



# Final Report

## Technical Assistance for Broadband Investment



This report was prepared by Reid Consulting Group, LLC  
for Morgan County Board of Commissioners // December, 2022

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# EXECUTIVE SUMMARY

This report reflects the findings of Reid Consulting Group (RCG) in the technical assistance project undertaken for Morgan County. During this engagement, RCG conducted Geographic Information Systems (GIS) analyses using multiple data sources to map broadband availability in Morgan County, plot the locations of resources that could be used to facilitate broadband expansion, and create fourteen detailed broadband expansion project areas in collaboration with the Morgan County broadband committee.

Morgan County faces significant broadband availability challenges. GIS analysis shows that 63% of households and 60% of businesses do not have access to the FCC minimum speeds of 25 Mbps down / 3 Mbps up, while 99% of households and 98% of businesses do not have access to NTIA minimum speeds of 100 Mbps down / 20 Mbps up. Funding awarded to Charter Communications as part of the FCC's Rural Digital Opportunity Fund (RDOF) and the Ohio Residential Broadband Expansion Grant (ORBEG) broadband expansion programs have the potential to address portions of these unserved and underserved areas, but significant gaps remain. Even if Charter fulfills its deployments under RDOF and ORBEG, 63% of households and 65% of businesses will remain underserved.

Given that underserved territory in Morgan County is primarily steep, heavily forested ridges and valleys, RCG recommends deploying fiber to the home wherever possible. Fixed wireless and low earth orbit satellite technologies both face significant propagation issues in such terrain. RCG recommends that Morgan County aggressively pursue state and federal funding to deploy fiber to the home throughout the county. To accommodate the potential for piecing together multiple funding sources, RCG staff worked with the Morgan County broadband committee to identify 14 potential project areas within the county's unfunded underserved territory. Budget estimates and fiber deployment scopes are presented for each of these areas.

# County Overview

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Reid Consulting Group (RCG) used multiple sources of data to create a geographic information system (GIS) of Morgan County. Sources analyzed include ISP service areas and offerings, known fiber assets, business data, household locations, FAA-registered vertical structures, opportunity zone information, ODNR resources, and industrial park designations.

RCG firmly believes that it has leveraged all useful resources to synthesize a unified analysis of the broadband landscape across Morgan County. In addition to creating the GIS for Morgan, RCG has continued to update (and make those updates available to Morgan County) as the landscape has changed with funding announcements and service provision agreements including, but not limited to, the results of the Ohio Residential Broadband Expansion Grant Program (ORBEG), the Rural Digital Opportunities Fund (RDOF), and public-private partnerships in surrounding areas.

RCG stands behind its good faith effort to include all relevant information from public, private, and civic/governmental organizations to demonstrate the most complete and accurate assessment of the existing broadband landscape in Morgan County.

In analyzing the needs of Morgan County based on the available data, RCG used its well-established rating system, a process for which RCG is known and trusted as an expert in applying. RCG assessed the true needs in Morgan County through the integration of data sources including Ookla Speedtest Intelligence® data licensed by InnovateOhio for the months of February 2020 through August 2021, carrier filings of available speeds with the FCC (Form 477), carrier reports of actual broadband deployments to USAC (HUBB), RDOF Phase 1 eligibility, and population density.

# Evaluation of Broadband Availability

**63%** of households do not have access to broadband speeds of 25/3 Mbps

Morgan County faces significant broadband availability challenges due to rugged terrain and low population density. 63% of Morgan County households do not have access to FCC minimum broadband speeds of 25 Mbps down / 3 Mbps up. This translates to nearly 90% of the populated land in

the county. Areas with higher population density like Eagleport, McConnelsville, and Stockport do show speeds above the FCC minimum; however, only a handful of census blocks in those locations exceed the National Telecommunications and Information Administration's (NTIA) threshold of 100 Mbps down / 20 Mbps up. For NTIA funding programs like the Enabling Middle Mile grant program and BEAD, nearly the entire county is underserved.

We conducted analysis of raw Ookla® data for the months of February 2020 through August 2021, applying the following filters:

- Include desktop, iOS, and Android app results<sup>1</sup>
- Exclude results with GPS precision of greater than 200 meters<sup>2</sup>
- Include only results from fixed broadband providers

Using the Ookla® results we rated each location based on the average of up/down speeds for all tests at that location. We then graded census blocks based on the median up/down speed of all locations within each block. Block-by-block ratings were further refined based on RDOF eligibility, past HUBB deployments, and Form 477 data. For blocks with no Ookla® test results, extrapolated ratings were assigned where possible via comparative analysis of population density, Form 477 coverage, HUBB data, and RDOF Phase 1 awards. Areas that could not be assigned an extrapolated rating are shown in gray on the map.

*Unserved and underserved ratings are color coded at the census block level as illustrated in Figure 1.*

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<sup>1</sup> iOS and Android results were included only if the device was connected to wi-fi during the speed test.

<sup>2</sup> To protect consumer privacy, Ookla® limits location precision to +/-100 meters. As a result, a single location may include multiple households and many individual tests.

# Morgan County Broadband Speeds

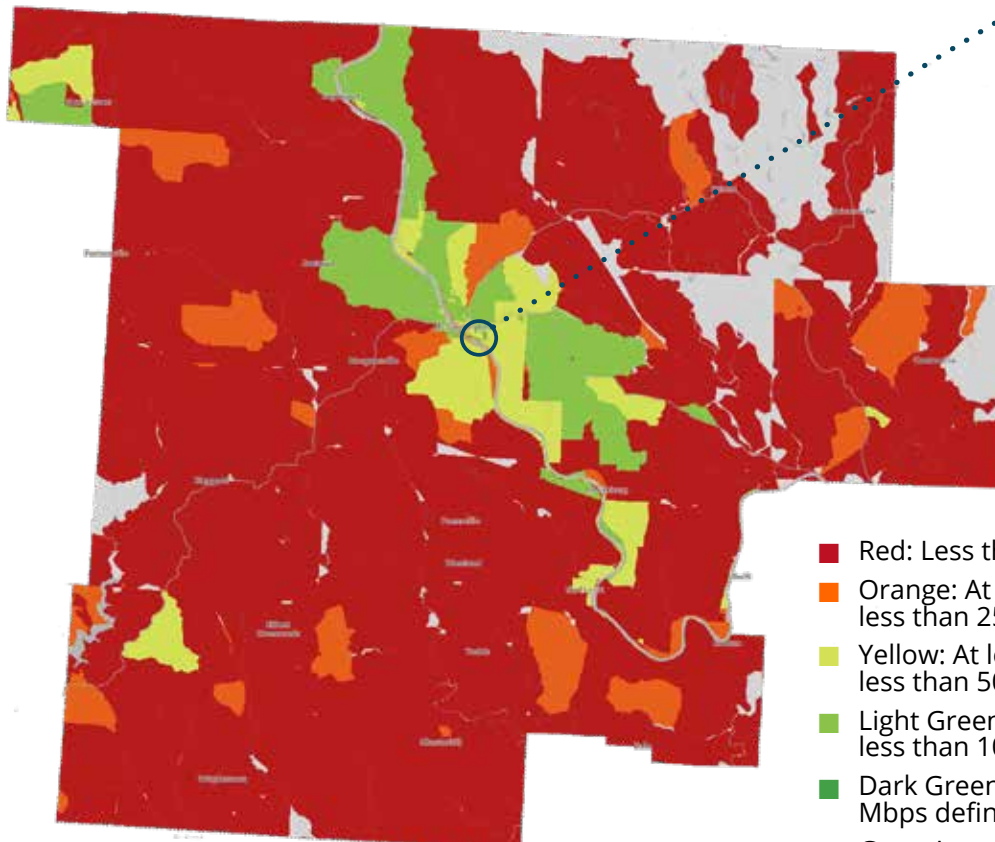


Figure 1a: detail of served areas in McConnellsville

- Red: Less than 10/1 Mbps
- Orange: At least 10/1 Mbps and less than 25/3 Mbps
- Yellow: At least 25/3 Mbps and less than 50/10 Mbps
- Light Green: At least 50/10 and less than 100/20
- Dark Green: Above 100/20 Mbps defined as served
- Gray: Areas with no data or speedtests submitted / unpopulated

Figure 1: Morgan County Broadband Availability

- **Of the 385 populated square miles in Morgan County, 343 square miles (89%) are unserved below the FCC minimum speed of 25/3 Mbps.**
- **Of the 7,878 households<sup>3</sup> in the county, 4,937 are unserved with speeds below 25/3 Mbps. 87% of these unserved households (4,272) also are below 10/1 Mbps.**
- **Confirming our analysis using Census data, we found 8,525 households in the county with 5,497 below 25/3 Mbps. Again, most of these unserved households (4,787) also are below 10/1 Mbps.**
- **Morgan County has a total of 869 non-interstate road miles. Of these, 746 miles (85%) pass through unserved territory with speeds below 25/3 Mbps.**
- **In these unserved territories, Morgan County has a population density of 14 households per square mile and a road density of 7.8 households per linear mile.**

<sup>3</sup> The above findings were translated into the "heat map" (figure 1) to visually represent the dramatic need in Morgan County.

## OUTREACH & COMMUNITY INPUT

RCG conducted a survey of Morgan County residents and business owners to identify issues with broadband availability and to understand the economic and cultural impact of those issues. This survey included free response interview sections that allowed participants to share their experiences and voice their concerns.

Residents and business owners in Morgan County were very vocal about persistent issues surrounding broadband accessibility. Of the 258 survey responses, more than 150 included comments on the need for reliable broadband. Issues cited included the inability to do schoolwork, lost employment and income opportunities because a home connection was not available or too slow/unreliable to support work-from-home and online sales, and the inability to connect with family members and caregivers. Many see the lack of broadband as another way that the world's ever increasing dependence on technology marginalizes Appalachian America.

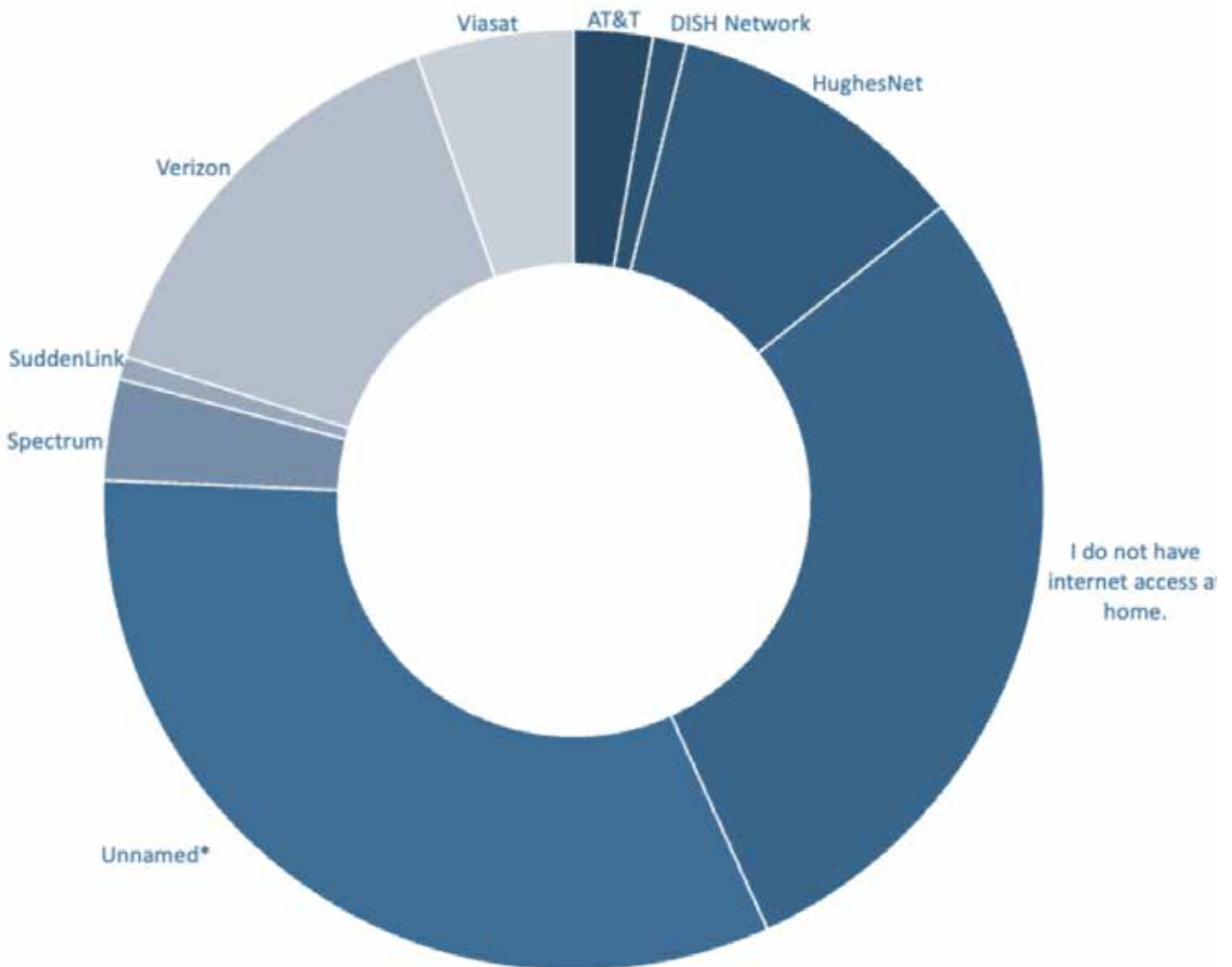
Lack of broadband prevents remote learning, removes communication and connection opportunities, eliminates access to modern safety and security monitoring products, hampers business opportunities, and significantly impacts health outcomes through lack of telemedicine services and remote patient monitoring opportunities.

*Survey queries netted more than 250 valid responses from residents of Morgan County. A majority of respondents were so committed to helping find an answer to the persistent broadband accessibility issues in the county that their completed survey results included contact information for follow up and additional input. In the sections below, we highlight specific comments from the survey's free response sections. Provider names have been redacted, but the comments otherwise are presented exactly as they were written by the participants.*

# Residential Broadband Survey

## Service Provider

Survey respondents who indicated having service identified seven different providers actively servicing parts of the region: AT&T, Dish, HughesNet, Spectrum, Sudden Link, Verizon, and ViaStat. Among the 100 respondents who identified their provider, Verizon (38%) and HughesNet (27%) represented the largest shares of the sample.



*\*Unnamed answers are likely to be CenturyLink / Lumen, names that were not in the list due to ownership changes during the time the survey was conducted.*



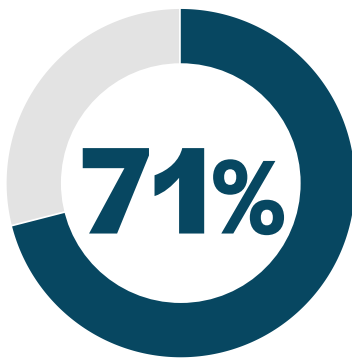
## Lack of Service

A total of 75 respondents noted that they do not currently have service at their primary residence. The majority (71%) indicated that service is not available at their residential location, 22% reported that the available service was too slow or unreliable, and 7% identified the primary reason as available service being too costly.

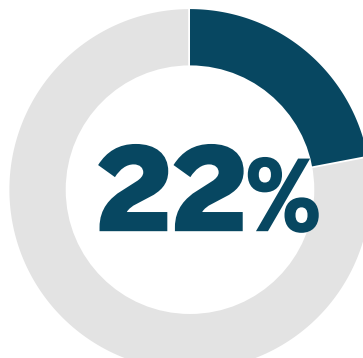
Additionally, among the 75 who do not currently subscribe to broadband service, 43% reported using their cellphone/a Hotspot from their cell phone to access the internet. Nearly one in five travels to a friend or family's home (16%) to access the internet, 13% only access the internet while at work, and another 10% report relying on the local library to complete on-line tasks.

**30%** report they **DO NOT** have internet access at home

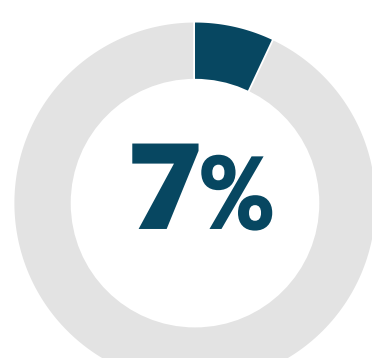
why? ← .....



**service  
unavailable**



**too slow**



**too costly**

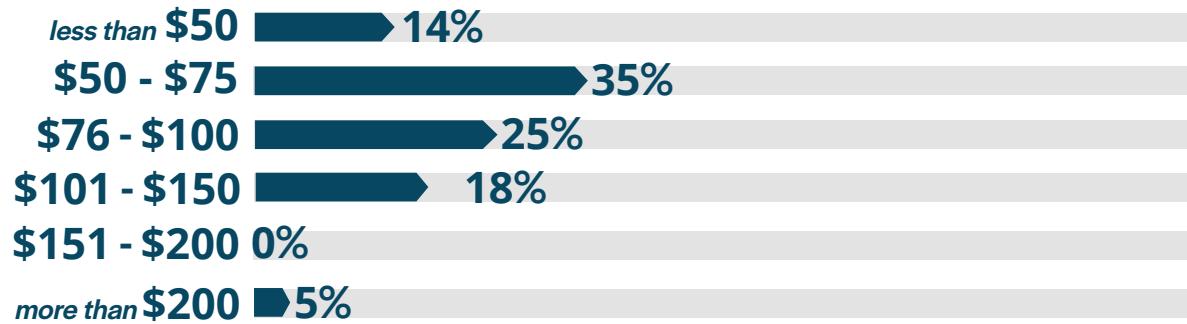
“

*I completed my college degree using my cellphones data as a hotspot. I work in public service for my county and often work from home, I have to use my cell phones data which is slow and limited. My husband and I have lived in our home for 9 years and have been on <Provider Name redacted> waitlist for the entirety of that time, we are continuously told "the bandwidth is full" and are not able to get internet.*

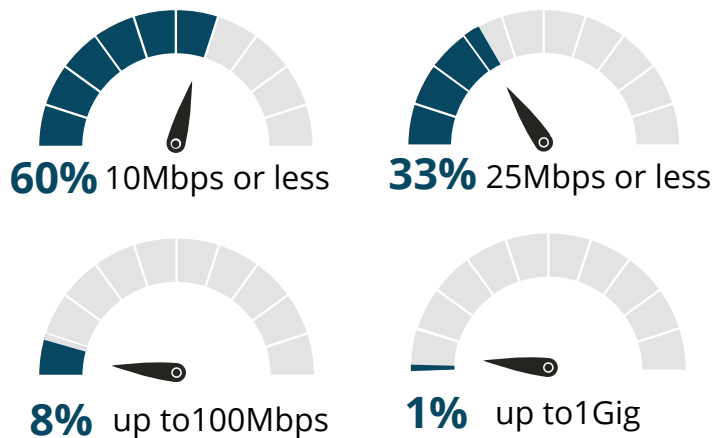
”

## Billing and Cost

Nearly 60% of the 182 respondents who shared cost information pay between \$50-100 per month for service. Only 14% of those respondents pay less than \$50 per month.



## Contracted Speed



Among the 138 respondents who contract for services with an ISP, nearly 60% are currently under contract for less than 10 Mbps. Fewer than 10% are currently under contract to receive service at more than 25 Mbps.

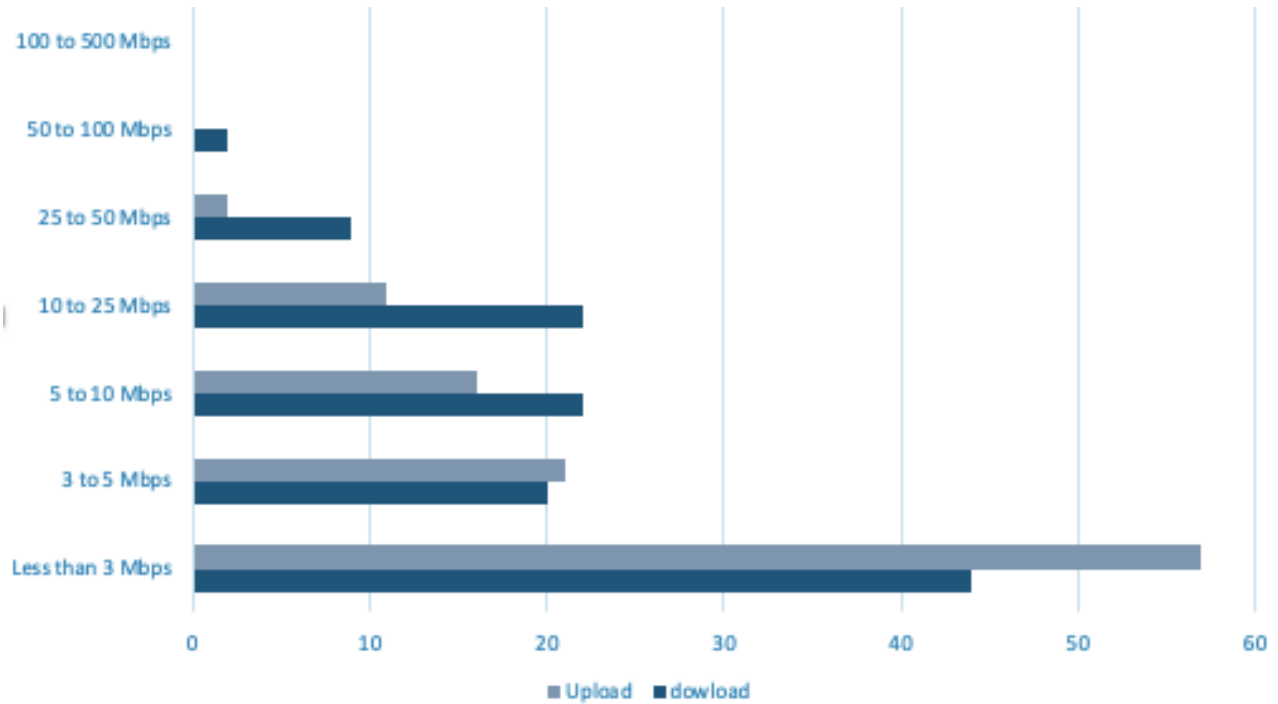


*I work from home for child and adult protective services (due to covid-19), my job is negatively affected due to no internet access. I completed a bachelor's degree online with only my phones hotspot. Access to internet would lower our bills as we could stream and have access to news as it comes.*



## Speed Test

More than 100 respondents agreed to complete a speed test on their current device as part of the survey. When testing download speed, 70% tested at a speed of 10 Mbps or less, while slightly less than 2% was able to reach speeds greater than 100 Mbps. When testing upload speeds, 88% tested at a speed of 10 Mbps or less, while slightly less than 2% was able to reach speeds greater than 25 Mbps. No respondents reported upload speed test results above 50 Mbps.



