sectors and move them up the productivity frontier through digitalisation and innovation, and to explore the productivity of social and cooperative forms of enterprise. The city-region already has emerging strengths in e-commerce and the use of technology in retail.

Similarly, there are opportunities in health and care for in-work progression through the integration of NHS and social care services and new technology-led innovations for care at home. As new digital technologies become ever more pervasive, foundational sectors may find themselves at the frontier of technology and innovation, creating opportunities for first-movers.

Coordination: The Panel conclude that, although investment in assets is required, most of their recommendations rely on ensuring the right powers are devolved to the city-region, and improved governance and coordination – both locally and between local and national government. Better coordination would make the economy function more effectively as a system, and lead to more effective use of existing resources by achieving a more productive balance between national and local decision-making about expenditure.

Building on Greater Manchester's strengths and opportunities



Health Innovation: global leadership on improving population health and tackling the Ageing Society Grand Challenge

Greater Manchester aims to lead the UK and the world in the roll-out of innovative new health and care solutions improving local population health.

The national Ageing Society Grand Challenge aims to secure five extra, healthy, independent years of life by 2035, with reduced health inequalities.

In order to maximise the local contribution to this national mission, Greater Manchester will focus on adopting innovations that support healthy ageing.

Good health will drive Greater Manchester forward

Greater Manchester's population is growing and getting older. The Prosperity Review confirmed that the forecast 13 per cent growth in the local population by 2040 only includes a five per cent increase in the working age population, compared to 50 per cent growth for over-65s and 100 per cent growth for over-85s. The national Industrial Strategy includes an ambition for people to enjoy 'five extra healthy, independent years of life by 2035'; to narrow health inequalities between the richest and poorest; and (via the Ageing Society Grand Challenge) to position the UK as an international leader in health, care and ageing innovation. However, the UK faces major challenges to improving population health and capitalising on the opportunities created by demographic change, including the need for significant innovation to transform the health and social care system.

In deprived areas, increasing healthy life expectancy is even more of a challenge. This challenge will be reflected in parts of Greater Manchester, as healthy life expectancy varies significantly across the conurbation. For example, Tameside and Manchester are two of the seven local authority areas with the worst levels of healthy life expectancy in the UK[5]. Poor population health (compared to the UK average) is also a very significant barrier to economic growth and productivity. Levels of worklessness for people with physical and mental health conditions in Greater Manchester remain well above national averages, and have risen among people over 50, despite falling amongst the city-region's population overall. Poor health is also a major contributor to low in-work productivity.

A global opportunity

Greater Manchester has a unique opportunity to use its research and industry strengths in health and care innovation to improve local population health, lead health and care system transformation and create nationally significant economic opportunities.

Greater Manchester's strategic priorities

To help realise the long-term strategic aspirations set out in this Local Industrial Strategy, Greater Manchester will:

- Continue using devolved health and social care arrangements to act as a test-bed for large scale clinical and med-tech trials, accelerating the pace of application of new technologies to manage and treat diseases, linked to core strengths in genomics, precision health, data analytics, and real world environment clinical trials, improving residents' health and developing new export orientated products and services.
- Lead the transformation of health and care systems to respond to the needs of an ageing population by establishing a Greater Manchester-government Innovation Partnership around the Ageing Society Grand Challenge, and the implementation of the NHS Long Term Plan.
- Through the Greater Manchester Ageing Hub, link the Greater Manchester health and care innovation pipeline to global economic opportunities around healthy ageing, and accelerate the pace of health and care system transformation by identifying a home for a prospective International Centre for Action on Healthy Ageing.
- Capitalise on the broader economic and innovation potential of demographic change by creating a city-region test-bed to trial close-to-market goods and services for older people, testing new opportunities and linking them to Greater Manchester's business, export and skills base.

The specific actions identified in this chapter will contribute to, and complement, the delivery of these aspirations.

The devolution of health budgets and powers creates an unprecedented opportunity to accelerate innovation adoption across the health and social care system, capitalising on the Greater Manchester Health and Social Care Partnership which brings together partners including 10 local authorities, 10 clinical commissioning groups, 12 NHS trusts and foundation trusts, and NHS England with a collective spend of £6bn per annum. Health improvement is consequently one of Greater Manchester's greatest opportunities and one of its most significant challenges.

The model introduced by Health Innovation Manchester provides an integrated academic health science and innovation system that is linked



to the demand for innovation in the city-region's health and care system, ensuring a pipeline between supply and demand to drive new ideas, products and services. All of Greater Manchester's NHS trusts, clinical commissioning groups and councils are part of the Health Innovation Manchester network-embedding a city-region approach to innovation priorities and need that is accelerating R&D, clinical trials, real world testing and the adoption of innovations with a stable and diverse population of almost three million. This gives Greater Manchester the tools to bring specialisms in fields like precision medicine, genomics, health informatics and real world clinical trials to bear on clearly defined health and care priorities while driving new technology industries that can be scaled up and the technology exported. Greater Manchester has already attracted major new investment into the city-region by providing the certainty industry partners need to develop new medicines, technologies, products and services.

Greater Manchester will continue to use its devolved health and social care arrangements, excellence in health research and thriving life sciences and digital industries to act as a test-bed for large-scale clinical and medical technology trials, accelerating the pace of application of new technologies to manage and treat physical and mental health problems, and integrate health and social care through digitalisation. This will drive innovation linked to the city-region's core strengths in genomics, precision health, data analytics, and real world environment clinical trials, benefitting Greater Manchester residents' health and creating new businesses, technology industries and inward investment.

Health and Care Innovation Assets

Greater Manchester has one of the largest life sciences clusters and centres of excellence in health research outside south east England. This includes excellence in precision medicine, health informatics, and bringing clinical research excellence and innovation into practice. The thriving sector includes companies specialising in med-tech, molecular diagnostics, biomarker industrialisation, bioinformatics and pharmaceutical manufacturing. Academic-industrial partnerships are accelerating clinical-industrial collaboration and attracting major companies and platform providers. The major biomarker discovery campus developing around the recent investment from Qiagen will embed links between digital, precision care and economic development. These industries are supported by an excellent digital, bio-technology and innovation service sector and specialised business support, incubation and post-incubation facilities through science parks, business schools and enterprise centres.

This is complemented by cross-overs with a deep local understanding of the power of digital technologies to transform traditional approaches to maintaining health and treating ill-health. Strengths in data (including big data), analytics, data science, computer science, artificial intelligence, and imaging are leading to innovation in disease prevention, diagnosis, treatment and in non-clinical care. One example is the NorthWest EHealth Salford Lung Study, an internationally recognised exemplar for clinical trials. Salford Royal is one of 16 NHS acute Global Digital Exemplars, and is one of the most mature digital health trusts in the UK. The Connected Health Cities project led by the Farr Institute demonstrates the power of data to change care delivery models and develop digital tools valued by patients and professionals.

Health and Care Innovation Assets (continued)

This type of innovation is supported by the digital infrastructure provided by the shared Greater Manchester care record (part of the Local Health and Care Record Exemplar programme): a single data exchange platform; emerging digital innovation hub; digital accelerator programme; and the legacy of shared data assets created by Connected Health Cities and CityVerve.

The city-region also has internationally leading strengths in ageing research, including the Manchester Institute for Collaborative Research on Ageing (MICRA) which contains over 300 researchers, international experts, and 60+ research projects and programmes spanning humanities, biology, medicine and health, and science and engineering.

Following the Science and Innovation Audit, there have been further developments in the health innovation ecosystem, including activity to develop The Pankhurst Centre: a hub for translational research to link clinical research with materials science, informatics, social sciences and computer science to address major health problems, and generate new start-ups and high-growth clusters.

These assets include cross-sectoral partnerships. One example is the Manchester Institute of Health and Performance - a partnership between City Football Group, Sport England and Manchester City Council, which aims to advance sports medicine and science to improve the health of the community.

One of the best places in the world to grow up, get on and get old

The World Health Organisation has designated Greater Manchester the UK's first Age Friendly city-region. Greater Manchester is already deploying innovative programmes to prevent ill-health in middle and older age and keep people in work, active, and encourage healthier consumer habits. Programmes like Living Well at Home will reduce the need for long-term residential care and improve care outcomes using the transformational potential of new assisted-living technologies. These technologies also offer routes to transforming social care careers. The Greater Manchester Ageing Hub coordinates activity across the city-region's universities, public services, transport, community and voluntary organisations, and business, and through a formal partnership with the national Centre for Ageing Better. This includes ongoing work to realise the economic opportunities of ageing, in collaboration with the International Longevity Centre, and identifying how to design transport infrastructure and services that support living well in later life. Greater Manchester's Ageing Strategy sets an ambition to become a global centre of excellence for ageing, pioneering research, technology and new ideas. The city-region is a European Innovation Partnership on Active and Healthy Ageing "Reference Site", denoting its inspirational ecosystem and the creative and workable solutions being developed in the area.

World-class ageing research centres in the city-region include the University of Manchester Institute for Collaborative Research on Ageing (MICRA), Health Innovation Manchester, the Dermapharmacology Unit Partnership between University of Manchester and Salford Royal, the Manchester Biomedical Research Centre, and the new Older People and Frailty Unit. Government has access to the innovation and learning coming from Greater Manchester through the National Institute for Health Research (NIHR)-funded 'Older People and Frailty' and 'Health Care Systems and Commissioning' Policy Research Units based in the city-region.

Greater Manchester will continue to capitalise on its scientific, research and digital assets, integrated health and care innovation system, and strong track-record of successful partnership working with government to transform the capacity of places to respond to the needs of an ageing population, increase economic growth and productivity, and build the social and economic foundations for ageing in place.

To spearhead the transformation of health and care systems in response to the needs of an ageing population, Greater Manchester will establish an Innovation Partnership around the Ageing Society Grand Challenge, with government sitting on its board. This partnership will develop a credible and robust innovation pipeline that adds value to the existing health and ageing research and innovation asserts in the city-region.

This pipeline should also meet the ambitions of the NHS Long Term Plan, including those around digitally enabled care, and local transformation priorities. The partnership will also develop practice development programmes in coordination with the Accelerated Access Collaborative, provide industry engagement, accelerate R&D, and support innovation adoption and diffusion. The partnership will also have a specific focus on how innovation can improve the productivity of the social care sector. The partnership's board will comprise of representatives from Greater Manchester (including the Health and Social Care Partnership, Health Innovation Manchester and the Greater Manchester Ageing Hub) and government (including BEIS, DHSC, the Office for Life Sciences, and UK Research and Innovation (UKRI)) to link national and local priorities. It will invite the National Innovation Centre for Ageing to attend to ensure the Innovation Partnership complements leading work elsewhere in the country.

A home for health innovation and healthy ageing

To link Greater Manchester's health and care innovation pipeline to global opportunities around healthy ageing, Greater Manchester will identify a home for a prospective International Centre for Action on Healthy Ageing (ICAHA), to complement the National Innovation Centre for Ageing in Newcastle.

Taken forward locally, the ICAHA will have a primary goal to drive real world testing and commercialisation of health, care and wellbeing innovations that support healthy ageing.

The Centre will:

- drive innovation that improves population health, increasing wellness by preventing premature frailty and changing behaviour to reduce the number of people over 50 out of work due to ill-health;
- focus on innovation that supports people to live well at home, reducing the need for long-term residential care and transforming social care careers through new models of care and treatment outside clinical settings. This will capitalise on the transformational potential of new assisted-living technologies and develop careers in care with progression through education and apprenticeships, enabling people to keep well and live independently in their own homes and communities; and
- work with the National Innovation Centre for Ageing to coordinate programmes that accelerate the commercialisation of ageing products and services nationally and internationally, and enhance the UK's position as a global thought leader and place to do business for healthy ageing. ICAHA will include a focus on parts of Greater Manchester that experience some of the most significant health inequalities in the UK, such as Rochdale, Oldham, Tameside, north Manchester and Wigan.

The Innovation Partnership and ICAHA will complement the wider work already underway to focus on the social and economic opportunities created by demographic change. Greater Manchester is exploring options to create a city-region test-bed to trial and diffuse close-to-market goods and services for older people. Independent work is underway, reporting in summer 2019, to define this opportunity. The test-bed will work in partnership with other centres of expertise across the Northern Powerhouse to trial new neighbourhood-scale approaches to ageing, test new goods and services targeted at the over-50s, and promote independent living including in fields such as smart devices, housing and transport. Greater Manchester will put calls out to industry for ideas and solutions to health and care challenges in areas including digital health, housing, care, and assisted living. The test-bed will include programmes for SMEs and the social economy, to drive the new business models and social innovations that are needed to design and adopt new products and services.

Advanced materials and manufacturing: building tomorrow's technologies and industry today

Greater Manchester will aim to be a world-leading region for innovative firms to experiment with, develop and adopt advanced materials and Made Smarter technologies in manufacturing, facilitating the design of new products and processes. It will support other national centres to build the UK's leadership in tomorrow's technologies.

Pioneering 2D materials

Greater Manchester is the home of graphene – an international icon of UK innovation first isolated in Manchester in 2004. Graphene, alongside many other new two dimensional (2D) materials being developed, has the potential to disrupt all industries and provide new ways of addressing the Grand Challenges facing the UK. Applications range from new battery technologies that will radically improve energy storage, to resilient and lightweight materials that will reduce emissions from the transportation system, cleaning water and spent fuels, and delivering new medical devices and materials that will improve quality of life into older age. The potential applications are almost limitless, providing an opportunity to cement Greater Manchester's global position at the centre of graphene and 2D material research and commercialisation for the benefit of the city-region, Northern Powerhouse and UK economy.

Greater Manchester's strategic priorities

To help realise the long-term strategic aspirations set out in this Local Industrial Strategy. Greater Manchester will:

- Develop an ecosystem to commercialise graphene and other advanced materials for the benefit of the Greater Manchester and UK economy, contributing to the delivery of all four Grand Challenges, through the actions set out in this Local Industrial Strategy.
- Strengthen the city-region's advanced materials and manufacturing clusters, ensuring 'Graphene City' in the former North Campus of the University of Manchester is networked with industrial and technology parks across Greater Manchester and leading technology parks across the UK.
- Develop 'Advanced Materials City' in the M62 North East Growth Corridor, focused on opportunities in Greater Manchester's manufacturing base, attracting significant inward investment and giving the market for 2D materials manufacturing a physical home in Greater Manchester.
- Improve productivity in Greater Manchester's manufacturing base by adopting Made Smarter approaches to accelerating the development, design, adoption and creative application of digital technologies, Artificial Intelligence, environmental technologies, and graphene and 2D materials, thereby revolutionising manufacturing processes and accelerating commercial growth.

The specific actions identified in this chapter will contribute to, and complement, the delivery of Greater Manchester's long-term aspirations.

The city-region is a global hub for transitioning breakthrough graphene and 2D materials science into new and disruptive products and applications. This lab-to-market leadership follows significant investment by government, UKRI, industry and Greater Manchester in state-of-the-art facilities and infrastructure to create a unique ecosystem and supply-chain in the city-region. This includes the National Graphene Institute, the Graphene Engineering Innovation Centre, and the Henry Royce Institute for Advanced Materials Research and Innovation.



Supporting Britain's economy

These assets sit at the heart of a wider research centre of excellence in advanced materials and manufacturing, including: the BP International Centre for Advanced Materials, the Cockcroft Institute, and nuclear and industrial biotechnology excellence at the University of Manchester; centres for advanced materials and surface engineering, computational intelligence, big data, and industrial digitalisation at Manchester Metropolitan University; the Institute for Materials Research and Innovation at the University of Bolton; and specialisms in robotics, artificial intelligence and automation at the University of Salford. The city-region's universities are also a pipeline of manufacturing talent: producing 5,000 engineering, maths and science graduates per year.

From lab to market

Greater Manchester continues to have a strong manufacturing base, employing over 110,000 people and generating £8bn of economic output each year. Made up predominantly of small and medium-sized enterprises (SMEs), the city-region has specialisms in advanced materials, textiles (which has a strong concentration in north east Greater Manchester), chemicals, food and drink (with a strong cluster in Wigan), and is developing capabilities in industrial digitalisation. The wider north west region is a substantial manufacturing and advanced engineering cluster, with specialisms in aerospace and energy and clear potential to absorb graphene and advanced materials. Greater Manchester also has one of Europe's largest industrial parks in Trafford Park. New strategic sites for manufacturing activity have been identified in the draft Greater Manchester Spatial Framework, which will provide a step-change in the market offer for industrial sites and provide space for the large-scale production and manufacturing of advanced materials. Plans are being progressed by the University of Manchester to create 'Graphene City' in the new innovation district at the former North Campus of the University of Manchester, which includes three and a half million square feet of new buildings and facilities. This will act as a magnet for inward investment and spin-outs.

The largest new growth area in Greater Manchester is the M62 North East Growth Corridor, which cuts across the boundaries of Bury, Oldham and Rochdale in the north east of the city-region and also has the potential to be a magnet for inward investment to the UK. Subject to consultation, development in this corridor potentially includes over one million square metres of new mixed employment space. Logistics centres will sit alongside advanced manufacturing, advanced materials production, renewables and green technologies. This area has already been identified by government as a 'High Potential Opportunity' pilot area for developing and scaling up production of lightweight and specialist materials for the transport sector, particularly light alloys, technical textiles, coatings, graphene and 2D

materials, and materials for demanding environments. Part of the development in the M62 North East Growth Corridor will be a new specialised 'Advanced Materials City', focused on accelerating opportunities in Greater Manchester's advanced materials manufacturing base. The ambition is that this space will include specialist premises and facilities to pilot particular applications of advanced materials aligned with Greater Manchester's manufacturing strengths and UK strategic priorities, integrated with digital and transport infrastructure.

Its development will be supported by technical expertise and investment from both national and local sources. As part of the Advanced Materials City development, Greater Manchester partners will develop links to the university sector, local colleges and schools to complement and improve the existing skills base.

Cutting-edge manufacturing

For the whole of Greater Manchester's manufacturing base, digitalisation of production, including the increased use of artificial intelligence and automation, presents significant opportunities to increase competitiveness and efficiency. Following the ground-breaking Made Smarter Review, the wider north west is now piloting a 'Made Smarter' adoption programme to support SMEs in the manufacturing sector to develop and adopt digital and environmental technologies to boost productivity, revolutionise manufacturing processes and accelerate commercial growth. This will identify how a Made Smarter approach can enable increased productivity across the whole manufacturing base by encouraging the development, design, adoption and creative application of digital technologies, artificial intelligence, environmental technologies, and graphene and 2D materials. Greater Manchester's ambition is to create a world class 'Made Smarter' ecosystem, building on the ongoing North West pilot programme, to support all local manufacturers to become leaders in the Fourth Industrial Revolution.

Leading industry

Greater Manchester's global assets in graphene and advanced materials, complementary research strengths, industrial base and development opportunities provide enormous potential to lead the UK effort on graphene and advanced materials commercialisation. There are clear opportunities to connect the local manufacturing base to the potential applications of graphene and 2D materials, and other innovations in universities, to drive industries of the future across the city-region. Greater Manchester will establish a new alliance to coordinate this multi-faceted opportunity to drive faster commercialisation activity across a wide range of sectors, based on independent research on the lessons learned from the graphene commercialisation experience so far.

The Greater Manchester Graphene, Advanced Materials and Manufacturing Alliance (GAMMA) will develop the city-region's advanced materials and manufacturing strategy.

The alliance will address gaps in the commercialisation and diffusion ecosystem for graphene, advanced materials and industrial biotechnologies.

GAMMA's remit will be to:

- exploit Greater Manchester's strengths by identifying opportunities to apply graphene and advanced materials technologies to address all four Grand Challenges: Ageing Society; Artificial Intelligence and Data; Clean Growth and the Future of Mobility;
- increase innovation, productivity and commercial growth in the advanced manufacturing sector through the roll out of Made Smarter, encouraging firms to adopt new technologies, such as advanced materials, digital technologies and artificial intelligence;
- drive innovation and productivity by ensuring that the advanced technical and design skills required are available to support manufacturing growth across the city-region;
- support the development of advanced manufacturing and materials sites across Greater Manchester, including ensuring that 'Graphene City' at the University of Manchester is engaged with local plans for an 'Advanced Materials City', as well as other industrial and technology parks across the city-region and the UK;
- advise on inward investment and marketing activity for the sector, including identifying potential target partners; and
- identify wider barriers to advanced materials commercialisation and manufacturing growth - such as access to finance and the availability of specialist premises and sites – and take forward local actions to address them.

GAMMA will be led by a board with representatives from Greater Manchester's universities, government, the Local Enterprise Partnership, GMCA, Growth Company (Business Growth Hub and MIDAS), UKRI and the private sector.

GAMMA will invite a strategic relationship with the Advanced Materials Leadership Council, providing a mechanism to coordinate local and national activity in collaboration with other UK assets, such as the University of Cambridge's Graphene Centre, the CPI's Graphene Application Centre and the NPL's National Graphene Metrology Centre.

Digital, Creative and Media: globally recognised clusters and the digitalisation of all sectors

Greater Manchester will be a leading European digital city-region, with the infrastructure, skills, and networks needed to digitalise all sectors, and internationally significant clusters in broadcasting, content creation and media, and cyber security.

Greater Manchester's strategic priorities

To help realise the long-term strategic aspirations set out in this Local Industrial Strategy, Greater Manchester will:

- Sustain and grow the internationally significant digital, media and creative industry clusters in the regional centre.
- Revitalise town centres and high streets by supporting creatives, digital entrepreneurs, and innovators to start or scale a business, social or cooperative enterprise.
- Grow our existing and emerging sector strengths in cyber security, broadcasting, content creation and media, software development, digital telecoms, fintech and e-commerce.
- Underpin cross sectoral growth by developing a digital skills pipeline and taking a Made Smarter approach to all industries, supporting firms across Greater Manchester to adopt productivity-enhancing digital technologies.
- Transform the local economy and public services by digitally enabling citizens and making more publicly held real-time open data available for anyone to use.

The specific actions identified in this chapter will contribute to, and complement, the delivery of those aspirations.



A strong base

Greater Manchester has the largest digital and creative sector outside London. National assets based in the city-region include MediaCityUK and The Factory, delivered through significant government investment. Innovation and creativity are synonymous with culture and a Greater Manchester Culture Strategy is being developed to create the conditions for creativity to flourish in every part of the city-region, enriching the lives of all residents and protecting, diversifying and growing Greater Manchester's unique culture, heritage strengths, assets and ecology.

Government and the creative industries sector, through the Creative Industries Council, have agreed a sector deal that includes a range of activity to boost creative sector growth which Greater Manchester will benefit from. This includes the location of a regional hub of Tech Nation (which supports digital companies and start-ups) in Greater Manchester; successful projects as part of the £33m Audience of the Future Challenge, via the Industrial Strategy Challenge Fund; and a £4m Creative Scale Up programme to support creative firms in three English regions including Greater Manchester.

The Science and Innovation Audit and Prosperity Review identified the digital sector as an important and growing strength in Greater Manchester's economy.

In 2018 the digital sector accounted for around 70,000 jobs and produced £3.4bn GVA in Manchester alone. This reiterated the 2016 Science and Innovation Audit's finding that the city-region has a "fast-growth" opportunity in digital as a key enabling technology across all sectors, with specific opportunities in 'big data', smart cities and the Internet of Things, which intersect with the mature creative, digital and media economy in the city-region. Greater Manchester's cultural and creative output, including its music, art and design, and new media content, is recognised around the world and is deeply rooted in the city-region's identity and the ways its people work. Growth in the digital sector and its inter-connections with creative and media assets will continue to propel the city-region's economic performance by providing highly productive jobs and companies, and exciting start-ups and scale-ups.

The Prosperity Review also identified sub-sectors with potential to be leading industries of the future. These stem from the vibrancy and coverage of the networks of the city-region's digital industries, which have created intersections with Greater Manchester's traditional sector strengths. E-commerce and retail tech businesses in the city-region are thriving through cross-fertilisation between digital companies and textile and clothing manufacturers, wholesalers and retailers.

The emergence of 'fin-tech' in Greater Manchester is taking place at the interface between financial and professional service companies and digital firms. Digital technologies are being used to design new business models and applications that link venues, artists and consumers in new ways. Strengths in software engineering and digital telecoms underpin the health of these new industries.

Opportunity: Broadcasting and content creation

Two opportunities stand out for Greater Manchester. Firstly, the city-region's broadcasting sector is internationally recognised, and sits at the heart of a wider content creation and media sector, underpinned by technological innovation. Over the past decades there has been significant public and private investment to build the physical facilities to grow, retain and attract media talent in Greater Manchester – from the facilities at MediaCityUK, the home of BBC North, ITV, the Landing, and dock10, to The Space Studios, and The Sharp Project. The city-region has strong academic strengths in creativity including the University of Salford's MediaCityUK campus and Manchester Metropolitan University's concentration of expertise in creative design, which will continue to grow through additions like the forthcoming School for Digital Arts. Planned investments including The Factory – a world-class cultural space being developed at the border of Manchester and Salford – will create new opportunities to bring the world's most exciting artists and creatives to the city-region and embed further interactions with content creators, digital companies and audiences. These investments have changed the make-up of the creative and media industries across the north and drawn in international investment, talent, and visitors. This creates a powerful platform for all firms, from small start-ups to major multinationals, to innovate, invest, create content and thrive in the city-region.

Greater Manchester will consider creating a fund to both grow local, regionally based independent production companies and attract larger scale TV, film and drama content production companies to relocate to the city-region (subject to approval by the Combined Authority). This would, in turn, be supported by a hub and spoke network to support apprenticeships, internships, work placements and graduate recruitment in TV, film and drama content production. This would improve access to employment in content production for talent from diverse communities and those furthest away from the labour market.

Opportunity: Digital and creative clusters as drivers of inclusive growth

Smaller digital and creative clusters exist across the city-region, usually underpinned by strong cultural assets and often linked to social enterprises and cooperatives. From the creative cluster in Ramsbottom to the emerging digital sector springing up around Ashton Old Baths, from Wigan Old Court's innovative approach to the repurposing of old buildings in the town centre and the increasingly diverse offer in Oldham's creative and independent quarter, it is clear that the digital and creative industries can be a driving force in revitalising local towns and high streets. Greater Manchester will continue to support the development of digital and creative clusters across the city-region.

Opportunity: Cyber Security

Secondly, the cyber security sector, already a strength in Greater Manchester, is set to grow significantly with the creation of a large Government Communication Headquarters (GCHQ) operation in the city-region. This will be complemented by a new office of The Heilbronn Institute for Mathematical Research - a major national centre that will drive collaboration between GCHQ and local universities. The direct and associated supply-chain opportunities from strengths in cyber security for residents, universities and businesses are unique in the UK, within a growing global industry estimated to be worth £170bn annually.

Building on existing relationships, closer working with government to fully realise this opportunity is a priority and the city-region will continue to bring strategic resources and iinfluence to support its growth throughout Greater Manchester.

Digital by default

Increasing digitalisation and application of artificial intelligence, big data, data science and data analytics, and robotics are impacting on every sector of Greater Manchester's economy as well as every aspect of people's lives and work. These new technologies create significant opportunities to raise productivity and competitiveness in the city-region's frontier and foundational sectors. However, they also present challenges including ensuring that the local business base is capable of absorbing them and that citizens have the skills and abilities to thrive in the new digital age. A critical issue for Greater Manchester will be ensuring that its large, diverse and growing financial and professional services sector – which has been the engine of jobs growth in the city-region for over a decade – continues to evolve and grow as increasing use of artificial intelligence changes business models in this sector, and creates new demand for digital skills amongst its workforce.

Made Smarter is demonstrating that the digitalisation of production in Greater Manchester's manufacturing sector can increase competitiveness and efficiency in existing firms.

Taking into account the learning from this programme, Greater Manchester intends to take a 'Made Smarter' approach to improve the productivity of all industries by encouraging the development, design, adoption and creative application of digital technologies, alongside skills development programmes.

Digitally driven strategy

Underpinning digital and media growth is the critical importance of ensuring a proper pipeline of digital skills and talent needed across all industries. 31 per cent of businesses responding to the 2019 Manchester Digital Skills Audit reported turning away work due to being unable to recruit the breadth of skillsets required to deliver it. Action is required to raise awareness of the range of careers and opportunities available and to up-skill and re-train the existing and future workforce so that people can adapt to the fast pace of technological change. This will be a significant challenge as over a fifth of Greater Manchester's population lack one or more of the five basic digital skills. The city-region's new National Institute of Coding is one example of the work Greater Manchester is already doing to meet the demands for technical digital skills. The city-region must also instil the design skills and creativity needed to build on the inter-connections between our local industries, and maintain the adaptability and resilience in the city-region that helps the economy respond positively to economic change.

Similarly, high quality pervasive digital infrastructure is a pre-requisite to success and will be delivered through market engagement and the Greater Manchester Digital Infrastructure Plan. This is articulated further in the Infrastructure Section. Greater Manchester's £3m Digital Skills Pilot, agreed at the 2018 Budget, will see the city-region and government work together to boost digital skills.

As part of the city-region's Digital Strategy, the Greater Manchester Combined Authority is investing in digitally enabling citizens which not only includes the focus on basic digital skills and connectivity but also a technology platform to improve secure information-sharing across public services to inform more comprehensive family and citizen support. This will improve the public sector's ability to target programmes to the specific needs of an individual and evaluate their impact more effectively, whilst giving residents greater transparency on how their data is working for them. Greater Manchester already has very productive collaborations with government on digital policy and strategy and is building closer ties with the national Connected Places and Digital Catapults to support this work. Greater Manchester will also establish closer ties with the new National Centre for Data Ethics and Innovation and Office for AI through a new Greater Manchester Office for Data Analytics.

Open Data

In parallel, it is recognised that leading digital cities appreciate the value of releasing local data to stimulate open innovation and enable productivity growth. By making more data publicly available, it is possible to drive productivity improvements and investment in diverse sectors, such as mobility. For example, the financial value of Transport for London's open data scheme initiative was estimated at £130m per year and is a cornerstone of London's narrative as a global digital city. In Greater Manchester this would support the city-region's green ambitions by enabling modal shift.

Greater Manchester will therefore initiate a review of local data. Government will continue to provide policy support on design, best practice, and available data sources. The review will identify willing partners and data owners - including real-time big data owners - to identify and address barriers to making this data openly available for re-use. The assumption will be that data that can be made available should be made available, unless it is prohibitively expensive or not appropriate (for legal, commercial or security reasons) to do so. This will include an open consultation with the public to allow citizens, businesses and other stakeholders to come forward with their suggestions. It will report by the end of 2020.

