MONTGOMERY COUNTY MD RURAL BROADBAND REPORT

Rural Broadband Connectivity and Demand in the Agricultural Reserve

Department of Technology Services

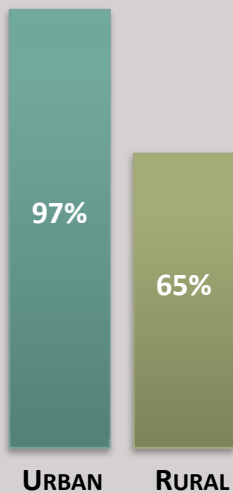### Office of Broadband Programs & Infrastructure Modernization

Released November 2020
Updated February 2021

RURAL MONTGOMERY COUNTY BROADBAND

97%

65%

URBAN   **RURAL**

U.S. WIRED BROADBAND AVAILABILITY

Source:
Federal Communications Commission

Montgomery County's Agricultural Reserve contributes $300 million annually to the Montgomery County economy and contains almost one-third of the land in the County. Yet it contains less than two percent of occupied homes in the County. As a result, while most of Montgomery County has access to two or three fiber and coaxial wireline broadband service providers, and three cellular broadband service providers, thirty-seven percent of the Agricultural Reserve does not have basic access to the Internet for school, work, social interaction, and daily living to enable full participation in the digital economy. The effects of the ongoing Covid-19 pandemic only magnify the importance of this issue.

This report was commissioned to enable a data-driven analysis of the gaps in broadband deployment and demand for broadband. The purpose is to demonstrate the business case for broadband partnerships in the Agricultural Reserve, where the economics of rural broadband deployment have created a rural-urban digital divide.

EXECUTIVE SUMMARY

Montgomery County Maryland's goal is for every household and business to have access to broadband services, and for every person to have the skills necessary to use the Internet for daily living and to participate fully in the digital economy.

- Typical broadband use for households and businesses operating from home exceed the minimum broadband requirement established by the Federal Communications Commission's **(FCC)** in 2015 (25 Mbps down and 3 Mbps up). An average family of four uses 7/7 Mbps daytime and 15/4 Mbps at night. A home business may need 20/17 Mbps, and multigenerational families may need 24/7 Mbps. The County should seek broadband that meets the FCC Advanced Baseline of 100 Mbps down/20 Mbps up, and seek symmetrical upload speeds for video conferencing.

- Fiber and cable best meet consumer needs and have been deployed to 63 percent of the Agricultural Reserve. Funding to extend fiber broadband to 12 percent has been provided through a federal grant with construction expected to begin in 2021. 16 percent does not need to be built. The cost to build to the remaining 9 percent (32 road miles, 327 unserved properties) is $4.6 million – $15,050 per served property ($10,050 per property to extend fiber past the property plus $4,300 per property to extend fiber from the road to the premises).

- 32 percent of Ag Reserve residents do not think their Internet access is adequate. 14 percent would pay more for higher speeds (compared to just 3 percent of non-Ag Reserve respondents). Interestingly, pre-COVID-19, 40 percent of Ag Reserve respondents use their home Internet to run a business, compared 24 percent of non-Ag Reserve respondents. 83 percent of Ag Reserve Internet subscribers subscribe to Comcast or Verizon FiOS.

- The Office of Broadband Programs will use mapping and survey data to leverage grant opportunities and attract buildout partners.

"It's really important for all these folks to have the kind of modern connections that you'd expect everyone else to have."

County Executive Marc Elrich

RURAL BROADBAND CHAMPIONS

The Rural Broadband Report is dedicated to the memory of Montgomery County residents and rural broadband advocates David Weitzer and Dennis Kamber who worked tirelessly to bring broadband to the Agricultural Reserve

The Department of Technology Services Office of Broadband Programs (OBP) would like to thank the residents, small businesses and leaders in the Agricultural Reserve who contributed to this report. In addition, OBP would like to recognize as Broadband Champions, the following individuals and organizations for their exceptional efforts to bring broadband to rural Montgomery County:

- Executive Marc Elrich and his Chief of Staff Dale Tibbitts
- County Council President Sidney Katz, Councilmembers Hans Riemer, Craig Rice, Nancy Navarro, and Andrew Friedson, former Councilmember Roger Berliner, and County Council Technology Analyst Dr. Costis Toregas
- The Montgomery County U.S. Congressional Delegation, with a special thank you to U.S. Senator Benjamin Cardin, U.S. Senator Chris Van Hollen, U.S. Representative David Trone
- Montgomery County Office of Agriculture Director Jeremy Criss, Special Asst. Jacqueline Arnold, and Dir. of Planning & Promotions Mike Scheffel
- Upcounty Regional Services Center Director Catherine Matthews
- Montgomery Countryside Alliance
- The Maryland Governor's Office of Rural Broadband Executive Director Kenrick Gordon
- Rural Maryland Council Executive Director Charlotte Davis
- Montgomery County Maryland broadband service providers Comcast, Verizon, RCN, and Telegia
- NBC4 Washington Jodie Fleisher, Rick Yarborough and Steve Jones

TABLE OF CONTENTS

INTRODUCTION

The goal of the Office of Broadband Programs and Infrastructure Modernization **(OBP)** in the Montgomery County Department of Technology Services is to achieve digital equity – for all residents and businesses to have the technology and skills they need to fully participate in our society, democracy, and economy.

In the more urban areas of the County, residents may lack broadband because they cannot afford the service, or because they lack skills and devices to effectively use it. Lack of broadband in urban areas is more acute among low income communities of color. Racial and digital equity are important issues in their own right. However, this report focuses on a third issue that exists for residents and businesses in the Agricultural Reserve: Broadband simply does not reach their homes.

This report was created with the assistance of CTC Energy & Technology, a local female-owned Montgomery County company that is a nationally recognized leader in broadband engineering and analysis. This report presents a summary and analysis of extensive data collection obtained through mail and field surveys, engineering studies, and interviews with residents, small businesses, industry partners, and government leadership. This report is intended to provide the market and engineering analysis necessary to form innovative and productive public-private partnerships to leverage grant funding opportunities that may help the County and the private sector work together to solve the Agricultural Reserve's broadband availability issue.

"Almost inseparable from his iPhone, Master Farmer Jamison keeps in constant contact with his family farm partners."
American Agriculturalist, March 2014

BROADBAND BASICS

Digital Equity is a condition in which all individuals and communities have the information technology capacity needed for full participation in our society, democracy, and economy. Digital Equity is necessary for civic and cultural participation, employment, lifelong learning, and access to essential services.

– National Digital Inclusion Alliance

What is Broadband Used For?

- Students can attend online classes
- Employees telework—working from home without having to travel to an office, including living in the County and working for businesses headquartered in other states
- Entrepreneurs can operate home-based and online businesses
- People can conduct telehealth visits with their doctors
- Residents can check electronic books out of the County's library and engage with the County government
- Residents can shop; conduct personal banking activities; pay bills; play games; watch movies and access other forms of entertainment; and stay connected with friends and family through social media

How Is Broadband Delivered to the Agricultural Reserve?

At the most basic level, "broadband" refers to a connection to the Internet that can be delivered over many types of wired and wireless technologies. Broadband connection technologies include:
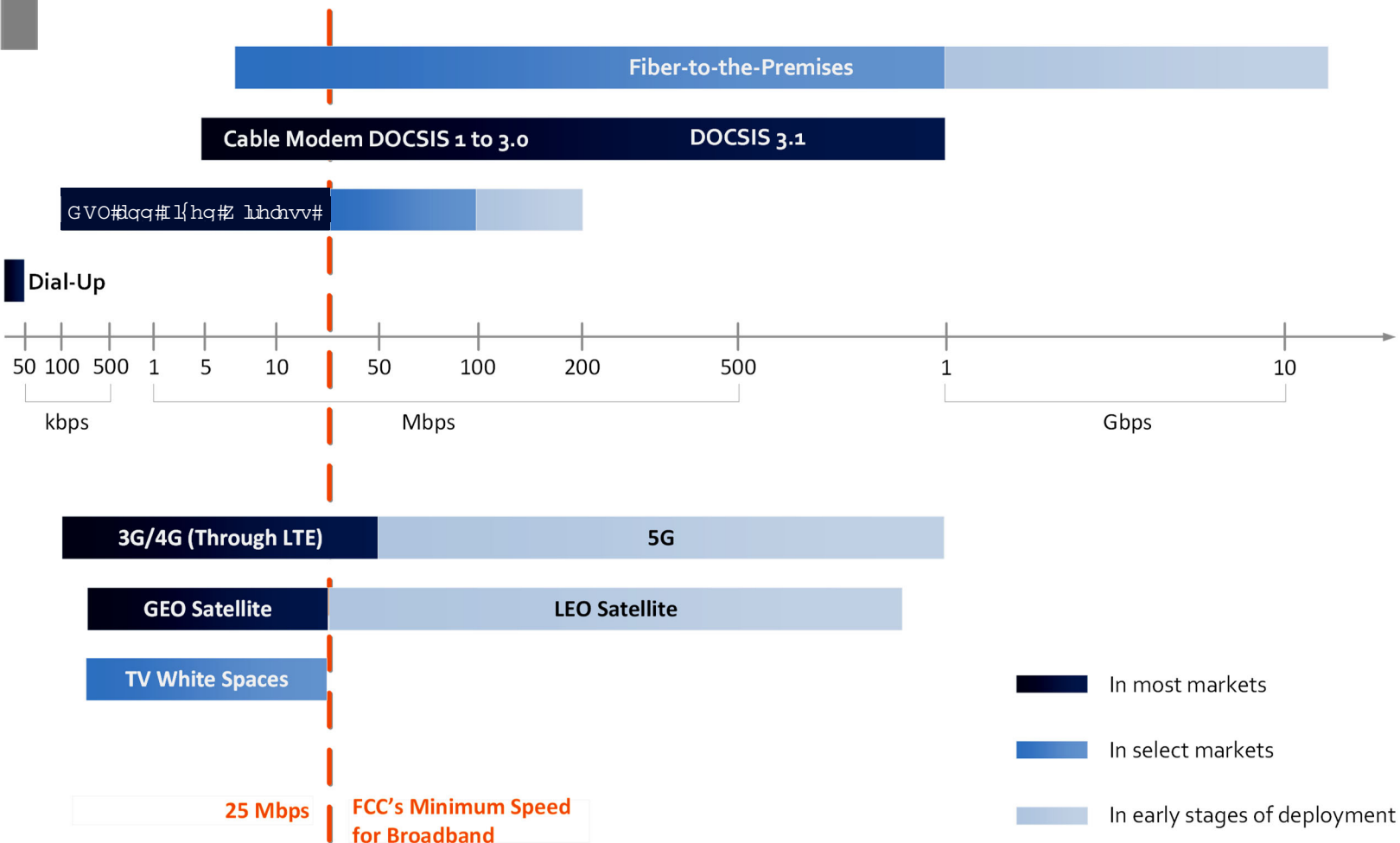
- **Fiber** – also called fiber optic or fiber-to-the-premises **(FTTP)**, this is the fastest broadband technology. Like coaxial cables, fiber optic cables are attached to utility poles or installed underground, then connected to a subscriber's home. Fiber is now used to deliver 1 gigabit per second **(Gbps)** service, though fiber Internet service providers **(ISPs)** also offer service at lower speeds for lower fees. Although not yet widely offered, the current technologies enable 10 Gbps or faster service over fiber.