*I have a pacemaker that I've tried to connect to my doctor's office, but my internet is too weak so I have to travel to have it read. It would be nice to use my phone to be able to get a hold of help if I need it. We cannot zoom with anyone... doctors etc. I would love to be able to stream something, but we cannot.*

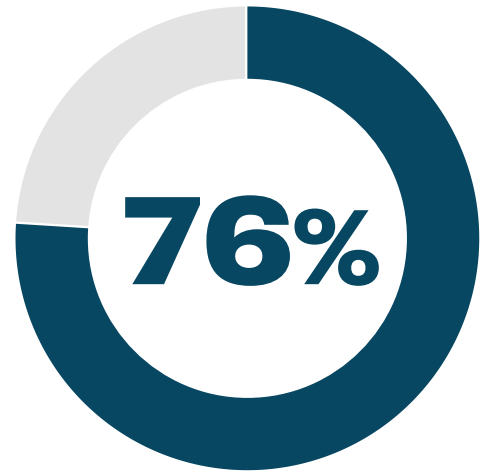
*We are currently using a <provider redacted> cell phone hot spot for internet access - we have spotty coverage depending on the number of people accessing data in our area, the cost is prohibitive, but we are caring for our high school age grandchild, and he needs access for school, e-sports through school and his gaming. We also have a small farm which would benefit from wifi capable cameras in the barns during kidding season.*



Among respondents who provided information on their contracted speeds and then performed a speed test, 76% reported download speed test results below their contracted speed, and 97% reported upload speed test results below their contracted speed.

“Internet access has the same impact that electricity did when it first came to rural areas. Unequal access increases the disadvantages of rural citizens. Quantity of data is a major issue as well as the cost differential with urban areas. Most rural connections are metered this limiting its use. Here in Morgan County, we also have limited cell service.”

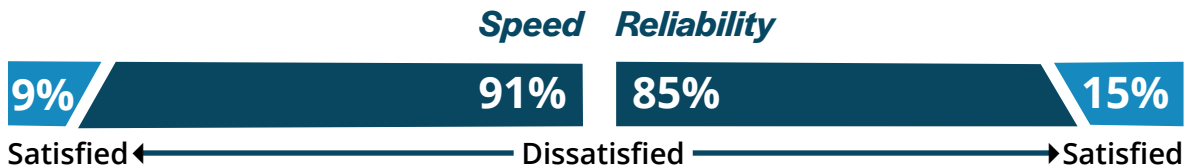
“The whole world runs on internet service. It is so difficult being unable for grandkids to do their homework, read an article online, or even search for a piece of history. This day and age, no one should be left out when it comes to high speed accessibility.”



report download speed below contract

## Satisfaction

Satisfaction is extremely low amongst respondents. Survey results found that strong majorities of respondents are dissatisfied/extremely dissatisfied with the speed of service (91%), as well as with the reliability (85%).



# Population Density & Business Locations

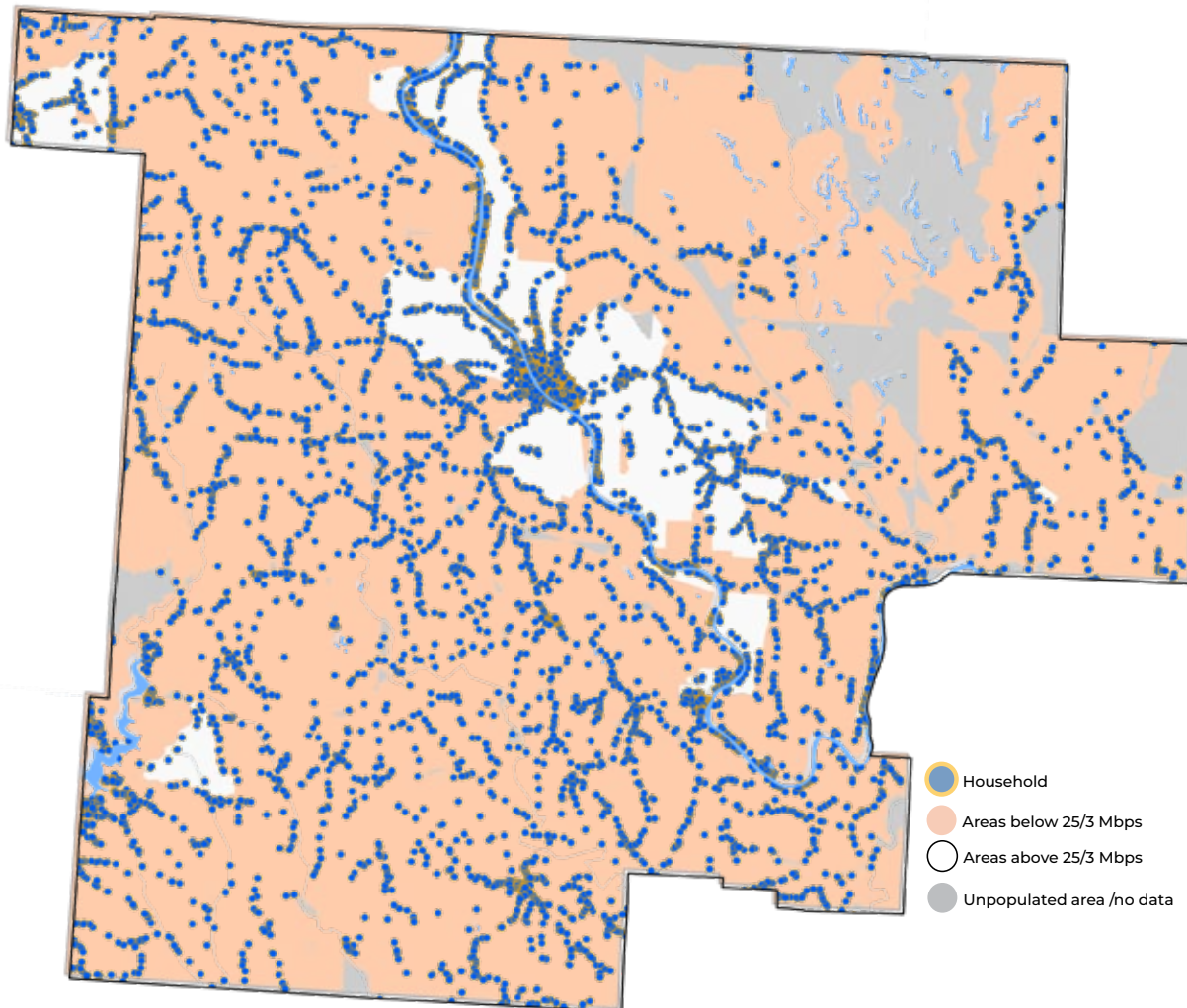


Figure 3: Morgan County Population Density

## Residential

Overall, Morgan County has low population density. Broadband speed patterns follow population distribution, with better service available in McConnelsville and its neighboring towns along the river corridor. The Rose Farm area also benefits from its proximity to the higher population density of Crooksville across the Perry County line. While service currently is poor in Chesterhill and the Burr Oak region, those areas are more populated than other parts of Morgan County's rural expanse, making those areas more attractive to providers interested in expanding service.

## Business

Analysis of Dun & Bradstreet business location/size/sector data reveals a similar distribution with many businesses concentrated along the river; however, there are many businesses scattered throughout Morgan County's unserved rural expanse, further indicating the need for broadband expansion.

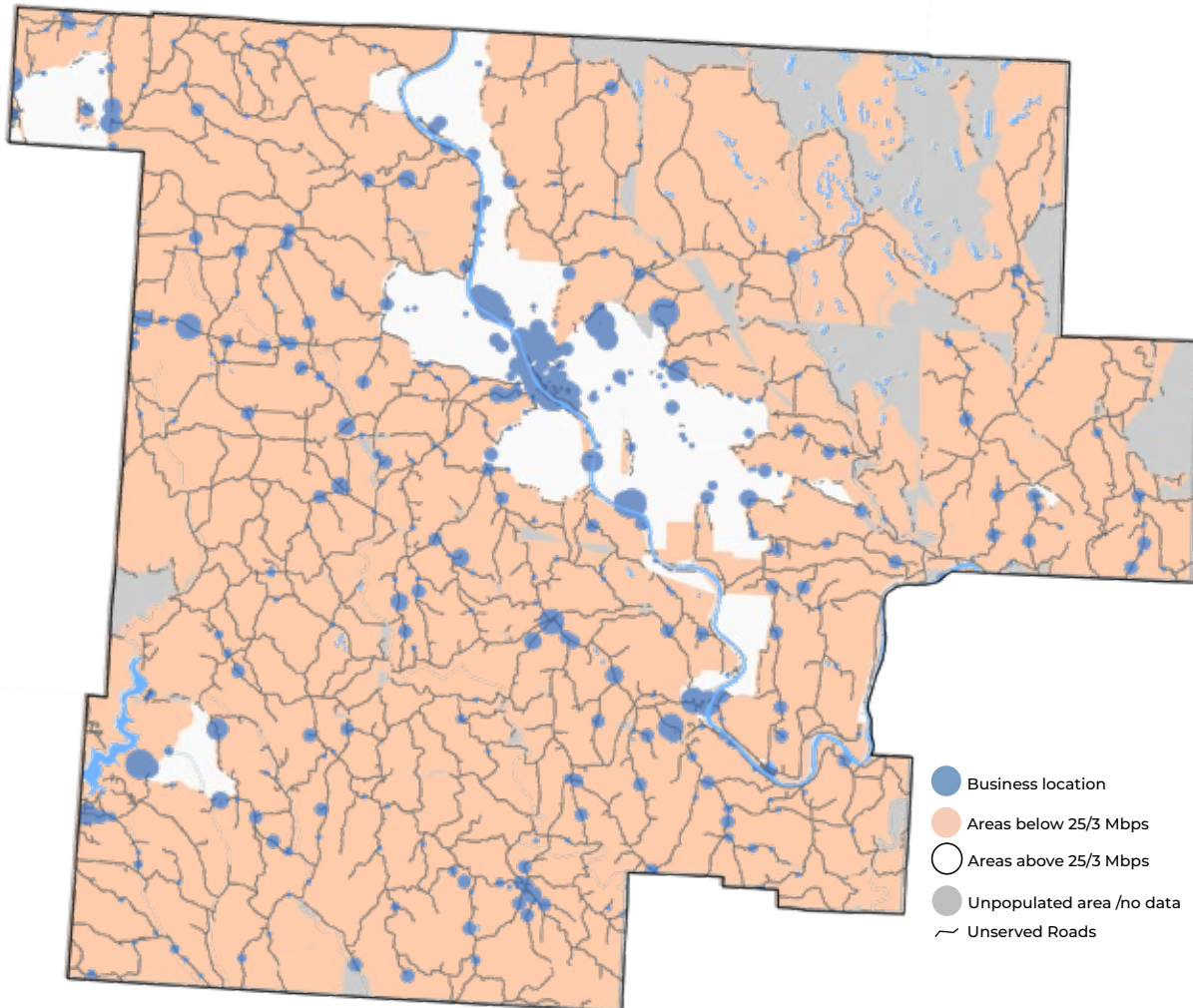


Figure 4: Morgan Business Locations

*Business demand for broadband varies based on company size and economic sector.*

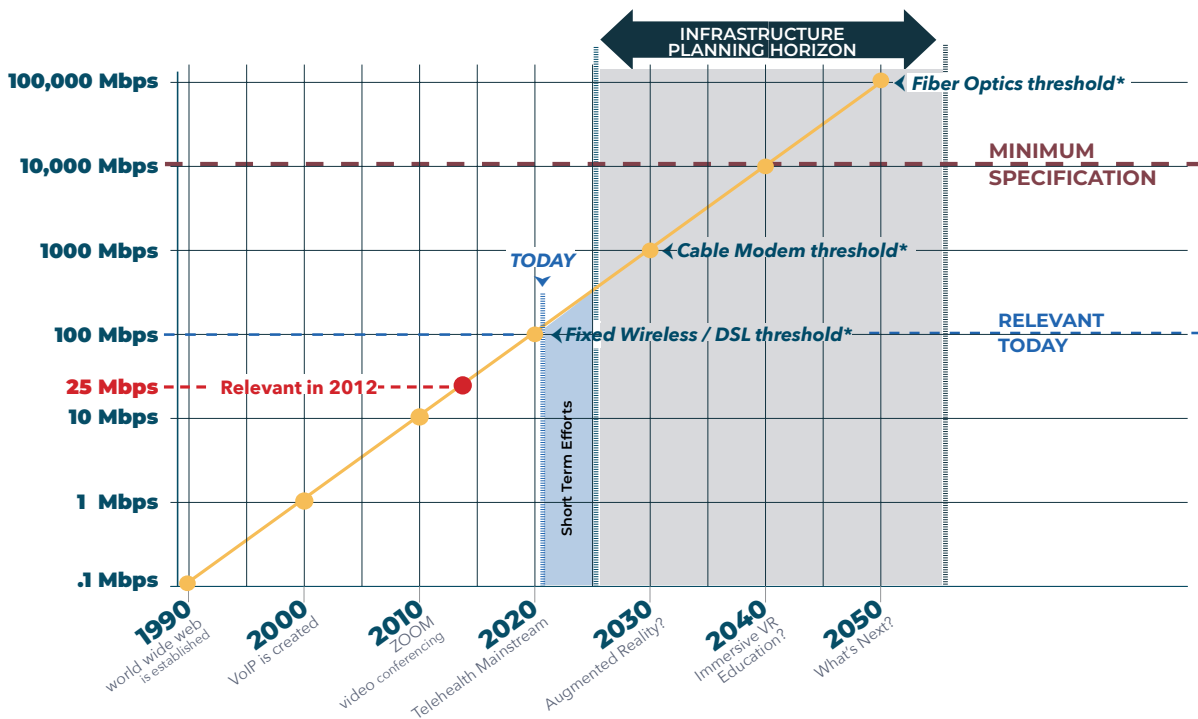
*The greater the demand, the bigger the dot. The presence of a high-demand business or multiple businesses of any size will make that area significantly more attractive to a broadband provider.*

*\*See "[Business Broadband Opportunity Index](#)" (Appendix C) for a detailed explanation of how dot size was determined*

# Technology Assessment

A significant contributing factor to Morgan county's lack of broadband is the worn-out telecommunications infrastructure that plagues much of rural America. Twisted pair copper cables installed in the 1950's and 60's delivered essential telephone services for decades. Yet by the time DSL rolled out, these copper cables were already beyond end-of-life. Now, three decades into the Internet age, these same worn-out twisted pairs remain in service, unable to support reliable telephone service, let alone broadband.

As we seek solutions to the broadband gap, it will be essential to deploy infrastructure that meets the long-term needs of the County. As illustrated in Figure 4, only fiber optic cables offer the ability to meet the requirements of 2055, providing a roughly 30-year lifetime appropriate to infrastructure projects. While short term efforts may make sense to relieve immediate needs, only fiber offers a long-term solution from among the currently available technologies.



\*Ceilings based on commercially deployed products

Figure 4: Bandwidth Demands and Technology Options

# Technology Options

## Fixed Wireless

Fixed wireless uses radio transceivers mounted on communication towers or vertical structures like water towers to deliver broadband to surrounding homes and businesses without the need to pass those locations with physical cable. In areas with flat topography, fixed wireless can be a quick, relatively inexpensive way to deliver service to areas that do not have the population density to support unsubsidized fiber deployments. On the other hand, fixed wireless has limited capacity, both because of the limited radio spectrum available and because of its need for line-of-sight communications. To receive service, a household must have an uninterrupted view of the tower. In the unlicensed frequencies often used for fixed wireless, foliage can further limit the range of service. Given that most of Morgan County's unserved households are located in steep, forested terrain, fixed wireless is not an ideal solution.

## Satellite

High earth orbit satellite services like Hughes Net, ViaSat, and others can deliver broadband speeds; however, their capacity is limited, and their latency (the time it takes for data to travel to and from the satellite) is high enough that real time applications like video conferencing are not practical. Low earth orbit satellites (Starlink) showed promise during early tests with high speeds and acceptable latency; however, low earth satellite signals are vulnerable to interference from foliage and precipitation, and they do not have the capacity to handle large numbers of subscribers. As such, satellite remains a niche technology best suited for remote "frontier" locations.

## Fiber Optic Cable

Fiber optic cable provides tremendous capacity, significant room for future growth, symmetrical speeds (the same speeds for upload and download), a long lifespan, and low ongoing maintenance costs. Residential fiber networks using readily available technology currently offer speeds up to 10 Gbps (10,000 Mbps), while business connections can range as high as 400 Gbps. Engineers have yet to discover an upper speed limit for fiber optic cables. Thus, fiber installed today can support ever increasing speeds over its 30-40 year lifespan simply by upgrading the electronics connected to those cables. Fiber does have significant capital costs up front, but once installed it costs much less to maintain than alternative technologies.



## Additional Considerations in Overall Assessment

### Cost-to-Pass

Fiber optic cable comes in a wide range of styles, from lightweight household drop cable to high-capacity cable that bundle hundreds of fiber strands together to carry massive amounts of data. Household drop fiber is inexpensive and puts less strain on utility poles, but it has limited capacity.

Broadband speeds have increased 10-fold every decade since 1990. To ensure that a fiber network built today remains useful 40 years from now, this report assumes the use of high strand-count cables. While a provider could deliver broadband that meets current state and federal speed requirements using only low strand-count household drop cable, such a network would offer little flexibility to expand services or increase speeds as demand rises.

Material and labor costs for high strand-count fiber are estimated at \$45,000 per mile (excluding make-ready). The cost ranges are provided in Figure 5.

### Cost-to-Serve

Internet providers typically absorb the cost of running a drop cable from an individual home or business to the nearest utility pole. The ISPs also generally covers the cost of the electronics to serve the homes and businesses. As such, we include the cost-to-serve as ISP match in project calculations.

### Distance and Total Cost

Broadband infrastructure typically follows existing utility corridors that primarily align with roads. While some utility corridors extend cross-county, road miles remain a strong proxy to estimate the required number of fiber miles. Thus, total project cost can be estimated by multiplying the make-ready and cost-to-pass per mile estimates times the number of state, county, township and unincorporated road miles in unserved areas.

## Estimating Fiber Costs and Distances

Building a fiber network involves three basic expenses: preparing utility corridors to support fiber optic cables (make-ready), installing fiber along those corridors (cost-to-pass), and connecting individual homes and businesses to the new fiber (cost-to-serve)

	LOW	EXPECTED	HIGH
Make Ready	\$40,000 *	\$55,000	\$50,000
Cost to Pass	\$40,000	\$45,000 **	\$65,000
TOTAL	\$80,000	\$100,000	\$115,000

Figure 5: Cost Projection Ranges for Aerial Fiber

\* Some industry groups estimate make-ready as low as \$5,000-10,000 per mile. Such estimates generally either assume the pole owners will make up the difference or that low strand count drop cables are being deployed.

\*\* Given current inflation rates, some providers are including material cost increases of up to 15% per year in their budget projections.

# In-County Assets

## Middle Mile

A middle mile network bridges the gap between communities being served and major internet exchanges. Middle mile fiber is necessary for any terrestrial broadband deployment, including both fixed wireless and fiber to the home. Middle mile can be either “open” (available to any provider who wishes to lease capacity) or “closed” (available only to the provider who owns that middle mile). Horizon Telcom currently offers open middle mile services that pass east to west through McConnelsville with significant north/south coverage along the river (see map figure). Additional closed middle mile may exist in the County; however, providers typically do not publish such routes.



Figure 6: Existing Middle Mile

## Towers & Vertical Assets

To assist with possible short term fixed wireless deployments, we have included in Figure 7 data about the location of cell towers, FAA-registered vertical structures, and MARCS towers in Morgan County. It is important to note that some cell towers may not appear in publicly available map data.

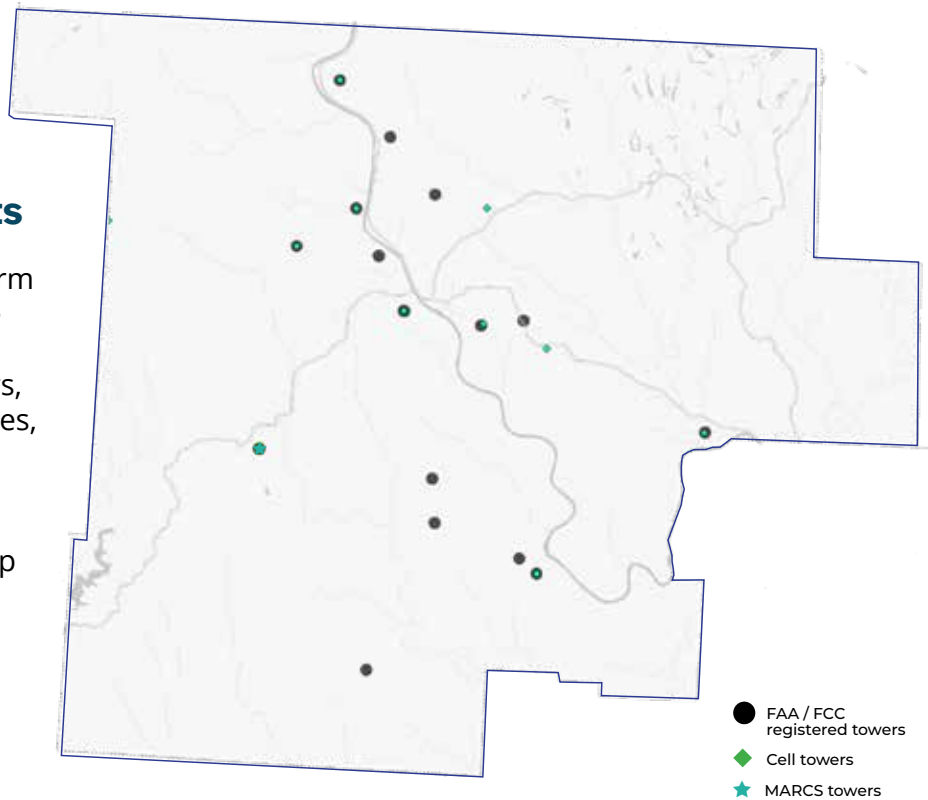


Figure 7: Morgan County Vertical Assets

## Adjoining County Assets

In some cases, it can be possible to subsidize incumbent providers in better served areas to expand their territory into adjacent areas. Crooksville in Perry County and Beverly in Washington County are the closest well-served areas adjacent to Morgan County. The Burr Oak region also has expansion potential in combination with Athens County, as the park and its surrounding areas straddle the county line.

