SOLANO CONNECTED: A BROADBAND AND DIGITAL EQUITY STRATEGY AND ROADMAP

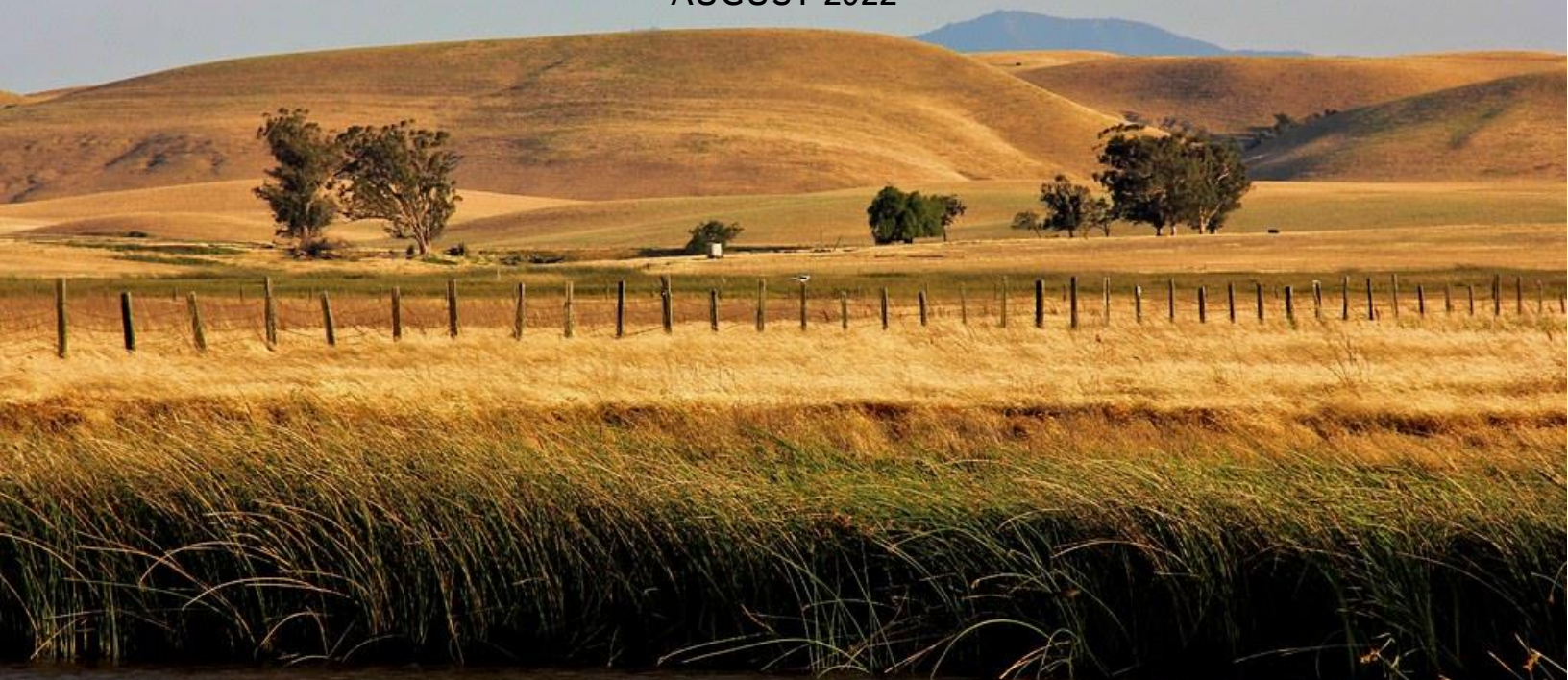
STRATEGIC REPORT AND RECOMMENDATIONS TO IMPROVE BROADBAND ACCESS IN UNINCORPORATED REGIONS AND DRIVE EQUITABLE BROADBAND ADOPTION ACROSS SOLANO COUNTY