- **Cable Modem** – Internet service delivered over the same coaxial cable that brings cable television into a home. Sometimes referred to as DOCSIS 3.1, this service is faster than DSL. The most state-of-the-art cable systems can deliver very fast service—up to 1 Gbps in some places.

- **Fixed wireless** – Internet service is delivered over radio signals from an ISP's nearby antenna to a fixed antenna mounted at the customer's home or business. The antenna at the customer's location connects to a small router device, which then emits a WiFi signal that is available to any devices in the house. Fixed wireless is often an option in areas where ISPs have not constructed wires to users' homes.

- **Mobile wireless** – Internet service delivered over radio signals from an ISP's nearby antenna to a user's cell phone or to another mobile device (like a tablet or laptop). Mobile wireless service (sometimes referred to as 4G or 5G or cellular service) is unique in that it follows users virtually anywhere they go. Users typically pay for mobile wireless service on a per-device basis.

- **Satellite** – Internet technology that delivers service over the air to a fixed antenna at a user's location. As the name implies, service is delivered from a satellite rather than wirelessly from ground antennas—so satellite is an option in remote places where ISPs do not have antennas or wires.

- **DSL** – an older technology used to deliver Internet service over copper telephone lines. In areas where the telephone company offers DSL (which is short for digital subscriber line), the service is available to homes and businesses that are within a certain distance from the phone company's local facility – usually limited to a range of few miles. DSL is the slowest of the Internet services delivered over wires.
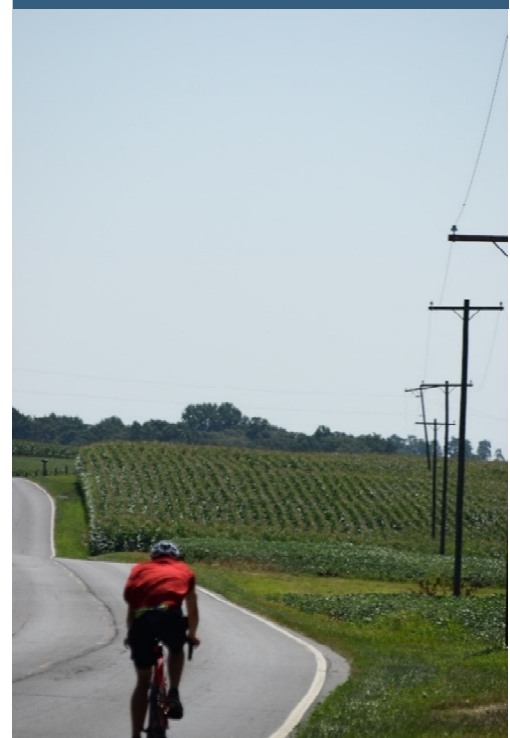
The FCC defines "Broadband" as an Internet connection speed of at least 25 Mbps download and 3 Mbps upload

Created in 1934, the Federal Communications Commission (FCC) regulates communications by radio, television, wire, satellite, and cable in the United States

Different technologies are capable of delivering different speeds. **"Download"** is the rate that video and data is delivered from the Internet to your computer, and **"Upload"** is the rate data and video is delivered from your computer to the Internet. 1 Gbps equals 1,000 Mbps (megabits per second). The higher the speed rate, the more capacity and speedier the connection will be. The illustration below shows the range of speeds provided by these delivery methods.

Fiber-to-the-Premises

Cable Modem DOCSIS 1 to 3.0　　DOCSIS 3.1

GVO#dqq#1{hq#Z luhdnvv#

Dial-Up

| 50 | 100 | 500 | 1 | 5 | 10 | 50 | 100 | 200 | 500 | 1 | 10 |

kbps　　　　　　　　　　　Mbps　　　　　　　　　　　Gbps

3G/4G (Through LTE)　　　5G

GEO Satellite　　LEO Satellite

TV White Spaces

■ In most markets

■ In select markets

■ In early stages of deployment

25 Mbps　│　**FCC's Minimum Speed for Broadband**

How Much Broadband Do You Need?

The FCC's broadband definition has not change changed since 2015—but our need for a fast Internet connection certainly has. How much broadband a household needs depends on how many people are in the house, what they are doing, and when they are doing these activities.

- Some applications – such as video conferencing, streaming, and gaming for example, take much more bandwidth than others – such as email, web surfing and audio.
- Watching downloaded videos takes much less bandwidth than watching live video stream.
- Having multiple activities at once, such as more than one person on a video conference call at the same time, or more people at home watching streaming video in the evening, will also impact how much broadband a household uses.
- Expansion of video conferencing for work and school, as well as video visits – from telehealth appointments with doctors to video interviews for pet adoption – are driving the need for better upload speeds as well.

For U.S. Dept. of Agriculture rural grants, areas are not eligible if 10/3 Mbps service is available

THE FCC HAS BEEN SLOW TO UPDATE ITS DEFINITION OF "BROADBAND"

FC Federal Communications Commission

FCC MINIMUM BROADBAND SPEEDS AND INTERNET DEVELOPMENTS

1996 FCC 0.2 Mbps 1st Definition

1998 Google launched

2004 Gmail

2005 Google Maps

2007 Netflix streaming Recommends 3 Mbps SD or 5 Mbps HD for 1 stream, 10 Mbps 2 streams, etc. (download speeds)

2010 FCC 4 Mbps down / 1 Mbps Up 2nd Definition

2015 Apple Music launched

2015 FCC 25 Mbps Down / 3 Mbps Up "Minimum" 3rd/Current Definition

2020 FCC adds 50/5 Mbps as "Baseline", 100/20 Mbps as "Above Baseline", to award more points in FCC rural broadband grant applications

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To estimate how much broadband a household need, we consider the following examples:

- A family of four in the daytime

- A family of four in the evening

- A Family of four operating a home-based business, with an additional teleworker and two telelearning students in the daytime

- Multigenerational family of eleven in the evening

	PEAK BANDWIDTH UTILIZATION TYPICAL FAMILY OF FOUR (DAYTIME)	DOWNLOAD / UPLOAD
x1	Telework Video Conferencing	1.5 Mbps / 1.5 Mbps
x2	Telelearning Remote Classroom	3.0 Mbps / 3.0 Mbps
x1	Streaming Music / Video	2.0 Mbps / 0.1 Mbps
x10	Home Security (Ring, etc.) and other household smart devices (Alexa, Cortana, etc.)	0.3 Mbps / 2.0 Mbps
	TOTAL BANDWIDTH USE (rounded)	7 Mbps / 7 Mbps

A household of 4 with 1 video teleworker and 2 students on Zoom would use 7 Mbps down and 7 Mbps up during a weekday

Broadband use by the family in our first example might grow to 15 Mbps download and 7 Mbps upload during peak usage. This estimate assumes that there is only one teleworker, no video conferencing at night, but more video streaming at night. Thus, some households in Montgomery County may use more or less broadband.

PEAK BANDWIDTH UTILIZATION TYPICAL FAMILY OF FOUR (EVENING)	DOWNLOAD / UPLOAD
x1 — Online Video Gaming	2.0 Mbps / 1.0 Mbps
x2 — Streaming Video Applications (Netflix, Prime, etc.)	10 Mbps / 0.2 Mbps
x3 — Surfing Internet	3 Mbps / 1.0 Mbps
x10 — Home Security (Ring, etc.) and other household smart devices (Alexa, Cortana, etc.)	0.3 Mbps / 2.0 Mbps
TOTAL BANDWIDTH USE (rounded)	**15 Mbps / 4 Mbps**

Bandwidth demands are becoming more symmetrical in the upload and download directions than the FCC and broadband technologies deployed today assumed, with interactive video (such as Zoom), uploading of video security (such as Ring), and cloud-based file sharing driving upload bandwidth demands#

At night, broadband for the four-person household might be 15 Mbps download and 4 Mbps upload

Households running business operations might use 20 Mbps download and 17 Mbps upload

Running a business from home increases broadband use, *e.g.*, to process financial transactions through e-commerce applications (Square, *etc.*), email, occasional video meetings with customers, and transferring files via online cloud storage providers. During the pandemic, this resident's spouse may be working from home and at least two children might be using additional bandwidth for Montgomery County Public School **(MCPS)** Zoom sessions, homework, and entertainment. This family would require at least 20 Mbps download and 17 Mbps upload in the daytime. Evening use would be similar to the family of four.

	PEAK BANDWIDTH UTILIZATION HOME BUSINESS (DAYTIME)	DOWNLOAD / UPLOAD
x1	Home Business Operations	10.0 Mbps / 10.0 Mbps
x1	Telework Video Conferencing	1.5 Mbps / 1.5 Mbps
x1	Streaming Video Applications (Netflix, Prime, etc.)	5.0 Mbps / 0.2 Mbps
x2	Tele-Learning Remote Classroom	3.0 Mbps / 3.0 Mbps
x10	Home Security (Ring, etc.) and other household smart devices (Alexa, Cortana, etc.)	0.3 Mbps / 2.0 Mbps
	TOTAL BANDWIDTH USE (rounded)	**20 Mbps / 17 Mbps**

Finally, a multi-generational family may consume more broadband than smaller households running small businesses. MCPS reports some students living in households of eleven or more people. It is not uncommon for as many as seven members of the family to be using bandwidth simultaneously for activities such as schoolwork, online video gaming, streaming video applications, or browsing the Internet. This family would require at least 24 Mbps download and 7 Mbps upload in the evening. Daytime use may be similar to a family of four because some of the generational family will be out of the house during the day.

Multigenerational households might use 24 Mbps download and 7 Mbps upload to support seven or more simultaneous users

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	PEAK BANDWIDTH UTILIZATION MULTI-GENERATIONAL FAMILY OF ELEVEN (EVENING)	DOWNLOAD / UPLOAD
x2	Online Video Gaming	4.0 Mbps / 2.0 Mbps
x3	Streaming Video Applications (Netflix, Prime, etc.)	15.0 Mbps / 0.3 Mbps
x3	Surfing Internet	3.0 Mbps / 1.0 Mbps
x1	Video Chat (Zoom, etc.)	1.5 Mbps / 1.5 Mbps
x10	Home Security (Ring, etc.) and other household smart devices (Alexa, Cortana, etc.)	0.3 Mbps / 2.0 Mbps
	TOTAL BANDWIDTH USE (rounded)	**24 Mbps / 7 Mbps**

Broadband Service Available in the Agricultural Reserve

- **Fiber FTTP and Cable Modem DOCSIS 3.0** are available in 63 percent of the Ag Reserve. Comcast offers 100 to 2000 Mbps download and 5 to 2000 Mbps upload. Verizon offers 200 to 940 Mbps download and 200 to 880 Mbps upload. Actual speeds may vary based on simultaneous users in the household and neighborhood. Some customers were quoted one-time fees of several thousand dollars to extend fiber to their homes and businesses. Verizon and Comcast are both fiber networks; Comcast uses coaxial cable to connect into houses and fiber everywhere else.

- **Fixed Wireless.** Telegia offers Fixed Wireless 10 to 30 Mbps download and 5 Mbps upload. Customers may pay more than fiber customers for the same level of service. Service may require nearby tall structures for antennas, or a relay between customer rooftops.

- **Mobile Wireless.** 4G cellular mobile broadband is available in parts of rural Montgomery County. Some customers report areas where service does not work, difficulty getting good coverage indoors, and problems exceeding monthly, total-use data caps.