World-leading industries

Finally, the Prosperity Review highlights that firms that trade internationally are more productive. In a digital future this will be even more important, since for many industries, competitors will be global, not local. One of the initiatives to support the internationalisation of the digital and media industries in the city-region will be showcasing the digital and creative output of Greater Manchester, providing platforms for artists, musicians, makers, designers, coders and developers to promote products and content around the world. Government will work with Greater Manchester and trailblazing digital and creative companies in the city-region to promote a locally funded biennial international event that showcases the best of Greater Manchester's digital and creative industries. This will be supported by a wider programme and digital platform to curate and promote conversations, approaches and products unique to Greater Manchester.

The Clean Growth Grand Challenge: driving rapid decarbonisation

Greater Manchester's 5-year Environment Plan sets out its long-term environmental vision "to be carbon neutral by 2038". Greater Manchester will launch the first city-region mission to achieve this. Government welcomes this locally led mission, which will support the delivery of the government's Clean Growth Grand Challenge.

Greater Manchester's strategic priorities

To help realise the long-term strategic aspirations set out in this Local Industrial Strategy, Greater Manchester will:

- aim to achieve carbon neutral living within the Greater Manchester economy by 2038 - driving innovation, the creation of new technologies, improved resource efficiency, and improved quality of life.

Greater Manchester's 5-year Environment Plan sets out its long-term environmental vision "to be carbon neutral by 2038". Greater Manchester will launch the first city-region mission to achieve this, aiming to:

- deliver environmental improvements that directly enhance well-being, health, resilience, biodiversity and quality of life, including by enhancing the natural capital of the city-region;
- design and trial innovative technology and financial mechanisms to support delivery of energy efficient homes, buildings and low carbon transport, helping to to reach the point at which all new homes and commercial/industrial buildings are net zero carbon;
- tackle poor air quality - the largest environmental risk to the public's health – through a co-ordinated Clean Air Plan developed by Greater Manchester's local authorities;
- accelerate new models of local renewable energy generation, storage and efficiency within the city-region, adopting a 'whole system approach', and testing the creation of a local energy market; and
- support Greater Manchester enterprises to accelerate the implementation of energy and material efficiency measures in the design and production of products and services through the Growth Hub and local partners' activity.

Finally, Greater Manchester will improve air quality by developing a coordinated Greater Manchester Clean Air Plan to tackle poor air quality, the largest environmental risk to the public's health.

The specific actions identified in this chapter will contribute to, and complement, the delivery of these aspirations.

Taking action nationally and regionally

In March 2018, the Greater Manchester Combined Authority began a consultation on adopting a target to achieve carbon neutrality in the city-region by 2038, over a decade earlier than the 2050 date adopted by the European Commission. Greater Manchester sets out its aim to achieve this in the 5-Year Environment Plan[4], published in March 2019. This aim and wider environment ambitions present an opportunity to deliver improvements that directly benefit Greater Manchester residents by improving air quality, mobility, housing and access to green space, as well as driving local innovation and growth in green industries. It is an opportunity for Greater Manchester to emerge as one of the leading green cities in the world, offering a high quality of life that attracts and retains skilled workers.

The government's 25 Year Environment Plan[4] sets out UK-wide actions to improve the environment within a generation, and designated Greater Manchester as the UK's Urban Pioneer for testing innovative ways to protect and enhance natural capital. Through this, Greater Manchester is already connecting people with the environment, and testing new tools and methods for creating natural liveable places that improve mental and physical health and child development. This includes the 'City of Trees' initiative for increasing urban planting across the city-region.

The draft Greater Manchester Spatial Framework sets out proposals to create sustainable places, recognising the social, environmental and economic inter-relationships between all communities and parts of the region. The co-ordinated Clean Air Plan being developed by Greater Manchester's local authorities will set out an approach to tackle poor air quality - the largest environmental risk to public health.

Intervening at the right scale and pace

While significant progress has been made in improving the city-region's environment, there is a recognised need to go further and faster. Greater Manchester's commitment to becoming a carbon neutral city-region provides an opportunity to accelerate this progress and also creates real potential to be the first city-region to determine how to apply the many new individual and interconnected technologies, services and social innovations needed to dramatically reduce carbon emissions and improve the environment, while growing the economy. Greater Manchester is big enough to test new solutions at scale and small enough to understand what does and does not work. The city-region already has a diverse and thriving group of around 2,500 companies (which employ over 45,000 people) in low carbon environmental goods and services on which to build the new types of jobs and industries at the forefront of clean and green growth.

However, there are serious technical and design challenges to tackle to realise carbon neutrality, including:

- the need to rapidly increase the energy efficiency of residential and non-residential buildings – significantly increasing the uptake of basic insulation measures and at the same time starting to deliver and then upscale deeper retrofit of homes;
- decarbonising the heating of homes and heating and cooling of commercial buildings – this applies to both existing and new buildings;
- significantly upscaling local renewable energy generation and storage with deployment of smart energy management systems; and
- decarbonising the transport system, accelerating the uptake of electric vehicles and providing the charging infrastructure to facilitate this.

Many of the solutions to these challenges do exist, though large-scale decarbonisation will require increased effort to upscale their deployment. Viable mass deployment requires further innovation to reduce costs and increase efficiency and interconnectivity. This in turn requires increased and coordinated cross-sector and cross-disciplinary research and innovation programmes.

Ultimately this will be part of a global effort. Greater Manchester's universities can play an important role by advancing and disseminating existing expertise in energy distribution, multi-purpose advanced materials, and industrial biotechnology (Manchester Institute of Biotechnology, University of Manchester), smart meters and Energy House (University of Salford) and hydrogen fuel cells (including through the Greater Manchester Hydrogen Partnership and the Manchester Fuel Cell Innovation Centre at Manchester Metropolitan University). There are also opportunities for the social economy to design solutions that will transform energy systems, reduce energy poverty and improve the environment.

A city-region mission

The Prosperity Review highlighted the opportunity to use the local ambition around carbon neutrality and environmental improvements to drive mission-based innovation and achieve the coordinated approach required. To maximise the local contribution to the national Clean Growth Grand Challenge, Greater Manchester will launch a city-region Mission to achieve carbon neutral living within the Greater Manchester economy by 2038. This will be delivered through a series of Greater Manchester-led mission-orientated projects, supporting delivery of the government's Clean Growth Grand Challenge.

The Greater Manchester 5-Year Environment Plan sets out the first set of actions to reduce carbon across all sectors of society (residents, communities, businesses, academic institutions, utility providers and local and national government).

Mission-orientated projects will be defined during implementation and are expected to include the following:

- **Carbon neutral retrofit and new-build:**

- Greater Manchester will work with the UK Green Building Council and other building environment professionals in the city-region to test Greater Manchester's ambition that all new homes and commercial / industrial buildings should be net zero carbon by 2028 - and see whether it can be achieved sooner (and the intervening steps required such as the balance between building efficiency, on-site energy generation and off-setting measures for remaining carbon emissions).
- Designing innovative finance and delivery mechanisms to retrofit homes and buildings with energy efficiency and carbon reduction technologies (and thereby reducing fuel bills of local authorities, businesses and residents). This is a key challenge with a potential global market as existing technologies are not currently commercially viable at scale.
- Developing large-scale modular construction facilities capable of building new homes at the quantity, pace, and to the environmental standards needed to deliver carbon neutral living and meet Greater Manchester's demanding new homes pipeline. This will be the key component of a wider Modern Methods of Construction and Design for Manufacture and Assembly centre of excellence in the city-region, feeding local employment, skills development and training and supporting a new manufactured homes industry. The centre of excellence will coordinate its activities with the UK Construction Innovation Hub.

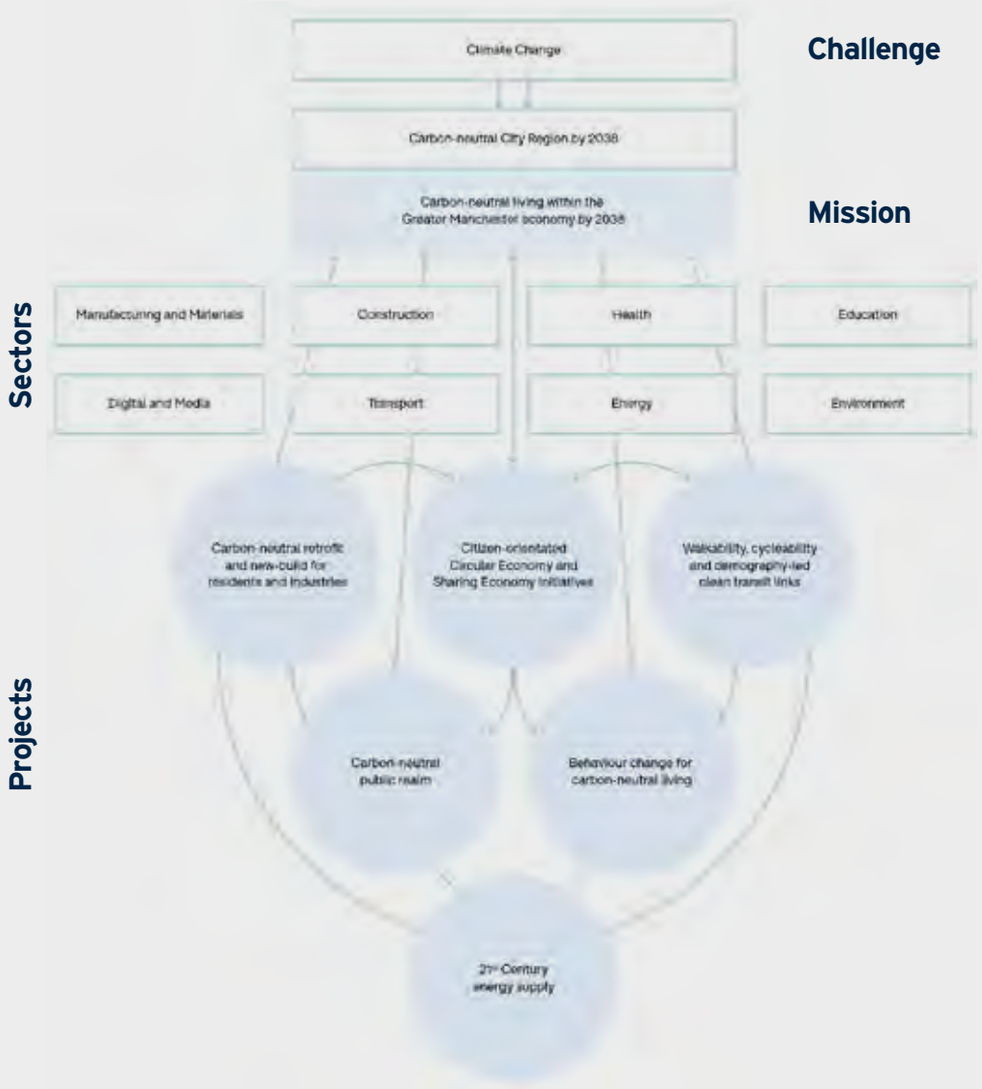
- **21st century energy supply:** A particular challenge is the generation of renewable energy in Greater Manchester given its established infrastructure and geography, which limit opportunities for centralised power generation. Government and Greater Manchester will continue to work together to provide the policy, legal and financial arrangements to establish the city-region as an energy transition region to accelerate innovative local renewable energy generation, storage, and efficiency. This will include a place-based whole system approach to energy supply and demand to create a local energy market and setting for integrating existing technologies with trials of new ones. This will build on learning from the Greater Manchester Local Energy Market research, funded by UKRI, which is testing the feasibility of city-region wide local energy markets that respond to 'place-based' constraints and market needs.

- **Sustainable and low carbon transportation:** The Greater Manchester Transport Strategy 2040 set out an ambition to reduce car use to no more than 50 per cent of daily trips by 2040. This will mean finding ways to create a radical change in behaviour, with a million more trips each day using public transport, cycling and walking, reducing congestion and pollution and increasing safety. The city-region's strengths in advanced materials and light-weighting also create the potential to drive new technologies that will reduce emissions from public and private transport.
- **Natural capital:** Making use of innovative finance, policy and delivery mechanisms to increase natural capital and realise the ecosystem service benefits that go with this (such as health, resilience, air quality and reduced flood risk).
- **Clean Growth and Productivity:** The shift to carbon neutrality will mean that some firms, particularly those that have carbon intensive operations, will need support to accelerate their progress towards carbon neutrality without constraining growth. Greater Manchester partners will develop a programme to support businesses to accelerate the implementation of energy and material efficiency measures in the design and production of products and services. This will also support a reduction in waste and the eradication of avoidable single use plastics. The Greater Manchester Sustainable Business Partnership will be key leaders in identifying and driving the changes needed.

The right skills will be essential to delivering the city-region mission for carbon neutral living by 2038. Greater Manchester will prioritise rapid action to provide relevant training, particularly in priority skill gap areas such as whole house deep retrofit.

Figure 3: Mission Roadmap for Net Zero Carbon Region by 2038

Designed for Greater Manchester Combined Authority by UCL Institute for Innovation and Public Purpose (IIPP), with support from the Commission for Mission Oriented Innovation and Industrial Strategy (MOIIS).



Ideas

Driving prosperity and leading industrial, social and economic transformation through innovation, partnerships and investment.

Greater Manchester's strategic priorities

To help realise the long-term strategic aspirations set out in this Local Industrial Strategy, Greater Manchester will:

- Strengthen the city-region's innovation asset base in our Industrial Strategy priority areas of health innovation, advanced materials, digital, creative and media, and clean growth.
- Integrate Greater Manchester's innovation eco-system to drive commercialisation, facilitate collaborations, partnerships and cross-overs between technologies and industries, and coordinate innovation that addresses the Grand Challenges.
- Drive increased private sector investment into R&D and increase the take-up of national innovation funding in Greater Manchester to support the achievement of the national 2.4 per cent target.

The specific actions identified in this chapter will contribute to, and complement, the delivery of these aspirations.

The Prosperity Review found that Greater Manchester has a strong and broad innovation base, which is why innovation – the development and deployment of new ideas – is embedded throughout the Greater Manchester Local Industrial Strategy.

Previous sections have set out how Greater Manchester intends to capitalise on internationally recognised scientific and research excellence in health innovation and advanced materials and manufacturing in order to drive the growth of innovation led, high value industries in the city-region, as well as building Britain's leadership in tomorrow's technologies.

For example, the city-region's digital and creative sectors will underpin the emergence of new specialist markets in Greater Manchester based on the design and development of new ideas, products and services and in leading the Fourth Industrial Revolution.

The Clean Growth Mission will drive bottom-up innovation, collaborations, partnerships and cross-overs between unrelated technologies and industries to develop new technologies and decarbonise our economy.

Maximising investment in research and innovation and tackling the Grand Challenges

Government has a target for national investment in R&D to match 2.4 per cent of GDP by 2027. The Prosperity Review showed Greater Manchester lags behind comparable city-regions in overall R&D spending, R&D tax-credit take-up, InnovateUK funding take-up, and university R&D spending. To ensure Greater Manchester maximises its contribution to this target and increases overall investment in innovation, it will be critical to extract maximum value from both Greater Manchester's existing innovation assets, and those under construction, and to continue to invest in maintaining world-class excellence in our opportunity areas. Synergies between Greater Manchester's areas of strength and the Grand Challenges must also be exploited, for instance using advanced robotics in biomechanical healthcare or using industrial biotechnology to develop low carbon fuels. Greater Manchester will continue to work with government and UKRI to maximise the impact of existing investments in innovation assets in the conurbation and incentivise private sector investment in R&D.

The opportunities identified in this Local Industrial Strategy will provide a framework for bids by local partners into the Strength in Places Fund, Industrial Strategy Challenge Funds and other national competitive funds (including those delivered by UKRI), as well as for embedding connections between universities, businesses and public bodies.

Central to Greater Manchester's local plans is the development of options for the Pankhurst Centre for Research in Health, Technology and Innovation. This will be a path-breaking, cross-disciplinary institute for translational research, to link clinical research with materials science, informatics, engineering and computer science to address major health problems, and capitalise on synergies between our strengths of health and materials plus digital and biotechnology. It will play a key role in creating exciting start-ups and high growth businesses in emerging sectors. Initial funding for the Centre has been identified, and the University of Manchester is now considering the best way to realise this plan.

Reinforcing Greater Manchester's innovation ecosystem

Greater Manchester will continue to reinforce its innovation ecosystem. This work will be coordinated by the Greater Manchester Innovation Board, whose membership includes local universities, leading innovative firms, the Medicines Discovery Catapult, Manchester Science Partnerships, public bodies, UKRI, and Nesta.

The Board provides the city-region with a platform for shared action, building on Greater Manchester's integrated governance, deep culture of collaboration between government, business, academia, and health, and strong partnerships. It will play a leading role in coordinating the public and private sector response to the Greater Manchester Local Industrial Strategy, focused on the opportunity areas of health innovation, advanced materials, digital, creative and media, and clean growth.

Greater Manchester will also work to identify and address gaps in the innovation funding ecosystem in the city-region to reduce financial barriers to private sector innovation and drive progress towards the national 2.4 per cent target. As a first step, Greater Manchester will review the availability of venture capital funding - in partnership with the City of London, financial services firms, and industrial strategy sectors - assessing the current landscape of Early Stage Investment seed funding and Venture Capital Funding in the city-region. This will evaluate missed opportunities to commercialise innovation due to gaps in this section of the financial landscape. This will include an assessment of the case for an early stage investment seed funding programme drawing on private investment and targeted at sub-£500,000 investments.

To drive increased private sector investment into R&D, Greater Manchester will also test new, and evaluate existing, routes for commercialising knowledge. This will include a locally funded pilot programme to develop a Cooperative Intellectual Property (IP) Bank to exploit latent Intellectual Property held by research organisations and large firms by making it available to smaller firms. The IP is attractive to smaller firms as it reduces up-front R&D investment costs, shortens time to market, and creates opportunities to solve technical challenges or create new market opportunities. Large firms and research organisations will benefit from deeper commercialisation of their IP portfolio and new IP-led industrial collaboration opportunities with SMEs.

People

Investing in a highly skilled and healthy city-region.

We will ensure that the education, skills and employment system allows everyone to reach their potential and employers have access to the skills required to deliver the Greater Manchester Local Industrial Strategy.

Greater Manchester's strategic priorities

To help realise the long-term strategic aspirations set out in this Local Industrial Strategy, Greater Manchester will:

- Support institutions to increase the number of people learning in those rated as good or outstanding – from early years, to schools, colleges and training providers.
- Give all young people and adults a clear line of sight to opportunities for education, skills development and work in the city-region.
- Ensure all residents have the functional skills and attributes employers need, particularly English, maths and digital skills; and enhance creative skills.
- Support adults to enter the labour market and progress in work through connected employment, progression and transition support.
- Increase take-up of the technical qualifications, including apprenticeships, needed to drive the Greater Manchester Local Industrial Strategy (particularly at levels 4 and 5).
- Increase employer investment in workforce development - including digital skills, management and leadership - and in workforce health. It will also ensure that employees are gaining the skills to retrain and progress.

The specific actions identified in this chapter will contribute to, and complement, the delivery of these aspirations.

In a modern, innovation-led, service-rich economy, people are genuinely a city-region's best asset. Greater Manchester has one of the largest and most diverse populations in the UK. It is home to nearly three million people, including more than 100,000 students, and there are over seven million people within an hour's travel time. The city-region's universities have strong and improving graduate retention rates, and it has one of the most linguistically diverse populations in the world, with over 200 languages spoken. One-in-six residents come from a black and minority ethnic background and the city-region has the UK's third largest LGBT+ community after London and Brighton. This access to skilled labour, cultural diversity and inclusivity is an inherent strength and provides a foundation for future growth, generating new ideas and making the city-region a magnet for new talent and investment.

Rapid progress over the past decade

The Prosperity Review identified many strengths in Greater Manchester's education and skills system. Over the past decade, Greater Manchester has transformed its qualifications profile: the proportion of the population with Level 4+ skills increased by 46 per cent, for example.

However, it is still the case that, despite good progress in recent years, we want more people to have the qualifications and functional skills employers need and that provide the foundations to progress in work.

Too few people are realising their potential and ill health is a major economic constraint, keeping people out of work and lowering the productivity of those in work. Not enough employers are utilising their workforce's full range of skills or developing their capacity to adopt innovations to drive productivity.

Early years provision is key to long-term success for individuals and the city-region's future productivity. Greater Manchester has an ambition to increase the proportion of children leaving reception with a 'good level of development' to at least the national average within the next five years. To deliver this, the city-region is rolling out a new delivery model for early years, based around the integration of public services in neighbourhoods, bringing together education, health and housing to address the wider social determinants of physical and mental health. It is also developing and upskilling the early years workforce to help them deliver early intervention, prevention and early education, while empowering families and communities to take greater responsibility in their health and wellbeing.

Work is also underway to make sure all young people are work and life ready, with raised aspirations, a clear line of sight of the opportunities and different education and training pathways available, and the attributes and soft skills to help them flourish and prosper.

Greater Manchester is already investing in: free bus travel for 16-18 year olds and the development of an Opportunity Pass (subject to Combined Authority agreement); the Bridge GM programme that connects schools, students and employers; a UCAS-style Career Platform that will simplify access to education, learning and training; and creating a Curriculum for Life. Government is already working differently in the city-region, such as through the Digital Skills Pilot, Self-Employment Pilot, Future Workforce Fund and through the Oldham Opportunity Area. The latter, is focusing on improving early literacy at home; building high performance across the school system; and boosting support for mental health.

To improve outcomes for adults, Greater Manchester has established an Employment and Skills Advisory Panel as announced in the national Industrial Strategy. This Panel brings colleges, training providers, local and national government, and employers together to identify local skills needs. Through the adult education budget, Greater Manchester and government are already collaborating to develop strategic responses to economic and technological change. The joint development and delivery of the Working Well employment support programme (that pooled funding from Greater Manchester's 10 local authorities, 10 Clinical Commissioning Groups, local Job Centre Plus districts, and the Greater Manchester Health and Social Care Partnership) provides locally tailored support to help long-term unemployed residents get back into the labour market, and supports people at risk of falling out of employment. Greater Manchester also has a vital and unique relationship with Health Education England (HEE), which underpins joint commissioning and allocation of HEE budgets, where appropriate, to pilot new models to address the skills requirements of the region's health and care system.

To help more people over-50 get back into employment, Greater Manchester, the Department for Work and Pensions, and the Centre for Ageing Better are exploring a new approach to employability support using a 'test-and-learn' approach. This will be used to inform the national and local evidence base about what works. Government and Greater Manchester are also working together to support the development of the National Retraining Scheme through the development of the Greater Manchester Local Industrial Strategy.

Towards deeper partnership

There is great potential in the education, skills and work system. Government and Greater Manchester have agreed to work in partnership to determine how this can be harnessed. The aim is to ensure the education, skills and work system can support everyone in the city-region to reach their potential, and for employers to have access to the skills needed to deliver the ambition set out in the Greater Manchester Local Industrial Strategy.

All parties have agreed to work together to explore opportunities to connect national and local post-16 skills and work policies in the city-region to deliver an effective offer for the near-three million citizens of Greater Manchester.

This will include using Greater Manchester's convening power, with government support, to issue a call to action for schools, providers and employers in the city-region to work together to bring about the changes needed.

Through this joint partnership working, we will identify strategic and delivery areas for review and, based on evidence and advice, identify the respective actions needed from all parties to deliver them. We want to make quick progress, but all parties recognise, and accept, that this will require their commitment for the long term.

As a starting point on that journey the Department for Education, the Department for Work and Pensions and Greater Manchester have agreed to identify the ways in which their priorities and activities across the various parts of the post-16 skills and work system come together and, based on evidence and consultation with the sector, have agreed to take forward actions to help ensure the system is effective.

Some early areas where there is potential for great results are: ensuring greater businesses engagement in the whole system from careers to in-work progression; supporting institutions with their efforts to raise quality and therefore help more young people to benefit from good or outstanding learning; identifying what more can be done at a national and local level to support those in work on low pay to progress in work and out of in-work poverty; supporting employers to retain older workers and those with health problems; and finally supporting more high quality apprenticeship opportunities with SMEs, securing employer commitments to provide high quality T Level industry placements, and boosting employer investment in retraining.

Within nine months, Greater Manchester, the Department for Education and the Department for Work and Pensions will set out to the GMCA and DfE and DWP Secretaries of State the respective actions, both in the short and longer term, which all parties will agree to take forward and will move the joint working between Greater Manchester and government to the next stage.

This deeper partnership will build on the strong track record of successful partnership working on the skills and work agenda that already exists between Greater Manchester and government.

This includes:

- the Employment and Skills Advisory Panel, which brings colleges, training providers, local and national government, and employers together to identify and respond to skills needs;
- the joint development and delivery of the Working Well employment support programme that pooled funding from Greater Manchester's 10 local authorities, 10 Clinical Commissioning Groups, local Job Centre Plus districts, and Health and Social Care Partnership;
- the vital and unique relationship between Health Education England (HEE) and Greater Manchester, which underpins joint commissioning and decision-making, including the allocation of HEE budgets where appropriate to pilot new models for addressing the requirements of the region's health and care system.

Greater Manchester will also align skills and work activity with health and care and other public services, in line with the recommendations of the Prosperity Review, recognising the links between good physical and mental health, employment and productivity. It is already ensuring:

- the Health and Social Care Prospectus contains actions to create a sustainable health and care system that realises economic potential in the city-region;
- the Greater Manchester Model of Unified Public Services sets out an approach to aligning services around people and place;
- the Greater Manchester Reform Investment Fund provides a unified city-region fund to use alongside local funding to drive improvements in health, housing, skills and education, crime and prevention services in tandem and at greater pace;
- that Working Well continues to reduce worklessness and improve well-being by supporting more people with poor health and disabilities to play an active and fulfilling role in the Greater Manchester labour market.



Infrastructure

Upgraded, integrated and future-proofed.

Greater Manchester will put in place the integrated 21st century infrastructure needed for digitally connected, clean and inclusive growth, and to facilitate international trade and investment.

Greater Manchester's strategic priorities

To help realise the long-term strategic aspirations set out in this Local Industrial Strategy, Greater Manchester will:

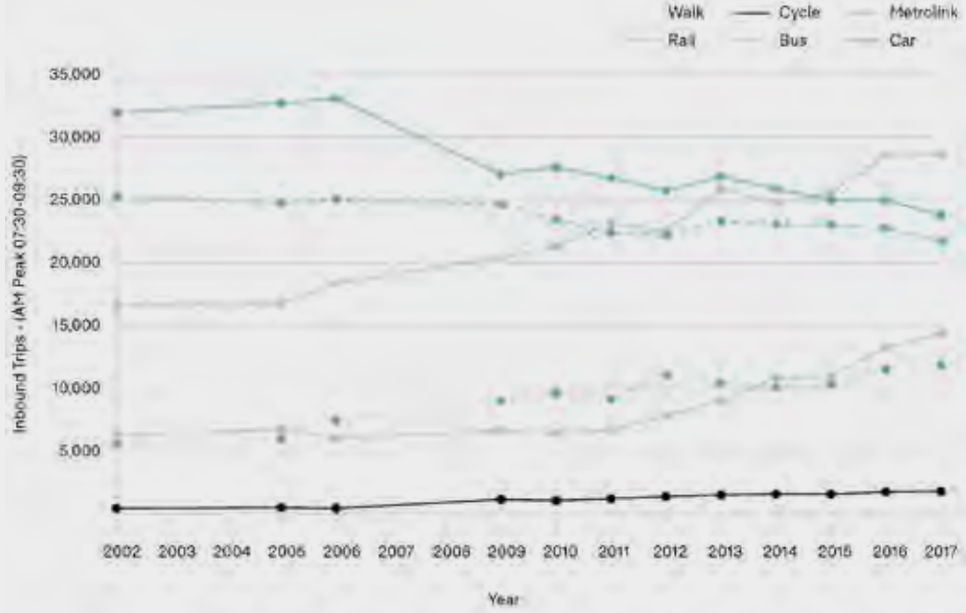
- Develop an Infrastructure Plan for the city-region and identify sources of sustainable, long-term local investment, to sit alongside devolved funding streams, to fund the delivery of the Plan.
- Short-term action to improve transport system performance through rail devolution, bus reform, trialling tram-trains, continuing to expand the city-region's walking and cycling infrastructure, and changing regulations to promote a cleaner, more efficient and integrated transport system.
- Radically improve connectivity with other UK cities through High Speed 2, continue developing Greater Manchester as the global 'Gateway to the North' through the Manchester Airport Transformation Programme[5], and work through Transport for the North to deliver the growth case for Northern Powerhouse Rail.
- Develop a roadmap for digital-led innovations that enable better coordination of the transport system.
- Continue transforming the digital connectivity of the city-region to drive economic growth and innovation, working with government to meet national targets of nationwide full fibre coverage by 2033 and full roll-out of 5G technologies for most people by 2027.

The specific actions identified in this chapter will contribute to, and complement, the delivery of these aspirations.

Transformative approaches

The Prosperity Review concluded that Greater Manchester's future growth, prosperity and sustainability will be restricted unless ambitious and long term infrastructure solutions are found. The growth potential set out in the draft Greater Manchester Spatial Framework will require large-scale, integrated and strategic infrastructure investment. This will build on recent investments by Greater Manchester and government, including in the Metrolink and the Bee Network supported by Greater Manchester's £312.5m allocation from the Transforming Cities Fund. These are innovative programmes which point the way to achieving modernised, carbon neutral infrastructure. However, there are challenges that Greater Manchester must address to achieve the modernised, carbon neutral 21st century infrastructure needed to deliver this Local Industrial Strategy. These are set out in the Greater Manchester Infrastructure Framework. They include new demands for electricity generation, storage and transmission coming from changes in how buildings are heated, energy is stored, and transport systems and vehicles are fuelled. Climate change will demand more resilience to flooding and greater 'eco-system services' from green and blue infrastructure.

Figure 4: Transport investments are driving change





Universal, affordable and resilient digital connectivity and better social infrastructure will be essential for driving inclusive growth across the growing city-region. Congestion is already providing persistent pressures and drags on productivity, leading to carbon emissions and air pollution. The transport system will need to address this problem at the same time as accommodating a growing population and providing affordable and flexible responses to the shifts in the major sites of employment, working patterns and school and college provision that means people are travelling further and at different times. To meet Greater Manchester's ambitions for an innovation-driven economy, industries will need the best digital and physical connectivity. Areas with lower productivity, pay and living standards need infrastructure that supports access to jobs in the centre but will also help improve the quality of local opportunities in the long term. New trading routes after the UK leaves the European Union will place greater importance on Greater Manchester's international transport infrastructure and east-west connections including the links to the Port of Liverpool, the development of Port Salford and the ongoing national strategic importance of Manchester Airport.