A STUDY CONDUCTED BY THE SOLANO COUNTY DEPARTMENT OF INFORMATION TECHNOLOGY AND BOSTON CONSULTING GROUP

AN ARPA-FUNDED PROJECT MADE POSSIBLE BY SOLANO COUNTY

PROJECT NUMBER: 35-521-01DITBBS

AUGUST 2022



About the authors

From June – July 2022, The Solano County Department of Information Technology (DoIT) and Boston Consulting Group (BCG) conducted a comprehensive study of Solano County's broadband connectivity to develop a strategy and roadmap to accelerate broadband access and adoption.

The Solano County Department of Information Technology provides customer-oriented and convenient access to information and services through the use of technology. Boston Consulting Group partners with leaders in business and society to tackle their most important challenges and capture their greatest opportunities in order to unlock the potential of those who advance the world. As part of this study, BCG engaged numerous community organizations and stakeholders to: understand Solano County's specific needs, learn from local efforts currently underway in Solano County, conduct a coverage gap analysis to identify unserved and underserved areas, and develop potential project recommendations and partnership opportunities to drive broadband access and adoption.

This study was made possible by funding from the County of Solano

Project Number: 35-521-01DITBBS

Contents

Figures

1. Executive Summary

Introduction

The goal of this study was to develop actionable project recommendations to drive 100% broadband access in unserved and underserved communities in the unincorporated areas of Solano County and drive broadband adoption equity across the County. This report details the study's findings, project recommendations, and the roadmap to execute, including potential funding opportunities and partners to collaborate with on project execution.

For the purposes of this report, "broadband access" refers to the availability of reliable internet connectivity, dependent on the existence of broadband infrastructure (e.g., fiber, fixed wireless infrastructure). "Broadband adoption" refers to the utilization of internet when broadband access is available. Adoption is dependent on three elements:

- The ability to afford broadband service
- Access to a connectable device
- Digital literacy skills to utilize those devices and the internet.

The Current State of Broadband in Solano County

This study estimates that:

- ~1,800 households, businesses and other buildings in unincorporated Solano County currently have broadband speeds under 25/3[1] megabits per second (Mbps) and are considered "unserved"
- Another ~3,900 households, businesses, and other buildings in unincorporated Solano County have internet access between 25/3 Mbps and 100/20 Mbps (the current standard set by the California Public Utilities Commission) and are considered "underserved."[2]
- ~12,300 households do not have internet subscription plans and ~6,600 households do not have a computer, creating barriers to equitable broadband adoption.[3]

Across Solano County, ~12,000 households do not have internet subscriptions and ~6,600 households do not have a computer, creating barriers to equitable broadband adoption

Broadband Access Findings: Physical Infrastructure

The coverage gap analysis found that ~3,100 residents are unserved (<25/3 Mbps) and ~6,800 residents are underserved (between 25/3 Mbps and 100/20 Mbps) in unincorporated Solano County, preventing residents from accessing the internet at speeds necessary for their work, education, telehealth, and other vital services. It is important to note that the Federal government has set the standard for future federally funded broadband infrastructure projects to be 100/100 Mbps, increasing the bar for service in anticipation of meeting future needs of digital access.

---

[1] Broadband speeds are denoted by their download speed in Mbps (first number) and upload speed (second number) in Mbps, (e.g., a 25/3 Mbps service would provide 25 Mpbs of download capacity and 3 Mbps of upload capacity)

[2] Analysis completed using data from FCC Form 477, NTIA – Indicators of Broadband Need, California Public Utilities Commission (CPUC), BroadbandNow, internet service provider (ISP) data, and spatial data stored by Solano County. See Section 5 for further detail.

[3] American Community Survey data for Solano County

As one may expect, served census blocks are largely within the seven cities of Solano County: Vallejo, Benicia, Fairfield, Suisun City, Vacaville, Dixon, and Rio Vista. City residents have multiple internet service providers and better access to wireless, including cellular service. Lack of adoption in cities is driven by digital equity issues, including cost of service and accessibility, rather than lack of access.