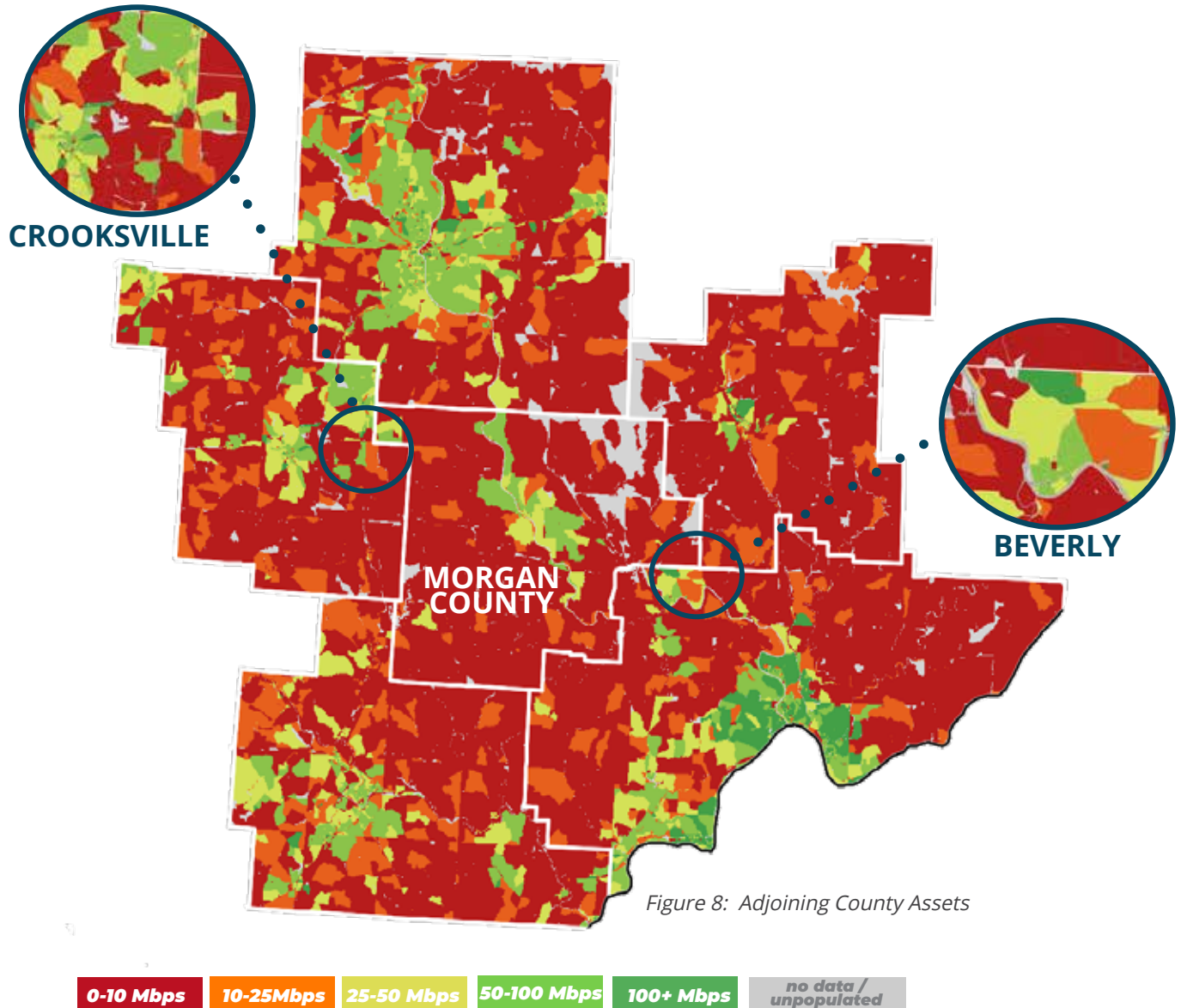


Figure 8: Adjoining County Assets

The existing open middle mile segments that pass through Morgan County are part of Horizon Telcom's regional middle mile network. Segments of that network pass quite close to the Athens/Morgan County line. In the south, middle mile passes within 1.5 miles of the county line at two different locations: the village of Bishopville near Burr Oak State Park and at a point approximately 3 miles southwest of Chesterhill and 1.3 miles southeast of Joy. On the eastern side of the County, middle mile extends through Beverly and continues northeast along SR 339 into Noble County. The northern portion of the county represents a gap in available open middle mile. The nearest segment that could be extended to reach Morgan County from the north currently crosses SR 60 near Pioneer Park in Zanesville.

Vertical assets can be found within 2 miles of the county line on the western and southern sides of Morgan County, including a MARCS tower on Fierce Ridge Rd just across the Athens County line. These adjacent towers have the same potential upsides and downsides for fixed wireless as towers located within Morgan County. While they have the potential to reach subscribers within a line of sight radius, steep valleys and heavy foliage reduce the total number of households that could be reached from these locations.

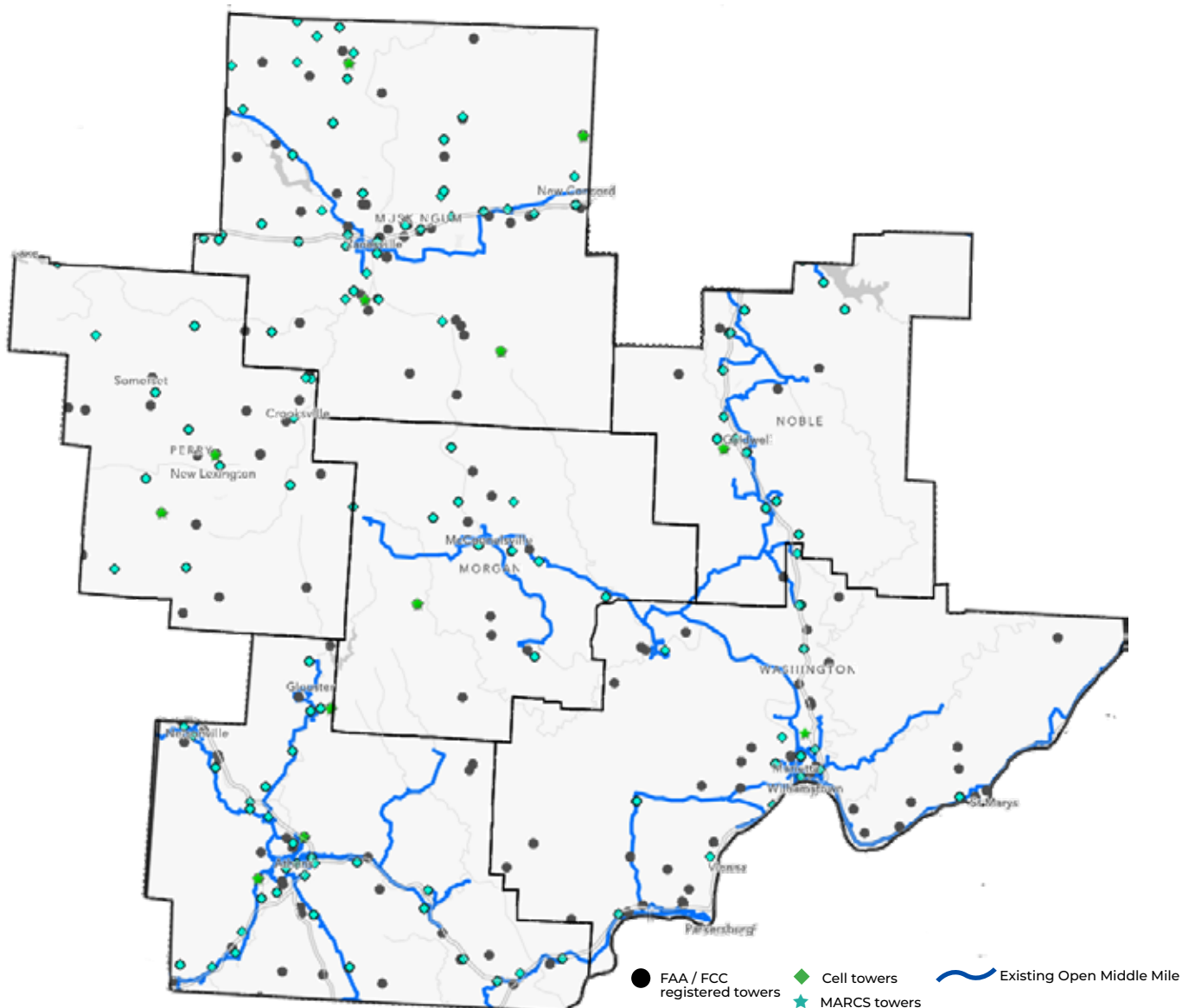
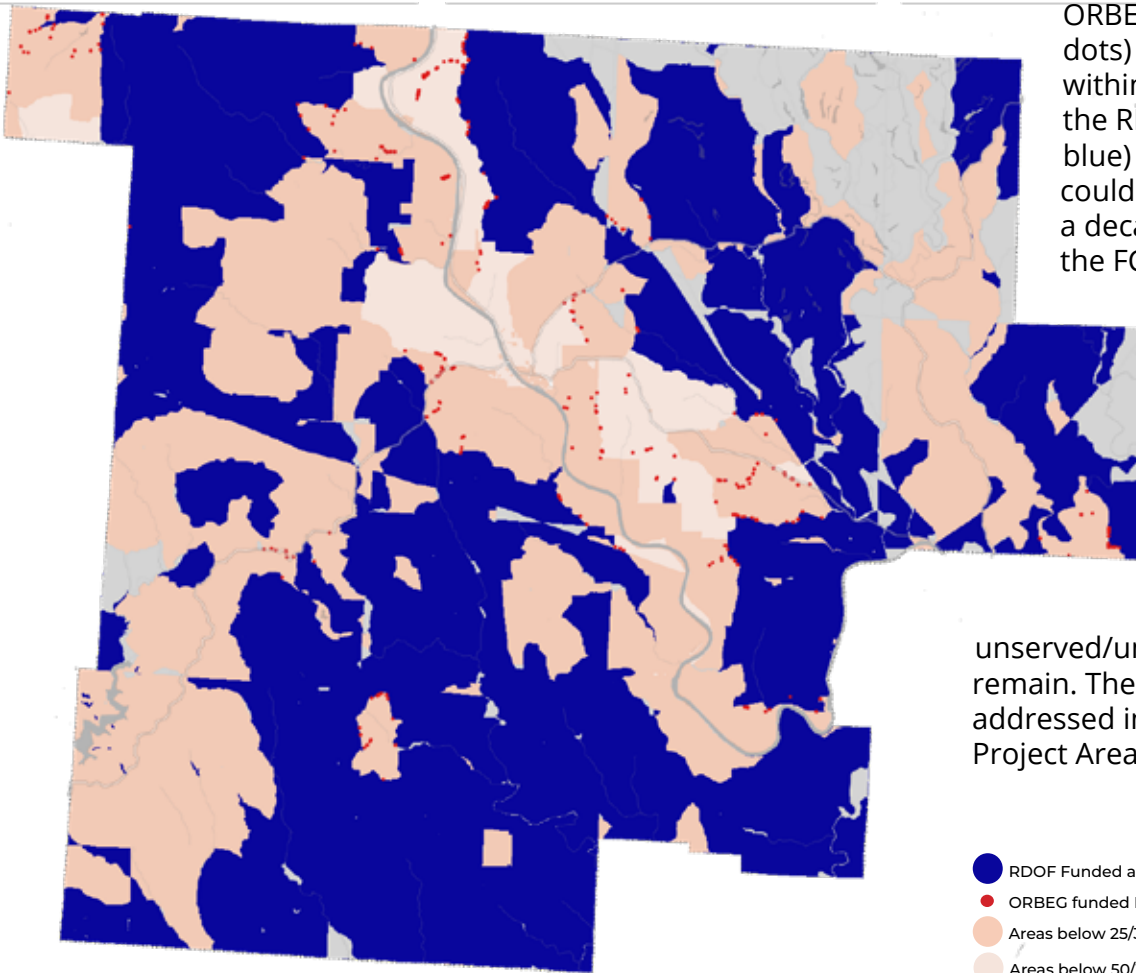


Figure 9: Middle Mile and Adjoining County Vertical Assets

# Gap Analysis & Opportunities

## Unfunded Territory

Charter Communications / Spectrum received funding to deploy fiber to the home in significant portions Morgan County (Figure 10) during Phase 1 of the FCC’s Rural Digital Opportunity Fund (RDOF) and the Ohio Residential Broadband Expansion Grant program (ORBEG). Charter’s



ORBEG deployments (red dots) must be completed within two years, while the RDOF territories (dark blue) have timeline that could extend up to nearly a decade. Given that both the FCC and the State of

Ohio have approved Charter’s funding in their respective territories, we have excluded those from consideration. Even with these territories removed from consideration, significant unserved/underserved areas remain. These areas are addressed in more detail in the Project Area section of this report..

- RDOF Funded areas
- ORBEG funded Households
- Areas below 25/3 Mbps
- Areas below 50/10 Mbps
- Unpopulated area / no data

Figure 10: RDOF and ORBEG Funded areas in Morgan County

## Lack of Competition

While Morgan County currently has multiple providers, including Charter, several WISPs, and copper-based DSL services from CenturyLink/Lumen, in practice Charter Communications is the dominant provider. While Charter’s extensive RDOF and ORBEG awards have the potential to increase the availability of high speed services, the lack of significant competition could result in delayed deployment and affordability issues for customers.

# Opportunities

Having multiple options for project areas with a clear understanding of priorities makes it easier to match those areas up with specific funding programs or internet providers. For example, some grant programs focus exclusively on residential service, while others include economic development as a core component.

## GRANT PROGRAMS

### Appalachian Regional Commission (ARC) POWER

The ARC POWER program accepts grant applications for projects that focus on economic development and business expansion. While not a broadband-specific program, up to one-third of available POWER funds in 2022 were earmarked for broadband. For Morgan County, the ARC expects at least 30% matching funds when applying for a POWER grant.

**Who can apply:** Local development districts, states/counties/cities or other political subdivisions and their agencies, institutions of higher education, and public or private nonprofits. Public/private partnerships are encouraged, with the private partner selected via RFP.

**Locations:** Unserved Appalachian communities and regions affected by job losses in coal mining, coal power plant operations, and coal-related supply chain industries due to the changing economics of America's energy production. Must have a business component: sole fiber-to-the-home projects will not be considered. Areas that received funding through other programs are not eligible.

**Project size:** \$400K - \$2.5M for deployment. Up to \$50K available to fund planning efforts. Applicant must provide at least some match (cash or in-kind).

**Technology:** Any

 <https://www.arc.gov/arcs-power-initiative/>

### American Rescue Plan Act (ARPA) or Other Local Funding

ARPA provides funds to local government agencies to address infrastructure needs, including broadband. While ARPA funds alone are not sufficient to fund broadband projects on a large scale, they can be used to incentivize provider investment or included in grant applications as matching funds. For example, a county could contribute some of its ARPA funding as match for an ARC POWER application or to help incentivize an internet provider or rural electric cooperative to apply for an ORBEG grant.

## United States Department of Agriculture (USDA) ReConnect

The USDA's ReConnect program provides capital subsidy via grants, loans, and grant/loan hybrids to deploy broadband to rural areas with speeds slower than 100 Mbps up and 20 Mbps down. Applications have already closed for Round 4, but the USDA has indicated that there definitely will be a Round 5 and possibly a Round 6.

**Who can apply:** Corporations, LLCs, Co-ops, and states or local governments including any agency, subdivision, instrumentality, or political subdivision thereof

**Locations:** Rural areas where at least 90% of households have speeds below 100/20 Mbps. Rural areas include cities/towns with population below 20,000 and urbanized areas contiguous and adjacent to a city/town with population below 50,000. Areas that received funding under other programs are not eligible.

**Project size:** Grants: up to \$25M; Grant/loan hybrids: up to \$50M (\$25M grant and \$25M loan); Loans: up to \$50M

**Technology:** Any



<https://www.usda.gov/reconnect>

## Ohio Residential Broadband Expansion Grant (ORBEG) program

BroadbandOhio's ORBEG focuses on expanding residential broadband availability in the State of Ohio. During the first round, \$250 million was awarded across the state with a large percentage of that money going to Appalachian Ohio. Reid Consulting Group expects ORBEG to receive approximately \$1 billion in new federal broadband funding through the Infrastructure Investment & Jobs Act (IIJA)/ Broadband Equity, Access, and Deployment (BEAD) program and an additional \$270 million from the Treasury Capital Projects Fund. BroadbandOhio has yet to announce how future rounds of funding will be awarded, but the program should be a significant source of funding.

**Who can apply:** Internet service providers.

**Locations:** Unserved (below 10/1 Mbps) and underserved communities (below 25/3 Mbps).

**Project size:** Any

**Technology:** Any



<https://broadband.ohio.gov/>

## Rural Digital Opportunity Fund (RDOF)

The FCC's Rural Digital Opportunity Fund provides capital subsidy to deploy broadband to areas with speeds slower than 25 Mbps up and 3 Mbps down. Funds from the first phase of this program were awarded in December 2020 via reverse auction. In Morgan County, FCC authorizations are complete for Phase 1 with Charter Communications receiving authorization for all of the census blocks it bid on in the County. Connect Everyone and LTD Broadband have defaulted on the handful of blocks they won in Morgan County. Those blocks are included as unfunded territory in RCG's map analysis. The FCC will be conducting at least one more round of RDOF funding using new maps that have yet to be published.

➔ ***If a provider abandons territories won during the first round, then those territories should be eligible during round 2.***

**Who can apply:** Anyone who bids in RDOF must have an Eligible Telecommunications Carrier (ETC) designation before the due diligence phase of the award process. This requirement somewhat favors established internet providers and telecommunications carriers; however, it does not rule out other organizations. For example, a rural electric cooperative or municipality could bid on RDOF territories as long as they file ETC paperwork with enough lead time to be certified during due diligence phase of the award.

**Locations:** Census blocks with speeds < 25/3 Mbps as defined by the FCC's internal maps

**Project size:** Any

**Technology:** Any

 <https://www.usac.org/high-cost/funds/rural-digital-opportunity-fund/>



**Click or Scan**  
with your  
smartphone to  
view RDOF phase 1  
auction results



# Project Identification and Prioritization

Given the findings detailed above, RCG and Morgan County have determined that securing grant dollars for broadband expansion is the appropriate next step. Charter Communications (Spectrum) has already received state and federal funding for large portions of Morgan County in [RDOF Phase 1](#) and [ORBEG](#). For the remaining unserved areas, RCG worked with Morgan County to identify 14 potential service areas. Demographic and cost estimates for these areas are summarized in FIGURE below and presented in additional detail in the following pages.

These 14 project areas do not necessarily need to be kept separate. Depending on the specific grant program, it may be advisable to combine two or more areas in a single application. Likewise, in some cases it may be possible to expand requested coverage beyond the defined project boundaries.