- **Satellite Service.** HughesNet advertises satellite Internet up to 25 Mbps by 3 Mbps, but County customers reported it was inadequate to meet their needs. SpaceX's Starlink is offering low earth orbit (LEO) satellite internet with 50-150 Mbps speed beginning in 2021 in selected markets.

- **DSL.** Verizon DSL service is available within ~1.75 miles of downtown Poolesville and Damascus, but Montgomery County customers reported it was inadequate to meet their needs.

Summary

1. Typical broadband needs by County households are at the limit of FCC miniumums for download speeds and exceed FCC minimum and baseline levels.

2. Planning should focus on meeting FCC Above Baseline 100 Mbps download and 20 Mbps upload, but demand for upload is growing. Symetrical download and upload is better suited for future needs.

3. Fiber and Cable Modem technology offers speeds that meet Above Baseline; Fixed Wireless may meet FCC minimums but has not kept pace with growing needs; Mobile Wireless data caps and coverage gaps limit effectiveness of this as a fulltime rural broadband solution; Satellite and DSL service are not meeting customers' needs, but Starlink could be a game changer by the end of 2021.

4. To meet current and future needs of rural residents, OBP is primarily focusing efforts on extending fiber and cable networks, continues to support Fixed Wireless, and works generally to expand 4G and 5G cellular coverage in the Agricultural Reserve.

Broadband planning should be focused on meeting FCC Above Baseline 100 Mbps download and 20 Mbps upload standards, but also emphasize symmetrical service to address increasing upload usage#

MONTGOMERY COUNTY AGRICULTURAL RESERVE

TOTAL AGRICULTURAL CONTRIBUTION TO THE COUNTY'S ECONOMY
$281,587,662

Traditional Agriculture
$42,581,000
Horticultural Industry
$154,378,185
Equine Industry
$84,855,896

Source: 2017 Office of Agriculture

The Montgomery County Agricultural Reserve or "Ag Reserve" was created in 1980 and has been heralded nationally as one of the best examples of land conservation policies. The Ag Reserve encompasses 93,000 acres – almost a third of the County's land resources – and is home to 558 farms and about 6,500 occupied properties.

In addition to enabling telework, remote learning and daily living, broadband is also important in the Agricultural Reserve because it allows small and medium-sized farms to:

- Expand direct and online sales, marketing, and supply change and logistics management opportunities
- Conduct precision farming – using computer algorithms, satellite imagery, and soil measurements to increase farm yields, use less water, and comply with environmental regulations
- Conduct high-quality video consultations with experts
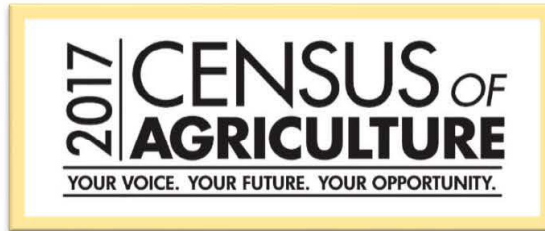
Montgomery County Statistics

Total Land in Montgomery County	316,800 acres
Agriculturally Assessed Lands	76,760 acres
Land in Farms	65,537 acres
Percent of Land in Farms	21.3%
Number of Farms	558 farms
Number of Horticultural Businesses	350
(cut flowers, landscape, arborist, lawn care)	
Average Farm Size	117 acres
Average Market Value of Agricultural Products Sold per Farm	$76,310
Total Cropland	48,771 acres
Harvested Crop Land	43,201 acres
Field Seed, Grass, Hay and Forage Land	8,385 acres
Woodland (Public 31,513 & Private 57,487)	89,000 acres
Average Age of Operator	59.8 years
Percentage of Principal Occupation Farms	39%
Publicly Owned Lands (Federal, State, County, WSSC)	58,500 acres

Farms by Type of Enterprise

Type of Farm	Number of Farms	Bushels/Tons	Production
Beef	88		1,853 cows
Horse	328		10,000 horses
Dairy	12		490 cows
	(2 commercial operations)		
Sheep	59		810 sheep
Goats-Milk and Meat	55		1,526 goats
Hogs & Pigs	49		274 hogs & pigs
Poultry	113		2,225 chickens
Corn for Grain	34	2.1 Million Bushels	11,977 acres
Corn for Silage	7	4,367 Tons	205 acres
Wheat	29	543,302 Bushels	7,785 acres
Soybeans	35	893,356 Bushels	14,559 acres
Forage – Hay	177	24,811 Tons	8,878 acres
Sod	3		940 acres
Vegetables, Fruits, Nuts	78		692 acres
Christmas Trees	4		43 acres
Greenhouse, Nursery & Floriculture Production	58		

Statistics provided by, U.S.D.A Ag Census 2017
University of Maryland Extension 2012
Summarized by Montgomery County Office of Agriculture
www.montgomerycountymd.gov/agservices
April 2019

Montgomery County, Maryland
Preserving Our Agricultural Heritage
Connecting Our Past…With Our Future

Agricultural Reserve

Montgomery County's agricultural reserve is an important environmental resource for future farm enterprises. A strong agricultural heritage provides a diverse business community and a strong economic base. Combining these strengths with the commitment for farmland preservation makes Montgomery County an attractive place to live and work.

Agricultural activities occupy about one-third of the County's land area. Over three quarters of the 93,000-acre agricultural reserve is preserved through transfer of development rights or easement purchase initiatives. The County's diverse agricultural industry produces millions of dollars in economic contribution from farm products and farm operations. The majority of Montgomery County farms are family-run operations, many reaching back several generations, which employ more than 10,000 residents. The County has 558 farms, of which 42% are farmed as primary occupation. Grain farms (corn, silage, wheat and soy beans) are the predominant agricultural use in the County covering over 34,526 acres. The County ranks number one in the State for total acres planted in berries. There are 454 farms or 81% that produce table food crops/products for direct human consumption.

Horticulture
During the past 36 years, the Horticulture Sector has grown dramatically. The 350 horticultural businesses employ more than 7,000 of the people working in agriculture. Horticulture is one of the largest sectors in agriculture and includes nurseries and landscaping/lawn care companies, arborists, sod farms and green house businesses. 20% of the horticultural industry in Maryland is in the County and the County ranks second in the state in total number of horticultural firms.

Equine Industry
Horses and equestrian facilities are a major component of the agricultural industry. There are almost 10,000 horses in the County and they represent a tremendous opportunity for farmers in terms of the supplies, services and products needed to support the horse population which exceeds the population of cows. The growing hay industry in Montgomery County is directly proportional to the growing number of horses. High quality veterinarians that provide services to the horses are now available for other livestock operations in the County.
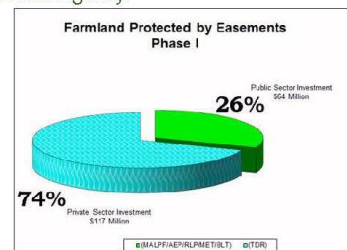
Agriculture for the Future
Montgomery County is committed to sustaining a viable agricultural industry. The Agricultural Reserve, established in 1980 by the Preservation of Agriculture and Rural Open Space Functional Master Plan, provides 93,000 acres for farming. A variety of private organizations assist farmers to prosper in Montgomery County: Montgomery County Farm Bureau, Montgomery Ag Producers, Agricultural Advisory Committee, Agricultural Preservation Advisory Board and Montgomery County Farmers Markets work together with the University of Maryland Extension, Soil Conservation District, and Farm Services Agency.

Farmland Preservation
The County currently ranks 3rd in the nation for total easement acres.
Achieved Phase I farmland preservation goal (Jan 2009) protecting 70,000 acres.
Accomplished through various easement programs (MALF, AEP, RLP, MET, BLT, TDR).
TDR Easements are the largest part of the Phase I goal retaining 1 lot per 25 acres.

Farmland Protected by Easements Phase I

Public Sector Investment $64 Million — 26%
Private Sector Investment $117 Million — 74%

(MALPF/AEP/RLP/MET/BLT) (TDR)

Economic Contribution to the County's Economy
Over 163 County farms have annual sales of $10,000 or more. The average farm size is 117 acres and 30% of the farms are greater than 50 acres in size. The County has experienced an increase of 30% in farms from 1-9 acres in size.

|	
Traditional Agriculture	$42,581,000
Horticultural Industry	$154,378,185
Equine Industry	$84,855,896
Total	$281,587,662

ECONOMICS OF RURAL BROADBAND IN MONTGOMERY COUNTY

The Montgomery County Agricultural Reserve is nearly adjacent to the nation's capital, where development pressure remains perpetual and intense. But despite that proximity, the Agricultural Reserve suffers from a lack of broadband like other rural communities.

Why is that? Many of the features that make the Agricultural Reserve a spectacular part of Montgomery County—wide-open spaces, rustic country roads, large properties, and long driveways—also make constructing broadband infrastructure more expensive. ISPs (Internet or Broadband service providers) calculate the cost of extending their infrastructure based on the new costs to build infrastructure to serve the small number of new customers, and do not generally spread the costs over their entire customer base in the County.

Nothing in federal law requires cellular broadband and telephone companies to serve all areas (as the original copper telephone companies were required to do), and federal law leaves it to
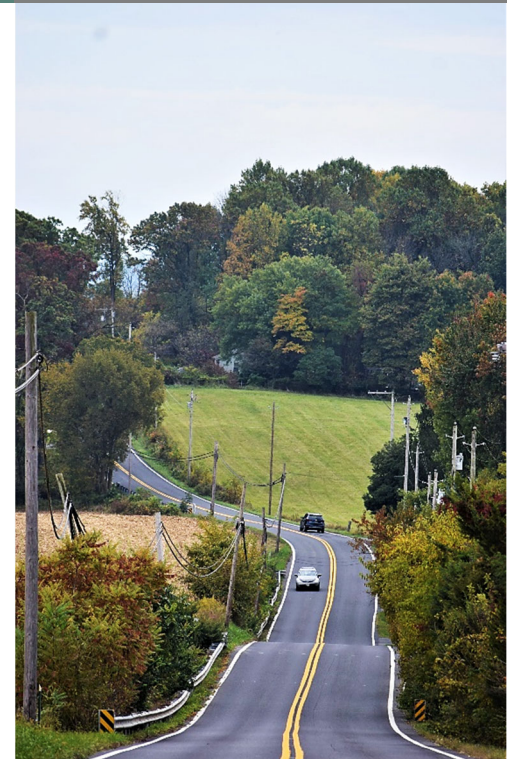
Community Broadband 2017 Cost Study

In 2017, the County commissioned a cost study to determine the cost of building a new fiber-to-the-premises (FTTP) broadband network across the entire County, to better understand the cost of constructing a broadband system to serve the Agricultural Reserve and difference in costs to serve rural versus urban customers.

The cost to construct a broadband network in the Ag Reserve is 7.6 times more per unserved property and 4.7 times more per customer than in urban areas of the County

*29 miles of fiber are needed to pass the unserved properties in the Agricultural Reserve and an additional 3.4 miles of fiber is need to connect the new fiber to existing provider's networks.

local governments to negotiate with national cable companies to establish and enforce buildout requirements for cable service. Requiring cable service to a minimum number of houses per mile also enables broadband services. Because there is no broadband service requirement, most ISPs seek external subsidies to give them a return on their investment to defray the costs of building infrastructure to reach rural homes and small businesses.