Solano County has several served areas that fall outside of city boundaries, such as served census blocks in Green Valley, north of Vacaville along Cantelow Road, English Hills, and near Willota and Rockville. Additional served census blocks include Pierce, Montezuma Hills, south of Highway 12 and west of Rio Vista, and the area east of Cordelia.

Underserved areas in Solano County are largely comprised of rural residential areas, such as Mankas Corner, the northern part of Green Valley, Allendale, English Hills, Pleasants Valley, the areas north and east of Dixon, and Ryer Island.

Unserved census blocks are primarily in rural or unincorporated areas of the County, with fewer homes and businesses. The largest unserved area is on the eastern side of the County, south of I-80 and bordering Dixon and Vacaville. This area largely comprises of farmland, and includes Batavia, Yolano, Libfarm, Bunker, Binghamton, Vale, Dozier, Maine Prairie, and Olcott.

Broadband Adoption Findings: Digital Equity

Beyond broadband access, stakeholders across Solano County are concerned and actively addressing equitable broadband adoption, defined as having daily access to the Internet at speeds, quality, and capacity necessary to accomplish common tasks, and the digital literacy skills necessary to participate online.[4] Broadband adoption was especially a concern for students, seniors, and low-income or homeless communities. These issues ranged from awareness of available ISP providers and subscription affordability, including data caps of low-cost programs that may lead to additional fees for customers; device access, specifically to devices suitable for distanced learning, work from home, telehealth, etc.; and digital literacy skills to become fluent in using these devices.

Digital equity is often not addressed with the same level of focus as broadband infrastructure but is critical given the digital divide disproportionally affects certain communities, especially in rural and low-income communities, hindering their access to and ability to use technology and digital resources.

Strategic and Actionable Project Recommendations for Solano County

To address these gaps in broadband access and adoption, The DoIT is recommending the Board of Supervisors considers both strategic recommendations and specific, actional project recommendations.

The strategic recommendations include:

- **Solano County should support local ISPs to apply for Federal and State broadband infrastructure funding**, e.g., by providing letters of support and expedited permitting, rather than directly pursuing funding, development, and/or ownership of broadband infrastructure
- **Invest ARPA funds to become a leader in addressing the digital divide in California today** and enable the County to be more competitive for future funding, such as Federal and State digital equity grant programs in late 2023 and 2024
- **Establish "Solano Connected,"** a permanent stakeholder group of 30+ local organizations planning and executing digital equity programs to address the digital divide
- **Collaborate with ISPs to reform low-cost broadband plans, e.g., adjusting data limits**, to ensure residents are properly served by the programs designed to enable broadband adoption

[4] National Digital Inclusion Alliance

The project recommendations include:

- **15 project recommendations for broadband infrastructure** development (including contracted staff and fiber and fixed wireless development)
- **5 project recommendations for digital equity** (including contracted staff, the "Solano Connected" coalition, and digital equity programs)

These actionable project recommendations come complete with project definitions, cost estimates, potential partners, and funding opportunities to pursue. These efforts would connect 2,550 buildings (6,360 residents) to robust broadband internet and establish vital digital equity resources, including a digital equity coalition of 30+ stakeholders across the county to drive digital equity projects long-term. One near-term project for consideration includes expanding broadband infrastructure in Elmira, which could be supported with ARPA funding to match private sector funding.

Future Funding Opportunities for Broadband

Securing federal, state, and other funding will be critical for Solano County to execute project recommendations. Given the multitude of funding sources, Solano County leaders and stakeholders will need to pay close attention to the timelines and deadlines of various funding sources to best meet submission requirements for each application. The most significant opportunities will be California State programs funded by the American Rescue Plan Act (ARPA), the Infrastructure Investment and Jobs Act (IIJA), and SB 156, a 2021 bill passed by CA legislature to fund $6B for broadband deployment in unserved communities. Additional information on broadband funding opportunities can be found in the Appendix.