Integrating Greater Manchester's infrastructure

To build the integrated 21st century infrastructure that Greater Manchester needs, a comprehensive infrastructure plan for the city-region is required. This needs to meet both local and national priorities, developed in consultation with government and infrastructure providers, and underpinned by a consensus to propel its delivery and success. To secure this agreement, government will join the Greater Manchester Strategic Infrastructure Board overseeing implementation of national and local plans and providing operational expertise to improve the performance of the city-region's transport, housing, energy and digital infrastructure. Implementation Plans will take into account how infrastructure development can contribute to the delivery of the full Greater Manchester Local Industrial Strategy. For example, linking to relevant outputs from the Clean Growth Mission, which will provide new technologies and models for low carbon infrastructure. It will also be critical that reforms of the education and skills system set out above will ensure a local pipeline of talent is in place to support the design and implementation of infrastructure programmes, and that new innovations like modular housing can be delivered at scale and pace.

Greater Manchester has a successful track record of delivering significant investment programmes, including the Transport Fund; the portfolio of housing, infrastructure, and business investment funds agreed through devolution deals; and public service programmes like the Working Well programme.

However, delivering truly integrated 21st century infrastructure will require further institutional development to build on the already robust governance, capacity and assurance processes in place in the city-region. Greater Manchester will therefore review its institutions, structures and processes to ensure the city-region can continue to deliver successful integrated infrastructure programmes.

The city-region will need appropriate and innovative investment and delivery models to deliver the scale and range of investments needed, which do not currently exist. The Prosperity Review agreed with the National Infrastructure Assessment that an integrated strategy for infrastructure at city-region level should be backed up by stable, substantial, devolved funding. Greater Manchester will consequently explore options for achieving sustainable, long-term local investment into infrastructure.

Short-term action is needed to address congestion and increase productivity and employment growth. The next stage of Greater Manchester's 2040 Transport Strategy (2020-2025) includes a further 65 projects including continued Metrolink expansion, new interchanges and ongoing investment in the city-region's innovative Bee Network of active travel corridors and junctions to encourage cycling and walking in the city-region, funded through the Transforming Cities Fund. Specific opportunities to tackle congestion include trialling tram-trains in the city-region, increasing the pace of improving rail and bus service quality, reliability and integration through ongoing devolution and reform, and improvements to existing TransPennine rail services.

The completion of the full Northern Hub programme and the Transport for the North Northern Powerhouse Rail programme would transform rail infrastructure, improving service patterns, frequency and capacity between key economic centres of the north, particularly east-west connections. An Integrated and Smart Travel programme is streamlining journey planning and payment.

Figure 5: Greater Manchester's global connectivity

Manchester Airport is the global gateway to the north of England. It serves more destinations than any other UK airport (over 200), facilitating trade and the cultural and visitor economies. The city-region's rail and road networks create fast national connections, and the development of Port Salford will establish the city-region as a modern UK port, and link to new international trading routes. The arrival of High Speed 2 and improved Northern Powerhouse links will strengthen inter-city connections across the UK.



Building on the powers already devolved to the Greater Manchester Mayor, Greater Manchester will continue working with government to improve the performance of Greater Manchester's transport system through implementation of existing devolution deals including greater local influence over rail services and stations, bus reform, trialling tram-trains, and regulatory reforms that complement the shift to cycling and walking, in the context of the Williams Rail Review.

To increase network capacity, widen labour pools and business access to markets across the UK cities, Greater Manchester will work to deliver the growth cases for High Speed 2, and through Transport for the North the business case for Northern Powerhouse Rail and improvements to Manchester-Sheffield road links. Enhanced connectivity will help Manchester Airport to fully utilise its capacity (55 million passengers per annum), open up new routes and increase services to key growth markets in line with the national Aviation Strategy.

The Future of Mobility in Greater Manchester

The Prosperity Review recommended new digital-led transport innovation – including as part of the government's Future of Mobility Grand Challenge – to improve services at less cost. This needs policy and technology co-ordination to maintain overall system performance, embed policy objectives like clean air, improved health and social inclusion; and to create public trust, alongside new data sharing agreements and platforms. Greater Manchester is building the foundations for a digital mobility ecosystem by: testing and assessing new technologies like Connected and Autonomous Vehicles; integrating transport infrastructure with the 'Internet of Things'; and adopting new models of integrated and flexible on-demand transport provision: namely of Mobility as a Service. Transport for Greater Manchester has built considerable knowledge and expertise in this field, pioneering proof of concept and significant research programmes, and working with businesses in this emerging market.

To identify the necessary locally led changes needed to drive and shape innovation-led transport improvements, Greater Manchester and government will develop a programme of activity for transport innovation to explore new ideas and bring together relevant stakeholders to collaborate with Transport for Greater Manchester. This will increase Greater Manchester's ability to improve the transport system as a whole, and to inform policy-making. Transport for Greater Manchester and the government's Future of Mobility team will work together to bring together the right set of stakeholders and private and local investors for transport innovations, exploring new technologies and governance models, and potentially trialling them in Greater Manchester.

Transport for Greater Manchester and government will consider how best to trial emerging technologies and services where the regulatory framework is not yet fixed. This whole systems approach and regulatory "sandbox" will support the Future of Mobility and Clean Growth Grand Challenges by creating a blueprint for the integrated, low carbon transport systems of the future, whilst building on digital infrastructure, industry strengths and Greater Manchester's approach to integrated public policy.

Digital infrastructure for a leading city-region

To enable these changes to the transport system and deliver all the aspirations in this Local Industrial Strategy, Greater Manchester will aim to become one of the best digitally connected city-regions in the UK. Digital infrastructure is integrated within the new Greater Manchester Infrastructure Framework and the remit of the Infrastructure Advisory Board, and Greater Manchester has the most significant city-region digital connectivity investment programme in the UK. The city-region is investing over £100m in digital initiatives, transformative data life cycle management, cyber security, health digitisation, better data governance and analytical capabilities. This includes £23.8m contributed by government to digital infrastructure development and almost £39m is already committed to investing in 'Full Fibre'.

This approach is accelerating market investment and will continue to do so with the city-region's ambition to attract private sector investment of over £200m, create further opportunities to develop 5G networks and test beds, and capitalise on over 500,000 mapped street furniture items that have the potential to provide high bandwidth, low latency 5G networks. Local Full Fibre Networks (LFFN) funding will connect over 1,300 public sector sites and will have a transformational impact on digital infrastructure - increasing full fibre coverage from two per cent to around 25 per cent within three years. Greater Manchester is continuing to facilitate further commercial investment by reducing the cost of works through granting of wayleaves, surface reconstitution, and harmonising regulatory processes across all 10 boroughs. Greater Manchester will continue to work with government to meet national targets of nationwide full fibre coverage by 2033 and roll-out of 5G technologies for the majority of the population by 2027.

Business environment

Supporting highly productive, innovative and international enterprise.

The productivity of businesses in Greater Manchester will be radically improved by strengthening their leadership and management, increasing innovation commercialisation, adoption and diffusion, and raising levels of exports, foreign direct investment (FDI) and inward investment.

Greater Manchester's strategic priorities

To help realise the long-term strategic aspirations set out in this Local Industrial Strategy, Greater Manchester, will:

- Strengthen the leadership and management capacity of businesses and enterprise in Greater Manchester to increase productivity and skills utilisation.
- Implement a Greater Manchester Good Employment Charter to improve skills utilisation and management standards and so raise productivity across all sectors.
- Support all business and enterprise to adopt innovations and create new products, services and business models.
- Sustain and develop the strong business support infrastructure, based around the Business Growth Hub, by further strengthening support to drive innovation (including business model innovation), productivity, workforce development and scaling up businesses in key sectors.
- Drive further internationalisation of Greater Manchester's business and enterprise base, supporting exports, inward investment, and international partnerships.

The specific actions identified in this chapter will contribute to, and complement, the delivery of those aspirations.

Greater Manchester's business base

The Prosperity Review highlighted the diversity of Greater Manchester's business base and the sophisticated mix of industries and supply chains in the city-region that creates multiple growth opportunities and diversification routes for business. The Review confirmed that Greater Manchester is a significant and growing UK international trading hub, and this is creating dividends for the economy in terms of strong FDI and the presence of highly productive foreign-owned firms in the city-region. International partnerships in the city-region span from IT giant Tech Mahindra's Salford HQ and innovation lab to the work of University of Manchester scientists at the Large Hadron Collider at CERN in Geneva.

Greater Manchester has a very strong track-record in attracting Foreign Direct Investment, and has invested in developing international partnerships to drive forward the city-region's priorities, including the Manchester-China Forum and the Manchester-India Partnership. This has made the city-region an international centre for business, and developed a nationally significant set of relationships and assets.

The Greater Manchester businesses that export are also the most productive, and are mainly in the manufacturing, digital and creative industries. However, in 2017 the city-region exported less than half the level of goods than would be expected for its size, despite strong performance in manufacturing exports.



Business support

Greater Manchester has an extensive and mature network of business advice services, centred around the Business Growth Hub. This community includes the Manufacturing Champions Network, private partners and business membership bodies including the Chamber of Commerce, the Federation of Small Businesses and the Forum of Private Business. Businesses have access to private equity, including Venture Capital and Business Angels, and benefit from the services and advice of a strong financial and professional service sector alongside Enterprise Zones and incubator and accelerator spaces across the region. The Growth Hub hosts Innovate UK and the Enterprise Europe Network (EEN) resources that connect local, national and international innovation networks, and takes part in the Interreg North West Europe Programme as part of transnational consortia. The British Business Bank and Department for International Trade have set up Greater Manchester offices to support initiatives like the Northern Powerhouse Investment Fund.

However, business density levels are below the national average and, while there are highly productive firms in every sector, there is a long tail of less productive firms in the city-region – and productivity within sectors differs more than between sectors.

The Prosperity Review suggests the causes of this need to be addressed by improving leadership, management skills, diversity and business models, and addressing low export rates, poor skills utilisation, and low levels of innovation adoption amongst firms.

Improving business productivity

To improve productivity, there must be a higher take-up of innovation across the business base, from adopting new internal processes, to developing new products, services and business models and finding applications for new scientific discoveries. Businesses will be supported to link to networks for knowledge and best practice exchange between peers, and clearly signposted to the available finance (including tax credits), support and advice. Government and Greater Manchester have already made significant investments in the Growth Hub, making it the largest in the country.

The Growth Hub and Greater Manchester partners will better coordinate existing business support programmes for increasing innovation and productivity, leadership and management, and supporting scale-ups to internationalise, as well as the wider business support offer available. Work will focus on enabling more local businesses to access this support, and providing more targeted support including one-to-one advice, mentoring and peer-to-peer programmes. Programmes will drive up leadership and management capacity to increase skills utilisation and innovation, and improve productivity.

Greater Manchester will also continue to rationalise regulation services to make access to advice and support simpler and easier for business, particularly regulations relating to innovation and exports.

To reinforce Greater Manchester's increasing contribution to UK soft power, existing global partnerships and approach to business (such as Manchester-India Partnership and Manchester-China Forum), and to build on the focus provided by this Local Industrial Strategy, Greater Manchester will launch a 'Global Prosperity Partnership Model', to be promoted by the Department for International Trade. This model will create city-to-city partnerships to build deep two-way relationships between cities, and strategic partners therein, in key markets and sectors through programmes on entrepreneurship, technology, IP exchange and collaborative R&D.

These thematic elements will give Greater Manchester and the UK useful insights into emerging technologies and innovations in overseas markets, such as green transport infrastructure advancements in China, to help accelerate commercial application in the UK. A balanced exchange that encourages the development of pilot zones and initiatives to encourage researcher collaborations and commercial spin-offs will underpin meaningful city-to-city collaboration.

To foster these partnerships, Greater Manchester will create a "soft landing" platform for international entrepreneurs, academics and researchers and companies coming into Greater Manchester, and in the partner cities, such as Bangalore, India, to provide similar soft landing bases for Greater Manchester's high-growth scale-up companies and universities.

This will build on Greater Manchester's Global Scale-up Programme which will take Greater Manchester's most exciting businesses and give them access to strategic international growth advice and coaching from partners, supporting them to scale up and grow into new markets, export and internationalise their business strategy.

Greater Manchester's Global Prosperity Partnership Model will aim to grow high value city-to-city trade and technology or IP exchange, and attract inward investment, visitors and global talent, and support exporters and high growth companies to scale operations globally as well as attracting high value inward investors and research investment. The programme will also include a focus on attracting major global events, in alignment with the Greater Manchester Convention Bureau, and leveraging the talents of the international student base in the city-region.

Supporting all workers

Through programmes like 'Be the Business', 'Made Smarter', executive development programmes provided by the Business Growth Hub, and the Greater Manchester Productivity and Inclusive Growth Programme, Greater Manchester and government are supporting businesses to improve their leadership and management capacity, as well as their efficiency and effectiveness. The Greater Manchester Good Employment Charter, which is being developed and implemented with employers and employees, will be another key lever for raising leadership and management amongst Greater Manchester's employers, improving productivity, wages, and job quality in all sectors, particularly those that have not traditionally engaged with public sector funded business advice. The Charter will also improve skills utilisation, raise employment standards and encourage employers to focus on the health and well-being of their workforce. It will use a tiered structure, backed up with support for employers, engaging a wide range of businesses, social enterprises, public service providers and voluntary and community sector organisations to help them progress to higher standards. Greater Manchester will also work with local universities to maximise the local impact of their excellent leadership and management training and development offer.

Greater Manchester will also develop a plan for increasing the productivity of big sectors in the 'foundational economy' – such as retail, hospitality and tourism, and social care. Greater Manchester will work with large employers in these sectors to help understand progression routes and skills gaps to inform the work of the skills partnership and help businesses develop plans to access new workers or tap unused skills among their existing workforce. Greater Manchester will continue to support the adult social care workforce, developing new roles, better career prospects and leadership training, skills and development. As these sectors face many of the same challenges across the country, Greater Manchester's leadership will provide lessons for other areas.

The city-region is the home of the Cooperative Movement and has a strong history of innovation in business models and integrating social values with enterprise and economic activity. Greater Manchester has a strong embedded social value procurement policy, which is being updated to reflect Local Industrial Strategy objectives, including those relating to the foundational economy. A significant proportion of Greater Manchester's social enterprises work in the foundational economy sectors of health, community development, education and training, sport and leisure services. Greater Manchester will continue to create the optimum conditions for Social Enterprises to thrive and grow productive and valuable careers, products and services, including support and advice on development and innovation. The Business Growth Hub, itself a social enterprise, will provide a range of services from growth support, access to finance, specialist sector advice and leadership and workforce development, to cooperatives and social enterprises who are seeking growth. The forthcoming Greater Manchester Social Enterprise Strategy being developed by the sector will set out how the sector can support the implementation of this Local Industrial Strategy and promote good jobs, and innovation.

Sector deals

Government has agreed a series of sector deals that affect the Greater Manchester economy.

The **Life Sciences Sector Deals** aim to ensure pioneering treatments and medical technologies are produced in the UK to improve patients' lives and drive economic growth by coordinating substantial investment from government, private and charitable sectors. Investments include The Medicines Company big data project with the Greater Manchester Health and Social Care Partnership, to improve the understanding, management and economics of cardiovascular disease. QIAGEN, a leading provider of molecular testing solutions is partnering with Health Innovation Manchester to develop a genomics and diagnostics campus. IQVIA Ltd is investing in a Northern Prime Site with NHS research-ready hospitals in Greater Manchester, Leeds and Sheffield to use data-enabled approaches to design and deliver hundreds of additional clinical trials and real-world evidence studies.

Roche is investing an additional £30m in the UK, including £20m over three years into a precision cancer research partnership with The Christie in Manchester, making the UK a leading global hub for rare cancer trials and potentially benefiting nearly 5,000 patients annually.

Greater Manchester has the largest digital and creative sector outside London. National assets based in the city-region include Salford's MediaCityUK and The Factory. Innovation and creativity are synonymous with culture and a Greater Manchester Culture Strategy is being developed to create the conditions for creativity to flourish in every part of the city-region, enriching the lives of all residents and protecting, diversifying and growing Greater Manchester's unique culture, heritage strengths, assets and ecology. Government and the creative industries sector, through the Creative Industries Council, have agreed a **Creative Industries Sector Deal** that includes a range of activity to boost creative sector growth which Greater Manchester will benefit from.

Sector deals (continued...)

This includes the location of a regional hub of Tech Nation, which supports digital companies and start-ups, in Greater Manchester; successful projects as part of the £33m Audience of the Future Challenge, via the Industrial Strategy Challenge Fund, and a £4m Creative Scale Up programme to support creative firms in three English regions including Greater Manchester.

Greater Manchester is the third most visited UK city by international visitors, behind only London and Edinburgh. This includes a significant volume of business tourists attending conferences and events in the city-region. Our sporting assets – especially our leading football clubs – are a key driver of visitor numbers to the city-region. The hospitality, tourism and sport sector employs approximately 110,000 people in just under 10,000 businesses and provided £2.9bn GVA in 2016. Greater Manchester and government are working with businesses locally and across the UK to examine options for a **Tourism Sector Deal**. This will aim to address issues around job quality and seasonality of work, as well as supporting the development of a 10-year Visitor Economy Strategy.

Greater Manchester has R&D strengths in nuclear energy. The **Nuclear Sector Deal** sets out a vision for the nuclear industry to 2030 and proposals for government, sector and joint action to deliver this vision.

The research institutes and manufacturing companies in Greater Manchester include key aerospace specialisms and form part of the north west manufacturing cluster. The **Aerospace Sector Deal** positions the UK to take advantage of the global move towards hybrid electric and electric propulsion and to exploit valuable emerging markets such as drones and Urban Air Mobility. It sets out proposals for a UK Aerospace Research Consortium, which includes the University of Manchester; a new supply chain competitiveness programme; export champions; a future flight challenge; and support for engineering apprenticeships.

Places

Cultivating prosperous cities, towns and communities across the city-region.

All parts of Greater Manchester will be supported to realise their full potential, cementing Greater Manchester's role in rebalancing the UK economy and reducing regional disparities.

Greater Manchester has many place-based strengths: from the dynamic city centre, to the creative cluster around the Quays and the concentration of research excellence on the Oxford Road Corridor, to the industrial hubs in Trafford Park, Rochdale, Wigan, and Bolton.

The town centres across the city-region are important hubs for employment, housing and transport. The community and voluntary sector make vital contributions to Greater Manchester's social, environmental and economic wellbeing. But the Prosperity Review highlighted that not all parts of Greater Manchester have benefited from the growth experienced over the past decade, and access to employment, opportunity and other assets is unequal.

Greater Manchester's strategic priorities

To help realise the long-term strategic aspirations set out in this Local Industrial Strategy, Greater Manchester will:

- Ensure a thriving and productive economy in all parts of Greater Manchester, by maximising national and international assets, city and town centres, strategic employment locations and neighbourhoods.
- Reduce inequalities, promote diversity and improve prosperity by addressing barriers to participating in employment and accessing opportunities across the city-region.
- Building on city, growth and devolution deals and continue reforming public services to ensure local public services are focused on improving outcomes and reducing inequalities.

The specific actions identified in this chapter will contribute to, and complement, the delivery of those aspirations.



Delivering the ambitions of this Local Industrial Strategy requires all parts of the city-region to realise their full potential.

Through the implementation of this Local Industrial Strategy, Greater Manchester will seek to strengthen economic areas across the city-region based on their unique opportunities and challenges, building on the diversity of its people and places. The draft Greater Manchester Spatial Framework clearly sets out the key locations that will be prioritised to drive inclusive economic growth:

- The expanding city centre, which will further strengthen as the most significant economic location in the UK outside London, providing a concentration of jobs that are readily accessible from across Greater Manchester and beyond. The city centre includes the Oxford Road Corridor which is continuing to develop as a world-class innovation hub with a very high concentration of research activity and enhanced business connections.
- The Quays, which is expected to deliver sustained growth as a major business location including an internationally important digital and creative cluster.
- The wider area of economic activity at the heart of Greater Manchester, stretching from the Etihad Campus in the east, through the city centre and The Quays, to Trafford Park and the Trafford Centre. This area includes key clusters of growth sectors, including the Salford Innovation Triangle which is emerging as a key site of research and innovation, and provides an enormous and extremely diverse range of businesses and jobs, which currently accounts for around one-quarter of employment in Greater Manchester and is expected to grow.
- Manchester Airport Enterprise Zone, with the expansion of the airport as the UK's primary international gateway outside London and the South East, providing easy business connectivity across the world, and increased employment activity around the airport site, Wythenshawe Hospital, and rail connections.
- The eight main town centres (Altrincham, Ashton-under-Lyne, Bolton, Bury, Oldham, Rochdale, Stockport and Wigan), which will be supported to provide a stronger focus for local economic activity by exploiting important advantages such as the direct mainline rail links to London from Stockport and Wigan, High Speed 2 and the university in Bolton.
- Port Salford, providing sustainable freight connections by water and rail and acting as an international gateway via upgraded facilities at the Port of Liverpool.
- The M62 North East Corridor, including the proposed development of 'Advanced Materials City' to accelerate opportunities in Greater Manchester's advanced materials manufacturing base and provide a physical home for the market for 2D materials, which will see a massive expansion of the existing employment areas forming a major facility similar in size to Trafford Park. This will help to deliver a better distribution of growth across Greater Manchester and boosting the economy of the northern part of the city-region.
- The Wigan-Bolton Growth Corridor is located in the north-west of Greater Manchester, and will complement the M62 North-East Corridor to ensure that there are significant investment opportunities across the northern areas, helping to boost the competitiveness of all parts of the north. The Wigan-Bolton Growth Corridor proposals are smaller in scale than the M62 North-East Corridor, but are nevertheless important in supporting long-term economic prosperity. The M6 logistics hub in Wigan (extending into Warrington, St Helens and West Lancashire) provides a major cluster of warehousing and distribution activity with easy access to the Port of Liverpool via the M58.

Figure 6: Strategic locations



The complexity analysis undertaken for the Prosperity Review demonstrates opportunities to develop higher value industries across all districts of Greater Manchester, if the right networks and mix of policy interventions are in place.

Existing and new businesses will be supported to raise productivity and job quality, and Greater Manchester will act to stimulate new growth opportunities in underperforming areas. Each part of Greater Manchester and each industry sector will need a different mix of policy interventions to realise their full potential, which could include investment in infrastructure, skills, business support, design and marketing, or specialist incubator spaces and premises. Each Greater Manchester local authority has committed to setting out how the key issues identified in the Greater Manchester Local Industrial Strategy interlink with opportunities and barriers in their locality, and to develop action plans to coordinate Greater Manchester and district level implementation and to deliver real change in all parts of the city-region.

In some cases, to create the conditions for private sector investment and growth, it will be necessary to tackle the excessive costs of bringing brownfield sites back into use and to raise the quality and attractiveness of urban environments and town centres. Greater Manchester will take an integrated place-based approach to bringing forward strategic regeneration proposals in town centres and strategic sites, which integrate investment in land remediation, housing, transport and other infrastructure to create sustainable employment locations.

A key element of this will be to develop and support the unique culture and heritage of the city-region, improving desirability and the quality of place to attract and retain talent and investment, especially in town and city centres. Where appropriate, this will align with and build on the Greater Manchester Town Centre Challenge and the use of Mayoral Development Corporations.

But prosperous places are not just about employment sites and local jobs. The Prosperity Review is clear that, for parts of Greater Manchester with lower productivity, pay and living standards, there needs to be both better jobs across the city-region and better access to jobs. Greater Manchester will continue to deliver the Transforming Cities Fund in ways that support the ambitions in this strategy and underpin continued and inclusive growth. Improvements to the transport system are clearly key to enabling access to jobs in the centre, but so too is addressing non-transport barriers to economic participation, particularly around low skills and ill health. Interventions to improve skills, work and health interventions will be coordinated to reduce inequalities and improve outcomes for residents.

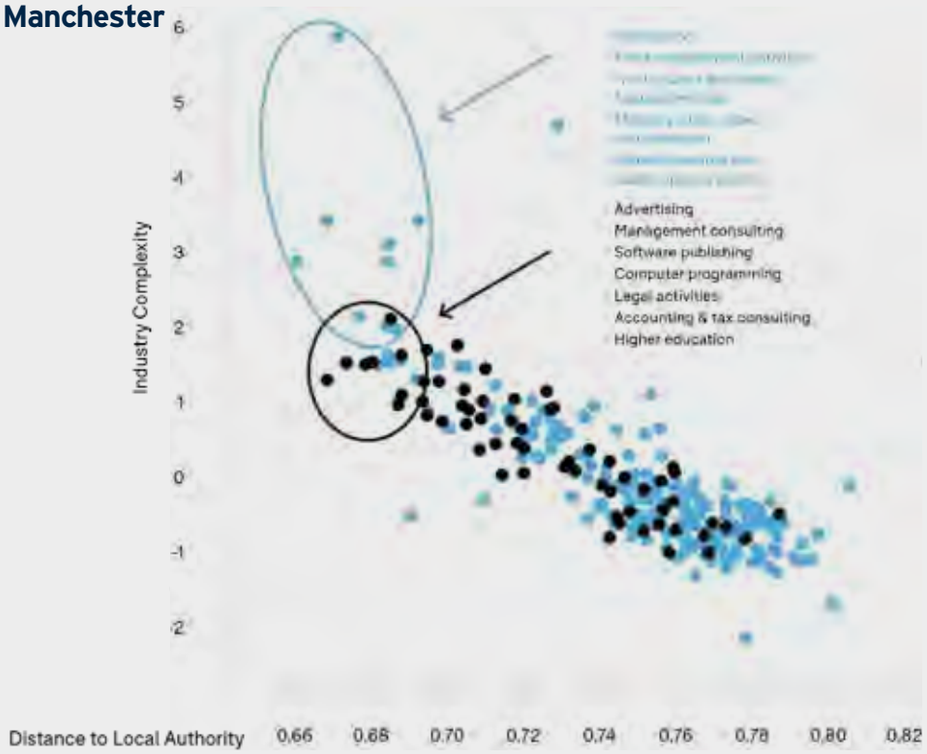
Key to this is integrating public services, so that they can be tailored to the unique circumstances of an individual and place, and so priorities like improving skills and increasing innovation are embedded and reflected in public services to find new place-based ways to approach industrial strategy. Greater Manchester will continue to build on the City and Growth Deals and the devolution of powers and resources to the city-region to reform and redesign public services.

The Greater Manchester Model of Unified Public Services is the framework through which the city-region will ensure that all public services are focused on improving outcomes and reducing inequalities. Greater Manchester will continue to implement and review the city-region's emerging public service reform model, supported by existing innovation funding and other local funding streams.

Using evidence to identify potential opportunities

The University of Cambridge has undertaken pioneering analysis to identify new industrial opportunities based on what an area is currently good at and, crucially, where they have potential to move to higher product complexity, as this could be advantageous in informing growth and capability upgrading. This analysis, undertaken for each Greater Manchester district, uses data on the current industry profile and skills mix, and uses this to identify possibilities to broaden into new specialisms.

Manchester

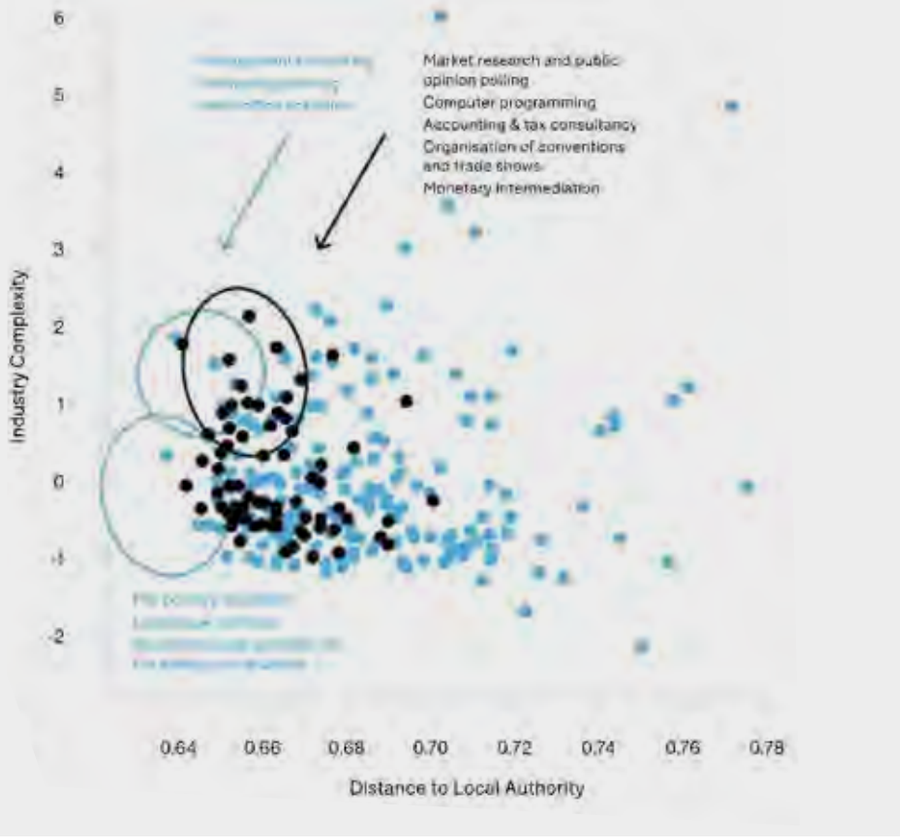


As an illustration for how this analysis could be used, the plot for Manchester shows 'related' opportunities for the city in market research and public opinion polling, trusts and fund management activities, and motion pictures, video and television, that complement the local authority's existing strengths in advertising, management consulting and computer programming. Not only are these specialisms well-aligned to Manchester's current industrial strengths, they also have higher product complexity, which is potentially positive for earnings and growth performance.

Using evidence to identify potential opportunities (continued...)

The plot for Stockport shows that, owing to its different set of existing capabilities, it has a number of 'related' opportunities including management consulting, software publishing and head-office activities with a high product complexity and also some with a low product complexity, such as pre-primary education, landscape services, and residential care activities.

Stockport



Implementation

A place-based approach has been used to develop the Greater Manchester Local Industrial Strategy, and it is designed to be implemented in the same way: capitalising on strengths and opportunities and recognising the barriers to growth and prosperity that parts of the conurbation face.