Rural vs. Urban Broadband Construction Costs

The County's 2017 Community Broadband Cost Study determined that the cost to construct broadband in the Agricultural Reserve made up only a small portion of the total estimated cost to construct a broadband network in the County—8.5%, but the Agricultural Reserve had a significantly higher—almost 4 times as much—**"cost per passing"** (i.e., the cost per property passed) than the County's urban and suburban areas. This additional cost for rural construction is what ISPs consider when deciding to deploy broadband infrastructure.

Element	Countywide	Urban/ Suburb Areas	Agricultural Reserve	Unserved* Ag Reserve
Est. Passing (# of Properties Passed)	359,970	351,240	8,730	327
Total Fiber Miles	4,158	3,748	410	33.4**
Total Cost Without Drops	$541.4M	$495.5M	$45.9M	$3.6M
Cost Per Fiber Mile	$130,205	$132,000	$112,000	$112,000
Cost Per Passing	$1,504	$1,410	$5,260	$10,750
Additional Cost Per Drop	$1,760	$1,750	$2,310	$4,300
Estimated (Est) Take Rate	35%	35%	35%	66%
Total Cost at Est. Take Rate	$763M	$710M	$53M	$4.6M
Average Cost per Served Property	$3,264	$3,160	$7,570	$15,050

A "Drop" is the wired connection between the road and a structure on the property; "Take rate" is the percentage of properties purchasing service and needing drops. Total Cost includes (Cost per Drop x Estimated Take Rate) + Total Cost Without Drops.

Understanding that the per-mile construction cost is slightly cheaper in rural areas, why is the "cost per passing" so much higher in the Agricultural Reserve than the rest of the County?

- **Rural Addresses Per Mile**

    This has to do with the number of addresses per street mile. On average, the County's urban and suburban areas have more than four times as many addresses per mile than in the Agricultural Reserve, meaning that you must construct as much fiber to reach one-quarter of properties.

There are four times fewer properties per mile in the Ag Reserve than in urban areas

Average Number of Addresses per Mile in the Agricultural Reserve
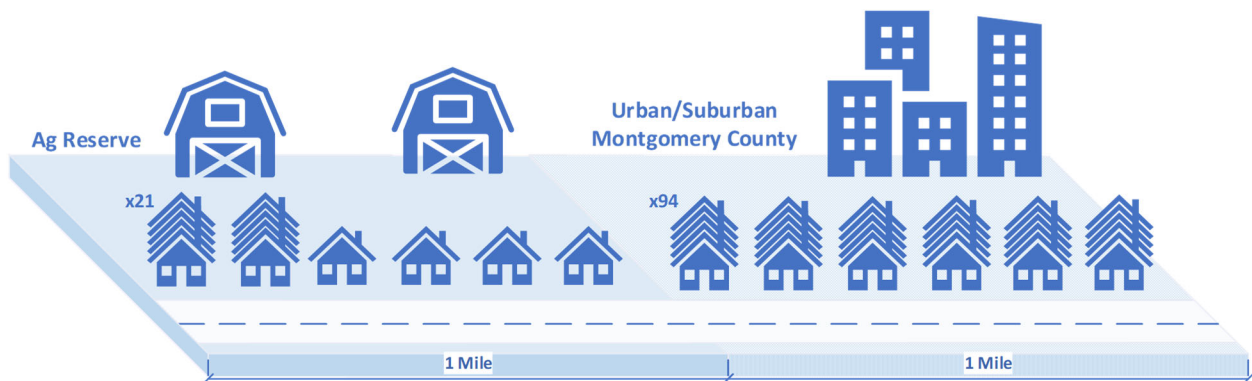
- **Rural "Drop Costs" from Road to Home**

    In rural areas, average construction costs are also significantly impacted by the cost to extend connections from the public right-of-way to the customer premises (commonly known as the **"drop cost"**). ISPs will include a standard drop connection – usually 200 feet – from the road to the customer's home as part of a standard activation fee. But in rural
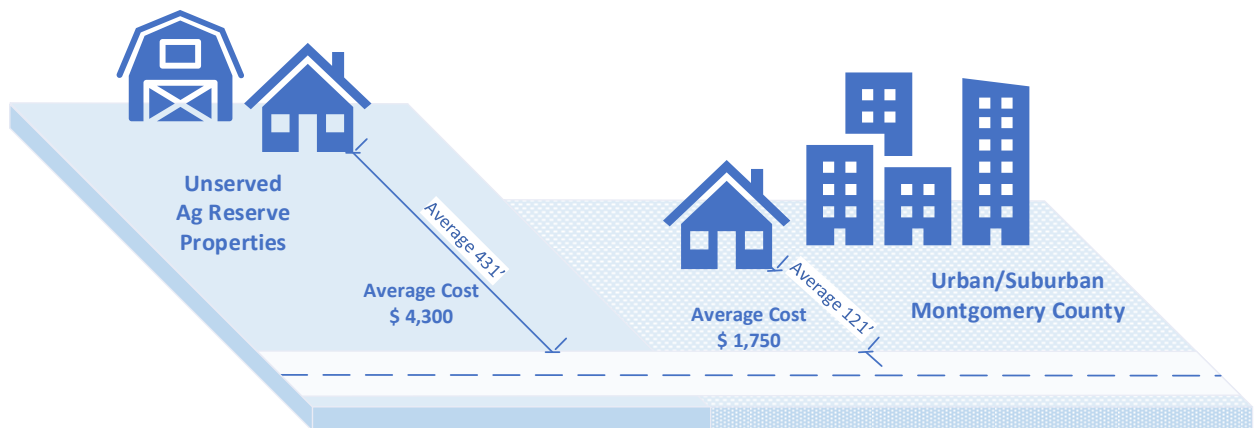
areas, where a house or farm sits at the end of a long private road or driveway, the property owner will typically have to pay most of the cost for extending the drop to the property. A grant application might request funding to reduce this cost. (In Ammon, Idaho, the drop cost can be paid over 20 years as part of the property tax bill.)

- **Increased Costs to Serve Rural Unserved Properties**

  When ISPs look to expand their current service areas, they calculate the business case to recover over 18 to 36 months from new subscribers, the total cost to pass all properties that could be served by the new extension. (They take this business approach because that is what their investors expect, and they have no regulatory obligation to do otherwise.)   ISPs have already expanded their infrastructure into areas within the Agricultural Reserve that are close to the ISPs' existing networks and have the largest density of properties that can be served for the lowest construction cost.

  This leaves the remaining unserved properties without a solution and an even higher passing cost to reach them. The remaining unserved properties are the farthest from existing networks, they are usually in areas with the least density, and they may have the longest driveways.   Based on field surveys, OBP estimates that the average drop distance for the unserved properties in the Agricultural Reserve is approximately 300 feet longer than the average drop distance in the urban and suburban parts of the County.

Average Drop Cost Comparison

Unserved Ag Reserve Properties

Average 431'

Average Cost $ 4,300

Average 121'

Average Cost $ 1,750

Urban/Suburban Montgomery County

The average drop distance between the road and a house among unserved properties in the Agricultural Reserve is 300 feet longer than in urban areas

- ## Increased "Cost Per Passing" for Rural Unserved Properties

  When the factors of lower average homes per mile, increased drop lengths and costs, and increased costs to serve still unserved rural properties are combined, the result is significantly higher average costs per passing, *i.e.*, higher average costs to construct fiber past every property. Whereas the average cost per passing Countywide is estimated at $1,503 and the cost per passing in the urban and suburban areas is $1,410 per property, the already higher estimated cost per passing of $7,570 for rural properties is increased to $10,750 (rounded to $11,000) per unserved rural property – over seven times as much as the County average.

Average "Cost Per Passing" Comparison
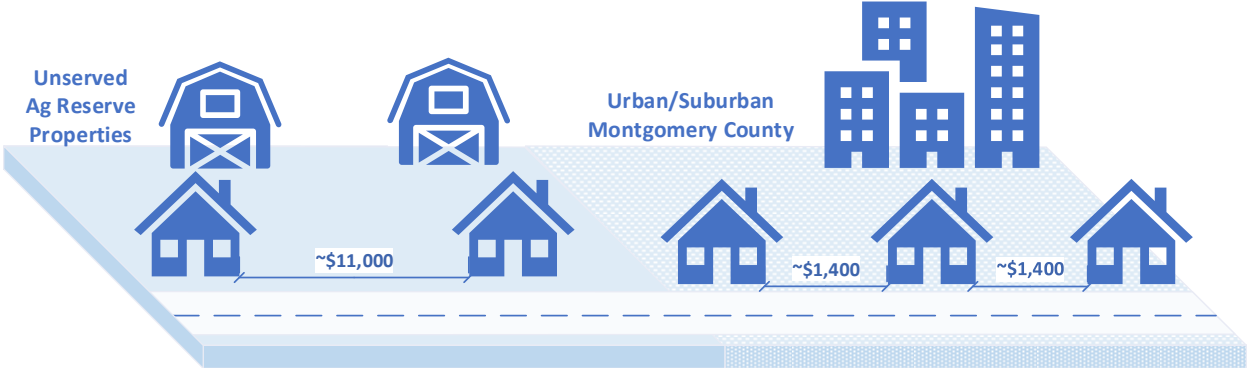
Passing Costs by Business Case Approach

Cost per passing to provide internet service to:

Unserved Agricultural Reserve Properties	$11,000 / 🏠
All Agricultural Reserve Properties	$5,300 / 🏠
$1,500 / 🏠 All Montgomery County Properties	

- ## Increased "Cost Per Passing" for Rural Unserved Properties

  When the increased drop cost is added to the cost per passing, the average total cost to bring broadband to an unserved rural property is $15,050. Total project cost is increased by $1 million to $4.6 million if the project assumes 66 percent of properties purchase the service (based on survey data) and pays for drops to those properties.

> **The average cost to extend broadband to an unserved rural property is $15,050 – almost 5 times more than the Countywide average**

Summary

The places in the Agricultural Reserve that have the greatest return on investment have already had fiber built or have been awarded a federal Connect America Fund II **(CAF-II)** grant to build fiber (see next section for addition CAF-II information). The County's strategy to meet its goal of getting access to broadband for every property in the Agricultural Reserve must address these economic facts:

- The County has limited regulatory authority to require broadband service to rural areas and should try to create public private partnerships and leverage rural grant opportunities.
- Fiber and cable meet the FCC Above Baseline standards and customer needs but 37 percent of the Agricultural Reserve does not have fiber (12 percent will get fiber beginning in 2021 from through CAF-II grant that must be completed by 2025).
- There are four times fewer homes per road mile in the Ag Reserve vs other areas of the County.
- Drop cable lengths from roads to structures on unserved rural properties are an average of 300 feet longer than in urban areas. (This is an average; some properties have much longer drops.)
- Drop costs average $4,300 for unserved rural properties – two times as much as comparable drop costs in other rural areas of the County and three times more than urban areas.
- Costs to extend fiber past the remaining 327 unserved rural properties average $15,050 per property ($10,750 passing cost plus $4,300 drop cost per property).

# BROADBAND EXPANSION IN THE AGRICULTURAL RESERVE

Broadband Grants and Rural Broadband Partnerships

The Office of Broadband Programs has been working for the past ten years with elected officials and broadband service providers to expand access to broadband service in the Agricultural Reserve service. These efforts have ranged from lobbying state and federal officials, pursing grant opportunities, and working to create public private partnerships.