Priority Actions for Solano County to Consider

To make the project recommendations in this report a reality, there are several priorities to fund in the near future:

- Broadband Infrastructure Program Contractor
- Additional broadband infrastructure development support
- Digital Equity Program Contractor
- The "Solano Connected" coalition and Digital Navigator system
- Digital Resource Awareness Campaign
- Digital Equity Seed Funding Program
- Solano County Library device lending program

This report also provides the framework for "Solano Connected" a digital equity coalition 30+ community stakeholders, including county agencies, cities, internet service providers, schools, non-profits, and other organizations committed to addressing digital equity. This collaboration will be critical to ensure the resources needed to address the digital divide and make future digital equity funding applications more competitive.

Our aspiration is for Solano County to become a leader in access to broadband, close the digital divide, and provide all residents, schools, and organizations with the resources they need to succeed in our digital world. This plan is meant to be a key milestone in a multi-year process to reach this aspiration.

Our aspiration is for Solano County to become a leader in access to broadband, close the digital divide, and provide all residents, schools, and organizations with the resources they need to succeed

2. What is the "digital divide" and why must we address it?

The "digital divide" is the inequality in access to digital technology, including access to reliable internet service and the ability to use that service, including both digital literacy skills and physical devices. While digital access has been a longstanding challenge—from the development of the radio to the telephone to computers—the importance of digital connectivity became even more clear with the COVID-19 pandemic. Broadband access and adoption are critical to citizens' ability to engage with modern society and combat systemic inequalities across the economy, education, healthcare, and more.

Education

Before the COVID-19 pandemic, one-fifth of public schools offered courses entirely through online platforms[5], and by spring 2021, almost 80% of US students were being offered a fully online learning option[6]. Students that cannot utilize online tools at home are put at a learning and development disadvantage, called the "homework gap". In addition, lack of 100% internet connectivity prevents educators from unlocking the cost efficiency, quality assurance, comprehensive integration, and improved learning that online tools can provide.

Healthcare

The share of doctor visits held over telehealth increased from less than 1% pre-pandemic to 8% recently,[7] the share of Medicare visits held digitally increased more than 63-fold in 2020,[8] and a third of behavioral health visits were conducted digitally in 2020.[9] Cigna data has shown that the cost of a non-urgent visit over telehealth is $93 less for an average visit, $120 less for a specialist, and $141 less for an urgent visit than in-person care.[10] A large-scale survey found that 45% of respondents believed internet access was a barrier to medical care, with the effect particularly pronounced among rural and elderly respondents.[11]

Government Services

The percent of citizens using internet-based government services rose from 21% to 39% during the pandemic,[12] with many governments leveraging digital platforms for COVID-19 testing, DMV appointments, voter registration, city council meetings, and social service enrollment. Broadband not only helps these citizens access critical government services but also provides them with opportunities to have their voice heard and participate in local governance.

Business

Today, 59% of US workers report working all or most of the time from home.[13] For workers, remote work saves commute time and may increase job satisfaction, and for businesses, remote work removes geographical barriers to a talented and diverse workforce and may improve employee retention.

---

[5] NCES
[6] Congressional Research Service
[7] Kaiser Family Foundation
[8] U.S. Department of Health and Human Services
[9] U.S. Department of Health and Human Services
[10] Cigna
[11] M Health Intelligence
[12] Inter-American Development Bank
[13] Pew Research

Economic Impact

Closing the digital divide positively impacts GDP growth, innovation, health metrics, and socio-economic equality. One study of broadband access expansion in rural Indiana indicated a three-to-four-fold ROI,[14] and another study showed that gaining access to a reliable internet connection could lead to a 1.1% increase in labor productivity.[15] Using the estimate of $27.6 million for Solano County gross product from Federal Reserve Economic Data, just the increase in labor productivity could mean over a $300,000 gross product uplift.