This section sets out the overarching framework for implementing the strategy to ensure it delivers for the whole of Greater Manchester.

Shared outcomes

As well as setting out specific actions, this Local Industrial Strategy also sets out Greater Manchester's long-term aspirations and the specific outcomes local partners are aiming to achieve. These will help guide future action and evaluate progress. **By 2040, Greater Manchester will aim to have secured:**

- increased productivity and pay across sectors, particularly where they are currently behind national averages, driven by businesses which are well led and managed, innovative and trading and investing globally;
- a greater number of high-quality manufacturing opportunities in strategic sites across the city-region, giving a more productive manufacturing base close to transport links and population centres;
- a fully integrated and digitalised health and care system, creating and adopting the latest in preventative and assistive health technology, and helping people stay in the labour market and stay productive for longer;
- achievement of carbon neutrality in a way that improves quality of life for residents, minimises the productivity impact on current businesses and maximises commercial opportunities across Greater Manchester;
- recognition as one of the top five city-regions for the digital economy in Europe, with full fibre broadband and 5G coverage;
- a city-region skills and work system that enables people to realise their potential, supports emerging industries, and is responsive to employers; and
- a coordinated infrastructure system, with a transport network that provides clean and effective intra-GM commuting and leveraging connections throughout the UK: north-south (HS2) and throughout the Northern Powerhouse.

Successful implementation will require the coordinated efforts of local and national government, as well as a broad set of stakeholders including private business and social enterprise, public services, universities, and community and voluntary organisations.



This is a challenge, but it is also a great opportunity. Coordinating the implementation of cross-departmental policies in a place, and aligning those with local priorities and actions, will enable us to deliver increased prosperity and productivity more efficiently and effectively for Greater Manchester's people and places.

Success will also depend on how responses and solutions, products and services are designed at all levels of implementation, from integrated public services to bringing new products to market and digital transformation.

The civic authorities, business stakeholders and people across all sectors, from transport and architecture to digital applications and service design, will collaborate through a range of mechanisms to ensure optimal use of skills, processes and thinking to deliver successful outcomes for the whole of Greater Manchester.

The government will continue to support the Greater Manchester Local Industrial Strategy through implementation of Greater Manchester's devolution deal, and improved partnership as set out in this strategy.

The Local Enterprise Partnership Senior Sponsor will champion implementation of the Local Industrial Strategy in Whitehall on an ongoing basis.

Greater Manchester will develop an Implementation Plan setting out clear milestones, deliverables, and timings for the actions set out in this strategy. An annual review of progress will be produced, that will be reviewed at a meeting of a government and Greater Manchester Implementation Board, made up of senior officials from across government and Greater Manchester.

At a regional level, the Greater Manchester Local Industrial Strategy will inform, and be aligned with, the government's Northern Powerhouse Strategy, which is due to be refreshed in 2019. Greater Manchester will continue to engage with partners in the north, including other Local Enterprise Partnerships and Mayoral Combined Authorities creating Local Industrial Strategies, to take forward shared priorities in line with this Local Industrial Strategy.

This Local Industrial Strategy does not include any new spending commitments outside of existing budgets. Instead, it will inform the strategic use of local funding streams and, where relevant, spending and decisions at the national level. It will also help Greater Manchester decide on its approach to maximising the long-term impact of the new UK Shared Prosperity Fund once its details and priorities are announced at Spending Review.

To demonstrate progress towards the long-term vision set out by this Local Industrial Strategy, the Strategy contains a number of specific actions. Where these actions are locally led, these will be drawn from local budgets which exist for those purposes; where actions are shared between Greater Manchester and government, they will be funded from existing local and departmental budgets, with funding allocated for those specific purposes.

This strategy does not represent all the priorities and action being developed in Greater Manchester. As detailed in this Strategy, Greater Manchester will regularly review the latest evidence to continue designing the most effective approaches and interventions to be at the forefront of the future UK economy. This Strategy sets out long-term ambitions and will continue to evolve as the economy changes.

Within Greater Manchester, the implementation of this Local Industrial Strategy will be brought into the Greater Manchester Strategy Implementation and Performance Management framework, ensuring that the delivery of the Local Industrial Strategy is coordinated with other actions. This will ensure alignment with key related plans, including the draft Greater Manchester Spatial Framework, Public Services White Paper, Health and Social Care Prospectus, and 2040 Transport Delivery Plan.

In line with the national Local Enterprise Partnership Assurance Framework, the Greater Manchester Local Enterprise Partnership will produce an annual delivery plan and a qualitative end-of-year report to evaluate how the Local Enterprise Partnership and other partners have contributed towards achieving Industrial Strategy objectives.

Evaluation

The government is committed to devolution where there is a strong evidence base, robust governance and delivery track-record in place. Robust evaluation is an essential element of demonstrating these competencies.

Greater Manchester will put in place a comprehensive evaluation programme for the Local Industrial Strategy. This will include the following:

- Project evaluations for the specific schemes that are implemented as part of the Local Industrial Strategy. It is expected that all projects funded as part of the Local Industrial Strategy will be subject to robust evaluation with independent input. Wherever possible and proportionate, cutting-edge independent evaluation methods will be used from the outset of programmes. The results of these evaluations will be shared widely. The process evaluation, described below, will include a mechanism for agreeing and monitoring that project evaluation is being undertaken robustly.
- An independent overarching process and impact evaluation will be put in place to assess the efficacy of government and Greater Manchester in delivering against the objectives set out in this strategy. Results will be reported annually to both Greater Manchester and government. A three-year review will be undertaken in April 2022 on the quantitative impact of the strategy, recognising that interventions will have a lag before taking effect. This should include an assessment of whether the current set of interventions are effecting the desired change and assessing the latest evidence on 'what works' in collaboration with independent experts.

Results of the evaluation will also be presented annually to the national Industrial Strategy Council.

Annex 1: Contributors to the Greater Manchester Local Industrial Strategy

A selection of the key groups involved in the development of the Greater Manchester Local Industrial Strategy are set out below in alphabetical order. We are also indebted to the individual businesses and people who took the time to engage with the creation of this Industrial Strategy.

- Be the Business
- Bolton Council
- Bury Council
- Business Growth Hub
- Business Services Association
- Confederation of British Industry
- Construction Industry Training Board
- EEF - Manufacturers' Association
- Employment and Skills Advisory Panel
- Federation of Small Businesses
- Greater Manchester Ageing Hub
- Greater Manchester Business Advisory Panel
- Greater Manchester Centre for Voluntary Organisation
- Greater Manchester Chamber of Commerce
- Greater Manchester's Colleges and training providers
- Greater Manchester Combined Authority
- Greater Manchester Devolution Voluntary, Community and Social Enterprise Reference Group
- Greater Manchester Digital Summit
- Greater Manchester Foresight Group
- Greater Manchester Green Summit
- Greater Manchester Health and Social Care Partnership
- Greater Manchester Housing Providers
- Greater Manchester Local Enterprise Partnership
- Greater Manchester Public Health Directors
- Greater Manchester Youth Combined Authority
- Greater Manchester Universities
- Growth Company clients
- Health Innovation Manchester
- Institute of Directors
- Manchester City Council
- MIDAS
- Marketing Manchester
- North West Business Leadership Team
- Northern Powerhouse Partnership
- Oldham Council
- Pro-Manchester
- Rochdale Borough Council
- Salford City Council
- Stockport Metropolitan Borough Council
- Tameside Metropolitan Borough Council
- Think-tanks (local and national)
- Trade Unions
- Trafford Council
- Transport for Greater Manchester
- Wigan Council

References

1. Details of the Manchester Independent Economic Review are available here: http://manchester-review.co.uk/
2. Details of the Greater Manchester Independent Prosperity Review are available here: https://www.greatermanchester-ca.gov.uk/news/independent-prosperity-review/
3. The Greater Manchester and Cheshire East Science and Innovation Audit is available here: https://www.greatermanchester-ca.gov.uk/media/1136/science_audit_final.pdf
4. The Five Year Environment Plan for Greater Manchester, 2019-2024, is available here: https://www.greatermanchester-ca.gov.uk/media/1986/5-year-plan-branded_3.pdf
5. Details of the Manchester Airport Transformation Programme are available here: https://www.mantp.co.uk/



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Greater Manchester

Infrastructure Framework 2040

Energy, Transport, Water, Flood, Green+Blue, Digital



GMCA GREATER MANCHESTER COMBINED AUTHORITY

1 Executive Summary

Greater Manchester has experienced major change over the past decades, and this is anticipated to continue, if not accelerate, in the future – particularly as a result of population and employment growth, environmental & climate change and technological advances. All of these changes have the potential to impact on Greater Manchester's infrastructure, which supports the residents, communities, environment and local economy of the City Region.

Recognising the importance of our infrastructure and the multiple parties which are involved in its management and delivery, Greater Manchester Combined Authority (GMCA) have taken steps towards the delivery of a holistic, cross-sector Greater Manchester Infrastructure Strategy (GMIS). The aim being to focus on developing infrastructure which ultimately improves the lives of all those living and working within Greater Manchester.

This document – The Greater Manchester Infrastructure Framework - is a precursor to the GMIS. It looks to frame the key issues and priorities which the GMIS should address and sets out:

- The key trends affecting infrastructure up to 2040
- How those trends will affect each infrastructure network (i.e. the impacts)
- The response needed to achieve the Greater Manchester infrastructure vision – the Framework

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The infrastructure sectors covered within this Framework focuses on the physical infrastructure broadly in line with the National Infrastructure Commission of:

- **Energy**
- **Flooding, surface and waste water management**
- **Transport**
- **Green and blue infrastructure**
- **Digital**
- **Potable (drinking) water**

While this Framework has focussed on the physical infrastructure, a separate study has been commission by GMCA to investigate a clearer mechanism to plan and deliver social infrastructure (including education, childcare, health and social care, and leisure and cultural facilities).

"The infrastructure we have now, and the infrastructure we plan to build, will support and sustain us for decades to come. Our quality of life, and our success as an economy in the future, will depend on our infrastructure's ability to respond to future challenges."

(NIC, National Infrastructure Assessment, 2018)

Vision for the Greater Manchester Infrastructure Strategy:

Develop and maintain a holistic infrastructure system that is robust, accommodates sustainable growth and support the ambitions of the Greater Manchester Strategy to make 'Greater Manchester one of the best places in the world to grow up get on and grow old'

Key Trends to 2040

Ever improving efficiencies of buildings and appliances, and increased awareness and changing behaviour of consumers is reducing per capita demands.

Population and Employment

- Population, housing and employment growth
- Changing working and shopping patterns
- Changing demographics – aging population
- Changing behaviours – conscious consumers
- Urban densification and regeneration

The Environment and Climate Change

- A changing climate and decarbonisation
- The UK Government's 25 year Environmental Plan
- Increasing recognition of the value of the environment to the economy and social well-being
- Legislation and the importance of improving air quality
- Increasing efficiencies of appliances and behavioural change
- Water Framework Directive & Water Quality targets

Technological, Digitisation and Wider Changes

- Increasing digitalisation
- New technologies, artificial intelligence and automation
- Increasing use of smart technologies and environments
- Ultra-low emissions vehicles

Impacts on the Future of Greater Manchester's Infrastructure Demands and Key Challenges

The key trends will have varying impacts on Greater Manchester's infrastructure over the coming decades up to 2040. The consequences of these impacts are summarised below and these have informed the development of a series of Key Challenges for GM's infrastructure that need to be addressed.

Heat

Housing and employment growth and the effects of extreme winter weather will increase the heat demand by approximately 15%. At present natural gas (a fossil fuel) provides 96% of primary heating fuel for homes. With the drive to decarbonise, GM will need to develop infrastructure capable of delivering low or zero carbon heat.	**Key Challenge 1: Low Carbon Heat**
Delivering low or zero-carbon heat is likely to be expensive, as such, heat demand needs to be substantial reduced.	**Key Challenge 2: Retrofit**

Electricity

Housing and employment growth will increase the peak electrical demand. Electric vehicles may raise this by a similar increase as all of the projected housing and employment growth. If the response to delivering low/zero-carbon heat (Key Challenge 1) involves the electrification of heat this has the potential to produce a step change in peak electrical demand. The anticipated growth in renewable generation to move to a low carbon future will create more complex and unpredictable electrical supply patterns. The electrical infrastructure needs to be able to accommodate these changes. This will necessitate a change in the way the electrical infrastructure operates and is used. An alternative approach, to existing, must be taken to mitigate substantial reinforcement and expansion.	**Key Challenge 3: Changing demands on the electrical**

Transport

TfGM forecasts an increase of more than 800,000 trips per day by 2040, largely as result of employment and population growth. Further changes in travel patterns will occur due to demographic changes (aging population), changing working practices and the prominence of online retail. These changes have the potential to increase congestion and delays across all modes of transport without further action.	**Key Challenge 4: Capacity, connectivity and diversity of transport networks**
Improving air quality and the move towards decarbonisation will require a shift to ultra-low emission forms of transport. Greater Manchester requires the associated infrastructure to support this change.	**Key Challenge 5: Ultra-low emissions vehicles**

Potable Water

Despite population and employment growth, there is expected to be an overall reduction in potable water demand in Greater Manchester. This is due to on-going leakage reduction management by UU, increasing efficiencies of appliances and behavioural change of consumers. It is noted, that there will still be local pinch points associated with limitations of existing assets. No key challenge has been identified as it is recognised United Utilities are leading on the aspects highlighted above through existing funding mechanisms.	**No key challenge for GMCA**

Surface water, flood alleviation and waste water

The triple challenges of population growth, new development and climate change will mean the performance of Greater Manchester's drainage and sewerage systems and flood defences may fall below standard. There will need to be a shift towards more nature-based solutions and additional investment to ensure Greater Manchester is fully resilient to future changes.	**Key Challenge 6: Mitigating flood risk**

Green and Blue Infrastructure

Housing and employment growth and further infrastructure requirements (e.g. low/zero carbon energy generation) will place pressures of GM's blue and green infrastructure.

There is increasing recognition and economic evaluation of the importance of green and blue infrastructure to our economy, health and social well-being. The increasing use of approaches which help to account for, protect or enhance our environment (e.g. Natural Capital and Environmental Net Gain) will help to progressively improve the region's green and blue infrastructure.

Key Challenge 7: Maximising the eco-systems services provided by green and blue

Notably, green and blue infrastructure has no direct funding stream, often presenting long-term uncertainty in driving forward the agenda.

Digital

Digital technology is increasingly the backbone of the major industries and our daily lives.

Approaching 2040, GM will need to be a smart and digitally ready City Region. To achieve this, and support on-going digitalisation, the region will require resilient fixed connectivity (through full fibre) supported by 5G (and subsequent technologies).

Key Challenge 8: Pervasive, affordable, resilient digital connectivity

Cross Sector

Infrastructure within Greater Manchester (and across the wider UK) is owned and managed by a multitude of organisations/providers. GMCA and the Local Authorities have limited direct control over infrastructure provision or decision-making processes within these sectors. Challenges arise due to co-ordination and responding to change outside of infrastructure sectors regulatory investment cycles.

Key Challenge 9: Collaboration

Notably, green and blue infrastructure has no direct funding stream, often presenting long-term uncertainty in driving forward the agenda.

Key Challenge 10: Funding

Ensuring the security of supply throughout each day against challenges associated with ageing assets and 'shocks' (e.g. flooding) and 'stresses' (e.g. population growth).

Key Challenge 11: Resilience

The Framework

The Framework for Greater Manchester:

- Identifies the responses required by GMCA, the Local Authorties and other stakeholders to address the key challenges
- Identifies opportunities for collaborative working to ensure GM is ready for, and can capitalise on, anticipated changes
- Positions Greater Manchester at the forefront of a changing dynamic of infrastructure use

The framework contained within the main body of the report identifies where relevant projects and programmes are already underway or planned and then subsequently where additional initiatives are required.

Key Challenge 1: Greater Manchester needs infrastructure capable of delivering low/zero carbon heat

1A - Engage with work to assess the viability of 100% hydrogen replacement of natural gas in the existing gas network

1B - Document the wide-scale applicability of options for delivery of electrical heating by heat pumps across GM's existing domestic and non-domestic properties

1C - Continue scenario planning to determine the future balance of low/zero carbon heat between either hydrogen, electrified heat, district heating and other forms

Key Challenge 2: There needs to be a substantial programme of reduction in demand from existing and new buildings

2A – Significantly reduce the heat demand of existing buildings

2B – Significantly reduce the heat demand of new buildings

Key Challenge 3: The current electrical infrastructure needs to be able to accommodate the growth of local renewable generation, rapid electric vehicle charging and, potentially, the electrification of heat

3A – Understand the opportunities and implications of a changing electricity distribution network and its regulatory framework

3B – Provide greater definition of the scale and type of local generation needed to meet a zero carbon future, and the technologies required to facilitate its integration and demand management

3C - Determine GM's Electric Vehicle charging electrical demand

3D - Determine GM's potential future rise in electricity demand from electrification of heat

Key Challenge 4: Greater Manchester's transport infrastructure networks should provide the capacity, connectivity and diversity to meet the future needs of its residents

4A – Enhance the attractiveness and capacity of walking, cycling and public transport within GM.

Key Challenge 5: Greater Manchester needs the infrastructure to support ultra-low emissions vehicles

5A - Determine Greater Manchester's role in setting the future for electric vehicle charging and hydrogen re-fuelling

5B - Determine the locations, scale and phasing of the key hydrogen demands for high torque transport (buses, HGVs etc.)

5C - Understand the travel and work patterns associated with electric vehicle charging to determine the location and capacity of the electrical infrastructure required

Key Challenge 6: Provision of infrastructure that maintains and/or reduces flood risk across Greater Manchester whilst accommodating developmental growth and climate change

6A – Develop a robust funding strategy to provide flood risk infrastructure to support anticipated growth

6B – Understand the implications for GM of potential future changes in the appropriate standards of protection against flooding

6C – Complete actions from the GM Draft Level 1 Strategic Flood Risk Assessment

Challenge 7: Maximising the eco-systems services provided by green and blue infrastructure, whilst responding to spatial pressures on finite space and improving accessibility

7A – Enable an economic value to be placed on green and blue infrastructure

7B – Implement an environmental net-gain approach

7C – Continue to enable further schemes to increase the green and blue infrastructure schemes in GM

Key Challenge 8: Implementation of the GM Digital Strategy to provide pervasive, affordable, resilient digital connectivity

8A – Ensure the digital leadership in GM remains relevant and tailored to the continually changing needs whilst driving uptake by consumers

8B – Influence the development of digital infrastructure regulation to enhance alignment with GM interests.

8C – Streamline the process for installation of new infrastructure within the street-space

Key Challenge 9: Greater Manchester's infrastructure needs a collaborative and co-ordinated approach to meet the present and future needs of the region

9A – Determine the process to address future changes and challenges through the production of a GM Infrastructure Strategy

9B – Enable sharing of programmes, plans and projects between GMCA, the infrastructure providers and the ten districts and identification of collaborative funding opportunities

9C – Provide the capacity of GMCA, the districts and the infrastructure providers to enable the above

Key Challenge 10: Funding models are needed to meet the present needs and enable change for the future

10A – Evaluate and articulate the total benefits of investment in infrastructure

10B – Drive scheme agglomeration and long-term certainty

10C – Identify alternative funding models that enable transformative funding, and partnership working amongst the GM infrastructure stakeholders

Key Challenge 11: Infrastructure that is resilient to shocks and stresses

11A – Improve the understanding of the reliance of GM on resilience of its infrastructure networks, and based in this understanding deliver improvements in their individual and collective resilience

Building on the framework for Greater Manchester (above), and in recognition of the development of the Greater Manchester Spatial Framework (GMSF), the document considers three typical spatial typologies within Greater Manchester (i.e. the Regional Centre, Towns and New hubs of development) and identifies the different nature of the responses required beyond those identified in the overarching framework. Please refer to the main body of the document for further information.

Next steps: The newly defined Greater Manchester Strategic Infrastructure Board will focus on taking the GMIF forward and support the delivery of the GMIS.



The UK Government has recognised the complexity and importance of our infrastructure in 'transforming the UK economy' and 'shaping our lives'

(HM Gov, National Industrial Strategy, 2017)
(HM Gov, National Infrastructure Delivery Plan, 2016-2021)

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Greater Manchester's Infrastructure Challenge

The Greater Manchester (GM) City Region is comprised of ten district councils (Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford and Wigan). Greater Manchester is home to 2.8 million people, and with a GVA[1] of £56 billion, Greater Manchester represents the largest functional economic area outside of London[2], accounting for 40% of GVA in the North West[3].

The UK Government has recognised the importance of infrastructure and established the National Infrastructure Commission (NIC) in 2015. The NIC has recently completed their first National Infrastructure Assessment (July 2018) which identifies, at a national level, how the infrastructure needs and priorities of the country should be addressed.

The National Industrial Strategy (June 2018) has further defined infrastructure as one of the five 'foundations of productivity'[4] and recognises its importance in 'transforming the UK economy'.

With recognition to the above, the Greater Manchester Strategy (GMS) highlights the importance of infrastructure to ensuring 'a thriving and productive economy in all parts of Greater Manchester'[5].

Greater Manchester has seen major change over the past decades and this is only expected to continue, if not accelerate further, in the future. GM's population and employment patterns are expected to change which, along with considerable environmental (including climate change) and technological changes, have the potential to significantly affect our infrastructure networks. These changes must be successfully managed to achieve the best outcomes for Greater Manchester.

Physical infrastructure is owned and managed by a wide range of organisations, at local and national levels. Each type of infrastructure depends upon each other and these interconnections play a critical role in the provision of effective infrastructure that supports the populace. The management of these systems, and their interconnections, can make it diffcult for infrastructure to respond to change - running the risk of infrastructure hampering, not contributing to GM's future.

It is for these reasons that the Greater Manchester Combined Authority (GMCA) has undertaken work towards a holistic, cross-sector Greater Manchester Infrastructure Strategy (GMIS), with the aim being to ensuring our infrastructure does not become a barrier to economic growth and impact on the environment and lives of the communities living and working in Greater Manchester.

The GMIS will set out the strategic directions for the short, medium and long-term priorities for infrastructure across Greater Manchester up to 2040, whilst facilitating further collaboration with the infrastructure providers, GMCA and Local Authorities within Greater Manchester.

Greater Manchester has many great infrastructure attributes, however future challenges facing the region will mean that Greater Manchester and it's partners will need to work collaboratively to achieve the City Region's vision of world-class infrastructure to support it's residents and businesses.

1. Gross Added Value – i.e. a measure of the values of goods and services produced in an area, industry or sector of an economy. For example, £56 billion of real value produced in the economy, like national GDP.
2. GMCA - Urban Pioneer Strategic Plan (2017)
3. New Economy – Greater Manchester Key Facts (2017)
4. GMCA - GMS Implementation Plan (2017)
5. HM Government – National Industrial Strategy (2017)

An Infrastructure Strategy

The need for the Infrastructure Strategy and its underlying Vision are set out in the Greater Manchester Strategy (GMS). The GMS is a people and place centric ambition to create a 'more inclusive and productive city region' which ensures that all the communities of Greater Manchester can 'benefit from economic growth and the (associated) opportunities'. To achieve this vision the GMS is structured around ten priorities for Greater Manchester, which the Greater Manchester Infrastructure Strategy will draw upon.

The Infrastructure Strategy will establish the potential high-level approach to enabling the future for Greater Manchester's infrastructure, and is to act as a bridging document to tie together the various relevant infrastructure sectors and Greater Manchester strategies towards the collective aims and canvas of change in Greater Manchester.

Key ambitions for the Greater Manchester Infrastructure Strategy are outlined below and seek to respond to the overarching Greater Manchester Strategy, with a focus on developing infrastructure which ultimately improves the lives of all those living within Greater Manchester:

Vision for the Greater Manchester Infrastructure Strategy

Develop and maintain a holistic infrastructure system that is robust, accommodates sustainable growth and supports the ambitions of the Greater Manchester Strategy to make 'Greater Manchester one of the best places in the world to grow up, get on and grow old'.

The Greater Manchester Infrastructure should seek to...

- Supports the lives and well-being of the people, communities and the environment within Greater Manchester
- Be age-friendly and support the economic and social participation of both young and old
- Support strategically identified growth for parts and communities within Greater Manchester
- Be flexible, robust and meet the existing and future needs of the communities and technological change
- Provide world-class connections and access to opportunity for all
- Provide world-class digital infrastructure which provides the platform for Greater Manchester to embrace emerging technological and societal changes
- Support a carbon-neutral Greater Manchester and be economically, environmentally and socially sustainable
- Protect and enhance the environment and associated social benefits to all the communities of Greater Manchester

our people our place

The Greater Manchester Strategy

Let's make



1

Children starting school ready to learn



2

Young people equipped for life



3

Good jobs for people to progress and develop

Greater Manchester



4

A thriving economy in Greater Manchester



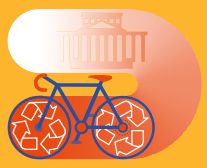
5

World-class connectivity



6

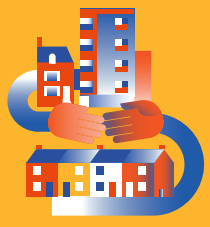
Safe, decent and affordable housing



7

A green city for all

one of the best



8

Safe and strong communities



9

Healthy lives and quality care



10

An age-friendly Greater Manchester

places in the world

An Infrastructure Framework

This Greater Manchester Infrastructure Framework is a precursor to a Greater Manchester Infrastructure Strategy. It focuses on the physical infrastructures broadly in line with the National Infrastructure Commission of:

- Energy
- Transport
- Water and wastewater (drainage and sewerage)
- Flood risk management
- Digital communications

It looks to frame the key issues and priorities which the GMIS should seek to address, to frame the future dialogue with the Greater Manchester infrastructure providers and facilitate action. The Framework sets out:

- The key trends affecting infrastructure to 2040
- How those trends will affect each infrastructure network
- The response needed to achieve the Greater Manchester infrastructure vision

The setting for this infrastructure Framework as well as the vision and ambitions for the infrastructure strategy were developed through a preceding "Definition" stage. These were each developed in partnership with the infrastructure providers and stakeholders of GM.

The challenges identified within this Framework document were initially founded from ten key infrastructure challenges identified in conjunction with the infrastructure providers during the Definition stage. These have been developed further through the production of this Framework by further articulation of the future trends and evaluation of the impact that these will have on the infrastructure.

The scoping and framework stages to date have concentrated on physical infrastructure. However, a need has been identified by GMCA for a clearer mechanism to plan and deliver social infrastructure. In particular it's essential that the implications of forecast population change for the demand for education and childcare, health and social care and leisure and cultural facilities are fully understood.

The Combined Authority has initiated a project to review and establish at high level:

- Which organisations hold responsibility for the provision of social infrastructure across Greater Manchester.
- The status of the social infrastructure pipeline and how new social infrastructure planning is linked to development plans.
- On what information and by what methodology is social infrastructure specified and planned.
- What barriers and impediments are anticipated to the delivery of this infrastructure.
- Whether any further support at combined authority level could secure and improve the delivery of this pipeline.
- The project is building upon the wealth of positive activity already underway across Greater Manchester led by the following groups and officers networks:
- Existing social infrastructure planning undertaken by the 10 districts
- Land commission and One Public Estate programme
- Greater Manchester Directors of Children's Services Group
- GreaterSport and GM Moving
- Health and Social Care partnership
- Culture Strategy / Culture and Heritage Steering group for Greater Manchester
- Social housing consideration through the Strategic Housing Group

This Framework sets out "what" is the future for infrastructure needs; the Strategy will then develop "how" this should be achieved.

In developing this Framework it has been recognised that predictions of infrastructure demand and networks in 2040 is subject to large uncertainties. To ensure that the Framework draws on the best estimates of that uncertain future, it has been developed in consultation with the following Partners and Infrastructure Providers. It has been based on evidence of likely trends and changes in demand and supply collected from a range of sources, including:

- National Infrastructure Assessment, and seeks to bring these projections together on a consistent basis.
- GMCA – including Urban Pioneer & Digital
- TfGM
- SCATTER research – Tyndall Centre, Manchester
- Electricity North West Limited (ENWL)
- United Utilities
- Environment Agency (EA)
- BT Openreach
- Cadent
- Highways England
- Homes Engand

Key Trends to 2040

The Greater Manchester Infrastructure Strategy looks to consider the time period up to 2040.

This following section identifies the key trends that will affect our infrastructure to 2040. A commentary is provided on how these trends will change the demand on the infrastructure. It also highlights the interconnections and interdependencies of these changes through the various forms of infrastructure.

Transport to the year 2040 is already extensively covered within the Greater Manchester Transport Strategy 2040 and, therefore, only those aspects and key issues that are pertinent to the other forms of physical infrastructure and their interdependency are drawn out within this document. The trends have been grouped within the three following areas:

- Population and economic growth, including demographics and social change
- The environment and climate change
- Technological, digitisation and wider changes

The infrastructure covered has been grouped into the following six areas and are considered within Greater Manchester (from the point of view of supply, distribution and use). Where the trend has an impact on a particular type of infrastructure this is indicated via the icons shown below. The impacts on the infrastructure are explained in the subsequent section.

Energy

Electricity North West (ENWL)
Cadent (Gas)

Electricity and heat generation, distribution and storage.

Transport

Transport for Greater Manchester (TfGM)
The 10 districts of Greater Manchester
Highways England
Network Rail
Bus Companies
Train Operating Companies
Manchester Airport Group (MAG)

Walking, cycling, Metrolink, heavy rail, roads, airports, ports and waterways, for both passengers and freight.

Potable (drinking) water

United Utilities (UU)
Sourcing and delivery of clean water supplies.

Digital

Telecommunications Operators
Passive infrastructure – i.e. duct provision, fibre, Wi-Fi and mobile infrastructure. (Excludes active networking equipment, data storage and server provision.)

Flooding, surface and waste water management

Environment Agency (EA)
United Utilities (UU)
GMCA & Local Authorities
Private Landowners

Infrastructure supporting the mitigation and alleviation of flooding and the collection, conveyance, management and treatment of surface and waste water; such as drainage pipes and waste water treatment works (WwTW).

Green and blue infrastructure

GMCA & Local Authorities
Private Landowners
Local Residents and Businesses

Green and blue infrastructure refers to the green and blue spaces and nature based features within and between urban areas in Greater Manchester, such as parks, river valleys, gardens etc. Natural capital identifies and places a value upon these assets within an ecosystem, such as forests, soil and living things.