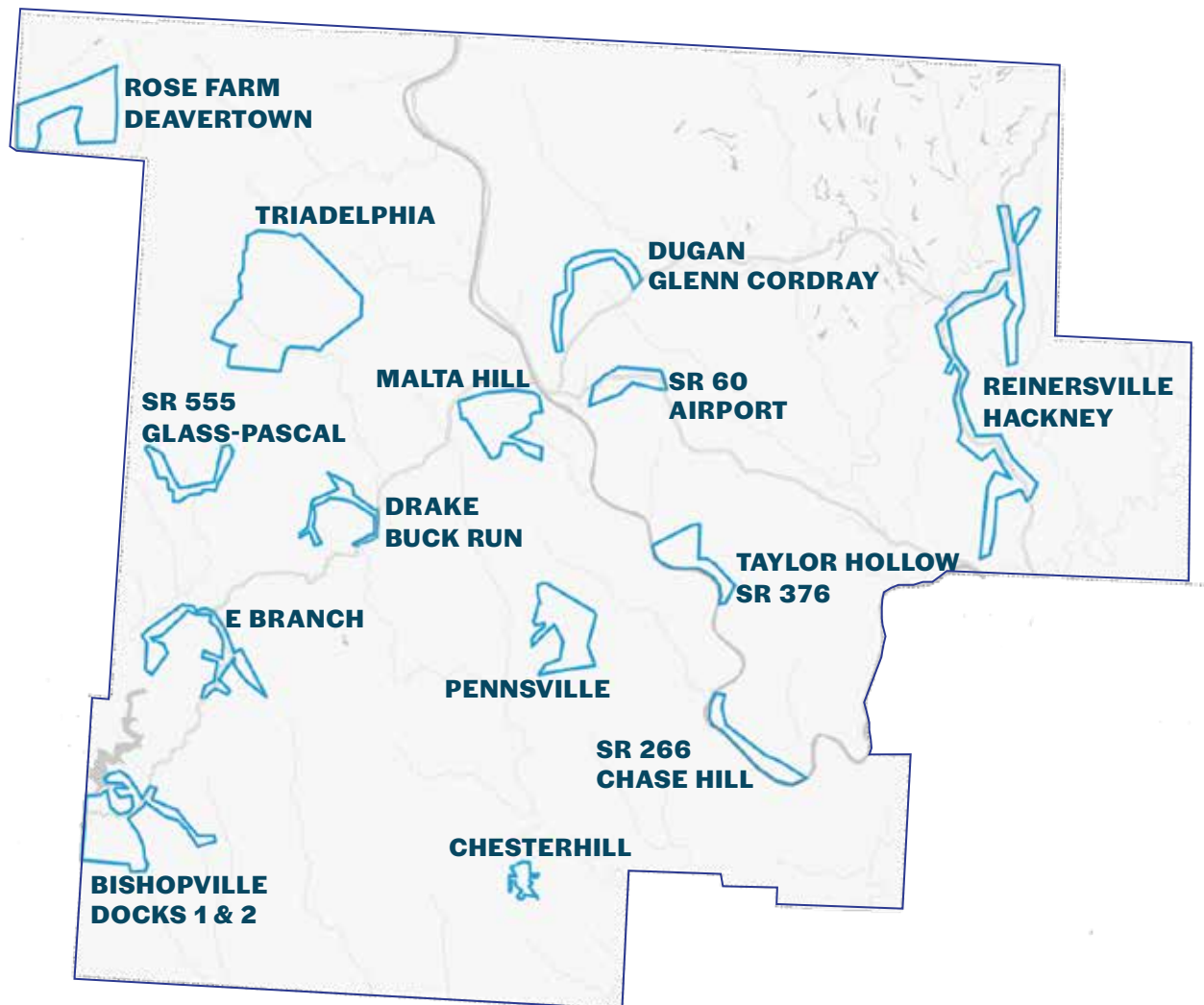


Figure 12: Morgan County potential project areas

PROJECT AREA  
**SR 555-Glass-Pascal**

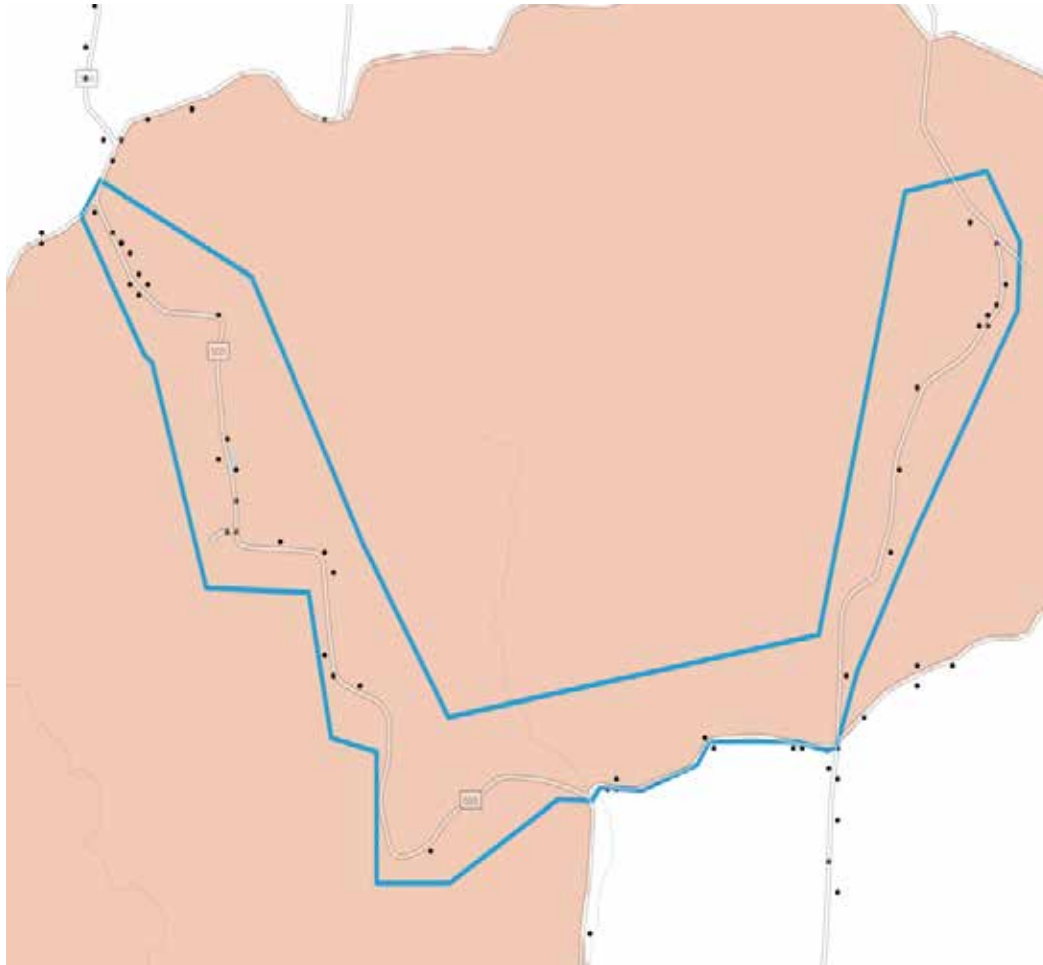


Figure 13: SR 555-Glass-Pascal Potential Project

**43** unserved households

**3.8** fiber miles

**11.3** households per fiber mile

**\$407,090**  
total project cost

**20%**  
ISP investment  
projected  
\$81,700

**\$325,390**  
funding gap

**0** businesses

PROJECT AREA  
**SR 78 - E Branch**

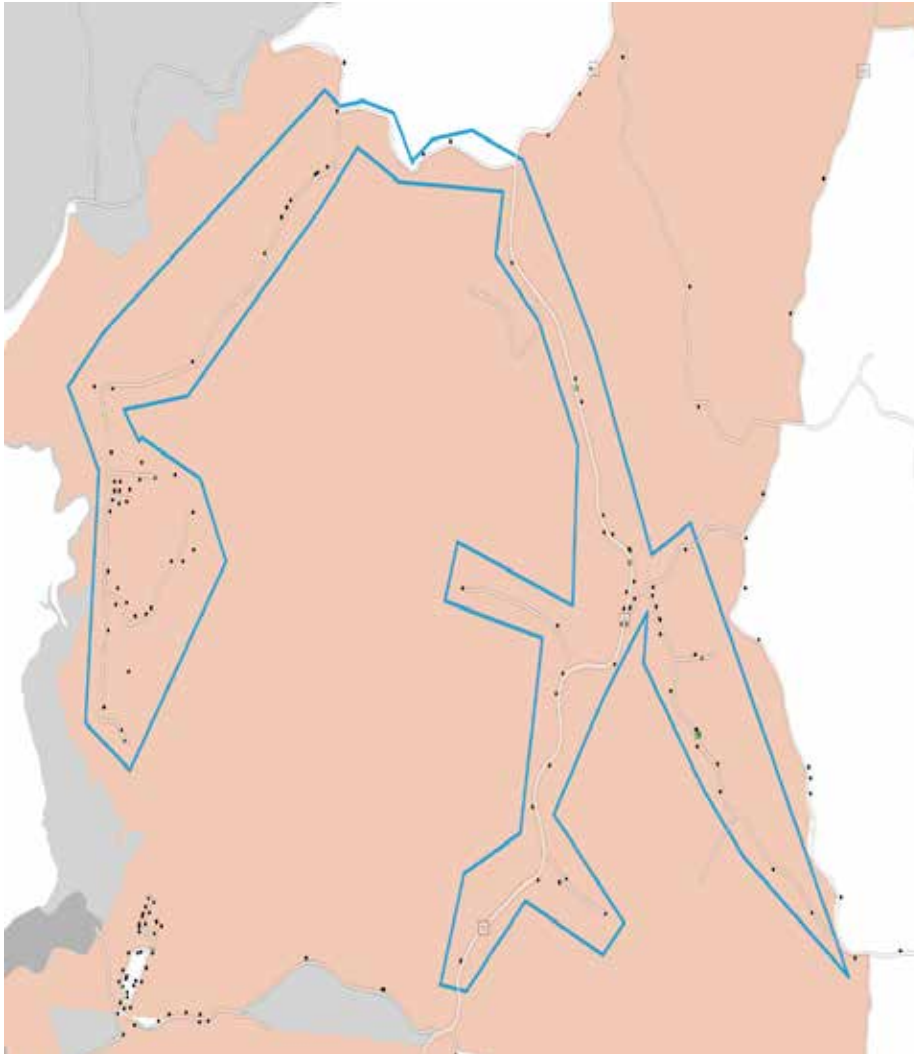


Figure 14: SR 78 - E Branch Potential Project

**91** unserved households  
**8.3** fiber miles

**11.0** households per fiber mile

**\$887,330**  
total project cost

**19%**  
ISP investment  
projected  
\$172,900

**\$714,430**  
funding gap

**3** businesses

PROJECT AREA  
**Malta Hill**

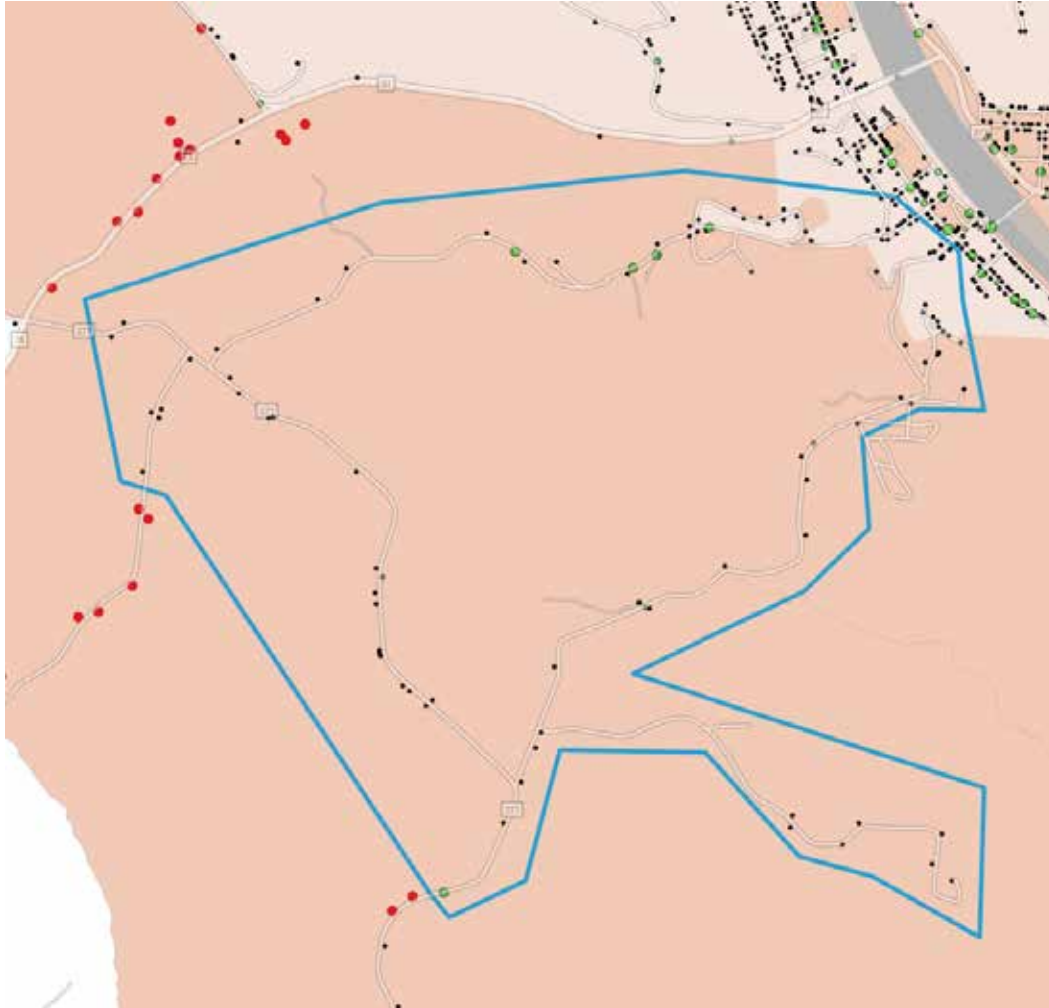


Figure 15: Malta Hill Potential Project

**107** unserved households  
**7.9** fiber miles

**\$857,410**  
total project cost

**24%**  
ISP investment  
projected  
\$203,300

**\$654,110**  
funding gap

**13.5** households  
per fiber mile

**8** businesses

PROJECT AREA  
**Taylor Hollow**  
**SR 376**

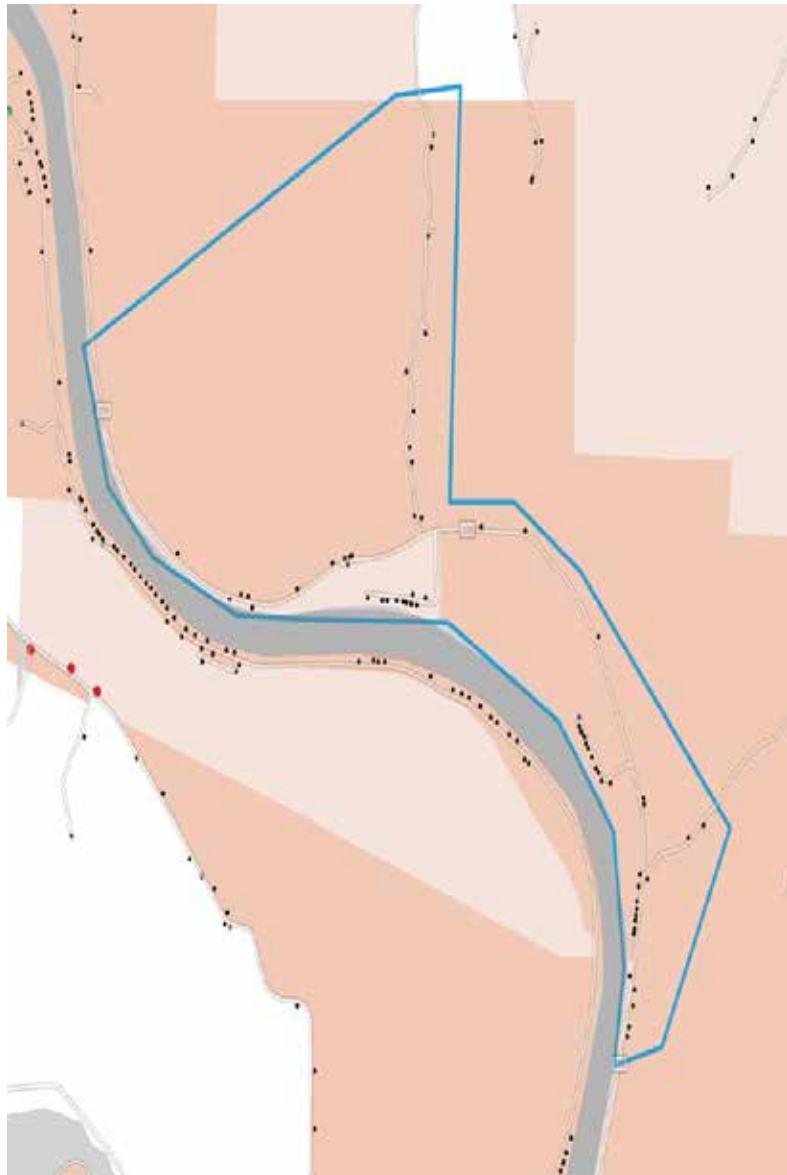


Figure 16: Taylor Hollow SR 376 Potential Project

**64** unserved households  
**4.3** fiber miles

**14.9** households per fiber mile

**\$470,320**  
total project cost

**26%**  
ISP investment projected  
\$121,600

**\$348,720**  
funding gap

**1** business

PROJECT AREA  
**Triadelphia**

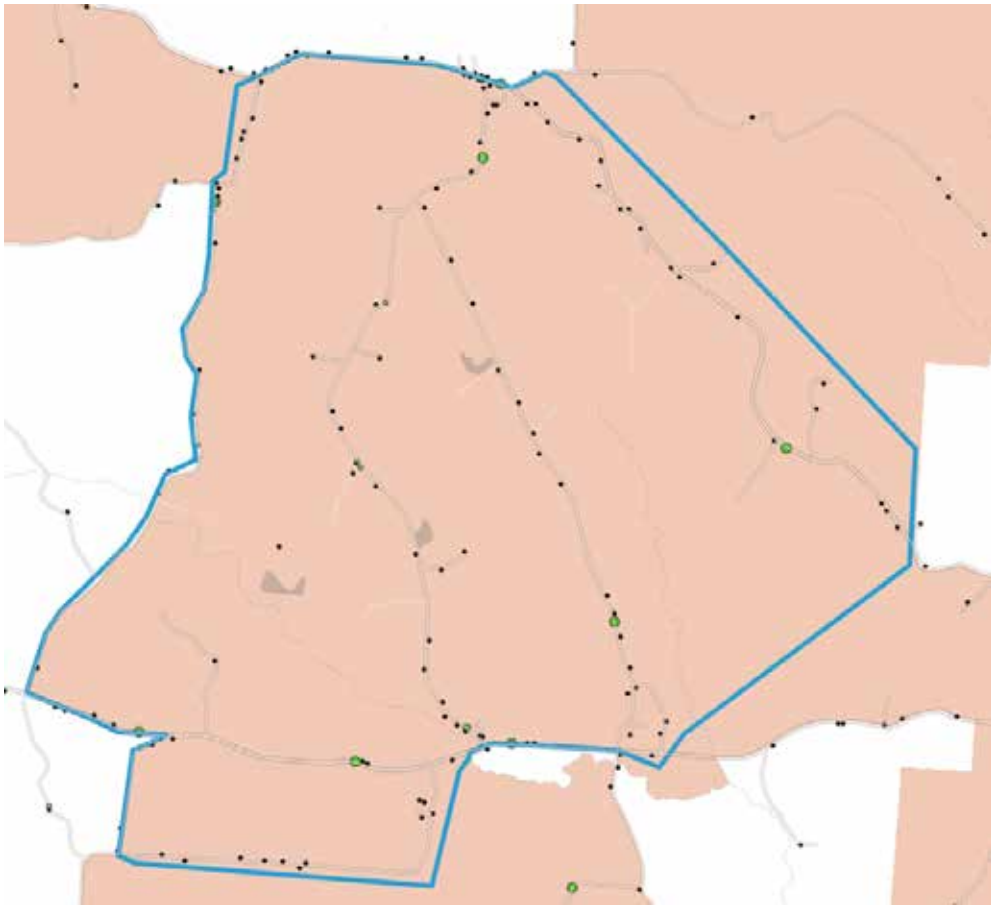


Figure 17: Triadelphia Potential Project Area

**109** unserved households  
**16.0** fiber miles

**6.8** households per fiber mile

**\$1,668,670**  
total project cost

**12%** ISP investment projected  
\$207,100

**\$1,461,570**  
funding gap

**14** businesses

PROJECT AREA  
**Pennsville**

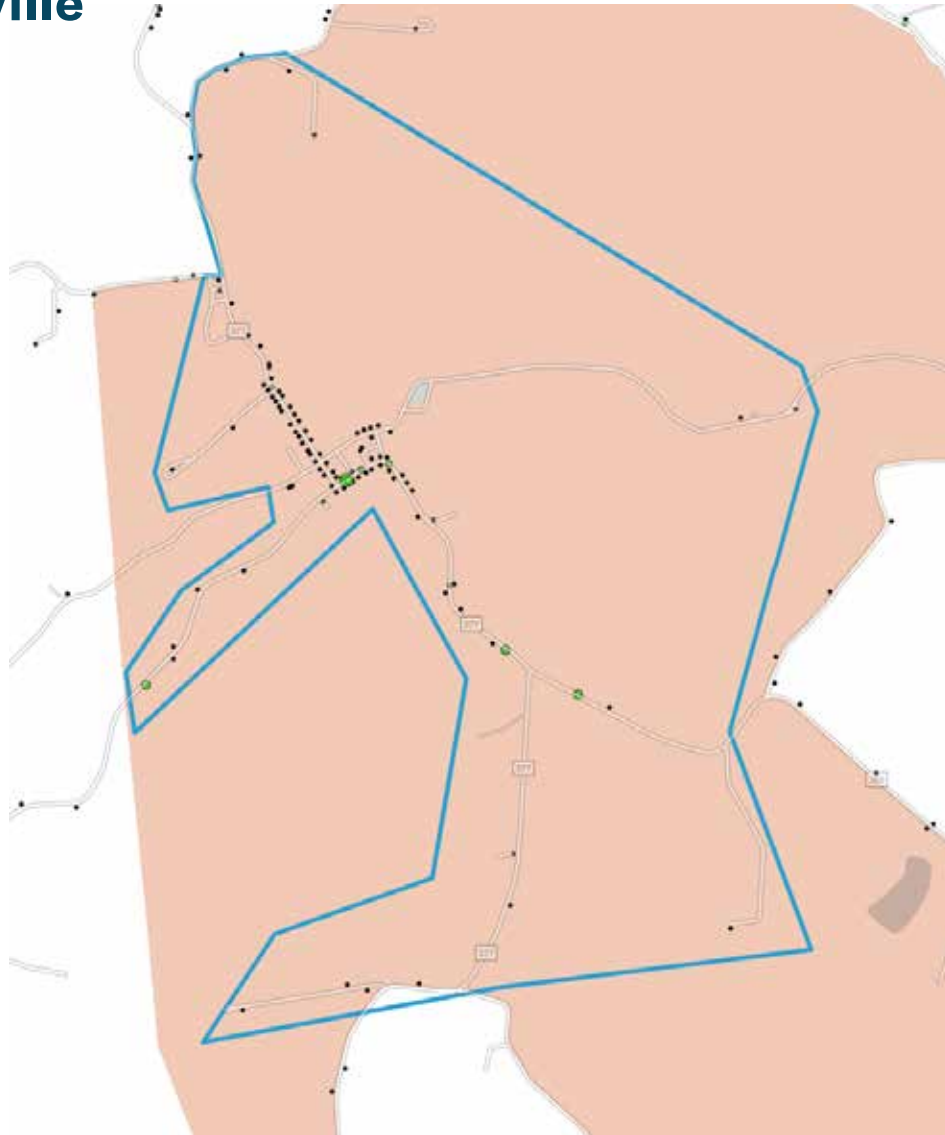


Figure 18: Pennsville Project Area

**92** unserved households

**6.6** fiber miles

**13.9** households per fiber mile

**\$717,960**  
total project cost

**24%**  
ISP investment  
projected  
\$203,300

**\$543,160**  
funding gap

**10** businesses

PROJECT AREA  
**Bishopville**



Figure 19: Bishopville Potential Project Area

**225** unserved households  
**13.0** fiber miles

**19.6** households per fiber mile

**\$1,460,650**  
total project cost

**33%**  
ISP investment  
projected  
\$484,500

**\$976,150**  
funding gap

**13** businesses



PROJECT AREA  
**Rose Farm - Deavertown**

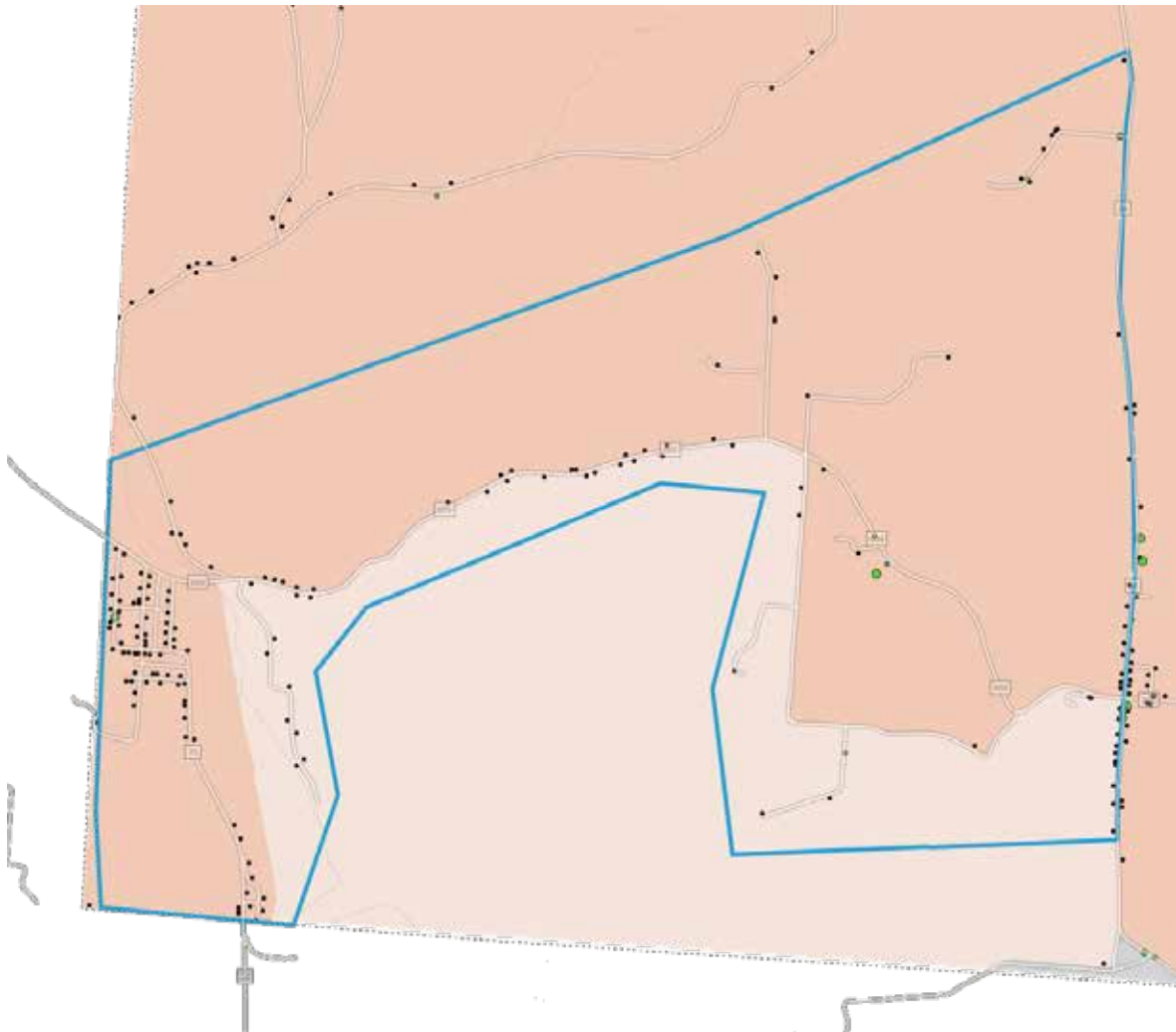


Figure 21: Rose Farm - Deavertown Potential Project Area

**159** unserved households

**9.8** fiber miles

**16.2** households per fiber mile

**\$1,080,170**  
total project cost

**28%**  
ISP investment  
projected  
\$302,100

**\$778,770**  
funding gap

**8** businesses

PROJECT AREA  
**Chesterhill**



Figure 22: Chesterhill Potential Project Area