Social Impact

The internet provides individuals with access, often for free, to a borderless world of entertainment, social connectivity, and community building, and cultural and entertainment experiences are shifting towards digital platforms as well. According to Pew Research, 72% of the US public uses some type of social network, and most of these individuals use a social network daily, demonstrating the necessity of internet for daily connectivity.

[14] Purdue University
[15] National Bureau of Economic Research

3. What will it take to address the digital divide?

There are many drivers of the digital divide, and many solutions to drive digital access and inclusion. This section details those opportunities across broadband access, or the availability of broadband infrastructure, and broadband adoption, or the ability to effectively make use of broadband access.

3.1 Addressing the digital divide through broadband access

Broadband access is dependent on the availability of broadband infrastructure to provide internet services to a geographic area. Broadband access often defined as "middle mile," or technology that connects internet service providers (ISPs) networks to a local network, and "last mile," or technology that connects a local network to specific buildings and end customers.

While there are many types of technology to provide this infrastructure, the Federal government has set the standard for future development at 100/100 Mbps service, with a preference for fiber over other broadband technologies. It is important to note that this standard has increased over time and is expected to do so as the needs for higher internet speeds increase with societal advancements such as working from home, telehealth, and other digital activities.

This section details different types of technology best fit to meet such needs.

Fiber

Fiber-optic internet, or "fiber," is considered the most future-proof, robust internet technology currently available. Fiber is comprised of bundled glass strands within cables that carry data using light pulses. It is comparatively costly per mile to install as it can require digging in the ground and laying fiber, which is labor and time intensive. It is also structurally difficult to access certain geographic areas, and economically difficult to reach others due to the business case. As a result, it is best suited for greenfield buildouts in dense urban and suburban areas. However, while upfront costs are typically higher, fiber has lower ongoing costs due to its high performance, customer satisfaction, and minimal maintenance requirements. One cost-effective means to expand fiber would be to lay down middle mile in a "dig once" approach and enable ISPs to plug into that infrastructure and provide last mile service. Government funding to subsidize this development is an important lever to improve the business case and often attracts additional development by ISPs to expand coverage even further.

The Federal government has stated fiber is the preferred technology given its scalability and high-speed connections. Fiber has a typical symmetrical speed of approximately 250-2,000Mbps, with approximately 10,000 times more usable bandwidth than a standard coaxial cable. As infrastructure and advanced technology continues to develop, it is also the best positioned; its low latency (signal delay or lag) is advantageous for technologies like AR/VR, and its speeds are independent of consumption across other premises, making it unaffected by other local network congestion.

Fixed wireless

Fixed wireless is technology that grounds wireless internet to a tower that provides internet directly to end customer using a cellular-based connection; it does not involve any cables, but rather transmits internet through radio waves. Because it does not require digging into the ground, it is well suited for difficult terrains, or areas with limited existing fixed wire infrastructure. It is also a good fit for areas with low resident density, where laying cable may not be economically feasible. Fixed wireless access (FWA) has comparatively lower upfront capital costs, which are typically for cell deployment, base tower infrastructure, and customer equipment. Costs vary based on a variety of factors, such as household

usage or size of the tower, but are expected to further decrease over time as fixed wireless technology continues to advance.

While costs make it an attractive option, it has limited speeds and scalability. Capacity does rely on network density and nearby consumption, often making it insufficient for areas with high concentrations of users. FWA has the lowest typical speeds at 30-300/5-20Mbps, and longest latency of 30ms-40ms.

Ongoing maintenance costs are also higher, requiring network upgrades and changes based on electrical usage. Other factors, such as trees, bad weather, and dense building materials can also interfere with signals between the towers and end users, requiring maintenance to improve signal strength. For these reasons, it is not the recommended option for high-usage households, high-density areas, or for supporting advanced technology innovations. Rather, it is best suited as a cost-effective solution for rural and some suburban geographies with minimal signal interruption.