Population and Employment

Population and employment growth

The Greater Manchester Spatial Framework is a joint plan for Greater Manchester that will provide the land for the projected numbers of jobs and new homes across the city region.

The employment and housing numbers behind this are set out by the Office for National Statistics, which indicates the population will grow by 275,245 between 2016 and 2040, driven mostly by natural increase (birth rates and residents living longer). Total employment is forecast in GMFM (2018) as:

- GMFM-2018 shows GVA growing at 1.7 % per year up to 2036, the same headline rate of growth shown in the previous GMFM-2017 model.
- Productivity is forecast to grow at 1.3% per annum, (0.1% per year more than GMFM-2017), reflecting slightly better outturn in productivity data from ONS during 2017/18.
- Total employment is forecast to grow at 0.5% per year in GM, equating to a net increase of 140,100 employees 2016 to 2036, compared to 141,000 in the previous model.
- Employment growth is largely driven by Business, Financial, and Professional Services - accounting for over half of the net increase in jobs up to 2036

More people will mean more homes and business and more consumers of energy.

More trips on the transport network.

Increased demands on the potable water supply and the quality of water resources.

Increasing levels of urban development will increase the proportion of hard surfaces and surface water run-off volume. More people may chose to live in existing homes at risk of flooding.

Population growth could lead to a reduction in the area of GM's green and blue infrastructure, replaced with new homes and business, whilst the additional population will lead to more people looking to use those resources.

More people will mean more homes and businesses, and more consumers of digital services.

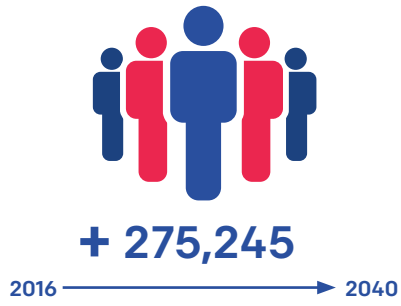
Changing working and shopping patterns

Shopping patterns are increasingly moving online, whilst flexible working will become more prevalent.

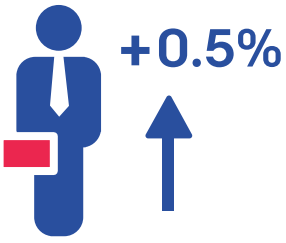
Changing personal and business behaviours will impact on peak energy demand and consumption.

Changing freight and logistics requirements

A growing demand for high speed, resilient data connectivity to facilitate these changing patterns



Population will grow by approximately 275,245 between 2016 and 2040



Employment is forecast to grow at 0.5% per annum in GM, equating to a net increase of 141,000 employees

A changing workforce

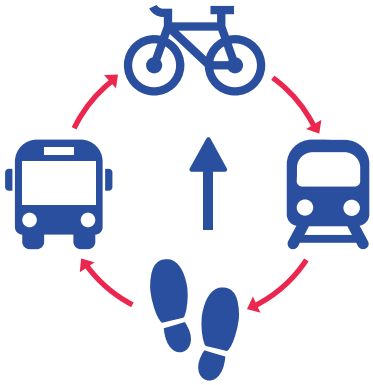
A more productive, higher skilled workforce, in higher paid jobs, focusing on more specialised and skill activities.

Tends to lead to increased commuting distances and more complex travel patterns.

Digital infrastructure to support the higher skilled industries – these may required increased digital infrastructure with energy demands associated



People aged over 70 predicted to increase by 15.2% by 2021



Improved transport connectivity

Aging population

In the UK, the proportion of the population aged 65 and older is projected to increase from 18% in 2015 to 25% by 2045. Our population in Greater Manchester is aging, and people aged over 70 predicted to increase by 15.2% by 2021, with the trend looking to continue to 2040.

(GMCA, Greater Manchester Population Health Plan 2017-2021)

Changing demographics will change energy demand requirements, e.g. increased heating or cooling demands to achieve comfort levels for vulnerable residents.

There will be an increased need for accessible transport infrastructure, with additional travel demands due to more people working later in life.

Providing accessible, high quality green and blue spaces will become increasingly important in maintaining the mental and physical well-being of the elderly.

More conscious consumers

Research suggests that beyond 2020, a new 'conscious consumer' will begin to dominate demographics (OECD, 2012), who have a focus on healthier, more sustainable and social lifestyles.

Greater demand for sustainable and active travel routes across Greater Manchester.

Residents will have a greater demand for higher quality green and blue infrastructure.

Urban Densification and Regeneration

The density of our urban centres will increase along with a projected growth of residents in these areas.

Greater density in our urban centers will create areas of locally increased energy demand.

Increased density in urban areas could contribute to reduced trip lengths and reduced car dependence due to greater accessibility of public transport services within urban areas and promote more use of walking and cycling.

Over 100,000 people lived in the Regional Centre in 2011, marking growth of 120% over the previous decade. There are now around 11,000 new residential units under construction in Central Manchester and Salford. The population is highly mobile - in 2010, 32,000 people moved to live in the Regional Centre, with 26,000 of those coming from the rest of the UK

The Environment and Climate Change

Climate Change

Climate change will alter weather patterns and increase the frequency and severity of extreme events, including higher seasonal rainfall and hotter summers.

More frequent 'Dry periods' increase our consumption of water and its availability when we need it most leading to increased chances of drought.

Increased probability and risk of flooding will lead to greater impacts on our infrastructure and higher standards of protection being required.

Heavier rainfall will lead to increased pressures on the surface and waste water networks. This will including impact on bathing water quality from effluent entering watercourses via CSOs and agricultural run-off due to increasing rainfall.

More green and blue infrastructure will be required to help mitigate climate change – such as flooding and urban heat island effect.



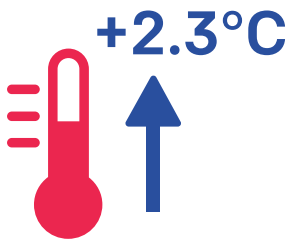
Overall peak rainfall intensity is expected to increase by up to 20% by 2040
(UK Government)

Increasing recognition of the value of the environment to the economy and social wellbeing

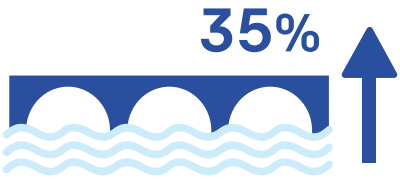
There is a growing awareness, backed by on-going research, that increasingly recognises the social, environmental and economic benefits that nature can deliver in creating liveable cities - overseen by the Natural Capital Group as part of GMCA.

The use of natural capital as a tool, with a more green and blue infrastructure led design approach, should become common-place in key choices and decision making, to give due regard to the environment as an asset to the overall economy.

Current planning approach is one of no net environmental loss; this needs to shift to an 'environmental net gain' principle for development, including housing and infrastructure, with an aim to safeguard and enhance our green and blue infrastructure.



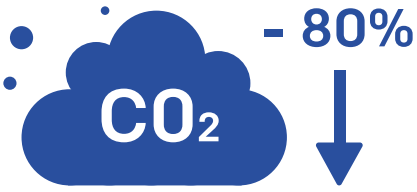
Annual temperture rise by 2050
(EcoCities, 2011)



The costs of the December 2015, Storm Eva, flooding event in GM are estimated to be £5-5.8 billion (KPMG). Extreme winter rainfall, like that experienced in December 2015, is now thought to be 7 times more likely as a result of human emissions of greenhouse gasses.'
(EA, 2016).

Major Project: Urban Pioneer

Greater Manchester is one of four cities nominated to help achieve the aims of the Government's 25 Year Environmental Plan (25YEP), through the application of Natural Capital. The Pioneers will identify good practice and innovative solutions to current environmental challenges.



UK Greenhouse gas emissions to be reduced by at least 80% by 2050
(Climate Change Act 2008)

Greater Manchester total tree cover is at 17% (City of Trees).



Major Project: Northern Forest

Plans are underway to create a new Northern Forest with 50million new tress, shadowing the path of the M62 from Liverpool to Hull, and encompassing Greater Manchester. The forest will look to improve the local environment, air quality, human health, flood risk and support tourism and recreation activities.

Major Project: City of Trees

The City of Trees movement has a target to plant at least 3 million trees in Greater Manchester over the next 25 years as well as bringing existing woodlands into management.

Air Quality

TfGM has developed the Greater Manchester Low-Emission Strategy and Greater Manchester Air Quality Action Plan, concentrating on ways to tackle emissions from road transport to improve air quality and to help in reducing carbon dioxide emissions. These complement the Greater Manchester Climate Change and Low Emissions Implementation Plan, which focuses on making the most of the region's energy and resources through reducing its carbon footprint.

Ultra-low emissions vehicles are likely to be an essential component in the solution.

The use and presence of green and blue infrastructure will be come increasingly important in improving air quality in Greater Manchester.

Decarbonisation

The UK is committed (Climate Change Act 2008) to reducing its greenhouse gas emissions by at least 80% by 2050, relative to 1990 levels. Greater Manchester is moving towards ambitions to achieve net zero carbon by 2038, in support of its understanding of the likely implications for cities in the UK of the Paris Agreement 2015.

Our power, heating, cooling and transport sectors will have to move towards being zero carbon.

There needs to be a full-scale shift away from traditional combustion engines with a transition to electric, hybrid or hydrogen vehicles.

Location of land available for new energy infrastructure, particularly associated with decarbonisation efforts – e.g. solar panels, bio-fuels, storage etc. raising a tension between zero carbon energy and green & blue infrastructure.

SCATTER modelled scenario for PV provision in GM: '16m2 per household on 50% of all households in GM. A residual 5.5-16.8km2 required on commercial rooftops or on ground mounted installations. 3.4-6.0TWh/year (7-12%) of GM energy demand.'

The Environment and Climate Change

Efficiency

Ever improving efficiencies of buildings and appliances, and increased awareness and changing behaviour of consumers is reducing per capita demands.

Increased efficiencies of fittings and changing behaviours will reduce the demand on the infrastructure.

The use of smarter technologies within each infrastructure sector will look to improve efficiencies further.



20 -40%

of energy in existing buildings can be profitably conserved.

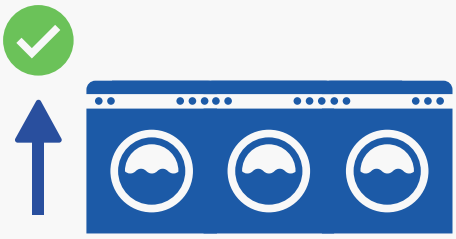
Passive building standards are at or near profitability for most new-build segments, but still only constitute a minority of buildings.

Arup, First Steps Towards a Circular Built Economy (2018)



Approx 60% of residential demands are from appliances. (National Grid Future Energy Scenarios)

EU 2030 target for electrical appliance efficiency saving of 30%



+ 5-30%

Commercial appliances improve in energy efficiency by 5-30%

SCATTER scenario planning (2018)

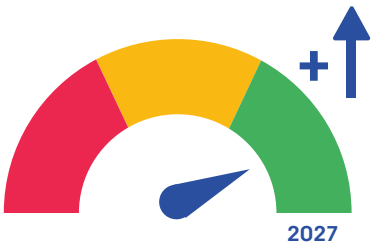
Areas of social and economic deprivation, which are often linked to with poorer health and reduced life expectancy, can also be associated to limited access to good quality green space.

(Arup, Cities Alive, 2015)



Urban greening as an asset has enormous potential to improve our health and wellbeing.

(Arup, Cities Alive, 2015)



The Water Framework Directive aims to ensure that all water bodies reach "good status" by 2027.

The UK Government's 25 year environmental plan

'A Green Future: Our 25 Year Plan to Improve the Environment', sets out what the UK will do to improve the environment, within a generation.

By 2040, the ambition of the government's plan is to achieve high quality, accessible, natural spaces with increased bio-diversity close to where people live and work; with a focus around the equal distribution of environmental benefits and resources to all.Including restoration of freshwater protected sites and wildlife habitats and an increase in woodland cover.

Meeting the aspirations of the plan will necessitate improved water quality of outflow from Greater Manchester's waste and surface water management infrastructure and a shift away from tranditional 'hard' engineered solutions

Water Framework Directive & Water Quality

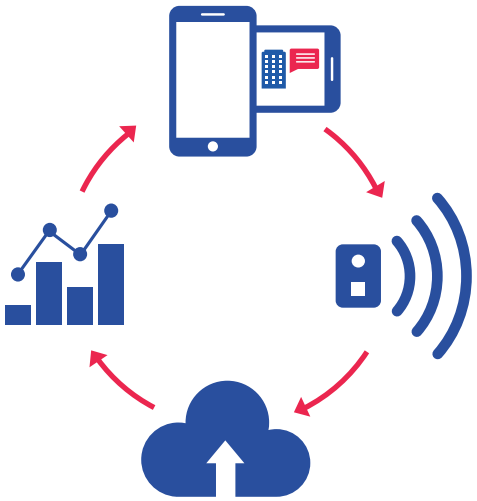
The Water Framework Directive (WFD) covers all European water bodies, and was transposed into English Law by the Water Environment Regulations (2003). It aims to ensure that all water bodies reach "good status" by 2027.

A majority of waterbodies in GM (>70%) bear little resemblance to their natural state i.e. they been heavily modified over the previous decades (EA, 2018). Over 90% of water bodies in GM are failing their objectives under the WFD, with most classified as 'moderate' status.

Technological, Digitisation and Wider Changes

Digitalisation

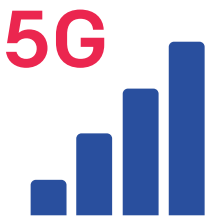
We are living in an increasingly digital world. Over the last ten years, technologies that are visionary today rapidly become part of everyday life tomorrow. In turn, people's expectations are rising constantly. 'Digital' now encompasses an increasing array of technologies, from sensors, smartphones, and robots, to augmented reality, cloud computing and data analytics. These technologies are changing the way we live and places we live in. Digital technologies are being used to make cities more smooth running, more productive, and more democratic. The pervasiveness of digital technology in our lives represents a major change. For these technologies to function effectively, it is fundamental that a robust and diverse underpinning infrastructure is installed that ensures a futureproofed platform for the development of these – and many new technologies – for years to come.
As our homes, businesses and cities become more reliant on digital technology to function the robustness of those systems becomes even more critical.



Digital technologies are being used to make cities more smooth running. eg. sensors, smartphones, augmented reality, cloud computing and data analytics.

Consumers will become increasingly reliant on electricity, as systems become 'smarter' and more technology enters daily lives.

Anyone in Greater Manchester should be able to access resilient, seamless connectivity at a speed they need anywhere at anytime.



Future digital infrastructure will need to be supported by 5G (and beyond)



Consumers will become increasingly reliant on electricity, as systems become 'smarter'.

New technologies, artificial Intelligence and automisation

Improvements in artificial intelligence and automisation technologies will transform infrastructure sectors and business markets.

Blockchain technology may play a role in trading of energy – such as peer to peer tariffs.

Autonomous vehicles are expected be present within Greater Manchester by 2021.

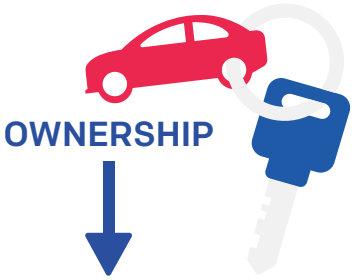
Digital infrastructure will be crucial to supporting future technology and a Smart City Region.

A growth of autonomous vehicles may enable the reduction of car parking space within urban area. There is an opportunity to utilise this emerging space for green infrastructure.



Autonomous vehicles are expected be present within Greater Manchester by 2021.

The Chancellor of the Exchequer, Philip Hammond, set an objective for driverless vehicles without a safety attendant to be on the UK's roads by 2021 (2017)



Improving the economics of shared use will cause a shift away from individual vehicle ownership.
(Commission of travel demand, 2018).

Technological, Digitisation and Wider Changes

Smart environments

New technologies will facilitate the creation of smart environments. Homes, networks and environments will become smarter, thanks to smarter devices connected by the Internet of Things and the fitting of smart meters and appliances within every house within GM. GM's urban and other significant economic centres will have smart grids.

Mobility as a Service (MaaS)– i.e. a single integrated system of payment/access for all modes of transport and extensively used within GM by 2040. MaaS with connected smart devices could allow services to evolve as they are accessed – enhancing delivery and creating a smart network.

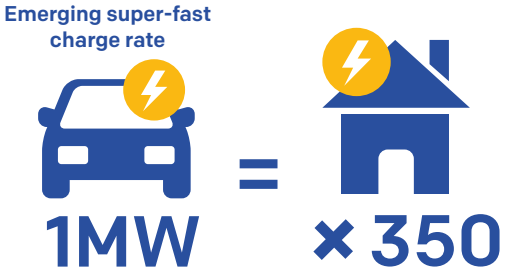


A single integrated system of payment/ access for all modes of transport, will be extensively used within GM by 2040.

Enhanced decision making - reducing demands and improve efficiency in Greater Manchester. Data from smart meters in particular will allow:

- Better insight into consumer patterns
- Better targeting / early anticipation of leakages and issues
- Intelligent demand management within the network

Technology will facilitate the development of a 'Smart Environment', with the ability to understand water quality in real-time, support decision making and collate data to support new 'value' models for water.



Emerging fast charging technologies can create a peak demand of 1MW - equivalent to the average demand of approximately 350 homes

Ultra-low Emissions Vehicles

The UK government recently announced ambitions for 50-70% of new cars and 40% of vans to be ultra low emission by 2030 and that the sale of new petrol and diesel vehicles will be banned in the UK from 2040. SCATTER research suggests Greater Manchester will need to transition to 80-100% electric, hybrid or hydrogen vehicles (including cars, trucks, buses and rail) by 2040 to achieve it's emissions targets.

Provision of charging, re-fuelling and parking infrastructure will be required to facilitate this transition.



2040

The Government will end the sale of new conventional petrol and diesel cars and vans by 2040

(The Road to Zero, Department for Transport, 2018)

The electricity required to travel 80miles is equivalent to the daily consumption of an average house

(ENWL, 2015-2023 Well Justified Business Plan (2017))



“ Being among the first to fully embrace new green [electric vehicle] technologies has the potential to bring huge economic advantages, and Greater Manchester is primed and ready to take that step. The automotive industry is hugely important for jobs in the UK, and the next generation of ultra-low emission vehicles will provide huge opportunities for our digital and manufacturing sectors.”

(Andy Burnham, 2018)

Impact on the Future of Greater Manchester's Infrastructure Demands

Impacts

The trends described in the preceding section will have varying impacts on Greater Manchester's infrastructure over the decades up to 2040; this section outlines what those impacts could be on each of the infrastructure sectors:

- Electricity and Heat
- Transport
- Potable Water
- Surface water, flood alleviation and waste water
- Green and Blue Infrastructure
- Digital

Whilst the subsequent sections address each of the sectors individually there are also some cross sector issues which are also identified. It further provides high-level estimates of the resulting changes in demands for heat, electricity, transport and water across Greater Manchester. By exploring the impacts on GM's infrastructure, a series of Key Challenges are identified throughout the following sections. Some Key Challenges are cross sector, and these have also been identified. The Key Challenges have been founded upon the key infrastructure challenges developed in partnership with the infrastructure providers during the Definition stage of this report's development.

All these Key Challenges are then drawn together to develop a Framework for Greater Manchester's infrastructure, which sets out the actions required in response to these Challenges. This Framework is outlined later in the document.

Where it has been possible to estimate the quantum of the impacts by 2040, this has been drawn from existing information sources and discussions with infrastructure providers. They are provided at a City Region level and should not be used to estimate the impact of the trends at a specific site or district.

The future impacts have been reviewed at a Greater Manchester regional scale. However, there will be localised capacity issues and opportunities within the region when considered at a smaller spatial resolution. The ten districts should work with GMCA and the infrastructure stakeholders to undertake work to understand key pinch-points and where opportunities around strong infrastructure capacity can be maximised.





Heat

Impact on the Future of GM's Heat Demand

Heat is a major energy demand generated in our domestic, commercial and industrial sectors and primarily fuelled by gas. Compared to heat, cooling demand is lower overall, but still significant; particularly from non-domestic sectors. The demand stems from refrigeration, air conditioning and other cooling devises and processes requiring electricity. town and city centres, and predominately supplied by the electricity network.

Heat and cooling demands are influenced by a range of factors. For example non-domestic heat demand is driven by changes in industrial processes, commercial and domestic heat demand often driven by a building's occupancy patterns as well as building design.

There are a number of key trends affecting Greater Manchester's heat demand to 2040:

Population and employment growth

Heat demand could increase by 2040 as more buildings are built to meet a rising population and growth in employment. Current building insulation and energy standards are much higher than in previous years, so the increase in heat demand will be less than the pro-rata increase in population.

Aging populations, changing working patterns and climate change

Peak demands across heat network are likely to change with demographic changes and our aging population for example increased heating or cooling demands to achieve comfort levels for vulnerable residents. Also more people working from home and longer office working hours could increase heat demands throughout the day. Climate change may contribute additional heating and cooling demands in response to extreme weather conditions.

Manchester City Centre Civic Quarter and the Piccadilly area are developing proposals for district heat networks, to help GM move towards zero carbon heating

Decarbonisation

To achieve carbon neutrality targets, the heat sector will need to be totally transformed. At present natural gas (a fossil fuel) provides 96% of primary heating fuel for homes (Energy Technologies Institute, 2017), and this will need to be substantially reduced or eliminated by 2040.

There a series of options available to help transition towards a decarbonised heat sector. This is likely to include district heating in dense urban areas (with large consumers and estates under common ownerships) and the electrification of heat – e.g. electric heating, heat pumps, in new developments where connections to heat and cooling networks are not possible. Thermal storage could reduce peak heat demands, helping balancing load through the day.

Hydrogen and biogas could partially (or fully) replace natural gas for space heating. Pursuing a hydrogen future will necessitate the production of low/zero carbon hydrogen and the transition of the existing gas network and domestic and non-domestic gas boilers to hydrogen. Either route is currently more expensive than heating via natural gas.

The future route is currently very uncertain, but what is extremely likely is that there will need to be a major change in heating infrastructure to deliver low / zero carbon heating.



Key Challenge 1: Greater Manchester needs infrastructure capable of delivering low/zero carbon heat

Achieving a 40% heat reduction depends on the property type, age and existing state. It is considered such a reduction could be achieved (based on a Victorian era property) through retro-fitting properties with:

- New glazing and draught-proofing and air-tightness
- Loft insulation
- Solid wall insulation
- Mechanical Ventilation with Heat Recovery system
- New energy-efficient boiler and smart energy controls

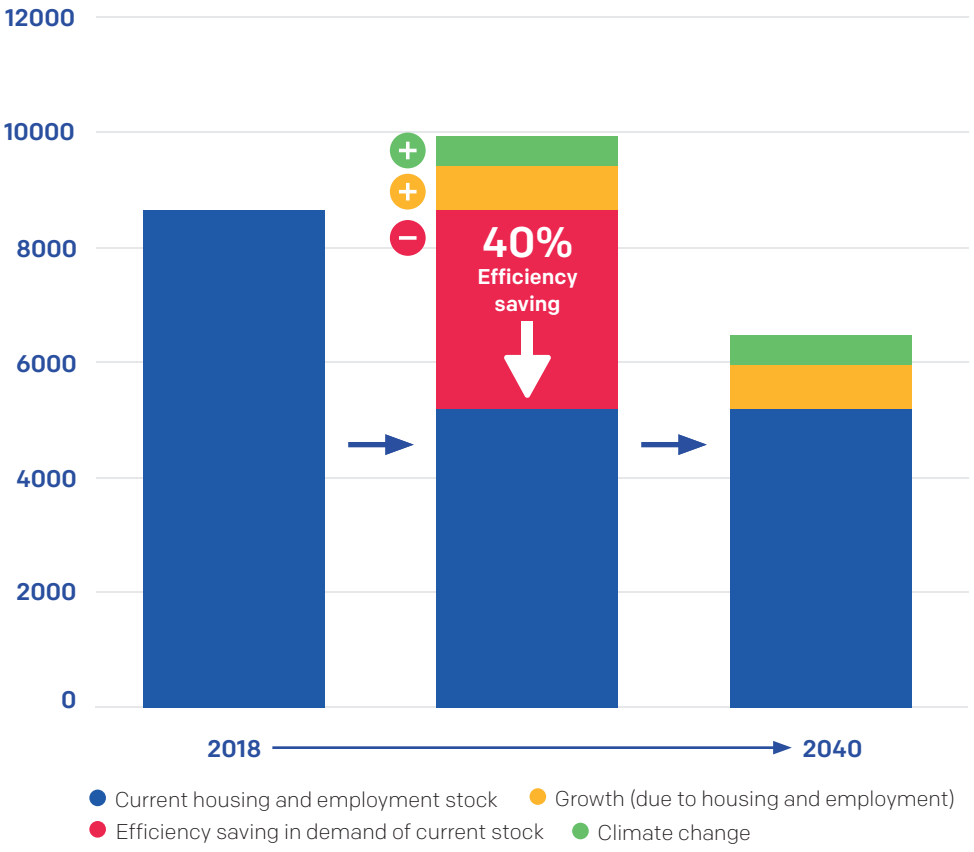
(Salix, 2009 and Arup, 2016)

Efficiency of new and existing buildings

Creating a new heat infrastructure will make heat more expensive than existing, and it is unlikely to be able to deliver the same amount of low / zero carbon heat as the existing network. Therefore, it will be essential for GM's heat demand by 2040 to be substantially reduced. A step change in the energy efficiency performance of existing domestic and non domestic property will have to be achieved – including retrofitting existing buildings, with new buildings designed to higher standards.

Key Challenge 2: There needs to be a substantial programme of reduction in heat demand from existing and new buildings

GM Peak Heat Demand (MW)



Heat demand associated with climate change is uncertain and could increase in response to extreme weather conditions.

Efficiency savings required in order to drive down the demand for low/zero carbon heat.

Potential 2040 demand is illustrated based upon a 40% reduction in heat demand due to efficiency savings which requires a fundamental shift in the scale of retrofit of existing buildings and higher standards for new build.

To solely offset the increase in heat demand due to growth a reduction in heat demand of around 10% would be required. However, to achieve a net zero carbon future, an efficiency saving of at least 40% will be necessary. A 40% reduction in heat demand will require a fundamental shift in the scale of retrofit.

Electricity

There are a number of key trends affecting Greater Manchester's electricity demand to 2040:

Population and employment growth

A growth in population and employment is likely to drive an increase in electricity consumption.

Efficiency, digitisation and smart environments

There is likely to be some reduction in electrical demand due to increasing electrical efficiencies of property, lighting, and appliances; this could be up to a 20% reduction. However this may be offset by the increasing digitisation and adoption of digital technology. Greater Manchester will become increasingly reliant on electricity, as systems become 'smarter' and more technology enters daily lives. There will be increasing energy demands associated with digital infrastructure (e.g. data bases, servers) and the overall resilience of the digital and electricity networks will become of increasingly high importance.

When just the factors above are considered there is unlikely to be a significant net increase in electrical demand in GM to 2040, albeit that there will be a need to increase distribution capacity in local areas, where the rate of population increase is proportionately higher. There are, however, key two factors which could have a significant impact on GM electrical infrastructure.

- Electrification of heat, arising from decarbonisation, and
- Electrification of transport (ultra-low emissions vehicles) – due to decarbonisation and air quality.

Decarbonisation of heat

As discussed in 'Heat', there remain a number of options for the decarbonisation of heat. To understand the potential impact on the electricity distribution network we have indicated the potential electrical demand from heat on the graph on the subsequent page, based on 90% of GM's 2040 heat demand (SCATTER, 2017) being supplied from the electricity distribution network. In itself this assumes a substantial reduction in GM's heat demand from now to 2040.

Ultra-low emissions vehicles and air quality

As transport transitions towards low-carbon and ultra-low emissions vehicles, an increasing prevalence of electric vehicles and associated charging facilities could have impacts on the peak electricity demand - although uncertain, high-level estimates indicate it could result in an additional 500MW on the networks peak demand (assuming mostly overnight charging).

Charging technology is moving forward rapidly with the emergence of faster chargers which in turn require far larger peak power demand of anywhere from 0.35MW to 1MW each. If just 200 cars utilised these at the same time it could represent approximately 10% of GM's current peak electrical demand. The charging of EV's will therefore need to be managed to spread the load across times of lower demand.

Other transport electrification, such as the power demand for HS2 and future rail networks will have a local impact (e.g. HS2 could require up to 5% of GM's existing peak demand) but through the work ENWL are undertaking, these projects are not expected to significantly impact on the overall electrical infrastructure.

Decarbonisation of all electricity supply

The UK government have set objectives for the carbon emitted from electricity generation to be largely removed by 2050. The National Infrastructure Assessment recommends that by 2030 at least 50% of electrical generation should be by renewable sources.

Whilst much of this change will happen outside GM, for example with the increasing investment in off -shore wind, there will be a need for some of GM's electricity demand to be met from renewable generation inside GM.

Increasing efficiency of local renewable technologies is likely to encourage more local renewables, but national government and the energy regulator is also likely to change regulations and pricing structures to encourage changes in customer behaviour.

Therefore by 2040 is it likely that more individual households, businesses, landlords and institutions will generate their own renewable energy. Building integrated energy supply (e.g. solar panels) and storage infrastructure (e.g. batteries) at a local or community level will become the norm, with consumers becoming producers of electricity for the grid at some times of the day. The local electricity distribution system will therefore need to accommodate this more complex pattern of electricity supply and demand.

The trends highlight there is likely to be an increase in peak demand on GM's electricity distribution network, driven largely by growth and the increasing electrification of heat and transport. Mitigation of this growth will come from increasing efficiency of electricity demand, increases in local generation, and the use of smart technologies, more flexible pricing, and local storage to spread peak loads across the day. The extent to which this mitigation offsets the increase in peak load remains unclear, subject to all the uncertainties described above .

As an illustration, taking a business as usual approach, the impact on the electricity grid can be measured by the number of Primary substations. At present GM has around 150 primary substations with an overall peak supply capacity of approximately 3200MW, and these are currently meeting a peak demand of 2200MW. The potential increase without electrification of heat is approximately 600MW which is equivalent to around 25 primary substations that could equate to a cost of circa £125m. If electrification of heat was to be included, this would equate to around 170 new primary substations that could equate to a cost of circa £850m, and for scale, the increase in peak demand is equivalent to more than 30km2 of photovoltaic array.