Federal ARRA Broadband Grant. In 2010, as part of a successful Statewide coalition, Montgomery County was awarded $11.5 million from the federal American Recovery and Reinvestment Act **(ARRA)** grant program to connect 80 elementary schools and 20 Housing Opportunities Commission properties to the County's fiber network, FiberNet. As an additional benefit, the County gained valuable experience navigating the federal grant application and award process. After the success of the ARRA grant program, the federal government funded a series of rural broadband grant initiatives.

Montgomery County's first challenge was to convince grant agencies that parts of Montgomery County are rural

The Sugarland Project aggregated demand to persuade Comcast to extend fiber to this neighborhood
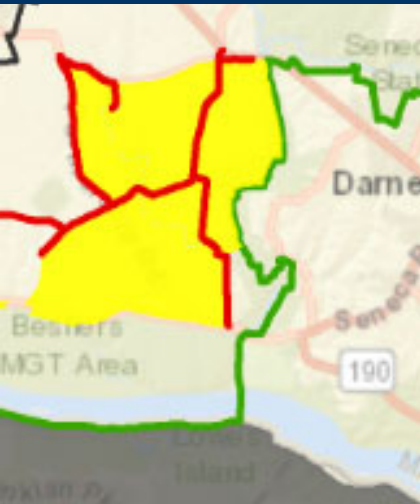
Sugarland Project

Sugarland Lane and Sugarland, Partnership, Montevideo, and White's

Qualifying as "Rural". Montgomery County's biggest challenge in applying for rural grants as an urban-suburban-rural county has been to get grant reviewers to accept that one-third of the County is rural, and to not be disqualified by the definition of "rural" in grant application requirements. [In 2019, Montgomery County successfully lobbied the Maryland General Assembly to amend State law to make the rural parts of Montgomery, Prince George's and Howard Counties eligible for State rural broadband grant funding.]

Google Fiber. Following the ARRA grant, in 2012, Google Fiber deployed its first network in Kansas City, Kansas. Google Fiber's approach was to require a threshold number of residents to sign up before they commit to building out a neighborhood. Although much criticized for leaving certain areas (and houses) behind, investors supported the approach because it lowered Google's costs by not having staff and trucks repeatedly going back to the same neighborhood.

Sugarland Project with Comcast. On a snowy night in March 2015 at a Broadband Community meeting at the Poolesville Town Hall, OBP staff discussed this approach of identifying a threshold percentage of neighbors to commit to service in cluster of homes to lower the deployment costs and demonstrate that "if you build it, they *will* come." From this meeting, residents David Wietzer and Dennis Kamber helped OBP and Comcast launch the Sugarland Project to expand broadband and cable television service to 75 properties on Sugarland, Partnership and Montevideo Roads in Poolesville. Residents Ben Allnutt, Gregory Grigorian, Tom Gutierrez and John Penecost were invaluable to the fulfillment of this project.

Federal CAF-II Broadband Grants. In 2018, legacy copper telephone carriers were invited to bid for federal subsidies to build broadband networks and Verizon was awarded over $3 million to build portions of Montgomery and Frederick Counties through a Connect America Fund II **(CAF-II)** grant. Verizon is required to offer 1 gigabit per second service (**Gbps**, or 1000 Mbps) to every address in the census blocks it selected by 2025 (Verizon has stated to the County that they intend to begin building in early 2021). Verizon selected the areas of Agricultural Reserve that had the most houses clustered together or provided a customer base that would likely purchase the highest tier of service.

Federal CAF-II Grant Areas

Federal ReConnect Grant. In 2018, OBP began to identify clusters of houses in the Agricultural Reserve that were located within 300 feet of the road. These properties would have lower overall project costs because they are closer together. The County intended to seek federal funding to extend fiber to reach these clusters of homes (this idea was developed by Garrett County, MD), aggregate neighborhood demand as had been done in the Sugarland Project, and work with a residential broadband company to provide drops and service as the grant match. However, the federal grant rules prevented this type of partnership – the same entity had to own the passing fiber and drops to houses. The County is not aware of any commercial provider seeking ReConnect grants to extend service to the unserved Agricultural Reserve.

Verizon Fiber Expansion. In 2019, the County redoubled efforts to work with Verizon to expand service in the Agricultural Reserve. Verizon needed to extend its network to reach the CAF-II grant areas and this presented opportunities. Since December 2019, the County has worked with Verizon to expand broadband service to the following neighborhoods:

Between December 2019 and October 2020 Verizon extended service to these neighborhoods in the Agricultural Reserve:

- **Old Hundred Road**
- **Barley Field Lane**
- **Mt. Ephraim Road**
- **Barnesville Road**
- **Big Woods Road**

Governor's Office of Rural Broadband Grants. Maryland Governor's Office of Broadband Programs was created in 2017 and in 2019 began a rural broadband grants program. In 2020, it offered grants requiring matching funds to local governments and ISPs to extend their networks to underserve rural areas. In 2019, Montgomery County was awarded a State grant to submit a 2019 federal ReConnect Broadband grant application. In Fall 2020, Maryland announced an additional $11.2 million in FY21 rural broadband grants with 100 percent match requirement. In January 2021 Montgomery County submitted an application to provide broadband to 52 unserved properties.

Rural Digital Opportunity Fund (RDOF) Phase I. In December 2020, the FCC awarded RDOF grants to SpaceX to buildout its Starlink service over the next 10 years in areas of Montgomery County (see maps below) and Maryland.

Rural Broadband Grant Requirements

First, the most difficult part of the grant development process is identifying a proposed grant area. If any area where broadband service is already available are included, the application will be rejected without opportunity to correct it. (Vexingly, for the federal ReConnect grant, the presence of inadequate DSL and Fixed Wireless service rendered an area ineligible for grant funding, even though the services available are not FCC minimum broadband service.)

Second, the grant must estimate the number of passed homes that will become broadband subscribers. If more customers take the service (*i.e.*, a greater **"take rate"**), then the cost estimate for the drop costs will increase (because more drops from the road to the home are being built) unless the applicant intends to have the customer pay a greater share of the drop cost (which may in turn result in fewer customers).

Third, grants require matching funds. (Even 100% federal grants require a 25% match.) A grant can present a wonderful opportunity for an ISP to lower its construction costs to add new customers. But in the Agricultural Reserve, where the most cost-effective rural properties are already served, it makes it more challenging to entice an ISP to provide some portion of the matching funds to serve properties that are the most expensive to reach.

Finally, grants require the ISP to be or become profitable (usually in 5 years). When an existing ISP adds a few nearby rural area customers, there are not many costs after the initial one-time construction costs—the new rural customers can be served by the same billing systems, service technicians *etc.*, and it is easier to show profitability. Also, if the cost of matching funds is shared among all existing customers, then there is little impact to new customers. But if the cost of the match has to be recovered from the new customers over 5 years or less, the additional cost to new subscribers could be high, and deter people from subscribing (which makes it more difficult to become profitable). Thus, a successful grant application may require convincing an ISP that has opted not to serve a nearby rural area, to become your grant partner and to recover match costs from you or their current profits.

THE UNSERVED AG RESERVE – 2021

PLEASE CONTACT THE OFFICE OF BROADBAND PROGRAMS IF YOUR RURAL PROPERTY NEEDS BROADBAND SERVICE OR IF ITS BROADBAND STATUS IS INACCURATELY CAPTURED IN THIS REPORT

The Office of Broadband Programs conducted field and mail survey data to find unserved and underserved rural areas within the County, and to develop strategies and grant areas to close our rural divide. However, this information only a snapshot in time. Please contact us by email at OBP@montgomerycountymd.gov or on our website at www.montgomerycountymd.gov/OBP if the broadband status at your Agricultural Reserve property is inaccurately shown.In addition, please contact us if you are in the Agricultural Reserve and are not able to get broadband sufficient to meet your household's or small business's needs. We can assist you with:

- Signing up for the SpaceX Starlink satellite internet service program
- Request cable television and broadband service from Comcast or Verizon
- Determine if your property can be served by other wireless providers

In addition, please contact us if you need maps or other information in this report presented in alternate formats to accommodate visual impairment, color blindness, or similar conditions.

Mapping Unserved Properties

To address these grant requirements, OBP conducted field surveys of the Agricultural Reserve to identify unserved areas that have no existing providers, and further conducted a postcard survey by mail to measure demand for broadband services to calculate the take rate. Both activities are intended to develop competitive grant applications that present a compelling business case to potential grant partners and to help develop innovation solutions to provide service to those without access to broadband.

To ensure accuracy of the mapping effort, every accessible public road in the Agricultural Reserve and the surrounding areas was physically surveyed by a County-employed cable inspector. However, our survey work excluded areas of the Agricultural Reserve where federal CAF-II grants were awarded to Verizon because these areas are ineligible for federal and state broadband grants.

The inspectors are experts in identifying broadband infrastructure; their primary job is to inspect communications infrastructure owned by cable franchisees to enforce compliance with the County's cable franchise agreements. Upon completion of the physical surveys and subsequent mapping, the data was shared with the incumbent ISPs in the Agricultural Reserve. Comcast provided updated information to improve mapping; Verizon declined to provide additional information.

The map below provides a snapshot of broadband infrastructure surveyed in March and July 2020, with additional updates in October 2020. Maps reflect new buildout by Verizon to five neighborhoods since December 2019, the Sugarland Project with Comcast, and areas where SpaceX's was awarded subsidies in December 2020 to buildout its Starlink service. There may new deployment of fiber infrastructure not yet captured in the map.

To enable maps to be presented with more detail in smaller scale, maps in this report have been reoriented to exclude non-rural areas, and in some cases divided into two regions, East and West of I-270.