**159** unserved households

**3.0** fiber miles

**53** households per fiber mile

**\$400,170**  
total project cost

**75%**  
ISP investment  
projected  
\$302,100

**\$98,070**  
funding gap

**10** businesses

PROJECT AREA  
**Drake - Buck Run - SR 78**

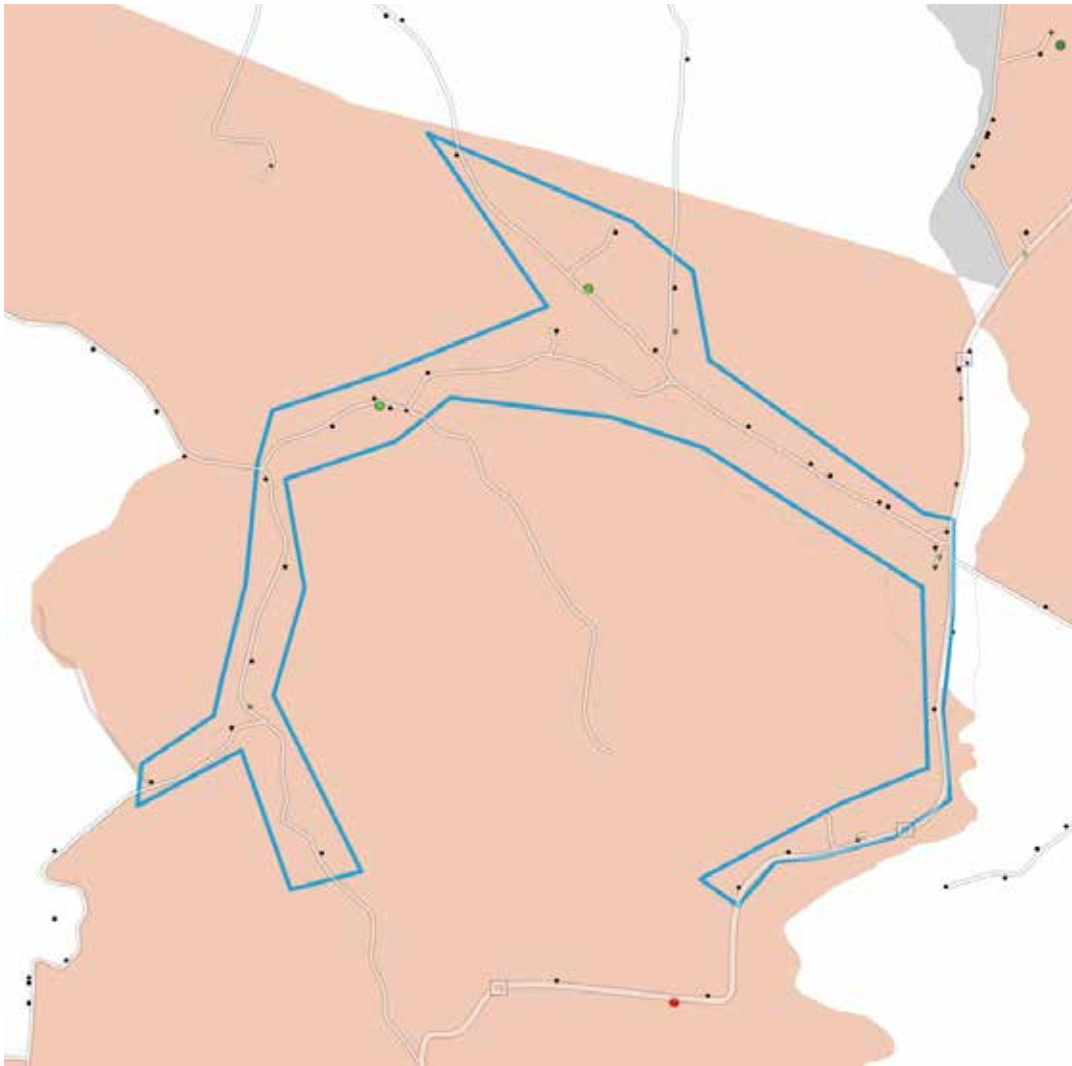


Figure 23: Drake- Buck Run - SR78 Potential Project Area

**28** unserved households

**5.4** fiber miles

**\$557,640**  
total project cost

**10%**  
ISP investment  
projected  
\$53,200

**\$504,440**  
funding gap

**5.2** households  
per fiber mile

**5** businesses

PROJECT AREA  
**Dugan - Glenn Cordray**

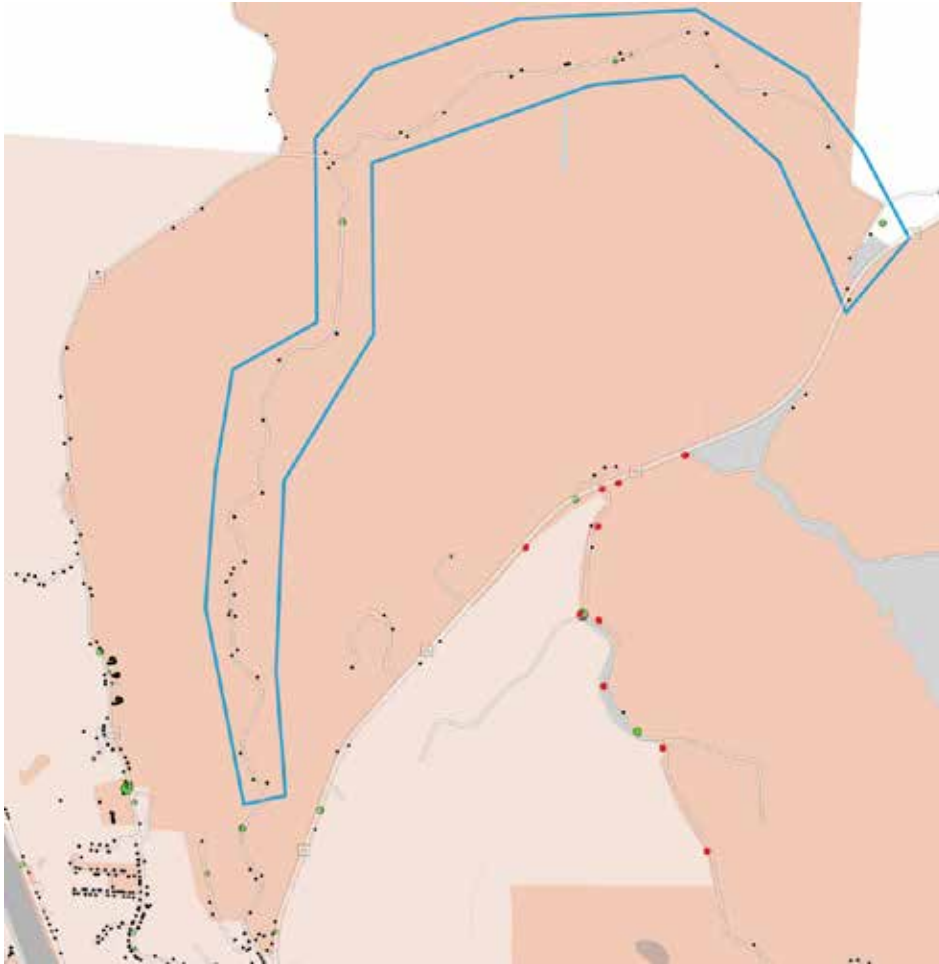


Figure 24: Dugan - Glenn Cordray Potential Project Area

**39** unserved households  
**4.6** fiber miles

**8.5** households per fiber mile

**\$484,570**  
total project cost

**15%**  
ISP investment projected  
\$74,100

**\$410,470**  
funding gap

**5** businesses

PROJECT AREA  
**SR 266 - Chase Hill**

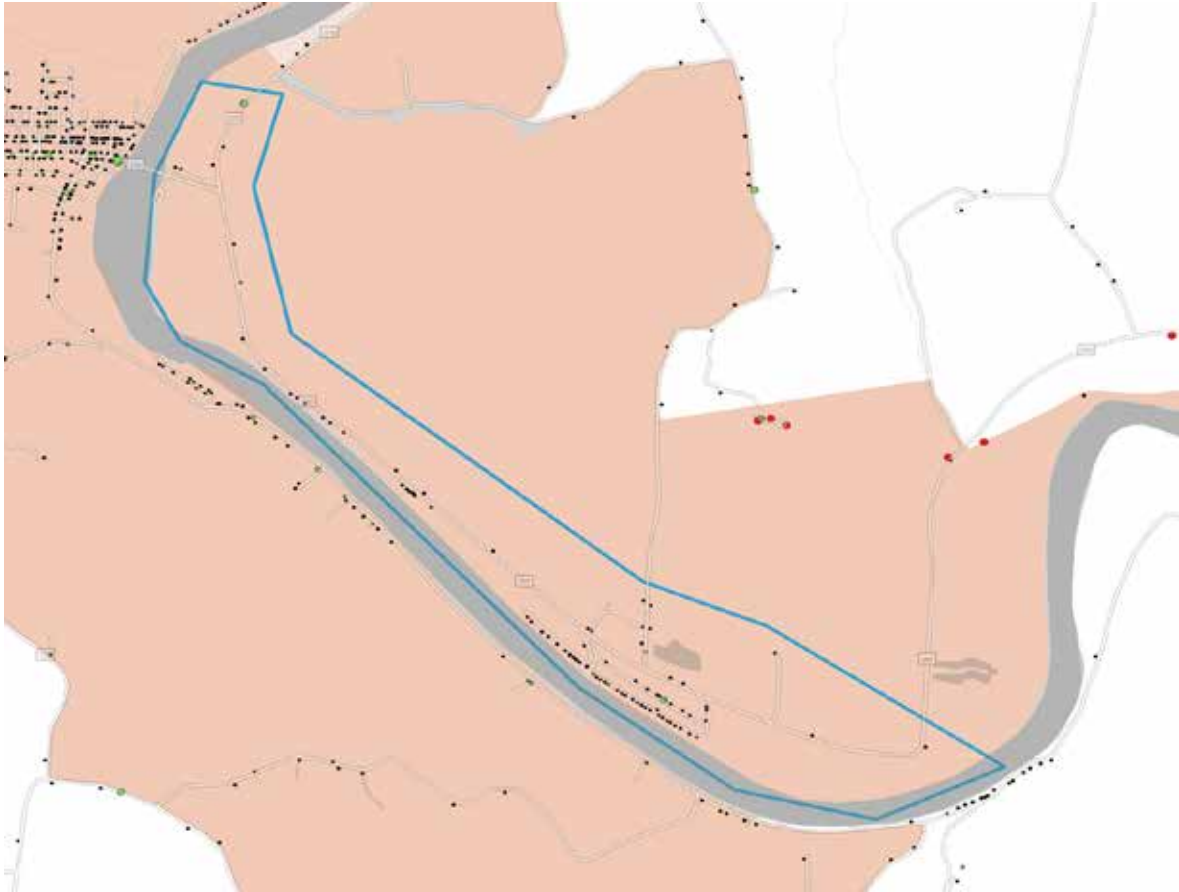


Figure 25: St Rt 266- Chase Hill Potential Project Area

**81** unserved households  
**4.8** fiber miles

**16.9** households per fiber mile

**\$531,030**  
 total project cost

**29%**  
 ISP investment  
 projected  
 \$153,900

**\$377,130**  
 funding gap

**4** businesses

PROJECT AREA  
**SR 60 - Airport**

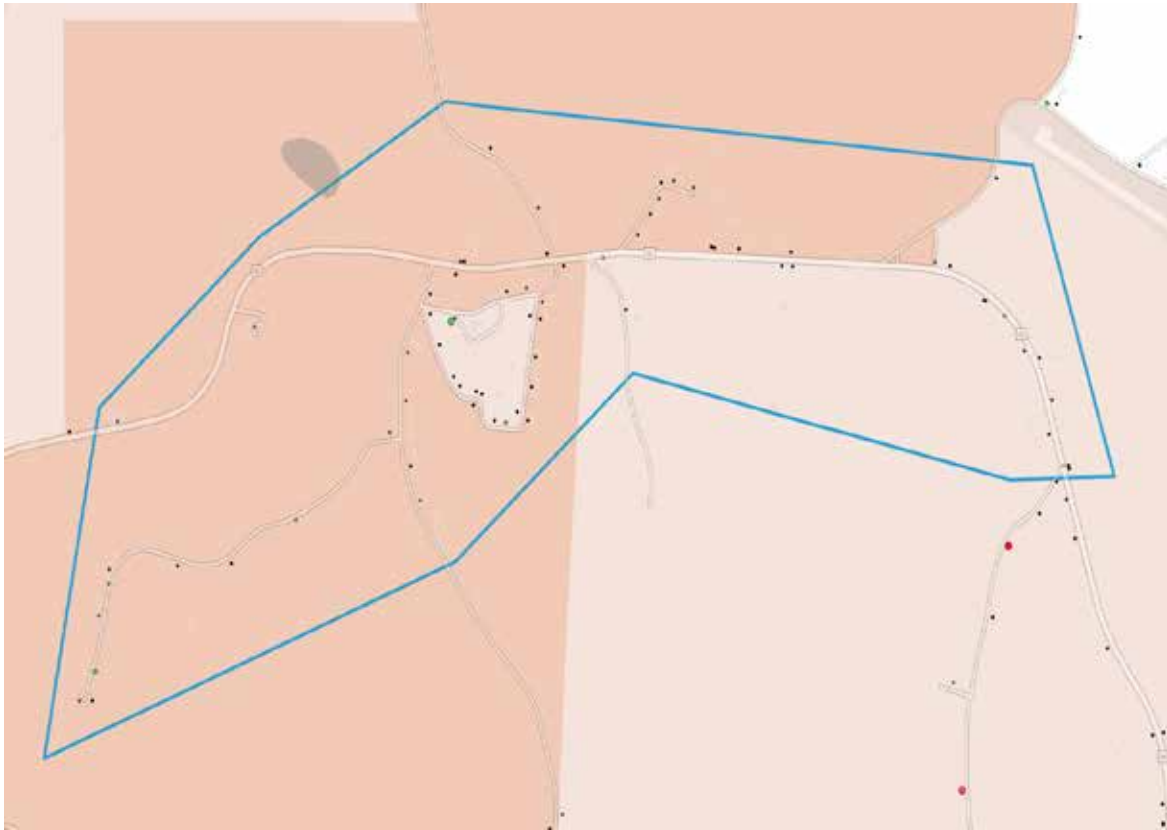


Figure 26: SR 60 - Airport Potential Project Area

**63** unserved households  
**4.7** fiber miles

**13.4** households per fiber mile

**\$509,690**  
total project cost

**23%**  
ISP investment  
projected  
\$119,700

**\$389,990**  
funding gap

**8** businesses

PROJECT AREA  
**Reinersville - Hackney**

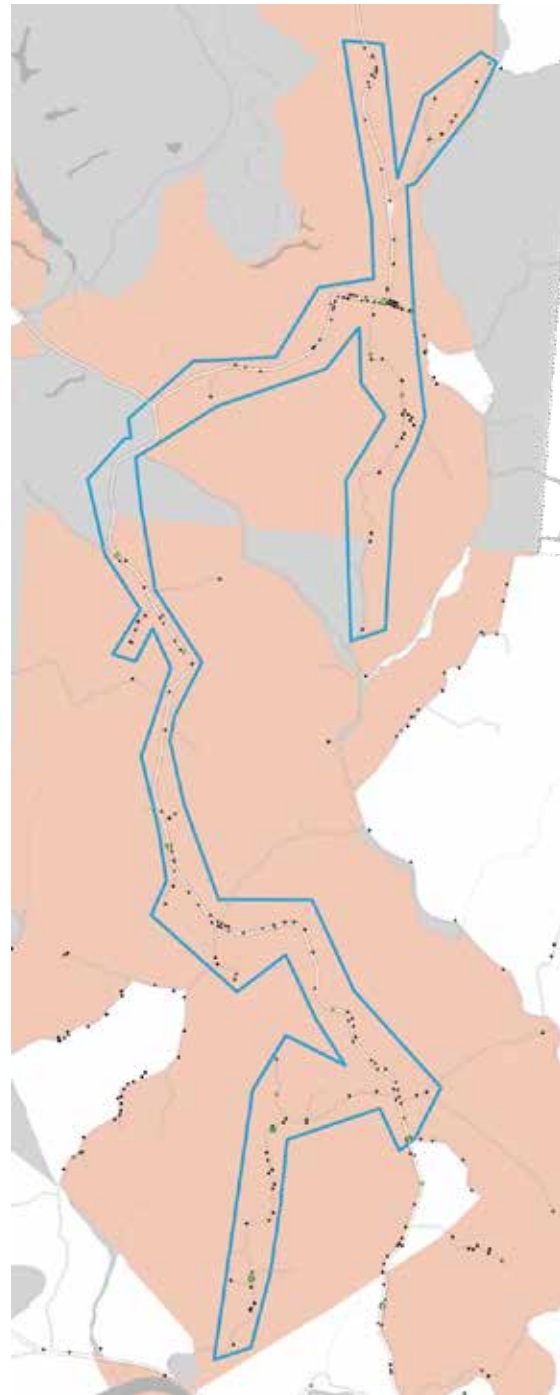


Figure 20: Reinersville - Hackney Potential Project Area

**181** unserved households  
**18.2** fiber miles

**9.9** households per fiber mile

**\$509,690**  
 total project cost

**23%**  
 ISP investment projected  
 \$119,700

**\$389,990**  
 funding gap

**12** businesses

# QUALITY OF LIFE

Morgan County, Ohio is heralded as a place of tremendous history and natural beauty. Many families came to Morgan County just after its incorporation in 1817 and stayed through the turn of the 20th century thanks to the availability of quality work and natural resources. Since then, the population in Morgan County has gradually declined, now carrying less than half of the mid-19th century census high of more than 28,000 residents. The 2020 census reported a county-wide population of 13,802, representing the lowest population reported since 1970 and an almost 10% decline since 2010.<sup>4</sup> The disappearance of jobs in the coal industry, the consolidation of schools and workforces, and the lack of infrastructure and technological conveniences found in urban centers have depleted the resource that makes Morgan County special – its people. Those who make Morgan county their home face dramatic hurdles to overcome.