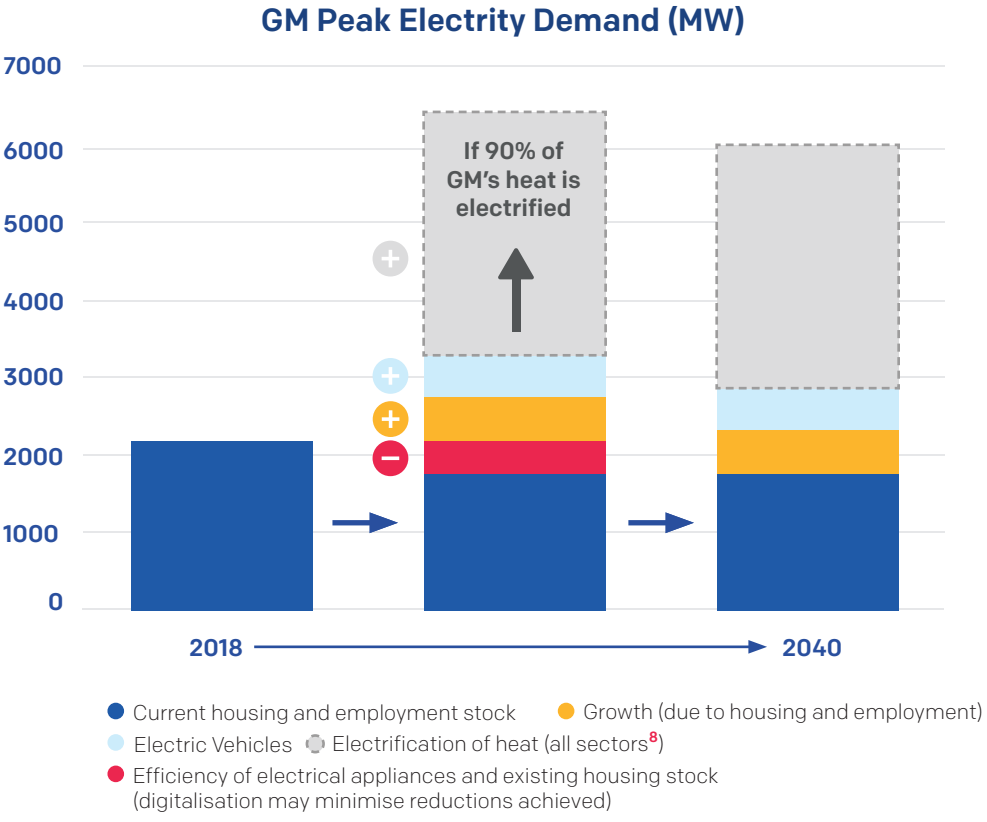
This would depend on the extent to which the existing spare capacity can be exploited to meet the spatial extent of the new demand.

Clearly, doubling the distribution capacity of the electrical network under a business as usual approach is extremely onerous and; therefore, a fundamental change in the way the electrical infrastructure operates and is used must be taken.

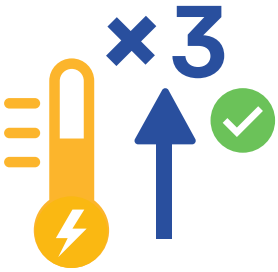


Key Challenge 3: The current electrical infrastructure needs to be able to accommodate the growth of local renewable generation, rapid electric vehicle charging and, potentially, the electrification of heat

Impact on the Future of GM's Electricity Demand



Growth in electrical demand from EVs is equivalent to the demand from housing and employment growth.



Electrified heating can be up to 3x more efficient

8. Assumed a scenario where, to support decarbonisation, 90% of heating (based on SCATTER research) is provided electrically (50% via heat pumps, 50% via direct electric heating)

Transport

There are considered to be a number of impacts on Greater Manchester's transportation demand to 2040:

Population and employment growth

Greater Manchester is forecast to grow significantly by 2040. The predicted increase in employment and population growth is forecast to result in an additional 800,000+ trips per day by 2040. Concentrations of growth are predicted in the City Centre, the Quays, Airport Gateway and the main town centres. This growth has the potential to increase congestion and delay across all modes of transport. High capacity, sustainable transport provision will be crucial to support and enable the planned growth and minimise congestion, especially within these areas.

Major transport projects including HS2 and Northern Powerhouse Rail are proposed to increase the capacity and connectivity of routes from Greater Manchester to London, Birmingham and major cities within the North.

Demographic change, urban densification and more conscious consumers

Further impacts on the length and number of trips in Greater Manchester will occur due to demographic changes. These changes include an aging workforce and changing and flexible working practices, which may reduce proportion of travel in the traditional 'peak' hours. The increasing prominence of online retail may reduce personal shopping trips, but will increase demand for home deliveries, and impact upon logistics and distribution networks to achieve faster delivery times.

It will be critical that transport infrastructure ensures that areas of higher deprivation within Greater Manchester have access to economic opportunities across the City Region. The emergence and growth of the 'sharing economy' could result in a reduction in individual car ownership and subsequently reduce car-based journeys. Conversely, it is considered that a changing workforce, involving more productive, higher skilled workforce, in higher paid jobs, focusing on more specialised and skill activities, may lead to increased commuting distances and more complex travel patterns.

Smart environments and technological advances

Mobility as a Service (MaaS)– i.e. a single integrated system of payment/access for all modes of transport, is likely to be extensively used within GM by 2040. MaaS with connected smart devices could allow transport services to evolve as they are accessed – enhancing delivery and creating a smart transport network. With radical technological advances in the transport networks (including autonomous vehicles) anticipated by 2040, the impacts on existing infrastructure will need to be considered, supported by appropriate strategies and policies where appropriate.

Air quality, improved connectivity and more conscious consumers

At present over 60% of trips in Greater Manchester are made by car – over the coming decades, measures to takle road congestion, improve air quality and promote public health will promote a shift to other forms of transport and active travel (e.g. walking and cycling). This will need to be supported by the right investment and infrastructure, whilst considering improvements to connectivity by all modes across the wider region. Increasing awareness of the adverse impacts of car travel on the environment and public health may also contribute towards an increase in walking and cycling alongside public transport.



Key Challenge 4: Greater Manchester's transport infrastructure networks should provide the capacity, connectivity and diversity to meet the future needs of its residents

NPR will increase the number of people within a 60minute train journey of 4 or more major northern cities from 10,000 to 1.3million (TfN, 2017)

Transitioning to 100% ultra-low emissions vehicles will require charging infrastructure for around 1.15million cars in GMCA

Based on present number of vehicles in GMCA

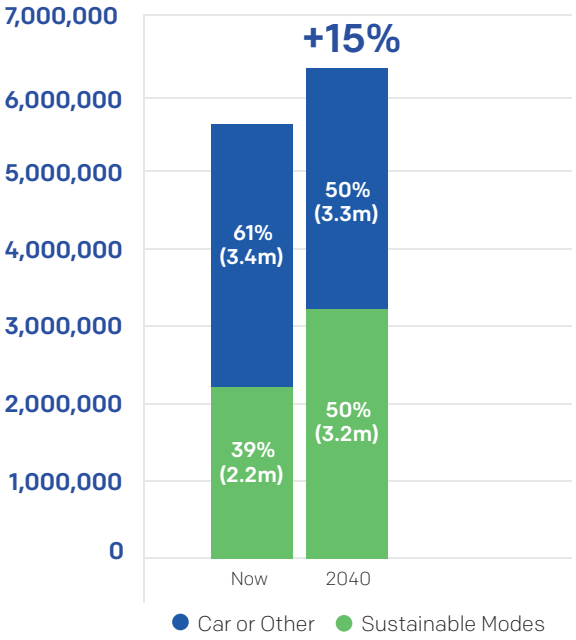
Decarbonisation and ultra-low emissions vehicles

SCATTER scenario planning suggests Greater Manchester will need to transition to 80-100% electric, hybrid or hydrogen vehicles (including cars, trucks, buses and rail) by 2040 to achieve its emissions targets. With the move to ultra-low emissions vehicles, provision of charging, re-fuelling and parking infrastructure (and supporting policies) will be required to facilitate this transition. This will need to accommodate the use of electric, hydrogen or hybrid vehicles; whilst considering the emergence of other new technologies.



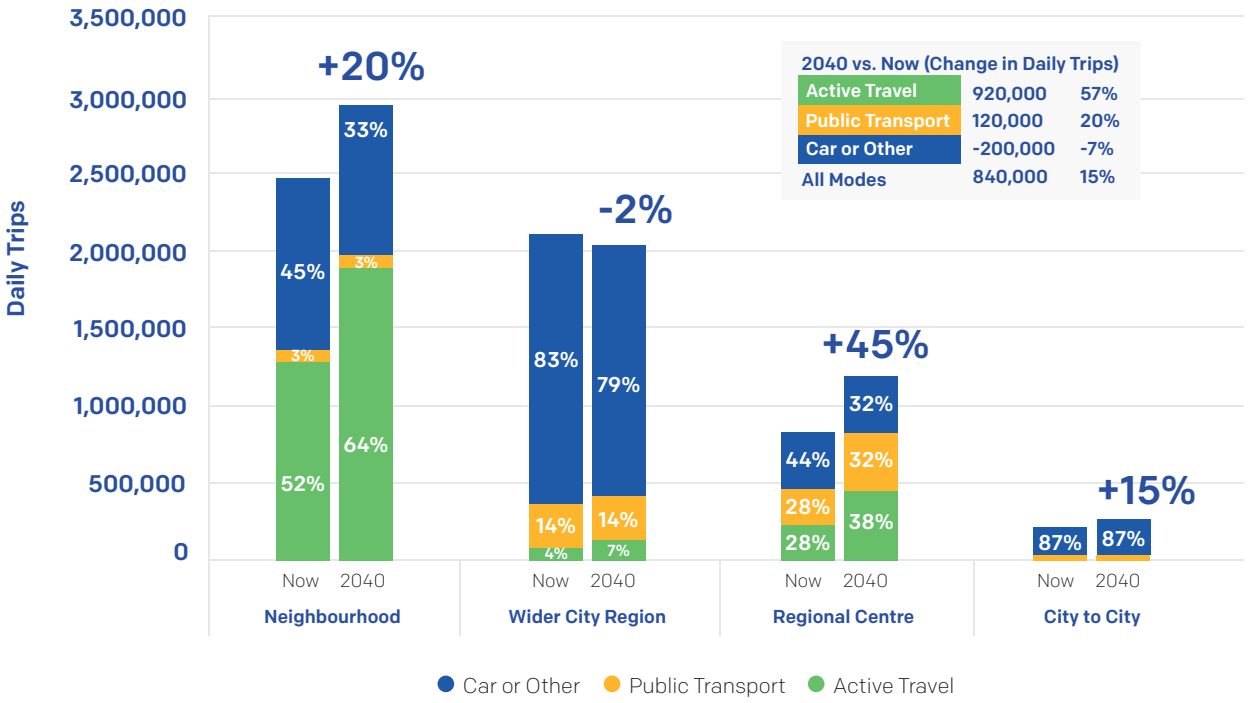
Key Challenge 5: Greater Manchester needs the infrastructure to support ultra-low emissions vehicles

GM Mode Share Vision (overall)



Source: 'Now' calculated using GM TRADS Years 3-5 (2014-2016)

GM Mode Share Vision (by trip type)



A high-level assessment of the number of daily trips within four spatial themes in Greater Manchester. The 2040 scenario represents the vision for Greater Manchester's travel considering future trends and aspirations of TfGM. (TfGM, 2018)

Potable Water

Overall as a City Region, there are no deficits of water supply forecast for Greater Manchester in 2040.

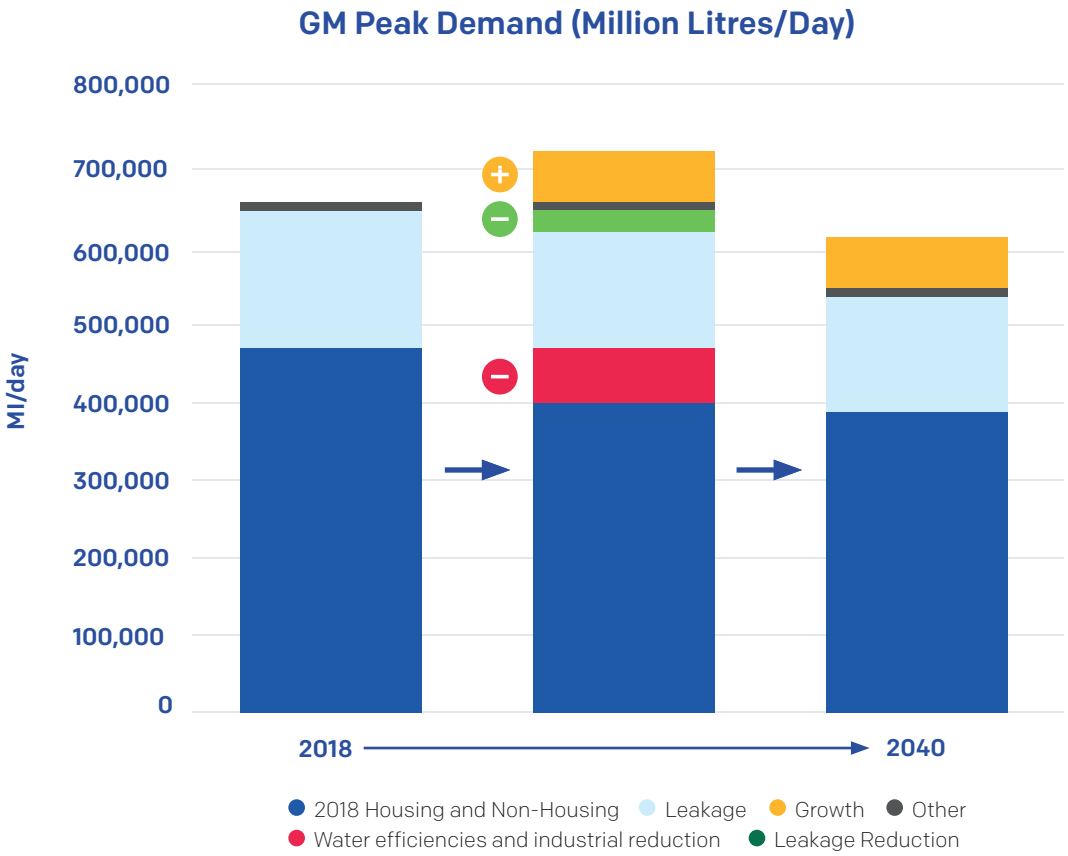
Despite population and economic growth, there is expected to be a reduction in potable water demand in Greater Manchester over time. This is due to the following aspects:

- Water Efficiencies: Increasing sustainable construction methods, more water efficient appliances, increased implementation of measures to re-use water (as grey water recycling systems) and changing behaviours to water usage should have a large impact on reducing the demands on the water supply. UU expect to there to be a annual saving of 1 litre per property per day up to 2040 (WRMP, 2019),
- Water Metering: Customers with a meter typically use less water than those without one. Over the next 25 years we expect meter penetration to increase to 76% across Greater Manchester. Reducing consumption from an average of 160l per person/day to 137l per person/day.
- Leakage Reduction: Leakage management contributes to an overall reduction in demand. By 2040 UU aim to achieve a minimum of a 17% reduction in leakages to conserve water throughout Greater Manchester and the North West.

Up to 2040, the potable water system is expected to have a 'good' (UU, 2018) level of resilience to extreme droughts, which is made possible by the leakage reductions and water efficiency measures.

No key challenge has been identified as it is recognised United Utilities are leading on the aspects highlighted above through existing funding mechanisms. GMCA should support these goals.

It should be noted that despite the anticipated reduction in aggregate demand across the region there will still be local pinch points associated with the limitations of existing assets.





Flood Risk, Surface Water and Waste Water

Population and economic growth and climate change

The triple challenges of population growth, new development (increasing the proportion of hard surfaces and resulting in a potential rise in surface water run-off flow) and climate change will mean the performance of Greater Manchester's drainage and sewerage systems and flood defences may fall below standard.

The increase in significance of flood events will have a detrimental impact on the city region, its citizens and economy if it is not sufficiently protected. This is particularly the case in areas of social deprivation or where there are areas of high economic activity that are densely populated as this has a knock on effect on supply chains. Additional investment in infrastructure will be needed to ensure Greater Manchester is fully resilient to such changes.

There will need to be a shift to more nature-based solutions (e.g. natural flood management) to support traditional food alleviation schemes and catchment-wide approaches. Such measures will need to be combined with the implementation of sustainable urban drainage solutions which will be essential to reducing surface water run-off (flow rate and volume), mitigating food risk and heat stress.



Flood risk can occur from a number of sources including fluvial (river), surface water (overland flow), groundwater and sewer flooding.

Challenge 6: Provision of infrastructure that maintains and/or reduces flood risk across Greater Manchester whilst accommodating developmental growth and climate change

Flood and Coastal Risk Management Programme

Within Greater Manchester the current FCRM programme (2015/2016 – 2020-/2021) identifies both surface water (Lead - Local Authority/other RMA) and fluvial (Main River) (Lead - EA) capital schemes. Out of this capital schemes have already been delivered to protect over 2400 properties. For projects yet to be delivered capital costs are estimated to be in the region of over £45million to protect over 1800 properties.

There are currently 96 FRM schemes in Greater Manchester within the six year Investment Programme intending to protect 10,367 properties at a cost of £236.6m.

The identified new development sites for housing and employment growth in GM are predominantly in urban areas and brownfield sites. Recognising that much of the brownfield land stems from GM's industrial heritage and its close tie with watercourses, it is likely a higher risk of fluvial flooding will be encountered in these development locations.

Environmental regulations, water quality and bio-diversity

By 2040, it is expected that waterbodies within Greater Manchester will have achieved the required environmental targets and support cleaner water, better managed habitats and more naturally functioning and resilient water bodies. At present, over 90% of water bodies in GM are failing their objectives under the Water Framework Directive (WFD), with most classified as 'moderate' status. In particular, the North-West River Basin Management Plan states that the priorities for the Irwell Catchment are to address diffuse urban pollution, physical modification and contamination from sewage treatment. (SFRA, JBA, 2018). There is still considerable work to be undertaken to achieve the aims of the WFD, which will require the co-ordination of a number of bodies including the EA, UU and GMCA.

Major Project: EU LIFE Funded Natural Course Project:

Aimed to improve integrated water management and tackle and overcome the issues and barriers to achieving objectives of the WFD. The project lasts for 10 years, up to 2025, and is lead by the Environment Agency in partnership with local organisations and authorities. GM organisations should work together to delivery integrated water management solutions, tackling issues such as diffuse pollution and flood risk management.

Further considerations: funding and resources

There are significant funding challenges with regards to the delivery of flood risk infrastructure in Greater Manchester. Government funding for flood risk infrastructure (Grant in Aid) often requires partnership contributions and it is heavily skewed towards the protection of residential properties. As a result urban areas which are predominantly commercial/office led require greater partnership contributions to be eligible for Grant in Aid funding. It will become increasing difficult to deliver further reductions in flood risk across the City Region without identifying where additional investment can be leveraged. As such there will be a need to understand wider economic business drivers and funding to identify additional investment in flood protection, this could also include other infrastructure programmes which align with the Environment Agency's FCRM schemes.

For Lead Local Flood Authority schemes the availability and skills of resources across Greater Manchester has been an issue which has impacted on previous delivery for the current FCRM programme. This issue could continue if the resource gap is not filled.



5,800

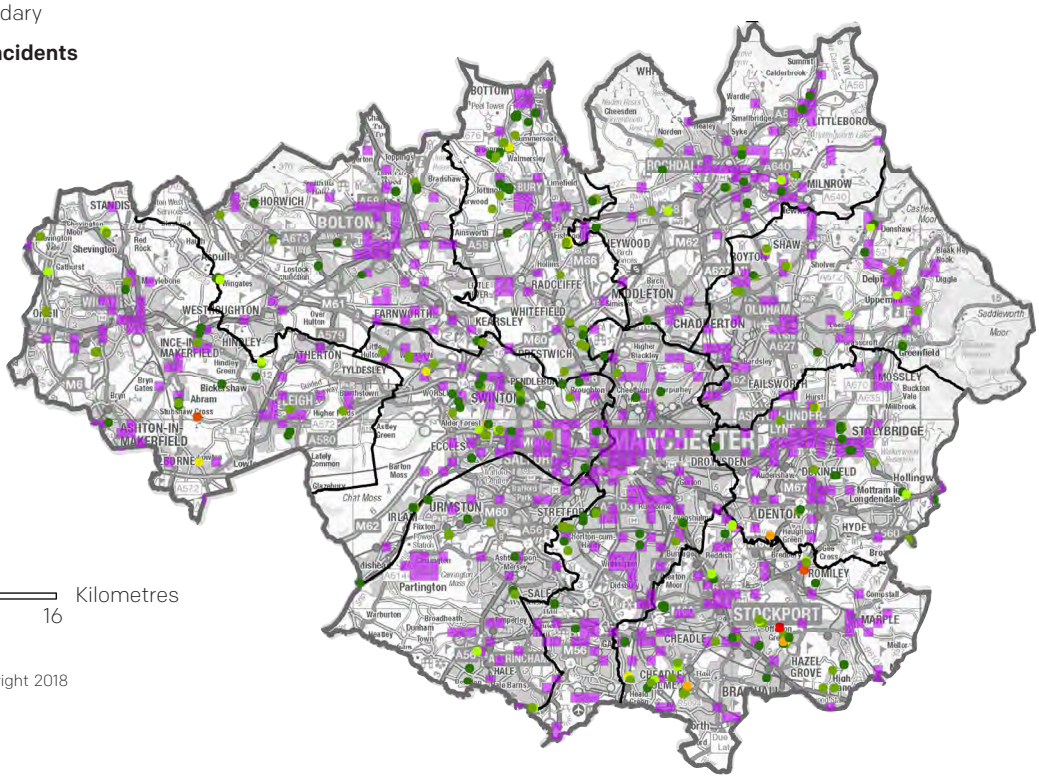
5,800 homes are protected by existing flood defences
(EA, 2018)

Historic Sewer Flood Incidents in GM (Draft SFRA)

GMCA boundary
Local authority boundary

Number of sewer flood incidents

295
208
41-60
21-49
11-20
6-10
2-5
1
Hotspots (GM SWMP)



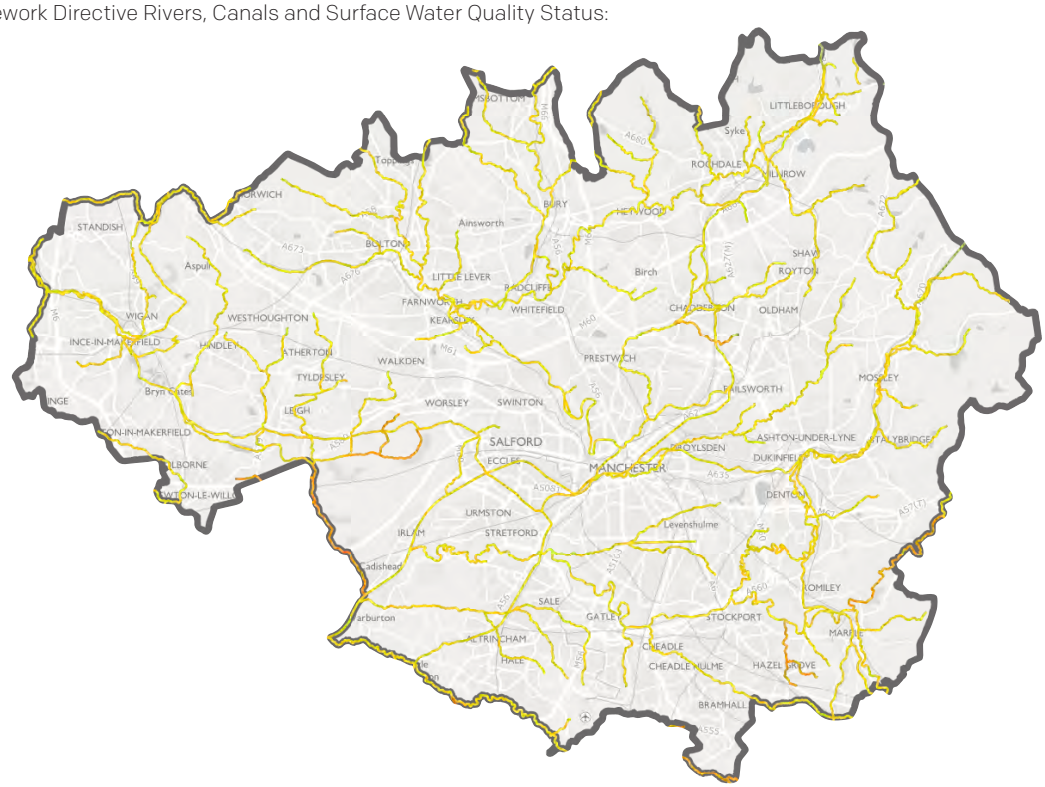
0 4 8 12 16 Kilometres

Contains OS data
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Water Quality of Watercourses in GM (2018)

Water Framework Directive Rivers, Canals and Surface Water Quality Status:

High
Good
Moderate
Poor
Bad
No data



Flood Risk from Rivers in GM (2018)

Flooding

- EA Flood zone 2 - land assessed as having a 1% – 0.1% annual probability of river flooding.
- EA Flood zone 3 - land assessed as having a >1% annual probability of river flooding.

Risk of flooding from rivers and sea:



Green and Blue

Population and employment growth

Increasing population and employment growth is driving the need for further development in Greater Manchester, placing pressures on the existing finite green and blue space within Greater Manchester. Similarly, there are associated infrastructure space requirements, including consideration of space for low-carbon energy generation (e.g. photovoltaics, bio-mass production), new sub-stations and data centres or natural flood risk management programmes. With greater pressures on land and increasing populations, it will be more important than ever to maximise the quality of, and the ecosystem services available in, our existing natural assets, and that appropriate policy and safe-guards are implemented to use and manage our land sustainably.

Recognition of the value of blue and green infrastructure and aspirations of national government and residents in Greater Manchester

With the increasing recognition of the importance of green and blue infrastructure to our economy, health and social well-being, coupled with aspirations of the UK Government (in the 25 Year Environmental Plan) and local residents, there will need to be a drive to provide high quality green and blue spaces close to where people from all communities live and work, with increased bio-diversity across Greater Manchester.

The increasing use of Natural Capital and Environmental Net-gain will help to provide the means by which to progressively improve the region's green and blue infrastructure towards these goals. Applying this way of thinking to projects and investment decisions can often yield benefits to stakeholders that are not always considered in traditional economic and commercial assessments.

As the Urban Pioneer (one of four cities nominated to help achieve the aims of the Government's 25 Year Environmental Plan (25YEP), GM is developing Urban Natural Capital Accounts – looking to map and identify the value of the natural assets within the City Region to support future decision making and the protection and enhancement of the existing natural assets.

The study has assessed nine different benefits from natural capital in the GMCA area, which have a combined value of nearly £1bn per year (£860m). Assuming these benefits continue over time, the natural environment is a £24bn asset to the people of Greater Manchester. These benefit estimates demonstrate the value if assets are maintained, or the value that could be at risk if not maintained - the societal return of investment in natural capital in GMCA.

The challenge is integrating the outputs into the investment decision making of numerous bodies and developers across the wider City Region.

Climate change

Green and blue infrastructure will play a vital role in adapting to, and mitigating the impacts of, climate change, such as heat and flooding. Retrofitting green infrastructure into our existing City Region and ensuring adequate provision within new developments remains an on-going challenge – particularly in the face of economic pressures.

Other considerations: funding and resourcing

Green and blue infrastructure has no direct funding stream (unlike potable water, transport etc.). These challenges often present long-term uncertainty in terms of resourcing and financial funding for driving the green blue agenda forward.



Challenge 7: Maximising the eco-systems services provided by green and blue infrastructure, whilst responding to spatial pressures on finite space and improving accessibility



Total Benefit (per year) = £866m

Air quality **£41m**
Recreation **£372m**
Physical health **£56m***
Mental Health **£264m**
Local climate **£4m**
Carbon **£2m**
Food **£50m**
Noise **£3m**
Minerals **£74m**



Digital

Digitalisation and Smart Environments and Networks

Digital technology is increasingly the backbone of the major industries and our daily lives. Embracing such technology throughout all sectors, geographies and occupations is fundamental to Greater Manchester's current and future international competitiveness (GMCA, 2018). To maintain our competitive advantage GM will need to be looking at 75% to 80% household and business coverage by 2024 and full coverage by 2028; equating to around 98% fibre – 2% through other technologies.

Over the years approaching 2040, GM will move to become a smart and digitally-ready city region. To achieve this vision, the future digital infrastructure will require strong fixed resilience connectivity, supported by 5G (and beyond), big data systems and other nascent technologies such as Artificial Intelligence and machine learning. Without connectivity, processing the sheer volumes of data necessary to create a network of communicating devices will be impossible. As such, significant improvements are required to increase the provision of wired (through full fibre to the premises) and wireless (through 5G, or subsequent technologies, and wifi provision) across Greater Manchester. Without the more basic technology solutions (such as pervasive fibre connectivity and 5G), the smart-region solutions and value-added outcomes will struggle to be brought to fruition.

Notably, Greater Manchester is already undertaking a series of actions to move towards wider fibre connectivity, including:

- Aspirations of the Digital Infrastructure Plan to achieve full fibre to 90% of GM businesses by 2025.
- A Local Full Fibre Networks (LFFN) funding investment programme to help achieve Full Fibre to the Premises coverage to 25% of GM Premises by the end of 2020.

5G roll out is expected from 2020, with Vodafone and SSE already making investments in infrastructure. However, the timing and costs of roll out is uncertain and international standards have yet to be agreed. It is possible that there will only be one network upon which providers deliver their services or that each provider might need to invest. Estimates of market investment could therefore be anywhere between £1bn and £4bn to deliver 5G across GM by 2030.



Challenge 8: Implementation of the GM Digital Strategy to provide pervasive, affordable, resilient digital connectivity

Cost estimates of full fibre connectivity in Greater Manchester:

1.17M households in GM and 100,000 business premises

- 25% by 2020 using £40m Local Full Fibre Networks / LA & CCG funding & estimated £200M market investment (300,000 premises covered @ £800 each)
- 75% by 2024 – market investment - c600,000 premises @ £800 each = c£480M market investment needed

Final 25% by 2028 = 300,000 premises @ 1,000 each (to reflect increased geographical barriers) = c£300M investment

Total investment required to deliver full fibre across GM estimated at c £1Bn

All assumes we minimise barriers and costs to investment as far as possible.