Legend:
- 0 Providers
- 1 Provider
- 2 Providers
- RDOF Awarded to Space Exploration Technologies Corp.
- CAF II Grant Recipient
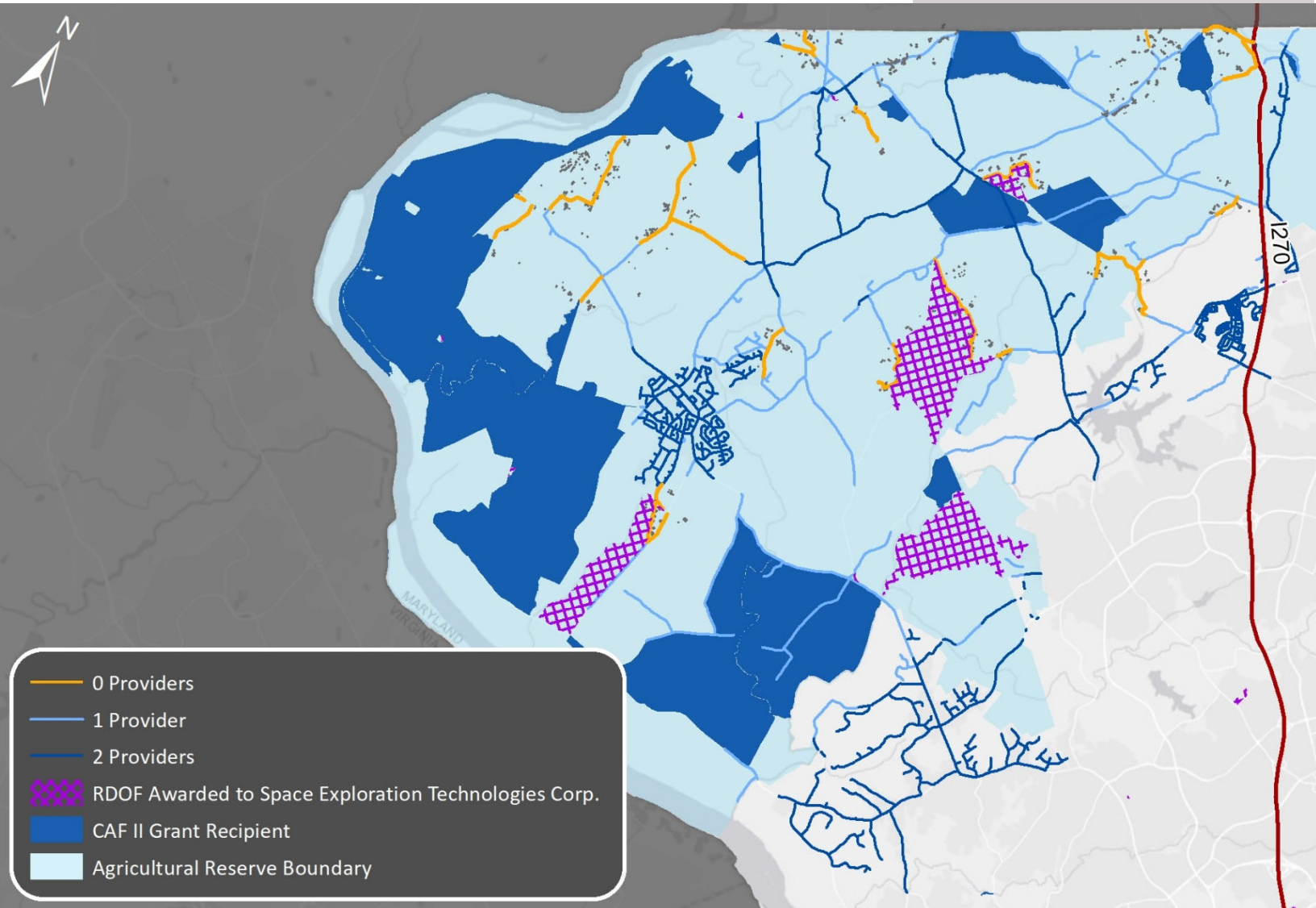- Agricultural Reserve Boundary
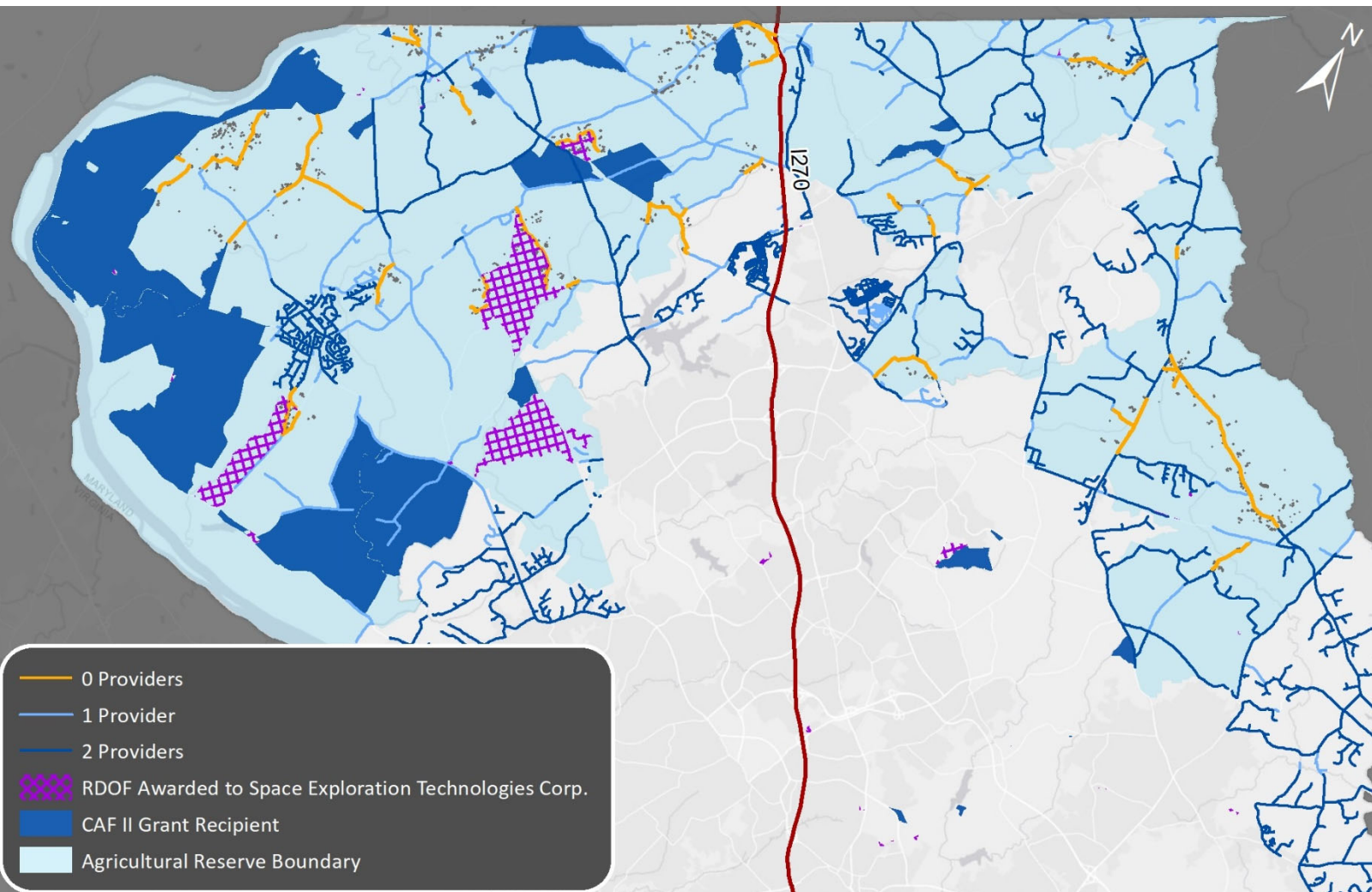
Agricultural Reserve — Unserved Areas

The map above shows the Agricultural Reserve in light blue, with the Verizon CAF-II grant areas in dark blue. The dark blue lines are roads where both Verizon and Comcast are available; the lighter blue lines are roads where Comcast or Verizon but not both are available; and yellow lines show where neither provider is available. The grey shapes are homes and other structures. The map above is reproduced over the next two pages to show information in greater detail.

	Miles	% of Total
Total Road Miles	354	--
Served by at least 1 provider	224	63%
CAF-II grant area	43	12%
No provider	32	11%

Does not total 100% because some roads (*e.g.*, backside of farm) do not need to be built. 32-mile estimate above assumes 3.4 miles of fiber is built to existing ISPs to connect 29 miles of unserved homes.

Several of unserved areas in the West side of the Agricultural Reserve are adjacent to the Verizon CAF-II federal broadband grant areas or on spur roads adjacent to existing facilities.
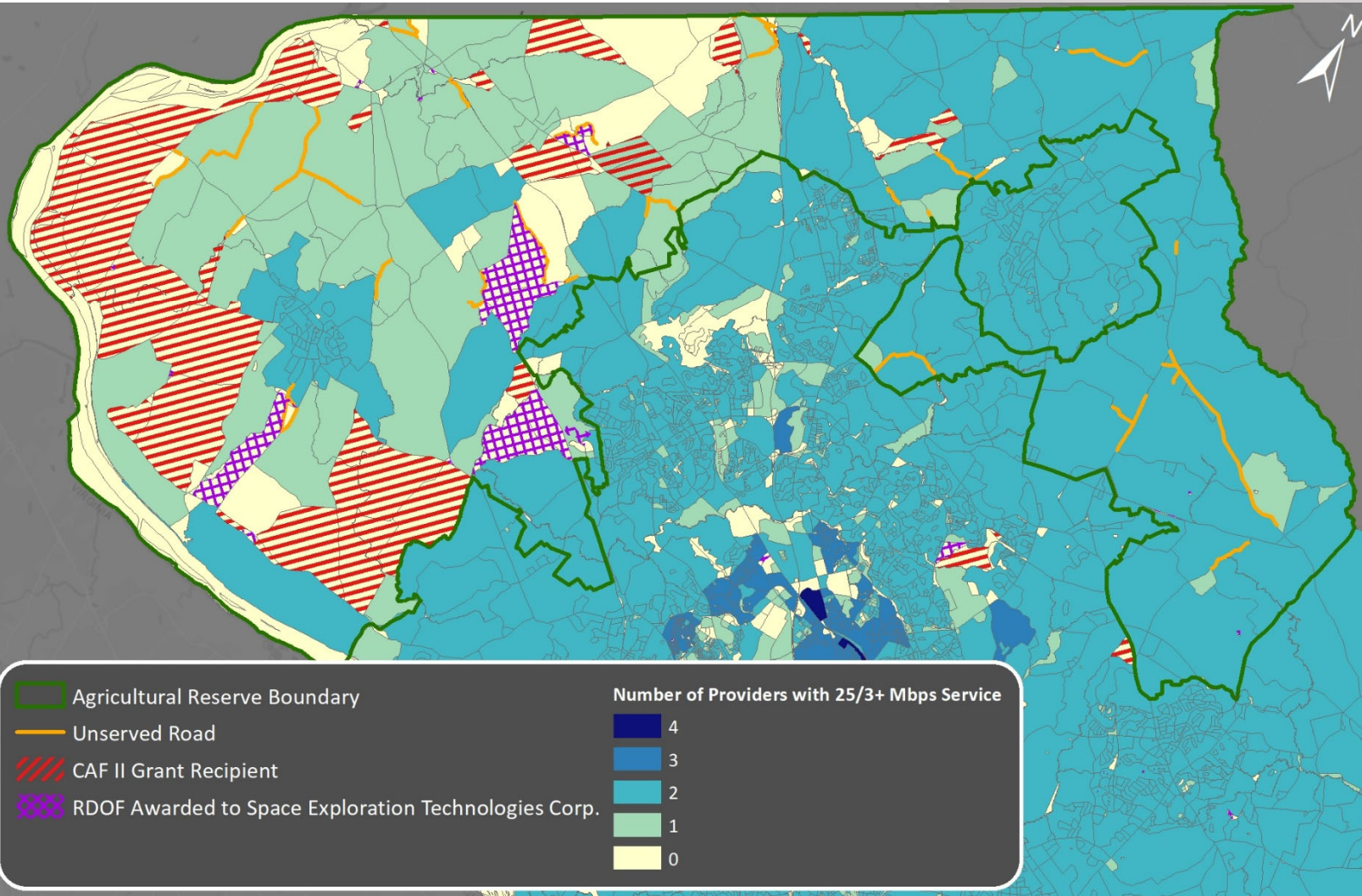

Legend:
- 0 Providers
- 1 Provider
- 2 Providers
- RDOF Awarded to Space Exploration Technologies Corp.
- CAF II Grant Recipient
- Agricultural Reserve Boundary

In addition, the largest unserved areas on the East side of the Agricultural Reserve are middle areas between where fiber was deployed from opposite ends but not extended to serve all properties.