The most recent USDA Poverty level numbers continue to represent persistent poverty among residents. Since 2000, one in five people (18%), and one in four children (25%) under the age of 17 live below the poverty line, outpacing the state of Ohio (12.9% total population/17.3% Children under 17).<sup>5</sup>

In October 2022, Jobs Ohio reported Morgan County's unemployment rate at 4.6% (not seasonally adjusted), surpassing both the state of Ohio (4.1%) and a full percentage point higher than the national average (3.4%).<sup>6</sup>

A contributor to unemployment is the inability to retain workers. While 85% of the school-aged population is enrolled in kindergarten through 12th grade, significantly better than the 69.6% average across Ohio, only 45.1% of the population aged 25 and older have a high school diploma, and just 10.9% of the same population have a bachelor's degree – nearly a third of the state average.<sup>7</sup>

As expected, disparity in workforce and education attainment impacts reported income and earnings. According to the 2022 census, Morgan County's \$44,848 median household income is close to 30% lower than the state of Ohio average (\$62,262) and 35% less than the national average (\$67,521).<sup>8</sup>

It's not hard to pinpoint some of the sources of economic struggle in Morgan County. The average commute for Morgan County professionals is greater than 30 minutes. Many are traveling outside of the county and even out of the state to larger population centers in search of a living wages.<sup>9</sup>

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<sup>4</sup> [https://data.census.gov/profile/Morgan\\_County,\\_Ohio?g=0500000US39115](https://data.census.gov/profile/Morgan_County,_Ohio?g=0500000US39115)

<sup>5</sup> <https://data.ers.usda.gov/reports.aspx?ID=17826>

<sup>6</sup> [https://ohiolmi.com/\\_docs/laus/colorratemap.pdf](https://ohiolmi.com/_docs/laus/colorratemap.pdf)

<sup>7</sup> [https://data.census.gov/profile/Morgan\\_County,\\_Ohio?g=0500000US3911](https://data.census.gov/profile/Morgan_County,_Ohio?g=0500000US3911)

<sup>8</sup> [https://data.census.gov/profile/Morgan\\_County,\\_Ohio?g=0500000US3911](https://data.census.gov/profile/Morgan_County,_Ohio?g=0500000US3911)

<sup>9</sup> [https://data.census.gov/profile/Morgan\\_County,\\_Ohio?g=0500000US3911](https://data.census.gov/profile/Morgan_County,_Ohio?g=0500000US3911)



Another strong indicator has been the impact of the waning coal industry. Each year, the Appalachian Regional Commission (ARC) ranks the impact of the losses in the coal industry on communities throughout the 13 state Appalachian region. ARC's 2022 report demonstrates Morgan County as having the "Highest" impact across all three of the metrics used - dependence, impact and risk - meaning that Morgan County falls in the bottom 20% in these areas. Morgan County also ranks in the bottom 20% for the composite score, which incorporates all three metrics. Morgan is one of just seven Ohio counties in this demographic.<sup>10</sup>

Additionally, each year the ARC applies an index-based classification system to compare each county in the region with national averages to understand how counties are performing. Analyzing three-year average unemployment rates, per capita market income, and poverty rates, each one of Appalachia's 423 counties is then classified within one of five economic status designations—distressed, at-risk, transitional, competitive, or attainment. FY2023 will be the fourth year in a row in which Morgan County has been tagged with an "At-Risk" designation.<sup>11</sup>

Buckeye Hills Regional Council recently compiled the following claim and evidence regarding the economic impact of remote work in areas such as Morgan County:

*Professional and academic research has gradually investigated and demonstrated the economic benefits remote work offers to non-metro and rural economies. Much early research on this subject focused on the impacts of the in-migration of "digital nomads" to rural communities, especially in response to state and local programs that offered economic incentives. For example, a 2022 report by the Economic Innovation Group found that one such program in Tulsa, Oklahoma delivered \$62 million in new local earnings in 2021.<sup>12</sup>*

*Numerous other studies have examined remote work commuting costs savings for existing jobs. A September 2022 study of 2,300 full-time U.S. workers found remote workers saved an average of over \$11,000 annually in commuting costs.<sup>13</sup> But researchers are beginning to identify other, more transformative, remote work benefits, as well risks that rural areas may miss on such benefits. Remote work is being found to encourage higher rural workforce participation, as shown by an evaluation of Ireland's extensive remote working hub system which found improved job access for people with disabilities and caring responsibilities.<sup>14</sup> Similarly, a 2022 study by Oxford University of remote work opportunities in more than 3000 US urban and rural counties found that while rural workers made higher use of online job information, many rural areas lacked the resources to support remote work.<sup>15</sup> This point was especially clear in a University of Missouri 2022 study which found each 1% increase in wired broadband adoption led to a 0.9% increase in rural employment.*

<sup>10</sup> <https://www.arc.gov/wp-content/uploads/2022/02/County-level-Coal-Impact-Maps.pdf>

<sup>11</sup> <https://www.arc.gov/classifying-economic-distress-in-appalachian-counties/>

<sup>12</sup> Daniel Newman, Kennedy O'Dell, & Kenan Fikri (2021) How Tulsa Remote is harnessing the remote work revolution to spur local economic growth, Economic Innovation Group, Washington, DC.

<sup>13</sup> 6th annual State of Remote Work Report (2022), Owl Labs, <https://owllabs.com/state-of-remote-work/2022>

<sup>14</sup> Harry Williamson (2022) An Evaluation of the Impacts of Remote Working, Irish Government Economic and Evaluation Service, Dublin

<sup>15</sup> Fabian Braesemann, Vili Lehdonvirta & Otto Kässi (2022) ICTs and the urban-rural divide: can online labour platforms bridge the gap?, *Information, Communication & Society*, 25:1, 34-54, DOI: 10.1080/1369118X.2020.1761857

# Digital Transformation

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County-wide availability of reliable, affordable broadband is essential to the economic and cultural well-being of Morgan County's residents. With remote work, online learning, and telehealth now a part of the mainstream American economic landscape, broadband access will be the driving force behind digital transformation.

The primary prerequisite for such transformation is availability. As such, RCG recommends that the County aggressively pursue funding opportunities to deploy service in the unserved and underserved areas identified in this report. While it is likely that significant Federal funding will become available through the IIJA, we advise against waiting for that funding to become available. Any smaller grant opportunities that become available in the short term should be pursued. Given the current inflationary economic trend and the ongoing unpredictability of national legislation, Ohio's promised \$1-1.5 billion in IIJA broadband funding should not be treated as a foregone conclusion.

Affordability likewise is an important part of the puzzle. As digital equity programs become available, RCG recommends that Morgan County pursue these opportunities as well. Grant programs that are not broadband-specific but which allow inclusion of broadband as part of an award should not be overlooked. For example, although the Appalachian Regional Commission's Community Grant Program will not fund last mile broadband deployments for their own sake, broadband can be an eligible expense if included as part of a telemedicine, revitalization, or workforce development proposal.

# Appendices

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54 **Appendix C: Morgan County Broadband Profile**

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# APPENDIX A

## Data Sources and Process

### Data Sources

Our mapping process utilizes multiple public data sources and one proprietary data source from Ookla as illustrated in Figure 6. We will also integrate additional data provided by the client and/or readily available from Internet Service Providers in the service area (e.g. maps of existing fiber networks).

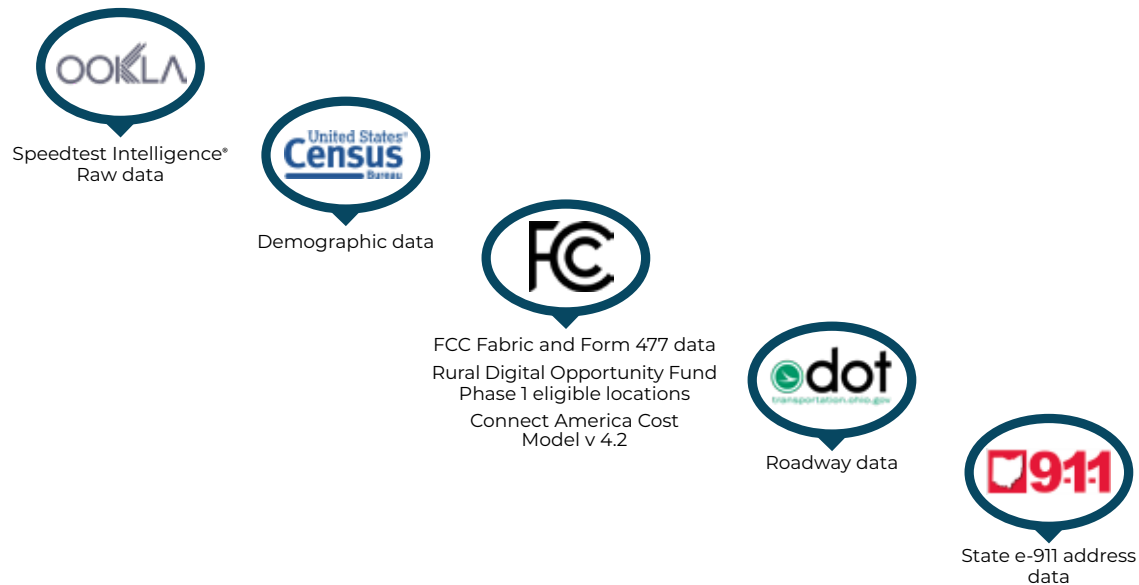


Figure 6 - Mapping data sources

## Analytical Processes – Ookla Data

We have found the Ookla data to be the richest source of speed test data available, by far the dominant commercial speed test company, the default for most consumer searches.

While not perfect in the control of the circumstances of any given test, the sheer volume of data enables valid statistical measures to determine broadband speeds experienced from subscriber households.

Our statistical analysis includes multiple preliminary steps that refine the data set and increase its accuracy. These include filtering to include only results from fixed broadband connections on devices that reported their GPS location with an margin of error less than 200 meters. The full process is outlined in figure 7 below.

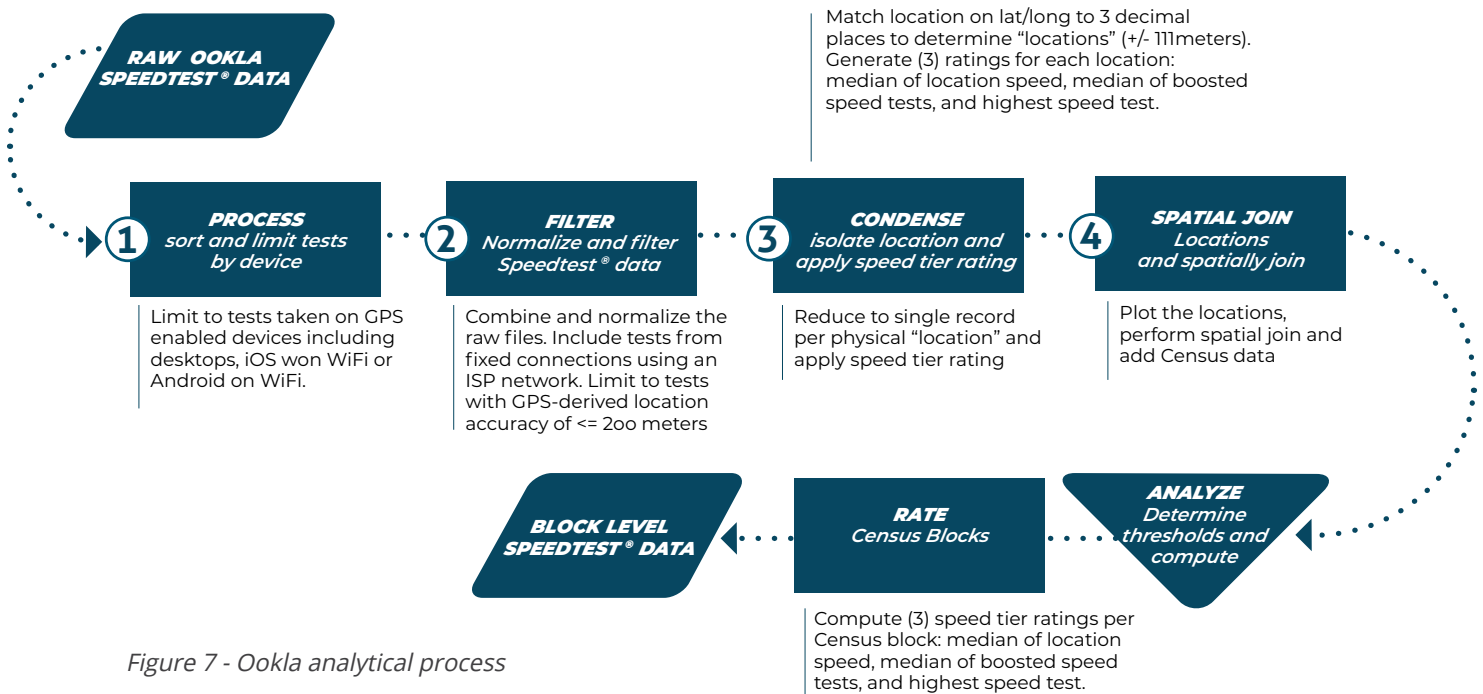
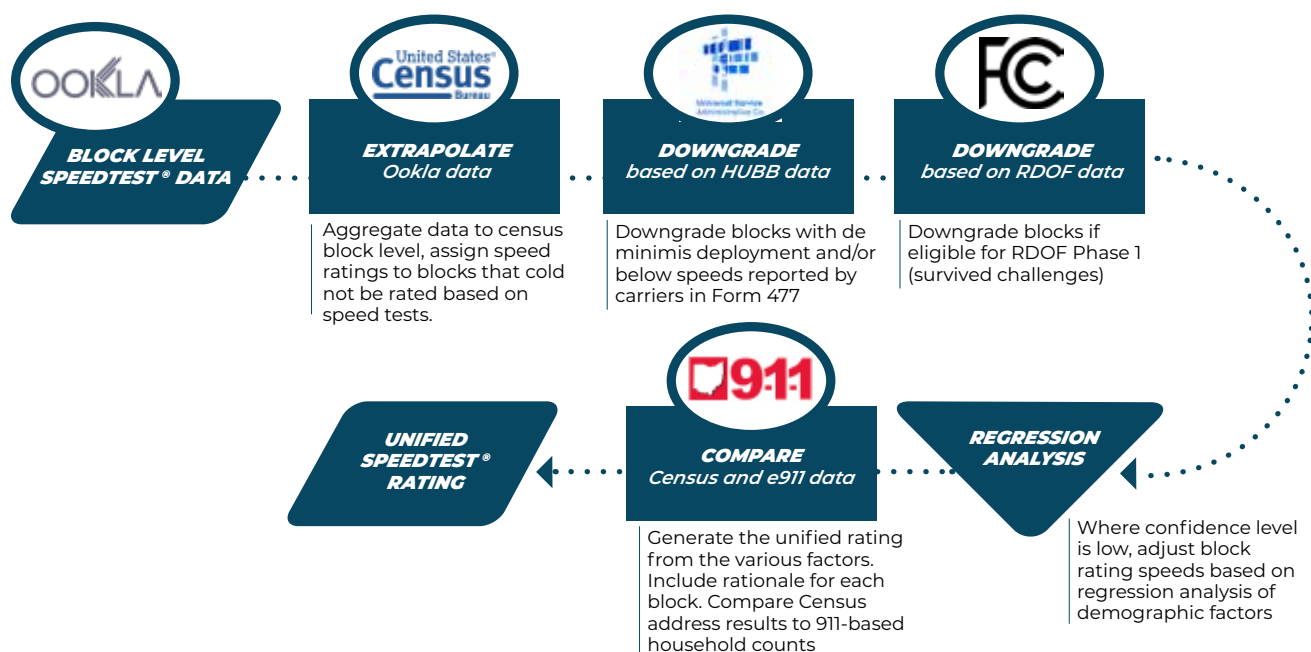


Figure 7 - Ookla analytical process

## Analytical Process – Additional Data Sources

The output of the Ookla analysis provides a strong basis for grading any geographic area on a census block level. However, refinements utilizing additional data sources can improve the overall accuracy and scope of the analysis. Figure 9 illustrates the methods we use to layer these additional data sources on top of the Ookla-based ratings, yielding the best broadband availability geographic profiles currently possible.



# APPENDIX B

## Digital Survey Materials

The Residential Broadband and Technology Use Survey was launched in coordination with a Residential Broadband Survey in May of 2021.

ConnectingAppalachia.org housed the survey. Respondents were directed to the survey through targeted social media posts, selective emails, and via QR code on printed fliers.

### Digital Survey Questions

The survey was comprised of 13 questions about broadband availability, speed, and technology use in the home with an additional demographic questions to record if the respondent operated a business out of the home. The questions are as follows:

<b>5,170</b> respondents	<b>32</b> Appalachian counties
<b>259</b> respondents	<b>Morgan</b> county

#### 1. *Which company do you use for home internet?*

Respondents were provided with a drop-down list of all registered internet service providers in Ohio, with an option to fill-in "other".

***Respondents answering "I do not have internet"***  
were directed to a set of exit questions:

- ***Please select the reason you do not have internet at your home***  
Respondents were provided with multiple choice options including: not available, too expensive, too slow or unreliable to justify the expense, and I do not need internet at home.
- ***Where do you access the internet when you need to?***  
Respondents had the option to write in their response.

#### 2. *What speed is your home internet package?*

Respondents were provided with multiple choice options to select ranging from 10 Mbps or less up to 1 Gigabit with the option to choose "I don't know"

#### 3. *How much do you pay for home internet?*

Respondents were provided with a drop-down list with pricing ranging from less than \$50 to more than \$200 per month

#### 4. *How would you rate your home internet?*

Respondents were provided with option to select one of 4 choices ranging from extremely dissatisfied to extremely satisfied for both speed and reliability of their service.

#### 5. *Does your bill include other services (phone, TV, premium content)?*

Respondents were provided with option to select "yes" or "no"

#### 6. *Have you ever conducted a speed test on your home network?*

Respondents were provided with option to select "yes" or "no".

#### ***Respondents answering "no"***

were informed:

- ***A speed test can help demonstrate the need for better internet. Would you like to run a speed test now?***

Respondents who answered "yes" were given instructions on how to conduct a

#### 7. *What is your download speed?*

Respondents were provided with option to select one of several choices ranging from less than 3Mbps to greater than 1 Gbps with the option to choose "don't know" for both upload and download speeds.

#### 8. *What is your upload speed?*

Respondents were provided with option to select one of several choices ranging from less than 3Mbps to greater than 1 Gbps with the option to choose "don't know" for both upload and download speeds.

#### 9. *What devices in your household access the internet?*

Respondents were given a grid chart to select from a list of smart devices including mobile phones, computers, phone and security systems, streaming devices and smart appliances. They additionally had to choose a quantity for each selection: 1, 2, or 3 or more.

#### 10. *How many devices are in use at one time?*

Respondents were provided with multiple choice options: 1, 2, 3, 4, 5, and 6 or more.

#### 11. *What is your home address?*

Respondents were only required to fill in the county, but given fields to fully fill-in their address.

#### 12. *Do you operate a business out of your residence?*

Respondents were provided with option to select "yes" or "no"

#### 13. *May we contact you about broadband issues in your community?*

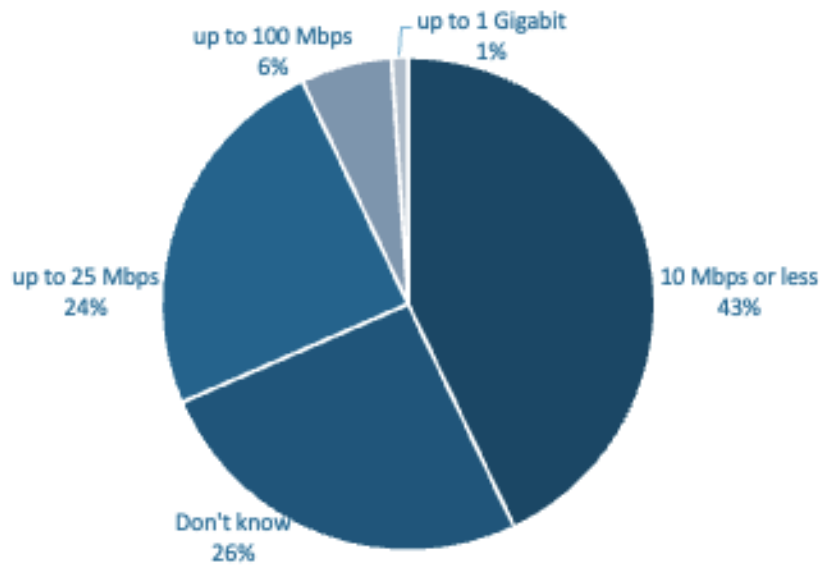
Respondents were provided with option to select "yes" or "no" and asked to provide contact information.