BT report that there is already considerable full fibre provision within their networks in Greater Manchester. The barrier to access is the final connection to premises.

(BT, 2018)



WiFi provision is patchy in public places and there are still barriers to access (registration requirements and cost) in many parts of GM

(GMCA, 2018)

Cross Sector

There are also three cross sector Key Challenges that have been identified through the development of this document which exist presently, but are exacerbated by the future trends and changes in infrastructure demand:



Key Challenge 9: Greater Manchester's infrastructure needs a collaborative and co-ordinated approach to meet the present and future needs of the region

Infrastructure within Greater Manchester (and across the wider UK) is owned and managed by a multitude of organisations/providers. Greater Manchester has limited direct control over the provision or decision-making processes within these sectors.



Key Challenge 10: Funding models are needed to meet present needs and enable change for the future

The present funding challenges to meet the current infrastructure needs for Greater Manchester will be exacerbated by the scale of future change



Key Challenge 11: Infrastructure that is resilient to shocks and stresses

Ensuring the security of supply throughout each day – energy, transport, water etc. against challenges associated with aging assets, increasing exceptional events 'shocks' particularly in the face of climate change (and it's effect of increasing the frequency of extreme events) and demographics and population changes 'stresses'.

The Framework

This Framework identifies: responses required by Greater Manchester and other stakeholders to address the identified Challenges; opportunities for collaborative working to be ready for, and capitalise on, anticipated changes; and to position Greater Manchester at the forefront of a changing dynamic of infrastructure use.

The Framework further identifies where existing plans and programmes are already being undertaken across GM, which are relevant to specific aspects of the responses identified, and where it is felt that these need to be extended through additional initiatives.

The Framework should be considered alongside the GMSF and Local Industrial Strategy. Any future programmes to take forward the responses outlined should be developed jointly with both these initiatives in mind.

Key Challenge 1: Greater Manchester needs infrastructure capable of delivering low/zero carbon heat

Response	Stakeholders
There is uncertainty of what infrastructure or infrastructures will be needed to deliver low/zero carbon heat. More technical and financial assessment is needed at both GM and national scale, but the accelerated timetable that GM are considering for moving to zero carbon may mean that the GM solution may differ in some respects from any emerging national solution.	
1A GMCA to understand the implications of 100% hydrogen to replace natural gas in the existing gas network	
GM should continue to support the HyNet programme being led by Cadent that is trialling the production of hydrogen from natural gas and enabling domestic, non-domestic and transportation usage;	**GMCA, the Ten Districts and Cadent**
The National Infrastructure Assessment recommends that community-scale trials are undertaken for 100% hydrogen as a replacement for natural gas by 2021; followed by a trial to supply at least 10,000 homes by 2023. GM should work with the NIC and Cadent to extend HyNet to bring the NIC's recommended trials into GM.	**GMCA, the Ten Districts, the NIC and Cadent**
1B Document the wide-scale applicability of options for delivery of electrical heating by heat pumps across GM's existing domestic and non-domestic properties	
The National Infrastructure Assessment recommends that an up to date evidence base is established on the performance of heat pumps within the UK building stock. Trials have already been undertaken within GM (e.g. the Smart Communities Project) that can input into this evidence base. GM and existing partners should work with the NIC to shape the evidence base.	**GMCA, the Ten Districts, partners and the NIC.**
The emerging pathway from Key Challenge 3 should be drawn in to inform the capability of the electrical infrastructure to support electrification of heat.	**Key Challenge 3**
1C Continue scenario planning to determine the future balance of low/zero carbon heat between either hydrogen, electrified heat, district heating and other forms	
GM needs to continue to develop and refine the future scenarios for net zero carbon taking account of the emerging outcomes of the potential for low/zero carbon heat via either hydrogen or electrification (including heat pumps and direct electrical heating) and the role of districting heating schemes. This must also be considered in conjunction with the actions from Key Challenge 3 and Key Challenge 5 for ultra-low emissions vehicles which may rely upon hydrogen.for ultra-low emissions vehicles which may rely upon hydrogen.	**GMCA, the Ten Districts Key Challenge 3 Key Challenge 5**

Relevant projects and programmes already underway or planned:

- GM Smart Energy Plan
- GMCA Hydrogen Framework
- Hynet Programme
- SCATTER scenario planning
- GM Low Carbon Hub

Key Challenge 2: There needs to be a substantial programme of reduction in heat demand from existing and new buildings

Response Required	Stakeholders
2A – Significantly reduce the heat demand of existing buildings	
The National Infrastructure Assessment recommends that £3.8 billion is made available nationally between now and 2030 to deliver energy efficiency improvements in social housing. GM needs to work with the NIC to determine how this funding can be accessed and be part of the design and delivery of such a programme.	**GMCA, the Ten Districts, NIC, social landlords**
GM needs to shape a heat demand reduction and thermal efficiency programme across the city region including private sector housing. This programme must include behavioural change to enact change beyond fabric alterations.	**GMCA , the Ten Districts and existing building owners.**
The extent of this programme will need to be informed by the findings of Key Challenge 1 and the emergent future to provide low/zero carbon heat. SCATTER scenario planning provides an indication of the scale of retrofit required to achieve net zero carbon: - Existing domestic and non-domestic stock to be retrofitted to achieve a minimum EPC rating of B/C - 45-60% of homes are insulated to a sufficient extent to reduce thermal leakiness by 57-75% - Average household room temperatures are reduced - Space heating demand for commercial properties is reduced by 30-40%.. An ETI study (ETI, 2015) found that an extensive retrofit of a thermally poorly performing home could cost up to £31,000 per building if performed at an industrial scale and provide a reduction of around 45 % in CO2 emissions.	**Key Challenge 1**
2B – Significantly reduce the heat demand of new buildings:	**GMCA and the Ten Districts**
GM needs to determine whether changes to local building standards for domestic and non-domestic thermal efficiency are locally required, in order to meet GM's low carbon objectives, and minimise the demand on GM's the future low/zero carbon heat infrastructure.	**GMCA and the Ten Districts**
Building standards are likely to be needed to be implemented in policy and policed for implementation.	

Relevant projects and programmes already underway or planned:

- GM Smart Energy Plan
- GMCA Retrofit Plan
- SCATTER Scenario Planning
- GM Low Carbon Hub

Additional initiatives beyond those present programmes are likely to be needed to address the needs of Part 2B of this challenge.

Key Challenge 3: The current electrical infrastructure needs to be able to accommodate the growth of local renewable generation, rapid electric vehicle charging and, potentially, the electrification of heat

Response	Stakeholders
3A – Understand the opportunities and implications of a changing electricity distribution network and its regulatory framework	
GM needs to work with Electricity North West Ltd and ofgem to understand the proposed future operation of GM's electricity distribution network, and how future regulatory regimes, such as the transition of ENWL to a Distribution Service Operator, will assist in promoting the objectives of the GM Instructure Strategy.	**ENWL, ofgem, GMCA and the Ten Districts**
This work to include how the electricity industry and regulatory framework promotes local renewable generation and storage, and the management of additional demands from growth, EV and heat.	**GMCA, the Ten Districts, ENWL, ofgem, UK Government**
GM and districts needs to consider the spatial requirements of the electricity distribution network, including the provision of substations in the planning of growth areas.	
3B – Provide greater definition of the scale and type of local generation needed to meet a zero carbon future, and the technologies required to facilitate its integration and demand management	
GM needs to work with stakeholders to promote the adoption of Smart City technologies, renewable generation, demand side response, and local storage, as a means of providing low/zero carbon electricity and reducing electrical demand on the grid.	**GMCA, the Ten Districts and ENWL**
SCATTER scenario planning indicates the potential scale of local renewable generation required to move to a net zero carbon future as: - 16m2 of solar PV per household on 50% of all households in GM - A residual 16.8km2 required on commercial rooftops or on ground mounted installations.	
There are areas across GM that are planned for development but are not yet being developed. The opportunity should be explored for using these sites for the interim installation of PV farms or other forms of renewable generation prior to development.	
3C – Determine GM's Electric Vehicle charging electrical demand	
Refer to Key Challenge 5	
3D – Determine GM's potential future rise in electricity demand from electrification of heat	
Refer to Key Challenge 1	

Relevant projects and programmes already underway or planned:

- GM Smart Energy Plan
- GoNeutral
- GMCA Hydrogen Framework
- Hynet Programme
- SCATTER scenario planning
- GM Low Carbon Hub

Additional initiatives beyond those present programmes are likely to be needed to address the needs of Part 3A of this challenge.

Key Challenge 4: Greater Manchester's transport infrastructure networks should provide the capacity, connectivity and diversity to meet the future needs of its residents

Response	Stakeholders
4A – Enhance the attractiveness and capacity of walking, cycling and public transport within GM. The predicted scale of growth, and environmental issues, will require further investment and careful planning and management of transport systems, co-ordinated closely across Greater Manchester. The Greater Manchester Transport Strategy 2040 establishes the basis for addressing this Challenge.	**GMCA, the Ten Districts, TfGM, Network Rail, Highways England**

Relevant projects and programmes already underway or planned:

- Congestion Deal
- Strategic Transport Plan
- Manchester North West Quadrant Strategic Study
- HS2 and Northern Powerhouse Rail
- Manchester Airport's Sustainable Development Plan
- Greater Manchester Moving Plan for Physical Activity and Sport
- Made to Move
- Greater Manchester Cycling and Walking Network
- Greater Manchester Cycling and Walking Infrastructure Proposal
- Bus Services Act 2017 and Bus Reform
- GMCA Case for Change
- Clean Air Plan
- Low Emission Strategy
- Air Quality Action Plan (2016-2021)
- Springboard to a Green City Region
- GM Low Carbon Hub

Key Challenge 5: Greater Manchester needs the infrastructure to support ultra-low emission vehicles

Response	Stakeholders
5A - Determine Greater Manchester's role in setting the future for electric vehicle charging and hydrogen re-fuelling This approach must also be co-ordinated with GM's strategy for air quality to ensure that it supports the need to reduce vehicle emissions at the pace required for GM.	**GMCA, the Ten Districts, TfGM and the NIC**
5B - Determine the locations, scale and phasing of the key hydrogen demands for high torque transport (buses, HGVs etc.) Current evidence suggests that hydrogen is likely to be the preferred zero carbon fuel for High Torque transport. GM needs to understand the potential implications for GM of this.	**GMCA, the Ten Districts, TfGM, Cadent and industry**
5C - Understand the travel and work patterns associated with electric vehicle charging to determine the location and capacity of the electrical infrastructure required Rapidly develop the approach for provision of EV charging points across GM, including home charging (allowing provision for homes without off-street parking), on- street parking, and car parks. GMCA, the Ten Districts, ENWL and TfGM to further determine how best to provide charging infrastructure to ensure a network of visible charging facilities in order to encourage uptake of EVs.	**GMCA, the Ten Districts, TfGM, GMEV forum and other user groups**
This should consider the charging rate and the smart management of charging to minimise impact on network peaks. This should also note the NIC's recommendations that: - Local authorities should work to allocate 5% of their on-street parking spaces by 2020 and 20% by 2025 for electric vehicle charge points. - Ofgem should immediately take on the role of regulating the interaction between electric vehicle charge points and the electricity network.	**GMCA, the Ten Districts, TfGM and ENWL**

Relevant projects and programmes already underway or planned:

- Clean Air Plan
- Low Emission Strategy
- Air Quality Action Plan (2016-2021)
- Springboard to a Green City Region
- GM Low Carbon Hub

Additional initiatives beyond those present programmes are likely to be needed to address the needs of this challenge.

Challenge 6: Provision of infrastructure that maintains and/or reduces flood risk across Greater Manchester whilst accommodating developmental growth and climate change

Response

Greater Manchester will need to understand the impacts from flood risk as a result of future climate change and what infrastructure investment is required to ensure the city region is resilient. Whilst there has been research on this to date, further assessment is needed to determine longer term impacts along with a wider strategy for investment.

6A – Develop a robust funding strategy to provide flood risk infrastructure to support anticipated growth

GMCA, the Ten Districts, Environment Agency

Additional investment in flood risk infrastructure is needed due to population growth and climate change.

Key Challenge 10

6B – Understand the implications for GM of potential future changes in the appropriate standards of protection against flooding

The National Infrastructure Assessment recommends that UK government should set out a strategy to deliver a nationwide standard of resilience to flooding with

- an annual likelihood of 0.5 per cent by 2050 where this is feasible
- a higher standard of 0.1 per cent for densely populated areas where the costs per household are lower.

GMCA and the Ten Districts

This could have significant implications for GM, these implications should be understood to inform GM's engagement with this strategy.

6C – Complete actions from the GM Draft Level 1 Strategic Flood Risk Assessment

This document recommends the following as further work to be completed:

- Deepen understanding of flood risk for currently unmapped areas and surface water flooding.
- Identify new locations for strategic flood storage.
- Data on flood risk incidents should be mapped and spatially stored
- Review existing flood risk management assets to inform capital programme.
- Identify organisational capacity within GMCA and the ten districts to deal with SuDS, adoption and maintenance

GMCA, the Ten Districts, Environment Agency and UU

Relevant projects and programmes already underway or planned:

- Strategic Flood Risk Assessment
- Urban Pioneer Strategic Plan

Additional initiatives beyond those present programmes are likely to be needed to address the needs of this challenge

Challenge 7: Maximising the eco-systems services provided by green and blue infrastructure, whilst responding to spatial pressures on finite space and improving accessibility

Response	Stakeholders
7A – Enable an economic value to be placed on green and blue infrastructure GM should develop the methodology to economically value green and blue infrastructure. This should include the identification of funding streams to develop the Natural Capital agenda further and provide long-term certainty and resources to integrate the outputs into investment decision making across Greater Manchester.	**GMCA and the Ten Districts**
7B – Implement an environmental net-gain approach Each development that occurs within GM should provide a net benefit to the eco-systems services. Determine how an environmental Net Gain approach can be implemented as rapidly as possible and applied to all development projects and the feasibility of application to new infrastructure projects. New developments to include SuDS wherever possible to provide increased green infrastructure, mitigation of surface water runoff and provide water quality improvement.	**GMCA, the ten districts**
7C – Continue to enable further schemes to increase the green and blue infrastructure schemes in GM The green and blue infrastructure of GM should be maximised by means outside of development projects. GM need to continue to promote greening of the City Region including the Northern Forest, City of Trees and other schemes that are increasing the green infrastructure provision. This should also consider how green infrastructure can be integrated into transport corridors.	**GMCA, the ten districts** **TfGM**

Relevant projects and programmes already underway or planned:

- Strategic Flood Risk Assessment
- Urban Pioneer Strategic Plan
- Natural Capital Investment Plan
- Urban Action Innovation Project
- Bio-diversity Net-Gain Guidance

Additional initiatives beyond those present programmes are likely to be needed to address the needs of this challenge

Challenge 8: Providing pervasive, affordable, resilient digital connectivity

Response	Stakeholders
8A – Ensure the digital leadership in GM remains relevant and tailored to the continually changing needs whilst driving uptake by consumers	
GM should determine how to increase the provision of wired (through full fibre to the premises) and wireless (through 5G, or subsequent technologies, and wifi provision) across GM. Identification of funding for the estimated £1 billion investment required to deliver full fibre.	**GMCA, the Ten Districts, telecoms providers Key Challenge 10**
The Greater Manchester Digital Infrastructure Leadership Group (GMDILG) already exists. The membership and terms of reference should be tested to ensure they align with the future digital needs of GM.	**GMCA, the Ten Districts, Key Challenge 11**
A programme to raise awareness and demand from consumers and property owners to support the uptake of FFTP and future digital technology.	**GMCA, the Ten Districts and telecoms providers**
8B –Influence the development of digital infrastructure regulation to enhance alignment with GM interests.	
GM needs to review the current regulatory framework for digital infrastructure of digital communications and assess opportunities to influence policy in the interests of GM's Digital Strategy.	**GMCA and the Ten Districts**
8C – Streamline the process for installation of new infrastructure within the streetspace	
GM should develop adequate policy (i.e. wayleaves) and provision of space and duct routes necessary for the telecoms operators, as well as other public-owned infrastructure and estate/smart stakeholders. This will be supported by the NIC's recommendation that government should streamline the wayleaves and connection process are the same for digital infrastructure as for other utilities by 2019.	**GMCA and the Ten Districts**

Relevant projects and programmes already underway or planned:

- GM Digital Strategy

Additional initiatives beyond those present programmes are likely to be needed to address the needs of this challenge

Key Challenge 9: Greater Manchester's infrastructure needs a collaborative and co-ordinated approach to meet the present and future needs of the region

Response	Stakeholders
9A – Determine the process to address future changes and challenges through the production of a GM Infrastructure Strategy	
The GM Infrastructure Strategy should develop an action plan to address the Challenges in this Framework.	**GMCA, the Ten Districts and partners**
GM should engage with the National Infrastructure Commission to identify opportunities to support GM's infrastructure strategy.	**GMCA, the Ten Districts and NIC**
9B – Enable sharing of programmes, plans and projects between GMCA, the infrastructure providers and the ten districts and identification of collaborative funding opportunities	
There already exists a Greater Manchester Infrastructure Advisory Group (GMIAG) which includes representatives from GM and partners, and main infrastructure network operators and provides a forum for cross-sector conversations. The terms of reference of this group should be tested against the challenges set out in this Framework, and where appropriate its scope amended.	**GMCA and the Ten Districts**
Common guidelines for the communication between the infrastructure providers and the ten districts are needed to provide clarity on how and who should be spoken to and this approach should be consistent across the districts. Ideally projects and proposals should be packaged between districts so single conversations can be had with the infrastructure providers and holistic solutions to be reached.	**GMCA, the Ten Districts and the GMIAG**
9C – Provide the capacity of GMCA, the districts and the infrastructure providers to enable the above	
The capacity of GM and the ten districts to understand and engage on infrastructure issues is limited by financial constraints and lack of direct experience of infrastructure networks. GM should consider how these challenges should be addressed to allow GM to fully engaged in coordination with other infrastructure stakeholders. It may also provide the platform to develop consistent approaches across each of the ten districts. Distribution of knowledge and experience is needed in both directions between GM-level and the ten districts.	**GMCA, the Ten Districts and regulated Infrastructure providers**
The powers and scope for some of the infrastructure providers is defined by national Regulators such as Ofgem and Ofwat. As part of the review of the role of the GMIAG, the extent to which the best solution for GM is curtailed by the regulators should be tested, and if necessary representations made by GM for alternative approaches.	**GMCA, the Ten Districts and the NIC**

Relevant projects and programmes already underway or planned:

- GM Infrastructure Advisory Group

Additional initiatives beyond those present programmes are likely to be needed to address the needs of this challenge

Key Challenge 10: Funding models are needed to meet present needs and enable change for the future

Response Required	Stakeholders
10A – Evaluate and articulate the total benefits of investment in infrastructure The evaluation needs to include: • The appraisal of less tangible, non-monetary benefits (like quality of life or community cohesion) that are often a key motivation for a project; • The wider / co-benefits that arise out of project implementation. This is particularly important for funding for flood risk infrastructure but is applicable across all forms.	**GMCA and the Ten Districts**
10B – Drive scheme agglomeration and long-term certainty Infrastructure investment schemes should be agglomerated wherever possible to maximise outputs from limited funds and co-delivered.	**GMCA, the Ten Districts and Infrastructure providers**
The process to address future changes and challenges developed through a GM Infrastructure Strategy and the associated action plan should help to provide this agreed cross-sector approach and provide longer-term certainty to attract institutional or private investors.	**GMCA**
10C – Identify alternative funding models that enable transformative funding, and partnership working amongst the GM infrastructure stakeholders The GMIAG should seek to more closely integrate and co-ordinate the strategic investment planning of the infrastructure providers against the proposals of GMSF and the outcomes of this framework.	**GMCA**
There are emerging means of local authorities borrowing from the Public Works and Loan Board to invest in infrastructure and reclaim benefits through regeneration / increased land values / increased tax etc. The methods for the value capture should be studied further and shared through GMCA and the Ten Districts.	**GMCA and the Ten Districts**
There are recent examples of investment ahead of need, particularly in the provision of primary substations prior to development commencing. The opportunities for extending this approach across other infrastructure forms should be assessed and should form part of GM's response to the consultation announced in the Budget Autumn 2018 regardingfor encouraging innovation in regulated utilities.	**GMCA**
In Autumn 2018 the Government announced that it will "introduce a simpler system of developer contributions that provides more certainty for developers and local authorities, while enabling local areas to capture a greater share of uplift in land values for infrastructure and affordable housing. The reforms include simplifying the process for setting a higher zonal Community Infrastructure Levy in areas of high land value uplift, and removing all restrictions on Section 106 pooling towards a single piece of infrastructure. The government will also introduce a Strategic Infrastructure Tariff for Combined Authorities and joint planning committees with strategic planning powers." GMCA should work closely with government to shape this towards Greater Manchester's needs.	**GMCA, the Ten Districts and Infrastructure providers** **GMCA and the Ten Districts**

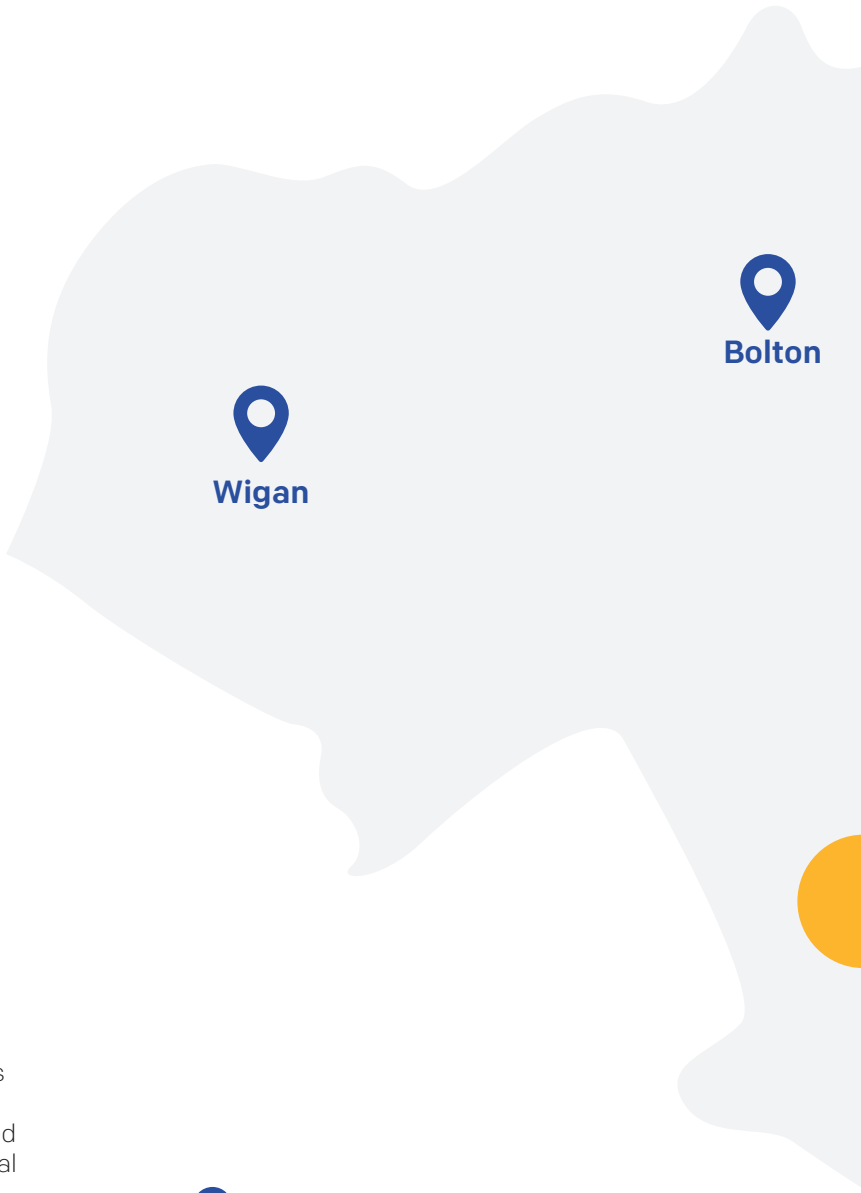
Additional initiatives are likely to be needed to address the needs of this challenge

Key Challenge 11 Infrastructure that is resilient to shocks and stresses

Response Required	Stakeholders
11A – Improve the understanding of the reliance of GM on resilience of its infrastructure networks, and based in this understanding deliver improvements in their individual and collective resilience There are increasing risks to infrastructure operations such as cyber risks and the interconnection electrical and digital networks as GM's infrastructure becomes smarter and more electrically reliant Winter rainfall is predicted to increase by 13% causing a rise in flood risk, and flood risk can impact on all infrastructures considered within this strategy. The infrastructure networks are also interdependent, for example where a failure of the transport network, prevents staff accessing the other utility infrastructures. Infrastructure providers will increasingly need to understand the implications for the resilience of their networks, but also work collectively to understand the opportunities for co-delivery of programme to improve resilience of infrastructure across GM. The GM Resilience Strategy currently being produced is specifically exploring the following for infrastructure: • The resilience of the electrical and digital networks as the future moves to an ever-increasing reliance on those • Understanding of the various infrastructure providers and the role of GM in ensuring the resilience of the infrastructure networks.	**GMCA, the Ten Districts, Resilience Unit and Infrastructure providers**

Relevant projects and programmes already underway or planned:

- GM Resilience Strategy



Typologies

Introduction

Building on the framework identified for Greater Manchester, and in recognition of the development of the Greater Manchester Spatial Framework (GMSF), this section looks at three typical spatial typologies within Greater Manchester (each with a specific set of localised trends and challenges) and outlines a series of individual frameworks for each:

- Regional Centre
- Towns
- New hubs of development

It should be noted, that the GM Framework is over-arching to each of these and applies throughout.

For each of the spatial typologies, a high-level estimate of potential changes in demand to heat, electricity and potable water has been made; the purpose of which is to illustrate any future challenges to consider.

- Towns
- Regional Centre
- Carrington - New hub of development
- Airport Gateway
- Northern Gateway (Bury/ Rochdale/Oldham)- New hub of development


Rochdale
Bury
Oldham
Manchester
Salford
Ashton
Stockport
Altrincham

Regional Centre

The centre of GM contains the most intensive concentration of employment within the city-region. It includes:

- Manchester and Salford City Centres
- Corridor Manchester (Oxford Road / Universities)
- Salford Quays / Media City
- Trafford Park
- The Etihad Campus

Over 100,000 people live in the Regional Centre, marking a grown of 120% over the previous decade, compared to 8.1% across GM over the same time period. There are now around 11,000 new residential units under construction in Central Manchester and Salford. Looking forward to 2040, significant growth is anticipated to be experienced and the Regional Centre will continue to provide a focus of increased levels of business, retail, leisure, culture and tourism activity. Whilst there will be efficiencies, due to the density of the Regional Centre, it will be a location in need of significant investment in infrastructure.

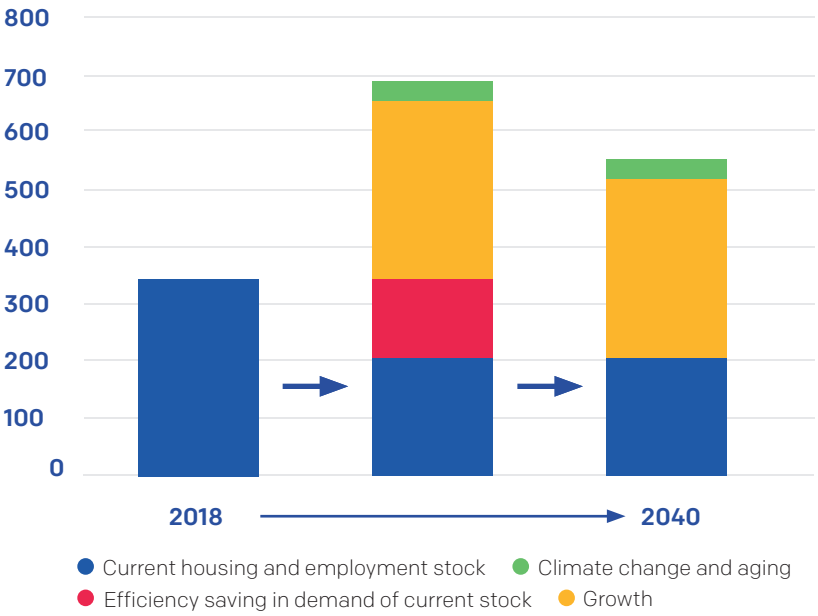
Development is expected to largely consist of apartments and high-rise buildings, increasing the density of the urban environment.

As a result, the Regional Centre is expected to experience localised infrastructure challenges in terms of capacity and peak demands of infrastructure. Whilst a smart infrastructure network will be critical to mitigating some of these issues, it is expected that localised reinforcements may be required. Space requirements for new infrastructure are expected to be challenging. For decarbonisation targets to be realised and as technology advances new energy, digital and transport infrastructure will all put pressures on the existing existing and proposed land uses.