Legend:
- 0 Providers
- 1 Provider
- 2 Providers
- RDOF Awarded to Space Exploration Technologies Corp.
- CAF II Grant Recipient
- Agricultural Reserve Boundary
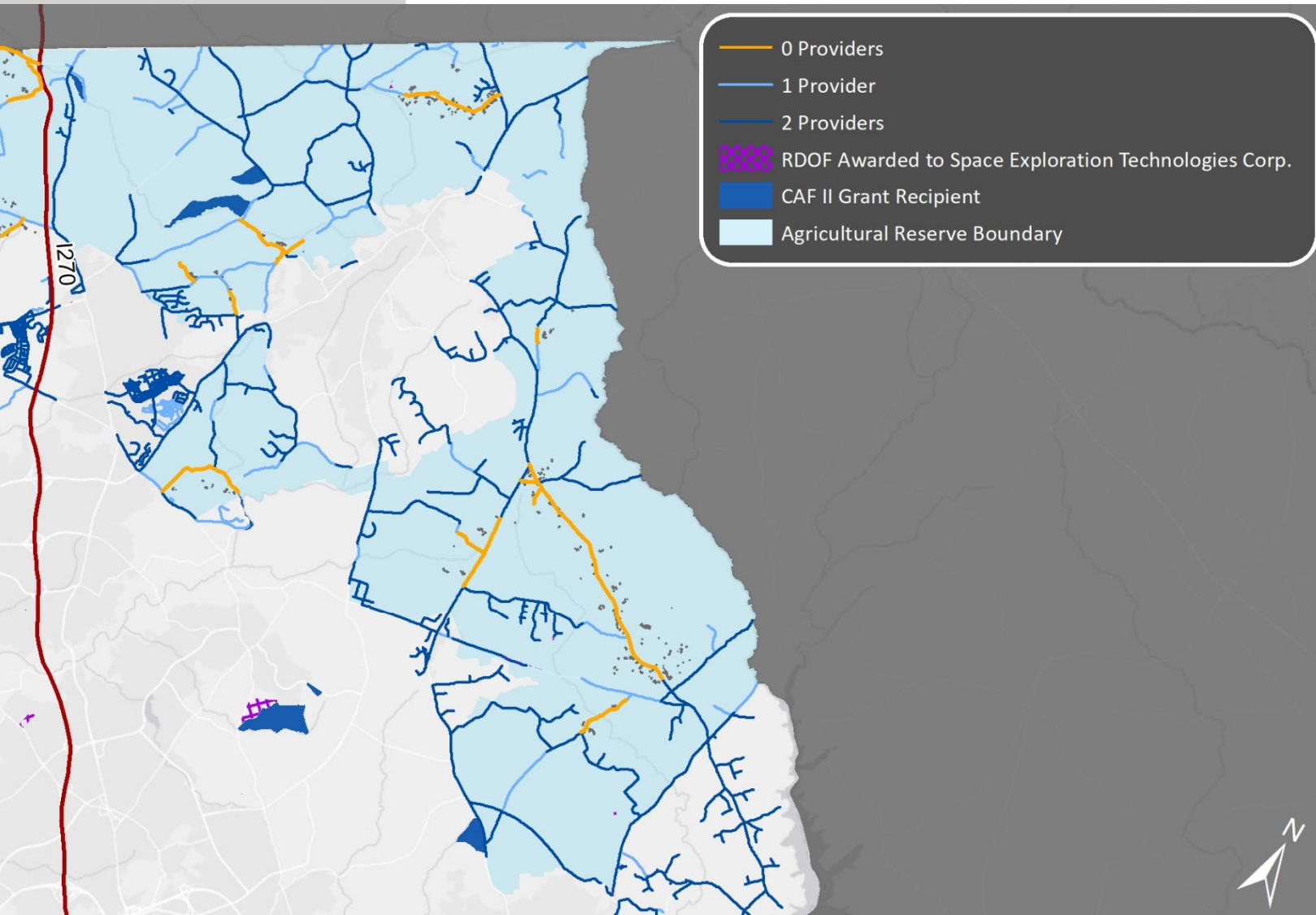
The County's field survey work also reveals how the FCC's mapping data overstates service availability. The FCC uses "Form 477" data submitted by ISPs to estimate where 25 Mbps down by 3 Mbps service is available by Census block. In rural areas where Census blocks are larger, the presence of service at one address within the Census block creates an overrepresentation of service availability. The map below shows where the FCC reports there is one provider (light green) or two providers (teal), but where the County found no fiber networks (orange lines). Census blocks are outlined in gray. The map also shows where there were no 25 Mbps by 3 Mbps service providers (yellow) were reported and the portions of those "no provider" areas where Verizon obtained CAF-II grants to serve. Non-rural "no provider" areas are typically nature areas.

FCC "Form 477" mapping data overstates where broadband service is available

Legend:
- Agricultural Reserve Boundary
- Unserved Road
- CAF II Grant Recipient
- RDOF Awarded to Space Exploration Technologies Corp.

Number of Providers with 25/3+ Mbps Service
- 4
- 3
- 2
- 1
- 0

Rural Broadband Postcard Survey

The County has heard from many Agricultural Reserve residents and businesses: They want better broadband. To better capture this data, the County conducted a mail survey of residences and small businesses in the Agricultural Reserve in January 2020. A key focus of the survey was to assess the availability and use of Internet services and whether the needs of customers are being met.

To avoid skewing results by using an online survey to ask about Internet access, OBP used a mail survey tool. To encourage participation, the survey was limited to 5 questions that would fit on a postcard (see below). The survey was featured in an NBC4 news story, promoted by the Office of Agriculture and the Upcounty Regional Services Center, in press releases, and though outreach to Agricultural Reserve community groups and on social media.

A broadband postcard survey was mailed to Agricultural Reserve and Rural-zoned properties in January 2020

1. **Does your household purchase Internet service (e.g., from Verizon DSL or FiOS, Comcast, Telegia, Hughes Net, etc.)?** *Select No if you only purchase cellular/mobile service (e.g., Verizon Wireless, T-Mobile, Sprint or AT&T) for broadband/Internet access.*

   ❑ Yes   ❑ No

2. **Is someone in your household required to have home Internet access for:**
   (Please check all)

   ❑ Teleworking   ❑ Educational purposes/schooling   ❑ Running a business

3. **To what extent do you agree or disagree that your home/business Internet service is adequate to meet the needs of your household?** *(Please circle your response)*

   1.Strongly Disagree   2.Disagree   3.Neutral   4.Agree   5.Strongly Agree

4. **Would you purchase or switch your home/business Internet service provider if an alternative provider were available with higher speeds?** *(Please check all that apply)*

   ❑ No   ❑ Yes, at same price   ❑ Yes, at lower price   ❑ Yes, at higher price

5. **To what extent do you agree or disagree that the local market offers high-speed Internet at prices your household/business can afford?** *(Please circle your response)*

   1.Strongly Disagree   2.Disagree   3.Neutral   4.Agree   5.Strongly Agree

Using property tax data records, 9,960 properties in the Agricultural Reserve were identified. At the request of the County's Office of Agriculture and Upcounty Regional Service Center, and additional 25,092 properties adjacent to the Agricultural Reserve that are zoned as Rural were also included in the survey to ensure that all rural areas were surveyed. After removing few duplicate records, a total of 33,045 postcard surveys were mailed to the Agricultural Reserve and Rural-zoned residences and businesses. 1,447 postcards were returned to the County as undeliverable. Response rates for the Agricultural Reserve and adjacent Rural-zoned properties was comparable.

- From a net total of 31,598 valid addresses, a total of 4,923 useable responses were received (15.6% response rate).
- From a net total of 7,252 valid Agricultural Reserve addresses, a total of 1,174 useable responses were received (16.1% response rate).

Broadband Survey Results

The field survey work performed spot checks and did not find unserved areas in the rural zoned areas outside of the Agricultural Reserve. Thus, the non-Agricultural Reserve responses served ("Other") as a useful control group to compare with the Agricultural Reserve responses. (Rural-zoned non-Ag Reserve areas include Olney, Sandy Spring, Montgomery Village, Darnestown and North Potomac.)

The key difference between the responses was whether the service is adequate (Q.3), whether they would the pay more for higher broadband speeds (Q.4), and use of home broadband to run a business (Q.2).

The responses to Question 1 were comparable given difficulties of broadband service in the Ag Reserve. 88% of Ag Reserve respondents subscribe to Internet service compared to 98% of Other respondents.
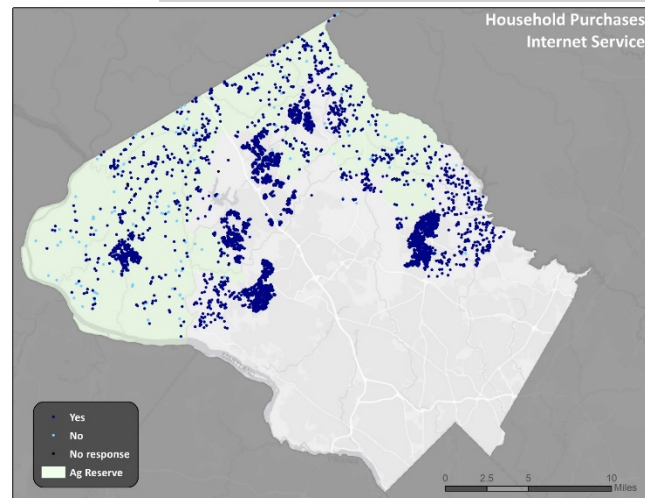
88% of Agricultural Reserve properties purchase Internet service, compared to 98% of other non-Agricultural Reserve properties

Q.3 Your Internet service is adequate to meet the needs of your household

Q.3	Ag Res	Other
Strongly Agree	18%	22%
Agree	35%	48%
Neutral	14%	16%
Disagree	13%	8%
Strongly Disagree	19%	5%
No Response	2%	1%

Q.3	Ag Res	Other
Strongly Agree or Agree	53%	70%
Strongly Disagree or Disagree	32%	13%

In response to Question 3, to what extent do you agree or disagree that your home/business Internet service is adequate to meet the needs of your household, Agricultural Reserve respondents were much less satisfied with their service:

- Almost four times as many Agricultural Reserve respondents strongly disagree that their Internet service is adequate, 19% compared to only 5% from non-Ag Reserve respondents
- 70% of non-Ag Reserve respondents agree or strongly agree their Internet service is adequate compared to 53% of Ag Reserve respondents
- Almost one-third of Agricultural Reserve respondent disagree or strongly disagree that their Internet service is adequate, 32%, compared to only 13% of non-Ag Reserve respondents

Moreover, in response to Question 4, would you switch ISPs if the alternate provider offered higher speeds, 14% of Ag Reserve respondents would switch even if they had to pay more, compared to only 3% among non-Ag Reserve respondents.

Similarly, in response to Question 5, whether the local market offers high-speed Internet you can afford, 51% of Agricultural Reserve respondents disagreed or strongly disagreed, while only 40% of non-Ag Reserve respondent disagreed or strongly disagreed.

However, prior to the Covid-19 pandemic, Agricultural Reserve respondent were almost twice as likely as non-Agricultural Reserve residents to use home Internet to run business:

- 53% use home Internet for telework (51% Ag to 54% Non-Ag)
- 40% use home Internet for education/school (39% to 41%)
- 28% use home Internet to run a business (40% to 24%)

32% of Agricultural Reserve respondents feel their Internet is adequate, 14% would pay more for high speed Internet, and 40% use their home Internet to run a home business.