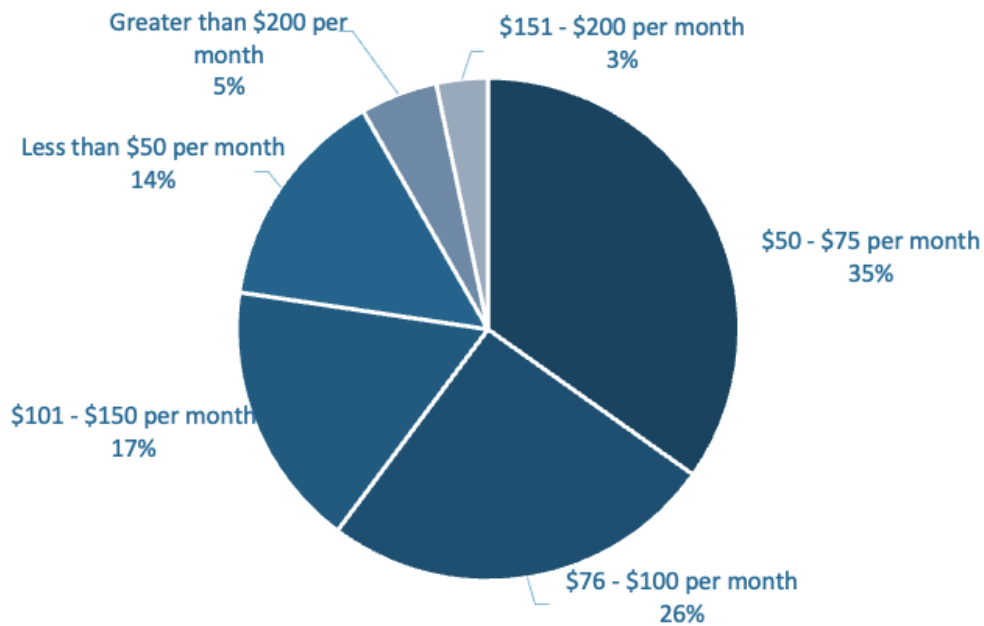
## Quantitative Results and Charts

The following charts represent the responses from individuals living in Morgan County. Included are unverified comments about individual resident's connectivity issues that have been edited only to remove personally identifiable information, and internet service provider names.

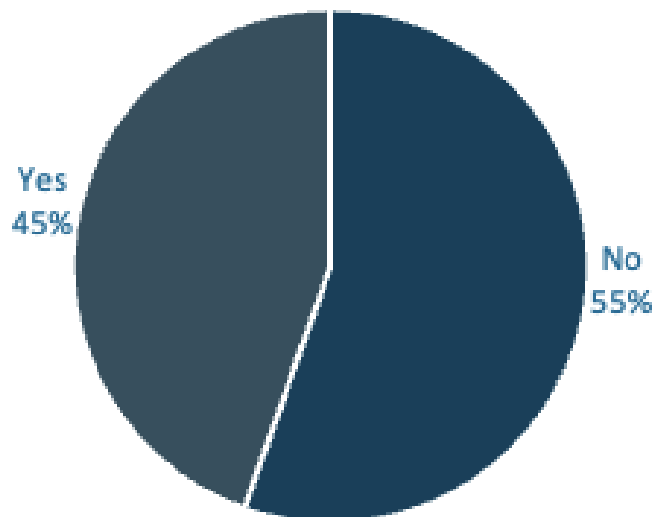
What is the Speed of your home internet package?



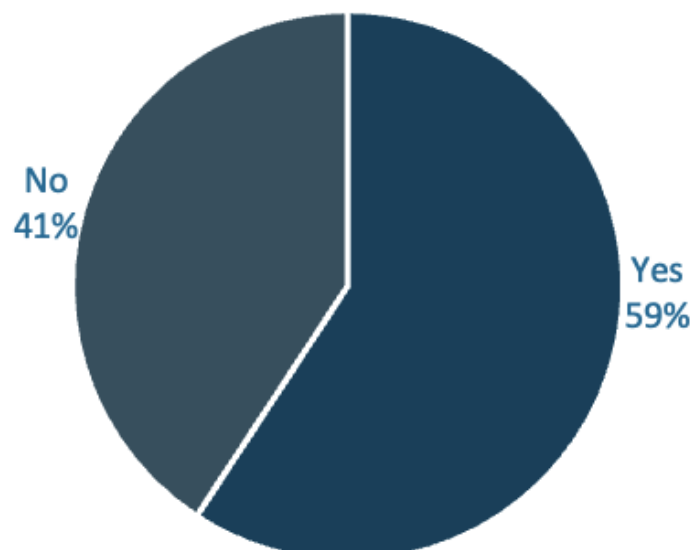
How much do you pay per month for internet



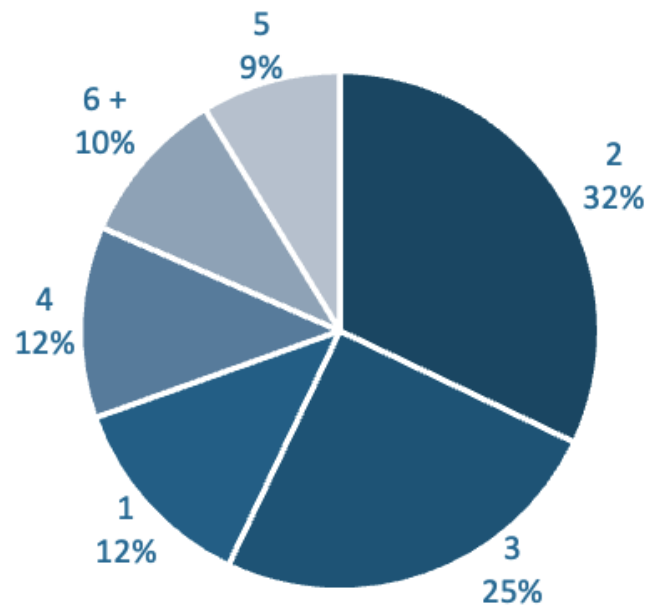
Does your internet bill include other services (phone, TV, premium content, etc.)?



Have you ever conducted a speed test on your home network?



## How many devices are typically in use at one time?



## Resident Comments

Do you have any additional comments you wish to share? For example: Why is internet access important to you? Has a lack of broadband affected you or your family? If you had better broadband, how would you use it?

Internet access has the same impact that electricity did when it first came to rural areas. Unequal access increases the disadvantages of rural citizens. Quantity of data is a major issue as well as the cost differential with urban areas. Most rural connections are metered this limiting its use. Here in Morgan County we also have limited cell service.

I bought a farm and I am trying to establish a farm business but access at the farmstead is nonexistent.

I am currently wanting to open Airbnb's in Morgan county for people to visit but will need fast internet for those working while traveling.

I completed my college degree using my cellphones data as a hotspot. I work in public service for my county and often work from home, I have to use my cell phones data which is slow and limited. My husband and I have lived in our home for 9 years and have been on <Provider Name retracted> waitlist for the entirety of that time, we are continuously told "the bandwidth is full" and are not able to get internet.

Cell phone data service is very slow at my home. The only internet option we have where we live is <Provider Name Redacted> which is extremely slow and unreliable. Access to internet is very important to my family as we run a business with an office at home. We waste so much time trying to do simple tasks because of how slow the connection is. We also have two young children that would benefit from internet access at home for various reasons. Most importantly, if our children were in school and it would go remote as it has here recently or if we had to make the decision to home school that would not be option at all to us solely because of a reliable and fast connection. We have spent

years of frustration over internet access and have continued to hit roadblocks with no solution in sight. Please help us!!

Research...news... bills...contact with family and friends...learning online...foster children school lessons. Impossible to stay up to date with local and regional happenings. Impossible to research personal financial issues. Impossible to take online courses to increase knowledge and prepare for a more successful life.

I need it for my business in order for me to move to having my business full-time and out of the nursing field I want to open my practice full-time out of my home. The Verizon MiFi is hit or miss as well as my cell phone, So I don't pay for MiFi. I have zero other options available to me except for satellite which I am hesitant about because they slow the speed down which doesn't do me any good! I am an RN and I cannot do work for insurance companies in case management and utilization review (which I have a certification for), therefore remote jobs that they offer, I cannot apply for because I cannot get high-speed Internet and the satellite connection is not a safe accepted connection for the insurance industry. I want to expand my business as well as taking it on to more Internet platforms but again impossible here. I have considered actually selling and moving out of Ohio and going someplace where I can be in

The country but still has Internet options. That would be more of a draw for the business that I intend to have at my home location.

I live alone. A senior citizen, age75. I have health problems that makes it very important to be able to trust phone/Internet. With a limited income am afraid that I will have to cancel this.

The world has moved to the tech age, and it is hard to accomplish things without reliable fast internet. Yes my wife works from home and a lot of time she has issues.

You need internet to stay involved in today's world. I had to complete my online bachelor's degree using my phone as a hotspot which limited the amount of studying I was able to do. When I work from home during the pandemic, I also have to use my cell phone as a Wi-Fi hot spot. I have been on the waiting list for <Provider Name Redacted> for over 9 years, I am always told "the bandwidth is full" in 9 years' time nothing has changed.

Without proper internet we cannot have security devices and cameras to protect us. We are not able to research, teach, or help our 2 year old son.

We are considering moving to Muskingum County where we will have broadband internet and a public water source. We would utilize Netflix and other streaming opportunities. We would be able to also utilize smart devices throughout the house; including, security system and Alexa.

My only source of outside communication. No cell phone service available. Have tried Verizon and ATT but no service or signal. (I can) go to neighbor's house or go to town and find a place to access (McDonald's etc.) so I can pay bills and get messages. I'm 67 yrs. old, on a fixed income, live alone, and concerned about issues with my health. Have cardiac and neurological issues and want to be able to get help when needed. Neighbors not very far away but if I had to contact someone because of an emergency I would not be able to. Was told if I can get internet service I may be able to go VoIP for phone?

Internet access is important to me because my daughter is a college student (enough said), and soon I will have the opportunity to work from home, but ONLY if I have reliable high speed internet. Apparently, there is a fairly new fiber optic line <Provider Name Redacted> that goes by my home, however when I called about getting hooked up I am told they are "not sure" how they would run it to my house, and then I get "transferred" and disconnected.

I have a deaf daughter, our communication is through the internet, she has needed me on numerous occasions that she could contact me

because of poor service.

I am a United Methodist pastor, and we conduct many meetings by conference call and by Zoom. Zoom simply will not work for me. Many members of the church have no internet connection at all, or very poor or expensive connection. Lack of adequate broadband has made telehealth difficult for us during Covid, means we cannot use any streaming services, cannot upload or download long documents for work, and cannot start any kind of business from home.

Internet rules our world now. When things were shut down last year and we were all stuck at home, working from home was very tough without internet. I had to rely on hot spots and most of the time the signal wasn't strong enough to video chat. I spent a lot of time on my grandparent's porch (usually freezing in the early months) so I can access internet but keep them safe. I am now currently positive

with covid and there is no easy way to participate in work activities from my home. I am currently pregnant and high risk so there is a high possibility I will have to work from home again soon, or not get paid because I wouldn't be able to do work without reliable internet. There are personal reasons for internet as well. For satellite TV we pay over \$150, if we had reliable affordable internet we would get rid of that service and rely on streaming services that are already included in our phone plan. We could also downgrade our unlimited data plan on our phones to help with cost, which is over \$200. Reliable and affordable internet would benefit my family tremendously. I mean it's 2021 almost 2022 and I can't get internet at my house, that's only 5 miles outside of city limits?

We have never had internet access in my area. We can get satellite internet, but the price and the unreliability of that is not worth it. Now the Verizon service is starting to get weaker, we also don't have reliable cell phone service for a hot spot or anything. It is 2022, how do people still not have access to reliable internet? If we had internet, I could start working from home every once in a while, to spend more time with my newborn. If we had internet I wouldn't have to spend an arm and a leg for cell phones or DIRECTV.

Broadband is not available to us. We only have access to DSL through <Provider Retracted>. High speed internet would allow us to be in contact with our grandson through Face time. We don't see him as often as we would like.

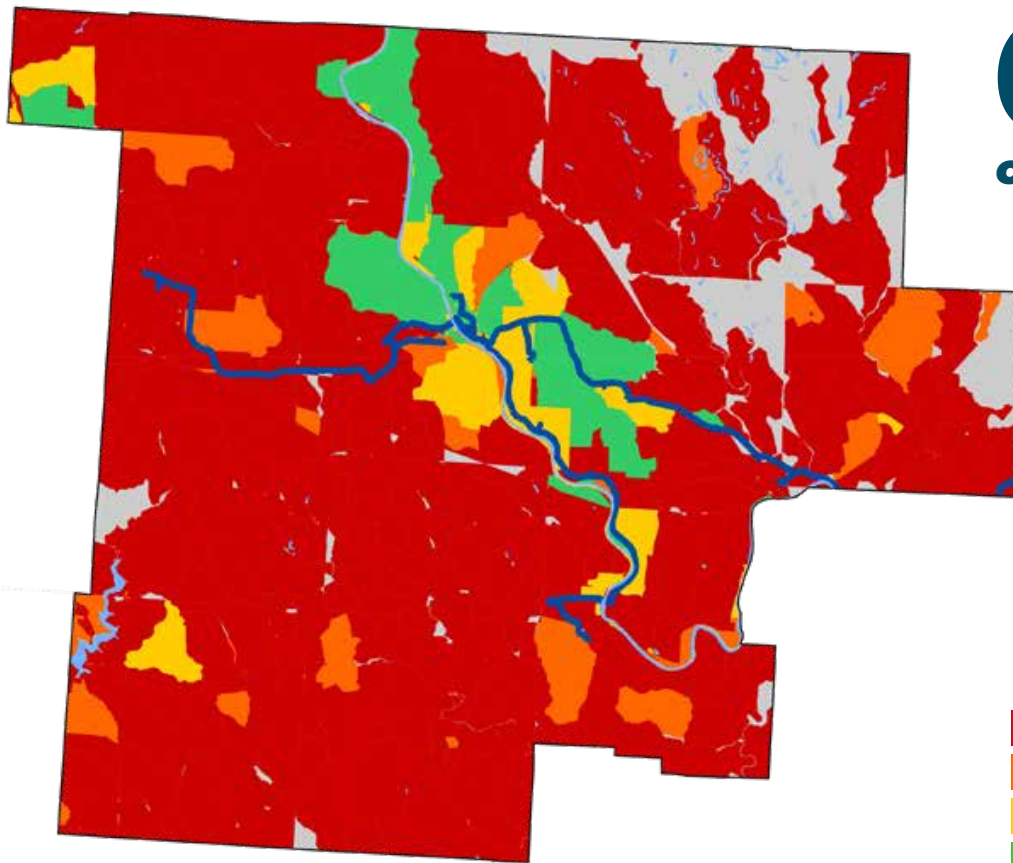
# APPENDIX C

## Morgan County Broadband Profile

In this section you will see a regional overview of broadband availability in Morgan County from October, 2022. Since that time rates contained within the county broadband profile for make-ready and cost-to-pass have increased due to fluctuations in commodities, inflation, and ties to the labor market. The main body of this report contains conservative estimates based on factors at the time of this report.

# MORGAN COUNTY

## broadband profile



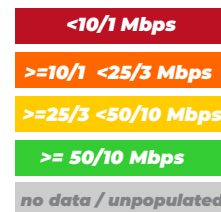
**63%**  
of households

▶ **4,937**  
households

**DO NOT HAVE ACCESS TO MINIMUM 25/3 Mbps**

**4,272**

**= 54% of households below 10/1 Mbps**



Existing Open Middle-Mile

**89%** of the populated area ▶ **343 miles<sup>2</sup>** do not have access to 25/3 Mbps

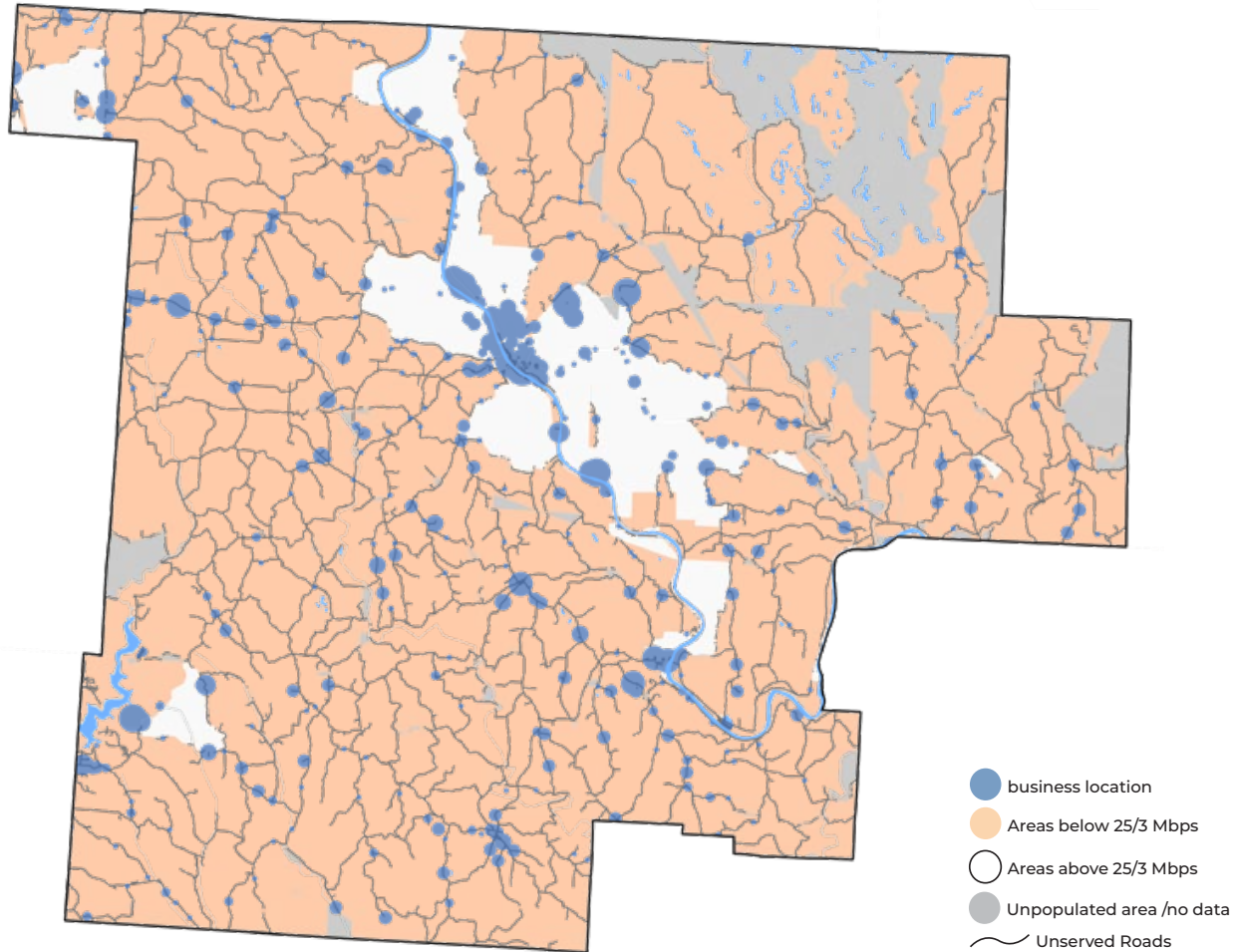
*\*Coverage ratings reflect multiple sources, including Ookla Speedtest Intelligence® data licensed by InnovateOhio for the months of February 2020 through August 2021. See "About the Mapping" (page 7) for detailed methodology*



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# BUSINESS OPPORTUNITY AREAS

below 25/3 Mbps



Business demand for broadband varies based on company size and economic sector. The greater the demand, the bigger the dot. The presence of a high-demand business or multiple businesses of any size will make that area significantly more attractive to a broadband provider.