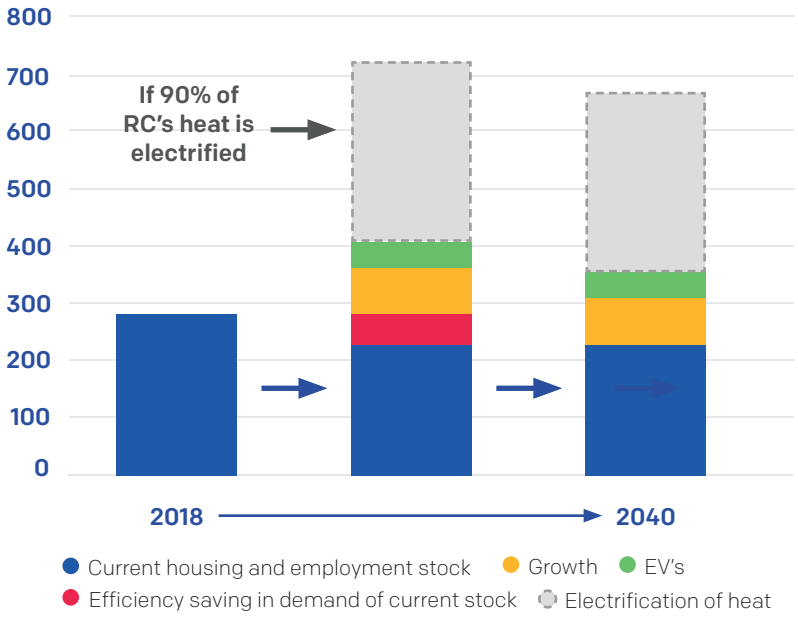
Heat Demand

Regional Centre Peak Heat Demand (MW)



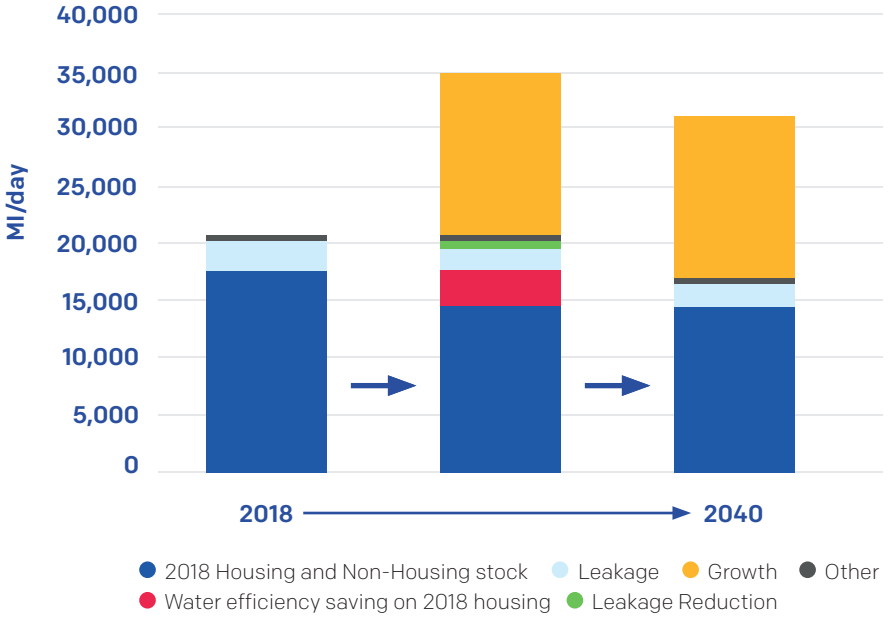
Electricity Demand

Regional Centre Peak Electricity Demand (MW)



Potable Water

Regional Centre



Significant growth within the Regional Centre has the potential to increase demands significantly.

Regional Centre Framework

The Regional Centre Framework only addresses aspects where the required response to the challenges is different from the overarching GM Framework. Readers should refer to both frameworks when considering future programmes, actions or responses.

Key Challenge 1: Infrastructure for low/zero carbon heat

Local Challenge / Opportunity

High density areas with high heat demands areas may provide opportunities for district heating and cooling systems.

Response	Stakeholders
GMCA and the Districts need to continue to explore the potential, and develop an approach for, the implementation of heat networks through this area.	**GM Low Carbon Project Delivery Unit**

Local Challenge / Opportunity

Many apartments are currently being built with direct acting electrical panel heating and, therefore, a switch to hydrogen for heating is unlikely to be feasible.

Response	Stakeholders
GMCA and the Districts need to be aware that the use of electrical panel heating in new build apartments would necessitate decarbonisation of the electricity to deliver low/zero carbon heat. Future strategies for low/zero carbon heat will need to account for this.	**GMCA, the Districts and the NIC**

Key Challenge 4: Capacity, connectivity and diversity of the transport networks

Local Challenge / Opportunity

Major transport projects and investment are improving national links to the Regional Centre – e.g. HS2, NPR.

Response	Stakeholders
GMCA, the Districts and TfGM need to ensure these national and regional projects will need to be integrated into Greater Manchester's local transport networks.	**GMCA, the Districts and TfGM**

Local Challenge / Opportunity:

Increasing density of people within the Regional Centre is an opportunity to provoke a shift in the use of streets from motorised vehicles to people and active travel.

Response	Stakeholders
GMCA, the Ten Districts and TfGM should continue to develop further opportunities to promote active travel, and rebalance the public realm in the Regional Centre between active and motorised travel. Any new development proposals should provide access for non-car modes and create a high, quality environment for visitors, workers and residents to enjoy.	**GMCA, the Ten Districts and TfGM**

Key Challenge 5: Infrastructure to support ultra-low emission vehicles

Local Challenge / Opportunity

Car ownership is typically lower in the regional centre

Response	Stakeholders
Lower car ownership offers the opportunity for provision of fully electric car-share / car-club schemes as part of a low-car provision. GMCA, the Districts and TfGM, should explore associated opportunities to maximise this potential to reduce car usage within the Centre.	**GMCA, the Districts and TfGM**

Local Challenge / Opportunity

There is a significant number of cars that drive to the area for work and leisure which will bring a rise in EV charging potentially during the day and evenings.

Response	Stakeholders
The GM-scale approach for ultra-low emissions vehicles should take due consideration of the regional centre's position as economic hub for the region and a major travel destination for both commuting and leisure car journeys.	**GMCA, the Districts and TfGM**

Challenge 6: Flood risk

Local Challenge / Opportunity

The area has limited space for the provision of flood mitigation features.

Response	Stakeholders
Space limitations mean solutions for local flow reductions are likely to involved more expensive buried storage options, further opportunities should be explored for the use of sustainable urban drainage options. Opportunities may exist to reduce river inflows to the regional centre by increasing storage in less densely populated upstream areas. Increasing the coverage of green infrastructure through the Regional Centre will help to mitigate peak rainfall reaching the areas surface water networks and reduce the risk of flooding.	**GMCA, the Districts and TfGM**

Local Challenge / Opportunity

Significant presence of high value residential and non-residential assets.

Response	Stakeholders

Challenge 7: Green and blue infrastructure

Local Challenge / Opportunity

The area has limited existing green infrastructure.

Response	Stakeholders
Opportunities should be taken to enhance the effectiveness of existing green and blue infrastructure – improving access for local residents in the centre. These may include: • Supporting City of Tree's initiative to increase the tree density in the City Centre. • Promoting the inclusion of Green and Blue infrastructure in regeneration proposals in the regional centre. • A review of all under developed land in or adjacent to the regional centre, to understand the potential contribution to green and blue infrastructure, as permanent or interim uses.	**GMCA and the Districts**

Challenge 8: Pervasive, affordable, resilient digital connectivity

Local Challenge / Opportunity

Early roll out of 5G is likely to be in those areas where mobile data use is most congested such as the Regional Centre.

Response	Stakeholders
5G needs access to full fibre, therefore the roll out of full fibre will need this to underpin this. GMCA and the Districts, in conjunction with the digital and telecom providers, need drive forward opportunities to promote connectivity and uptake in the regional centre. They need to continue to liaise with national bodies to capitalise on the opportunities that a high density urban areas offers; for example, Vodafone's present trial of a 5G pilot in Salford Quays.	**GMCA, the Districts and the infrastructure providers**

Challenge 2, 3, 9, 10 and 11 refer to Greater Manchester Framework (page 36 - 43)



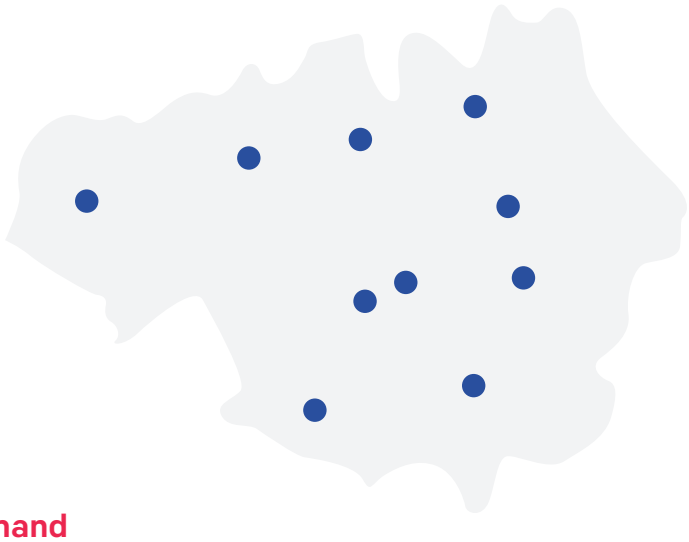
Towns

There are ten main towns and associated Local Authorities (aka. the Districts) within Greater Manchester. These towns and their centres are facing challenges as their traditional functions and contribution to the GM economy are in-decline. This is due to a number of factors including the on-going growth of internet shopping and large out-of-town retailers, office spaces and leisure facilities. Recognising this, GM are developing a series of strategic interventions (including the Town Centre challenge strategy) to support Greater Manchester's local authorities to realise the potential in town centres, with a particular emphasis on achieving sustainable communities featuring thriving housing markets[9].

Looking towards the future, the role of these main towns as local economic drivers will looked to be developed further, building on their good public transport linkages, to provide the primary focus for economic, retail, leisure and cultural activity in their surrounding areas. There is an aim to focus on local regeneration and promote housing growth in these areas, maximising them as residential centres, and spreading growth out of the City Centre.

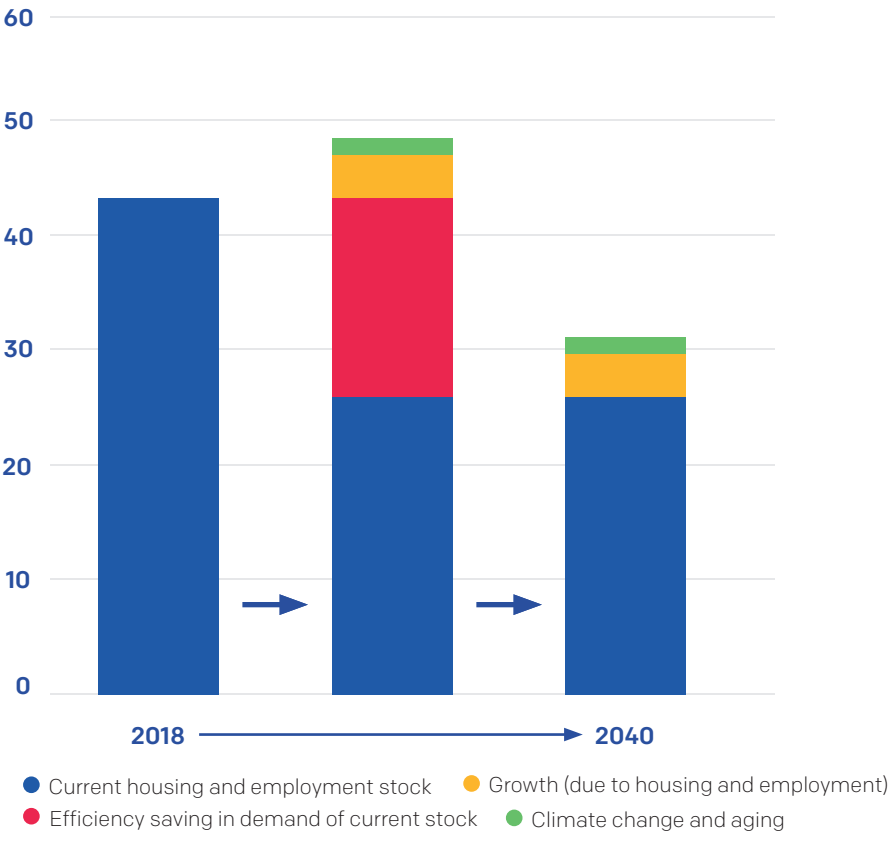
Impacts:

For the purposes of considering the potential changes in demands for heat, electricity and potable water supplies, a nominal town with a population of 50,000 has been considered. Growth has been assumed in-line with that of Greater Manchester.



Heat Demand

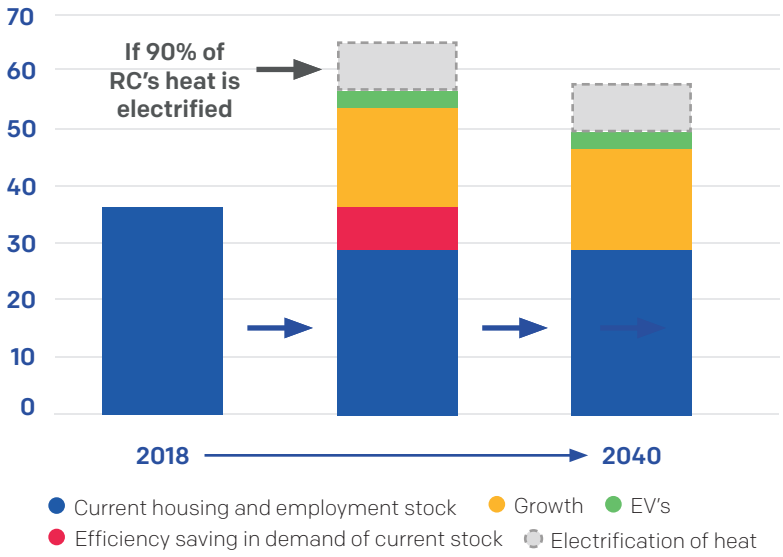
GM Town Centre Peak Heat Demand (MW)



9. https://www.greatermanchester-ca.gov.uk/news/article/265/mayor_s_town_centre_challenge_marks_major_milestone_as_new_locations_revealed

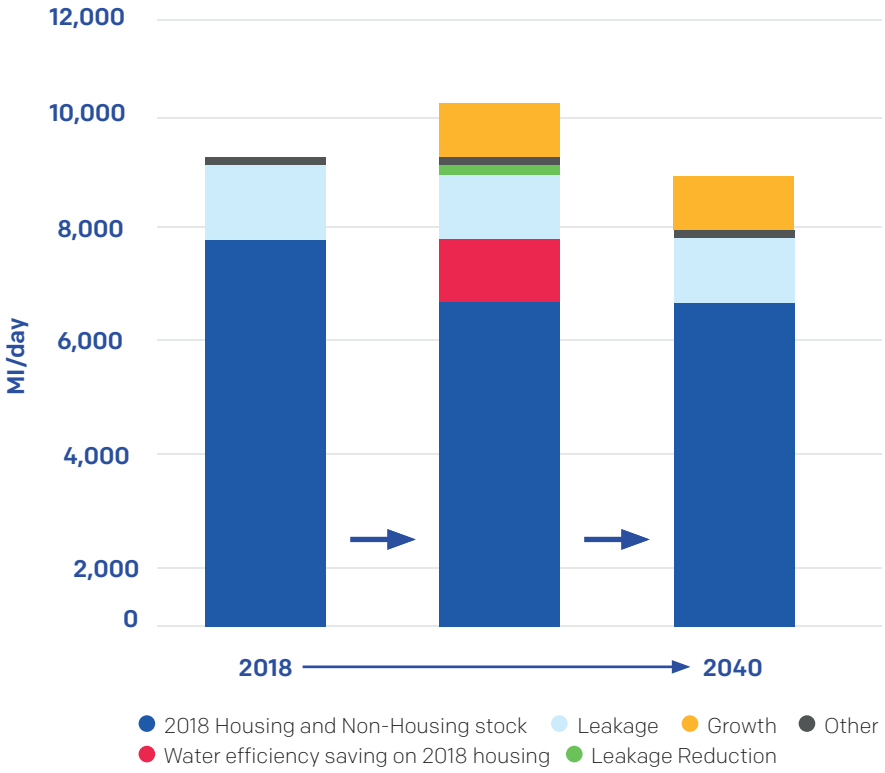
Electricity Demand

Town Peak Electricity Demand (MW)



Potable Water

Town Centre



Towns Framework

The Towns Framework only addresses aspects where the required response to the challenges is different from the overarching GM Framework. The Town Centre Challenge, and associated developments should refer to both frameworks in the development of any future proposals or masterplans.

Key Challenge 4: Capacity, connectivity and diversity of the transport networks

Local Challenge / Opportunity

Increasing density of people within the towns is an opportunity to provoke a shift in the use of streets from cars to people and active travel (such as beelines).

Response	Stakeholders
Any regeneration or development proposals within Towns should provide access for non-car modes and create a high, quality environment for visitors, workers and residents to enjoy.	**GMCA, the Ten Districts and TfGM**
Opportunities to improved connectivity between town centres should be explored where possible.	**GMCA, the Ten Districts and TfGM**

Challenge 6: Flood risk

Local Challenge / Opportunity

Incremental development (e.g. schemes under permitted development and the gradual paving of front and back gardens) creating challenges associated with increased surface water run-off and reducing green infrastructure.

Response	Stakeholders
GMCA, the Ten Districts and the EA need to review and consider this within the wider context and policy associated with flood risk.	**GMCA, the Ten Districts and the EA**

Challenge 7: Green and blue infrastructure

Local Challenge / Opportunity

Industrial heritage of towns typically means that existing development is not as well integrated with blue and green infrastructure.

Response	Stakeholders
GMCA, the Ten Districts, the EA and UU should consider opportunities to reconnect to and enhance the green and blue infrastructure in these locations e.g. de-culverting or re-wilding schemes along local watercourses. Opportunities should be sought to develop green and blue corridors connecting the towns to the wider region and externally of Greater Manchester. It is recommended Districts develop Local Green and Blue Strategies to develop and move forward these aspirations.	**GMCA and the Ten Districts**

Key Challenge 9: Collaborative and co-ordinated approach

Local Challenge / Opportunity

Our town centres are facing serious challenges over the coming decades as a result of changing markets and consumer habits. In recognition of this, GM has launched the Town Centre Challenge – an ambitious new initiative to regenerate urban centres across Greater Manchester.

Response	Stakeholders
Infrastructure providers will need to be aware of how they can support town centre aspirations and the changing demands associated. Early and on-going communication between Local Authorities and Infrastructure providers will be essential in achieving these ambitions.	**Ten districts of GM and the infrastructure providers**

Challenge 1, 2, 3, 5, 8, 10 and 11 refer to Greater Manchester Framework (page 36 - 43)

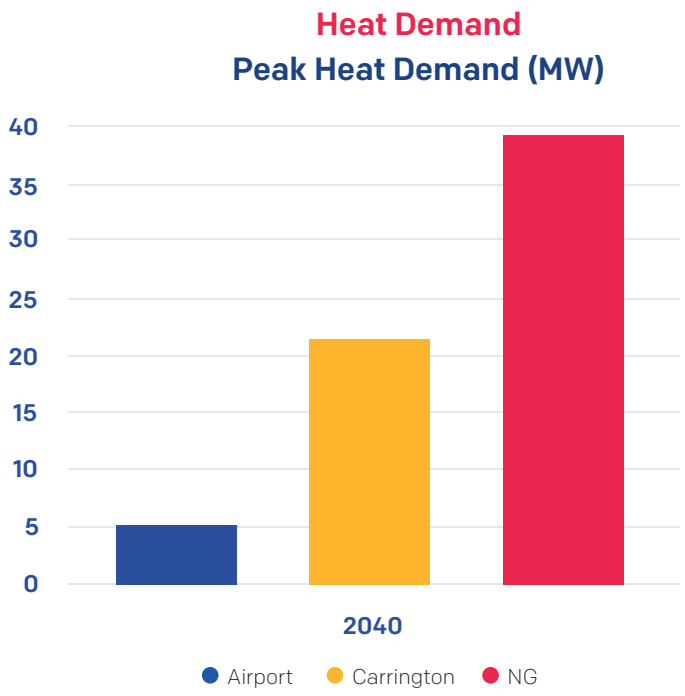
New hubs of development

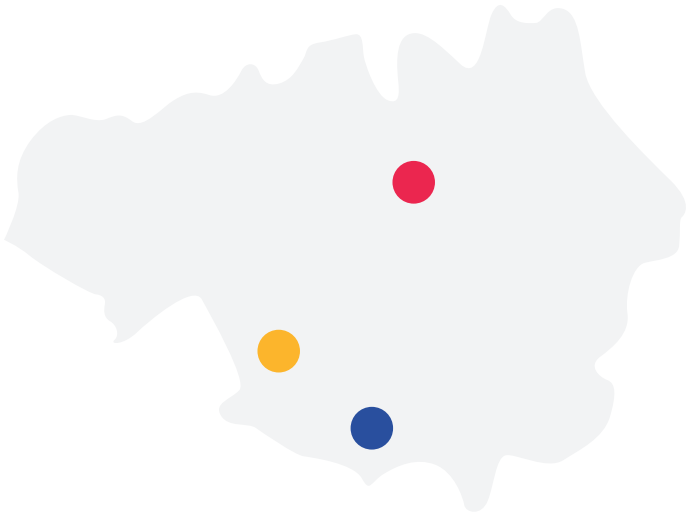
The Greater Manchester Spatial Framework identifies a number of new areas of development across the region of Greater Manchester. These allocations of land will look to support the growth of Greater Manchester outside of the Regional Centres and Towns.

At present, these development sites are likely to have limited infrastructure provision, beyond that of the neighbouring developments. Careful and holistic consideration of the demand implications on local infrastructure provision will need to be undertaken to avoid network issues. These areas may require new connections and localised reinforcements / upgrades, which should be considered whilst looking ahead to the future envisioned landscape of Greater Manchester.

For the purposes of considering the impacts of change on the infrastructure and developing a high-level framework, three locations have been considered:

- **Airport Gateway** - Provides a unique combination of outstanding international connections and excellent public transport access. The Manchester Airport City Enterprise Zone will aim to offer a range of high quality development opportunities in an area of high market demand.
- **Carrington** - Within the proposed Western Gateway, involves the major redevelopment of the former Shell refinery in Carrington. Proposals include a large residential scheme, with a combination of industrial, employment and retail space.
- **Northern Gateway** - Covers a stretch of the M62 corridor around its intersection with the M66. It provides a unique opportunity to enhance the economic role of the northern and eastern parts of GM and significantly increase the supply of new housing.

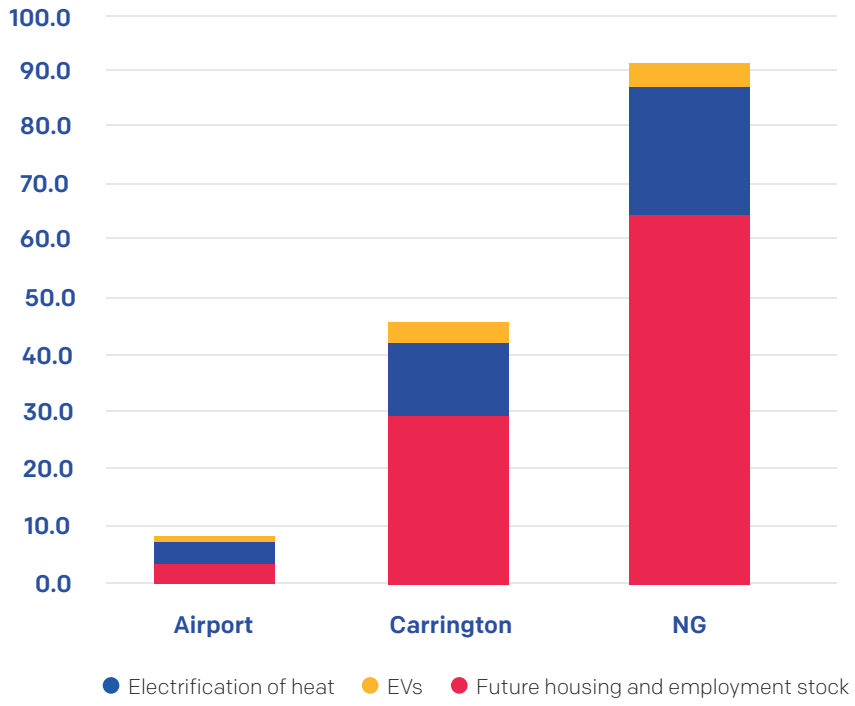




The Greater Manchester Spatial Framework is a joint plan for Greater Manchester that will allocate land for jobs and new homes across the city region. The framework, which is being produced by the 10 councils working together in partnership, will try to make the right places to deliver the homes and jobs needed up to 2035.

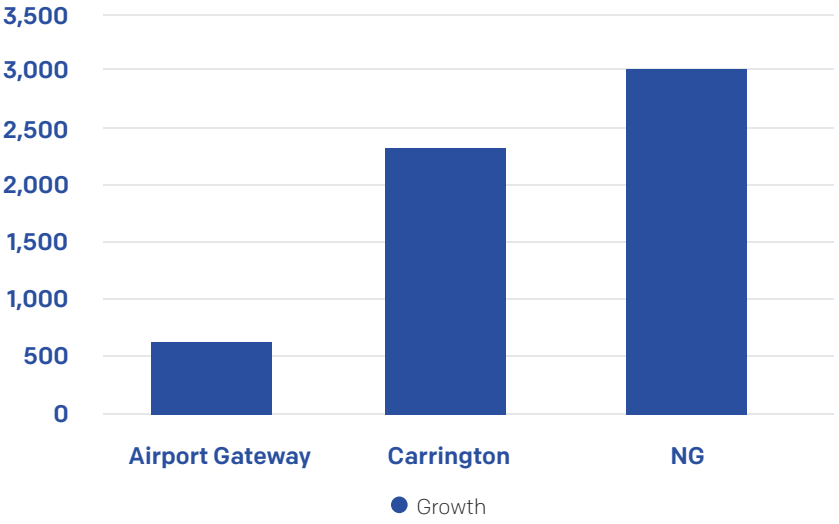
Electricity Demand

Peak Electricity Demand (MW)



Potable Water

Growth Areas



Observation: **Northern Gateway's indicative demand is half of a town of 50,000 people.**

New Hubs of Development

The New Hubs of Development Framework only addresses aspects where the required response to the challenges is different from the overarching GM Framework. Readers should refer to both frameworks in the development of any future proposals or masterplans within these locations.

Key Challenge 1: Infrastructure for low/zero carbon heat

Local Challenge / Opportunity

These new areas of major developments are in areas that will not have much of an existing infrastructure.

Response	Stakeholders
They will typically be built out over a number of years, and thus recognising as discussed above that future heat options are not clear, each development should consider their particular energy future, and provide flexibility to accommodate that future.	**Developers, GMCA and the Ten Districts**
It is currently likely that this will include high standards of building insulation, provision of heat networks in areas of dense development, and provision for air or ground source heating in areas of less dense development.	
The newer low carbon heating approaches may be more expensive than approaches compatible with current buildings regulations. GM should therefore explore with stakeholders how the installation of low and zero carbon heating can be made economically advantageous for the site developers in order to add to the evidence base for this growing technology and avoid fixing in more high carbon heating in GM.	**GMCA, the Ten Districts and stakeholders**
GM should also evaluate the potential for one or more of these areas to act as a trial area for the roll out of 100% hydrogen to properties for heating. As identified in GMIF Key Challenge 1 and linking with the NIC's recommendation, the new hubs of development are likely to be best placed to host this pilot.	**GMCA, the Ten Districts, NIC and Cadent**

Key Challenge 3: Electrical infrastructure able to accommodate local renewable generation, rapid electric vehicle charging and, potentially, the electrification of heat

Local Challenge / Opportunity

These are areas of new development, with opportunities to develop new masterplans.

Response	Stakeholders
These areas have significant potential for the implementation of local renewable generation, the extent of which should be determined by GM and its need for low carbon generation. A number of these developments, their associated master-planning and constructions phases will be starting the next couple of years, GMCA and the Districts must not miss opportunities to incorporate the necessary infrastructure to support a zero carbon future.	**GMCA, the Ten Districts**
The future necessary changes needed to the electrical distribution grid have not be trialled at a large scale. These new build areas may provide the opportunity for larger scale trials. GM, developers and ENWL should work together assess how early implementation of smart technologies, including battery storage can be implemented in these areas.	**GMCA, the Ten Districts, developers and ENWL**

Key Challenge 4: Capacity, connectivity and diversity of the transport networks

Local Challenge / Opportunity

New developments may require significant new or enhanced transport infrastructure to support connectivity to the wider City Region.

Response	Stakeholders
Capacity and connectivity of local transport facilities should be considered during site allocation and proposal development, with close co-ordination with TfGM and local highway authority. Sites should be located where sustainable transport options are in place or can be delivered in future.	**GMCA, the Ten Districts and TfGM**
Master-planners should incorporate measures to support and promote active travel – e.g. walking and cycling infrastructure.	**Developers**

Key Challenge 5: Infrastructure to support ultra-low emission vehicles

Local Challenge / Opportunity

These are areas of new development, with opportunities to develop new masterplans.

Response	Stakeholders
Determination of how to best ready these new sites for EVs and alternative technologies, providing flexibility within the approach without prohibiting development or installing abortive technology.	**GMCA, Ten Districts and TfGM**

Challenge 6: Flood risk

Local Challenge / Opportunity

Scale of some of the site allocations may require consideration of flood mitigation measures beyond the site boundaries.

Response	Stakeholders
Where the new development hubs are taken forward at more suburban scales of density, opportunities should be taken for more natural approaches to drainage and flood management.	**GMCA, the Ten Districts and the EA**
Where appropriate, solutions should be explored at a catchment level, where the new development areas could make a larger contribution to flood risk reduction than just within their footprint, particularly where they are upstream of the city region or other existing developments. GM and the EA should look to bring schemes and funding together in coordination to exploit such opportunities.	**GMCA, the Ten Districts and the EA**

Challenge 7: Green and blue infrastructure

Local Challenge / Opportunity

Sites located on existing green and blue infrastructure.

Response	Stakeholders
Opportunities to implements and enhance green and blue infrastructure from the master-planning stage of the new development hubs must be taken, and the implementation of these proposal must be sustained through the build out of the development.	**GM, the Ten Districts and the Developers**
Schemes need to carefully consider the long- term maintenance and management of green and blue infrastructure and ensure that the resourcing and delivery of this maintenance is commercially and organisationally secured. This needs to be considered from the project inception.	**Developers**
GM and the districts should explore the potential for these new development areas to trial a Net Environmental Gain approach to development.	**GMCA, the Ten Districts and the Developers**

Key Challenge 9: Collaborative and co-ordinated approach

Local Challenge / Opportunity

New sites provide opportunity for new and innovative approaches.

Response	Stakeholders
GMCA and the Infrastructure Providers need to consider how the provision of significant new future proofed infrastructure for these areas can help support the wider needs of GM, including consideration of the financial contributions of customers, infrastructure providers, house buildings and developers can be coordinated.	**GMCA, the Ten Districts, and the Infrastructure Providers**
Ensure new infrastructure is future proofed may require funding and financing beyond the business as usual approach. GMCA, the Ten Districts and the Infrastructure providers need to consider and develop alternative mechanisms to support these developments.	**GMCA, the Ten Districts, and the Infrastructure Providers**

Challenge 2, 8, 10 and 11 refer to Greater Manchester Framwork (page 36 - 43)

Produced with support from Arup