Follow-Up Internet Access Questionnaire

As a follow up to Question 1, OBP sent a letter to the 1,026 respondents in the Agricultural Reserve who stated they subscribe to the Internet. 525 responses were received back (51% response rate) and of the 511 useable responses:

- 83% purchase Internet that meets FCC minimum speeds (423)
- 17% purchase Internet that does not meet FCC minimum speeds (88)

- Broadband at least 25/3 Mbps
- Broadband below 25/3 Mbps
- Unknown Broadband Speed
- Agricultural Reserve Boundary
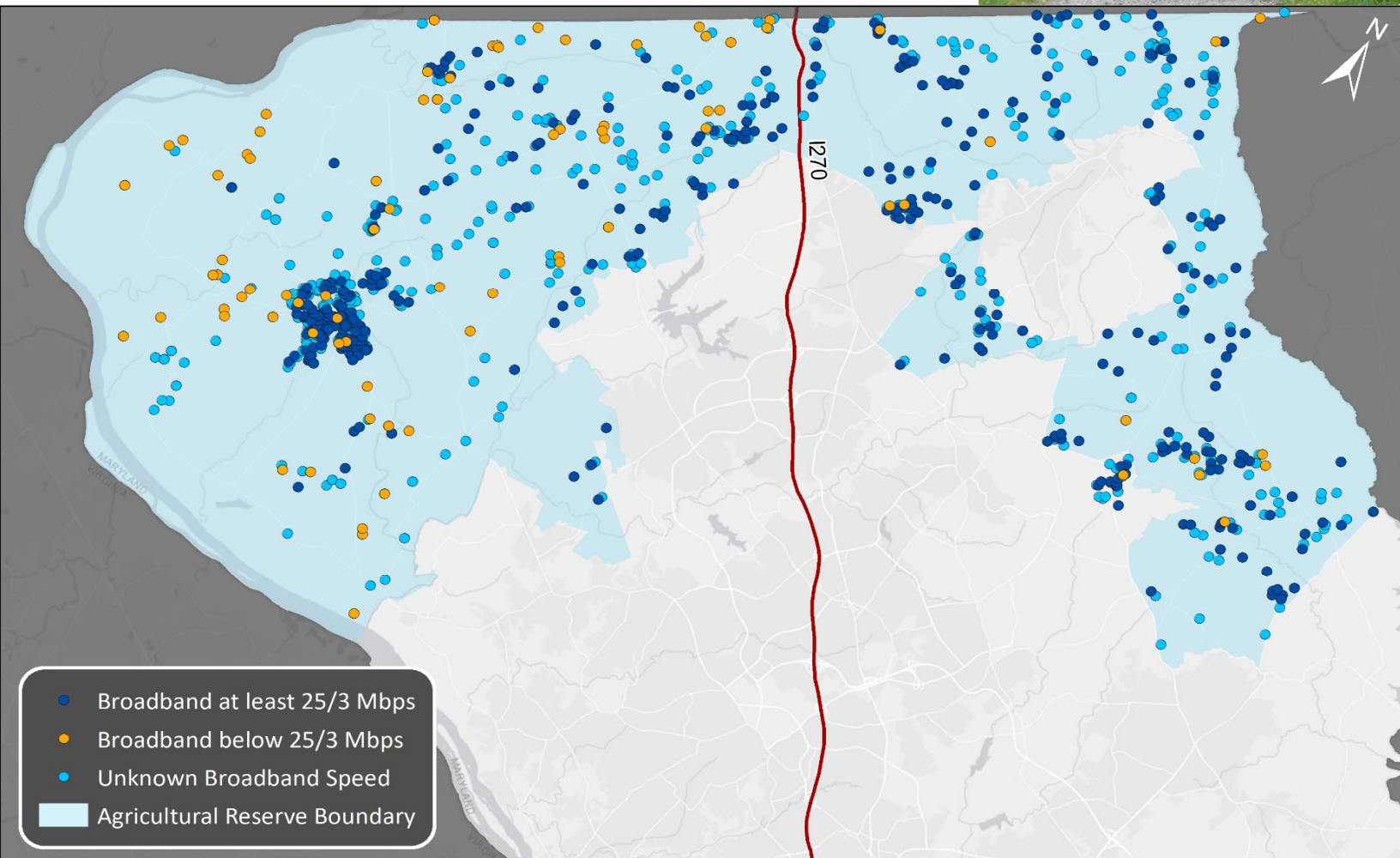
Of the 31% of the Ag Reserve respondents who purchase Internet— 83% purchase service that meets FCC minimum broadband speeds

Property Tax and GIS Analysis

OBP further analyzed property tax records and geographic information system (GIS or mapping data) for the unserved properties in the Agricultural Reserve that are not in the CAF-II grant areas. OBP estimates that there are:

Montgomery County unserved rural properties include 144 family homes and 130 farms

- 144 Single Family Homes, with structures located an average of 240 feet back from the road (drop length)
- 130 Farms (46 crops, 20 livestock, 6 dairy, 58 general), with structures an average drop length of 457 feet
- 8 properties are used for utilities, warehouse or forestry
- 45 properties are vacant, unused or set aside for no development

OBP will be leveraging the economic feasibility data compiled for this report and reviewing this data with community groups and residents to create additional broadband solutions.
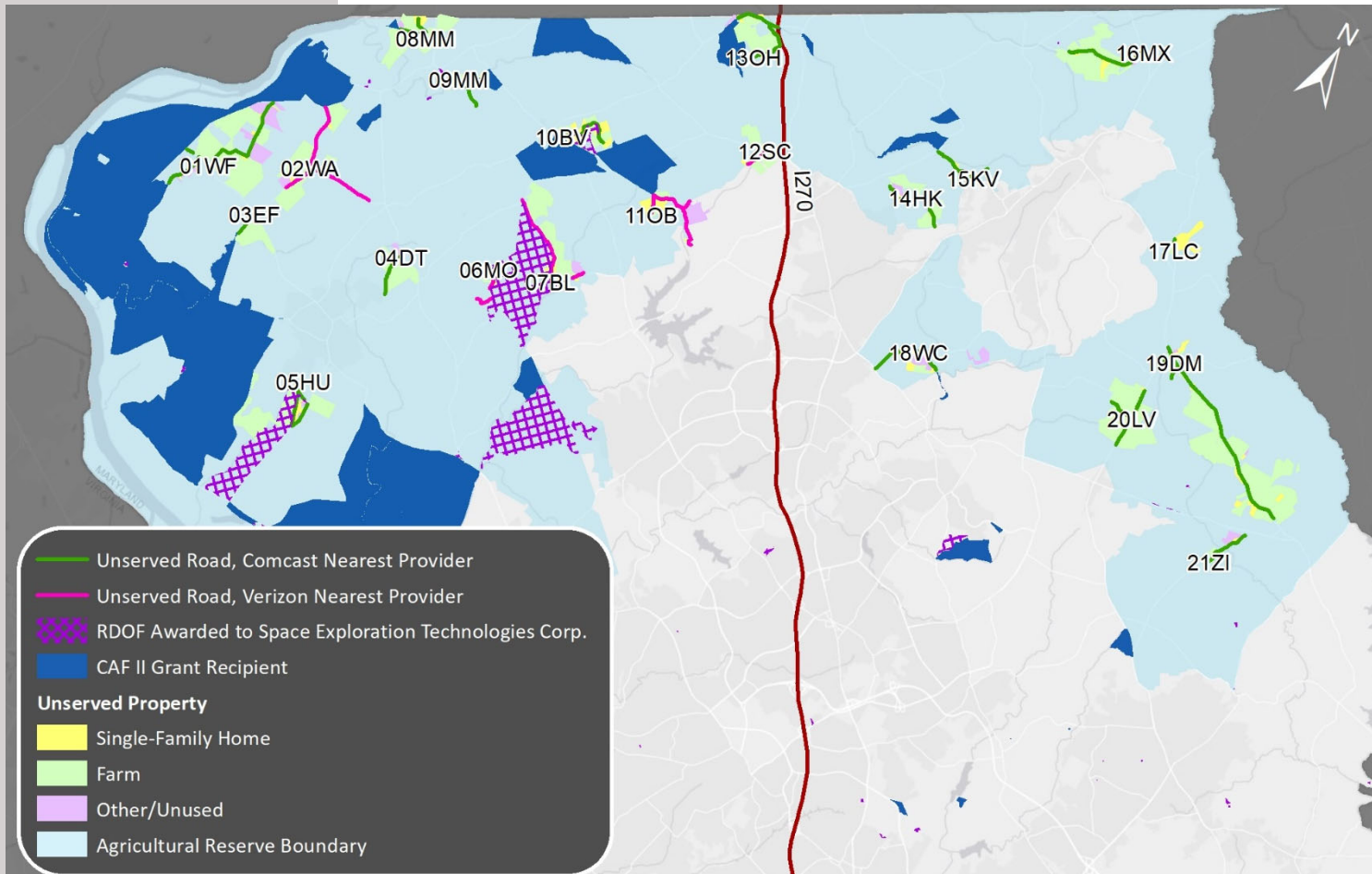
Types of Unserved Properties in the Montgomery County Agricultural Reserve

CONCLUSION

The County will continue to explore innovative approaches and use all available regulatory tools to expand broadband networks in the Agricultural Reserve until every home and business has broadband access.

This Rural Broadband Report provides economic feasibility data about unserved properties in the Agricultural Reserve and the cost to extend fiber to these properties. OBP will leverage this information to seek State and potentially federal grant funding, and will continue to work with the County's ISPs, to cost-effectively extend broadband networks to the 11 percent of the Agricultural Reserve that remains unserved.

The relative high cost to expand service and low number of new customers makes it difficult for any single entity to shoulder. The solution therefore may be a broad partnership between the County and the Agricultural Reserve's residents, farms, and business – one that addresses the problem holistically by pursuing funding and projects as jigsaw pieces that all add up to broadband for the entire Agricultural Reserve.

Office of Broadband Programs, Department of Technology Services
Montgomery County, Maryland

ACKNOWLEDGEMENTS

Photos supplied from the private collection of Jacqueline Arnold unless noted as stock photo.

Cover   Historical Agricultural Farm Building and traditional wood fence
Page 1   Wheat close-up. Chart is urban vs rural wireline broadband availability
Page 2   Young woman sitting on bench on laptop in front of a corn field; Woodbourne Creamery robotic milking room; sunflower close-up
Page 3   Greenhouse nursery; poppy wildflowers
Page 4   Sunflower field
Page 5   Sunny Ridge Farm grain bins along road; warehouse farm market; Jamie Jamison, master farmer on phone
Page 6   Sunset at Historical Agricultural Farm Building
Page 7   Sod equipment, grass and house; three people in farm market interior; bicyclist on country road with corn field in background and power lines on right side
Page 8   CTC Illustration comparing broadband speeds of different technologies
Page 9   Stock photo of Latino family of three at breakfast with computer, tablet and phone
Page 10 CTC Illustration Peak Bandwidth Utilization Typical Family of Four (Daytime)
Page 11 CTC Illustration Peak Bandwidth Utilization Typical Family of Four (Evening). Stock phone African American mom on computer on couch with two kids on phones
Page 12 Interior farm market with people in masks; CTC Illustration Peak Bandwidth Utilization Home Business (Daytime); rural doctor office exterior photo
Page 13 CTC Illustration Peak Bandwidth Utilization Multi-Generational Family of Eleven (Evening); Stock photo multifamily with computer and tablets
Page 14 Sod equipment, sod field and houses
Page 15 Crowd at Historical Agriculture History Barn; food being picked at farm