*\*See "Business Broadband Opportunity Index" (page 8) for a detailed explanation of how dot size was determined*

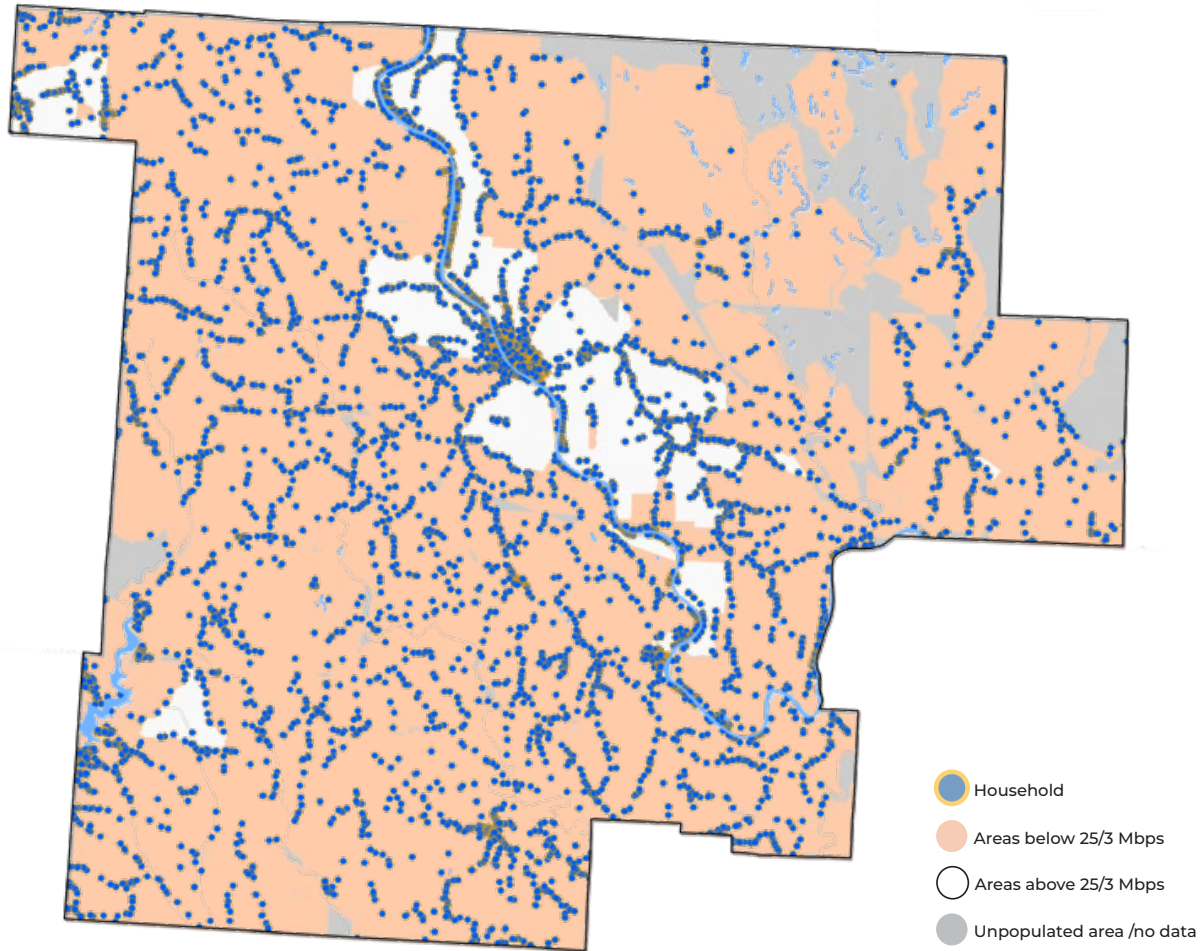


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# RESIDENTIAL OPPORTUNITY AREAS

below 25/3 Mbps



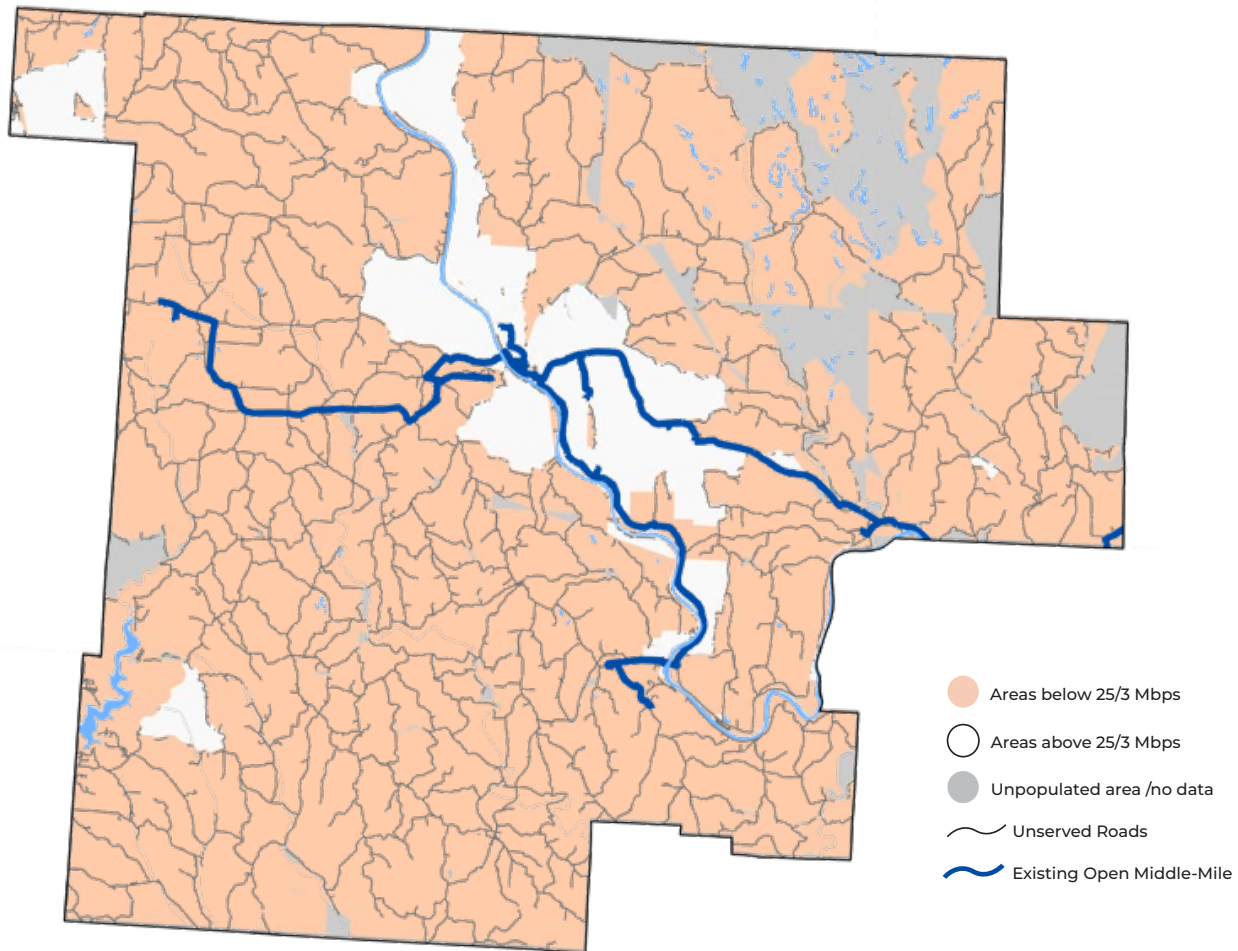
**7,878** ▶ **4,937** are below 25/3 households



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# MORGAN COUNTY

..... unserved roads



**634 miles** of unserved roads = the amount of fiber needed to install fiber-to-the-home in areas below 25/3 Mbps



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# MORGAN COUNTY

cost to close the gap

**A FIBER NETWORK  
for the next 40 years**

## BUDGET

**\$54.9** MILLION  
*Total County Cost*

## OUTCOME

**4,937** *Unserved households passed*  
**7.8** *Households per fiber mile*

**\$8.5** MILLION  
*Projected internet provider investment*

**\$1,720**  
*Investment per household*

## FUNDING GAP

**\$46.4** MILLION

**634** MILES OF FIBER

**\$9,400**  
*Gap per household*

Cost estimates assume \$41,000 per mile for utility pole make-ready, \$40,000 per mile for high strand-count, aerial fiber.

\*See "Estimating Costs and Distances" (page 9) to learn more about these calculations.



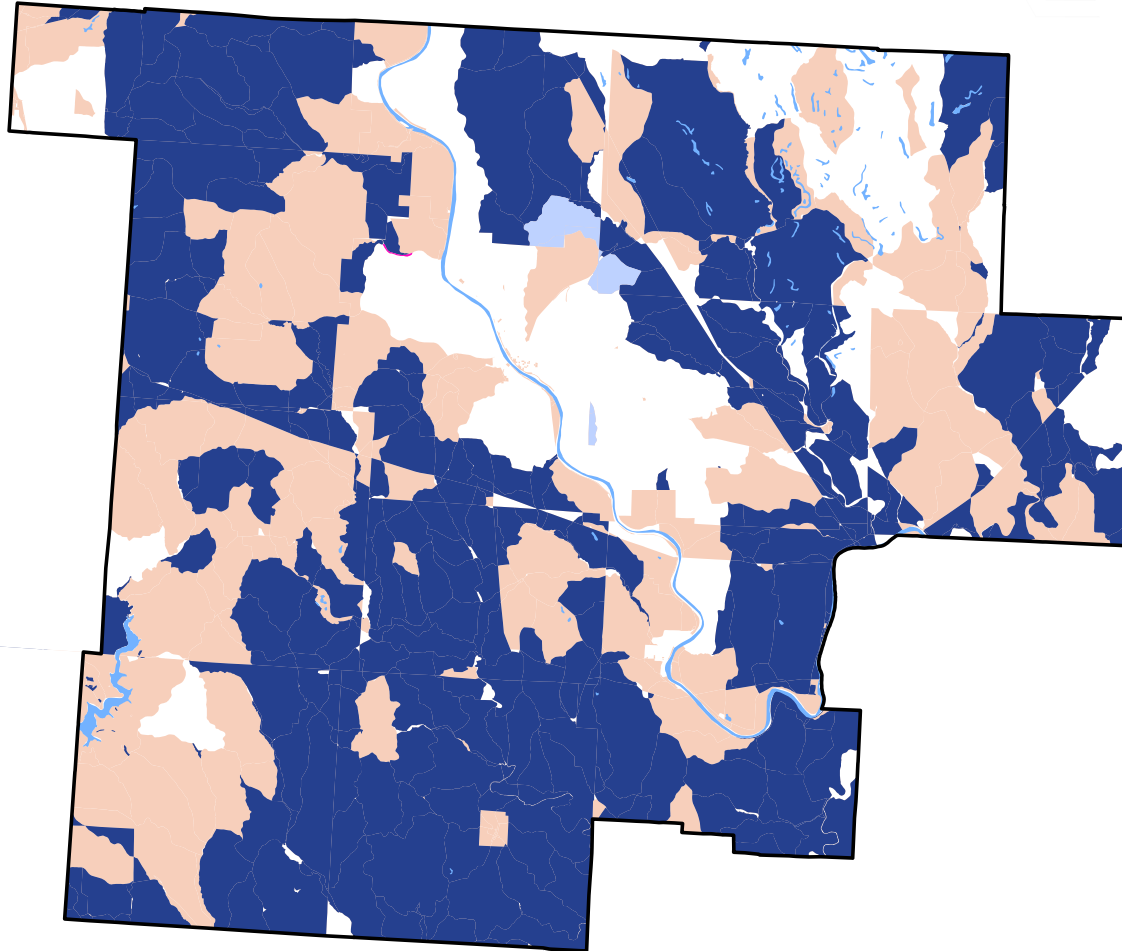
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# TENTATIVE AWARDS

## Rural Digital Opportunity Fund (RDOF)



● Unfunded Areas below 25/3 Mbps   ● Charter Communications   ● Connect Everyone   ● LTD Broadband

The FCC's Rural Digital Opportunity Fund (RDOF) subsidizes internet providers to deploy broadband in unserved rural locations. In 2020, the FCC awarded a total of \$170 million to 11 internet providers in the state of Ohio. The majority of this funding remains tied up in financial due diligence, so many other funding programs consider such awards tentative.



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# THE METHODOLOGY

..... breaking down the data

## About the Mapping

This profile was created under contract by Reid Consulting Group, LLC. for Ohio Mid-Eastern Government Association (OMEGA). This map, collectively with county maps created for Buckeye Hills Regional Commission (BHRC) and Ohio Valley Regional Development Commission (OVRDC), is being provided to Connecting Appalachia. Connecting Appalachia is a consortium of local governments, regional economic development councils, and industry professionals working to increase economic opportunity for Appalachia by expanding access to quality, affordable broadband.

Broadband coverage maps are based on a rating system developed by Reid Consulting Group, LLC. Data sources include Ookla Speedtest Intelligence® data licensed by InnovateOhio for the months of February 2020 through August 2021, carrier filings of available speeds with the FCC (Form 477), carrier reports of actual broadband deployments to USAC (HUBB), RDOF Phase 1 eligibility, and population density.

Unserved and underserved ratings are color coded at the census block level:

<b>&lt;10/1 Mbps</b>	Red: Less than 10/1 Mbps
<b>&gt;=10/1 &lt;25/3 Mbps</b>	Orange: At least 10/1 Mbps and less than 25/3 Mbps
<b>&gt;=25/3 &lt;50/10 Mbps</b>	Yellow: At least 25/3 Mbps and less than 100/20 Mbps
<b>&gt;= 50/10 Mbps</b>	Green: Above 100/20 Mbps defined as served
<b>no data / unpopulated</b>	Gray: Areas with no data/ speedtests submitted- unpopulated

We conducted analysis of the raw Ookla® data for the months of February 2020 through August 2021, applying the following filters:

### Filter

Include desktop, iOS, and Android app results\*

Exclude results with GPS precision of greater than 200 meters\*\*

Include only results from fixed broadband providers

*\*iOS and Android results were included only if the device was connected to wi-fi during the speed test.*

*\*\* To protect consumer privacy, Ookla® limits location precision to +/-100 meters. As a result, a single location may include multiple households and many individual tests.*

Using the Ookla® results we rated each location based on the average of up/down speeds for all tests at that location. We then graded census blocks based on the median up/down speed of all locations within each block. Block-by-block ratings were further refined based on RDOF eligibility, past HUBB deployments, and Form 477 data. For blocks with no Ookla test results, extrapolated ratings were assigned where possible via comparative analysis of population density, Form 477 coverage, HUBB data, and RDOF Phase 1 awards. Areas that could not be assigned an extrapolated rating are shown in gray on the map.



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# THE METHODOLOGY

continued

## Business Broadband Opportunity Index

Business demand for broadband varies based on company size and economic sector. The more employees at any given business location, the greater the demand will be for that location. Certain types of businesses also tend to consume more bandwidth regardless of size. For example, a medical clinic with 50 employees will need significantly more capacity than a construction contractor of similar size.

When planning for broadband expansion, it is important to consider the effect businesses have on overall need. The presence of a high-demand business or multiple businesses of any size in a particular area may make that area significantly more attractive to a broadband provider than the surrounding population density would predict.

The Business Broadband Opportunity Index helps planners visualize this economic impact by mapping the location of every business (as identified by Dun & Bradstreet) with a dot size proportional to that business' expected broadband demand. The larger the dot, the greater the demand. Calculations are as follows:

### OPPORTUNITY INDEX = BUSINESS SIZE \* INDEX MULTIPLIER

**Business Size:** Number of employees as reported in Dun & Bradstreet. If count is blank, assume 1 employee.

**Index Multiplier:** A number from 1-5 based on industry sector.

**On the Map:** The greater the demand, the bigger the dot. To aid with visualization, comparative rankings from 1 to 10 are also assigned.

Category	Multiplier
Healthcare	5
Education & Libraries	5
Telecom and IT	5
Banking and Finance	5
Professional Services	4
Publishers	4
Real Estate	3
Hospitality	3
Publishers	3
Non-Profit	3
Wholesalers	2
Dealers and Retail	2
Transportation	2
Childcare	2
Sports, Music & Arts	2
Religious and Fraternal	2
Manufacturing	2
Printing	2
Restaurants & Food	2
Farming	1
Hunting, Fishing	1
Energy	1
Raw Materials	1
Contractors	1
Textiles	1
Unclassified	1



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# THE METHODOLOGY

continued

## Estimating costs and distances

Building a fiber network involves three basic expenses: preparing utility corridors to support fiber optic cables (make-ready), installing fiber along those corridors (cost-to-pass), and connecting individual homes and businesses to the new fiber (cost-to-serve).

ASPECT	LOW	EXPECTED	HIGH
Make-Ready*	\$32,000	\$41,000	\$60,000
Cost-to-Pass**	\$32,000	\$40,000	\$40,000
<b>TOTAL per mile***</b>	<b>\$64,000</b>	<b>\$81,000</b>	<b>\$100,000</b>

\* Some industry groups estimate make-ready as low as \$5,000-10,000 per mile. Such estimates generally either assume the pole owners will make up the difference or that low-count drop cables are being deployed.

\*\* Assumes high strand-count fiber network using strand-and-lash design.

\*\*\* Cost-to-serve not included, assumed as ISP investment.

The following assumptions have been made when estimating costs:

**Aerial Installation:** The high incidence of surface rock in Appalachia can make buried conduit prohibitively expensive, so costs in this report have been calculated based on attaching overhead fiber to existing electrical poles.

**Make-Ready:** As part of any broadband deployment, electric utilities must modify or replace at least some of their poles to accommodate increased cable weight, wind and ice loads, and limited clearance between power lines and communications cabling. These costs vary based on electric provider and the kind of cable being installed. A heavier cable may require more make-ready than a lighter one.

In this report, we assume a make-ready of \$41,000 per mile to accommodate high strand-count cables that require strand-and-lash support. This figure also is approximately what it would cost to build an independent communications pole network as a last resort, should ISPs and local utilities be unable to reach an acceptable agreement.

**Underground Alternative:** Buried fiber can avoid utility pole attachment fees and associated make-ready, but such savings must be weighed against the total cost of going underground. Costs can vary widely based on burial depth, the presence or absence of other underground infrastructure, the need to bore beneath roads, how much rock is encountered, and whether conduit is used versus direct burial.

Given the prevalence of surface rock in Appalachia, it is estimated that burying fiber in conduit (the preferred approach for long term durability) would cost between \$90,000 to \$140,000 per mile in total.



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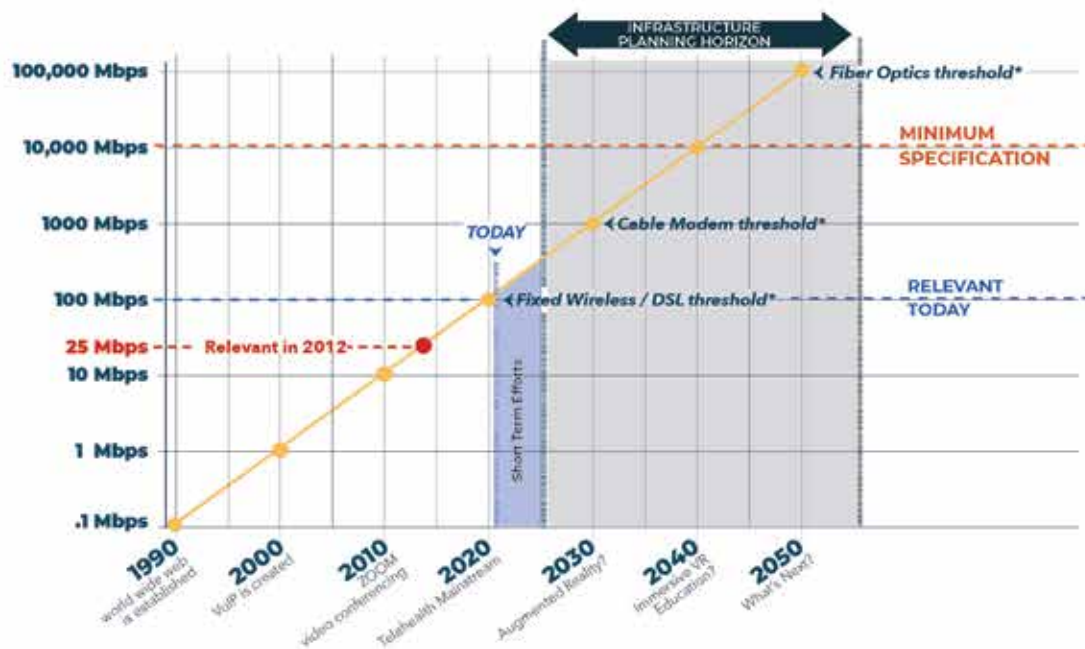
# THE METHODOLOGY

continued

**Cost-to-Pass:** Fiber optic comes in a wide range of styles, from lightweight household drop lines to high capacity cable sheaths that bundle hundreds of fiber strands together to carry massive amounts of data. Household drop fiber is inexpensive and puts less strain on utility poles, but it has limited capacity.

Broadband speeds have increased 10-fold every decade since 1990. To ensure that a fiber network built today remains useful 40 years from now, this report assumes the use of high strand-count cables. While a provider could deliver broadband that meets current state and federal speed requirements using only low strand-count household drop cable, such a network would offer little flexibility to expand services or increase speeds as demand rises.

Material and labor costs for high strand-count fiber are estimated at \$40,000 per mile.



\*Ceilings based on commercially deployed products.

**Cost-to-Serve:** Internet providers typically absorb the cost of running a drop cable from an individual home or business to the nearest utility pole. As such, the cost-to-serve is not included in budget estimates.

**Distance and Total Cost:** Last mile broadband infrastructure typically follows existing roads. Total project cost can be estimated by multiplying make-ready and cost-to-pass by the number of state, county, township and unincorporated road miles in unserved census blocks.



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# THE METHODOLOGY

## calculating cost and investment

### BUDGET

The budget is based on a fiber-to-the-home network with enough capacity to meet demand for the next 40 years. Expected investments and grant amounts will vary based on the area to be served, the population density, and the presence or absence of other services.

### TOTAL COUNTY COST

Total county cost is the sum of make-ready (\$41,000) and cost-to-pass (\$40,000) multiplied by the number of unserved state, county, township, and unincorporated road miles.

$$\text{Unserved Miles} \times (\text{Make-Ready} + \text{Cost-to-Pass}) + \text{Number of households}$$

### Projected internet provider investment

The total an internet provider can spend to install fiber and still make a profit, estimated between \$1000 and \$2500 per household. As population density goes down, costs go up while expected investment remains the same.

$$\text{Unserved households} \times \text{Investment per household}$$

### FUNDING GAP

The funding gap is the difference between the total cost of the project and the available or anticipated private investment. For an internet service offering to be sustainable, grant or other public funding must be used to close this gap.

$$\text{Investment} - \text{Total County Cost} = \text{Funding Gap}$$

### Gap per household

The gap per household is calculated by dividing the funding gap by the total number of unserved households.

$$\frac{\text{Funding Gap}}{\text{Unserved Households}} = \text{Gap per household}$$



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# THE METHODOLOGY

..... calculating the outcome

## OUTCOME

The sum of E-911/LBRS addresses that fall within unserved census blocks. Census households were used instead of LBRS in Carroll, Clermont, Harrison, Highland, and Tuscarawas counties.

**Unserved households passed**

Total number of unserved households divided by the number of unserved state, county, township, and unincorporated road miles.

**Households per fiber mile**

The amount an internet provider can spend to install fiber and still make a profit, estimated between \$1000 and \$2500 per household. As population density goes down, cost goes up while expected investment remains the same.

**Investment per household**

## THE RESULT

Fiber distance is based on the number of unserved state, county, township, and unincorporated road miles within the county.

**MILES OF FIBER**



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