Other

Wired cable (or HFC) is another solution for internet service, which combines fiber optic and cable to connect to broadband. It is the most deployed option, accounting for 50% of broadband market share. Cable has relatively high upfront costs and higher maintenance costs than fiber but is less expensive to deploy than fiber; for this reason, upgrading existing cable infrastructure is typically more common than replacing with fiber. HFC offers speeds of 10-1,500/5-100Mbps and latency of 15-27ms, which is generally sufficient for typical household usage but not the best for advanced technology.

Satellite technology is an emerging technology that provides wireless internet via satellite directly to end customers. It is highly cost effective, however, it is not considered broadband technology and connectivity speeds slow with increased use, making it difficult to scale in a community. This makes satellite best suited for near term connectivity while more robust broadband infrastructure, such as fiber and fixed wireless, is developed.

5G, the fifth-generation standard for cellular networks, promises greater speed, lower latency, and increased reliability; however, it is also not considered broadband. Compared to the current 4G standard, which has a peak of 1 Gbps, 5G theoretically can deliver speeds up to 20 Gbps. Current implementations by leading cellular carriers deliver median speeds of up to 118 Mbps, but availability is limited[16]. Reliability and upload speeds are both areas where 5G underperforms compared to broadband options such as fiber or fixed wireless. However, for extremely rural communities who are unlikely to be targeted for broadband infrastructure buildout, 5G may be the best option available. 5G does not qualify as broadband for the purposes of receiving CASF or federal funding.

Technologies also are not mutually exclusive, and the best approach is sometimes to utilize a mix of technologies, depending on needs, population density, and the environment.

3.2 Addressing the digital divide through broadband adoption

While broadband adoption is predicated on existing broadband access, realizing the true value of broadband infrastructure investments is dependent on the actual usages of the internet. The digital divide has meant that internet adoption and utilization is disproportional for different communities, like other systemic inequalities such as equitable access to housing and healthcare. These inequalities often emerge along socio-economic and racial dimensions.

[16] Ookla Speedtest, Q1 2022

This section details three ways to address adoption needs.

Service affordability

Access to an affordable internet subscription is critical to enabling residents and businesses to access the internet; high-tech broadband infrastructure is insufficient if costs prevent families in adopting these services. To address cost concerns, the Federal government has funded several programs to enable low-income households to access the internet.

For example, the FCC provides $30/month subsidies through the Affordable Connectivity Program (ACP) to families on certain government assistance programs (e.g., Supplemental Nutrition Assistance Program, Social Security, Medicaid) or to families below 200% of the federal poverty line. It is important to note that ISPs can implement data caps that limit the amount of data an ACP participant or other low-income program participants can use in a month before they incur additional charges, which can be burdensome on low-income families and other households.

Unfortunately, awareness of this program is low and far fewer families are enrolled than are eligible. A study conducted by EveryoneOn targeting individuals earning below $50,000 found that only 37% of participants were aware of free, discounted, or ACP internet offerings in their communities. Based on active household enrollment in qualifying Federal programs, at least 70,000 households were eligible for ACP in June 2022, while only 10,500 households were enrolled.

Another reason that individuals may be disconnected from the internet is that they are not aware of their internet options, which are often advertised through digital channels. Unconnected households often need to be reached through grassroot efforts and non-digital methods such as flyers, radio, and targeted calls, or through Digital Navigator systems as described in this report. Such efforts also need to consider the language needs of targeted households, with translations that meet the language needs of those in the community. Communications need to be clear and provide guidance not just on the availability of services, but on how to qualify and apply for broadband assistance programs. Overall, it is critical that any broadband expansion project not only bring low-cost internet to individuals, but also raise awareness on how to access said broadband at rates that are affordable for the targeted communities.

Device access

Similar to broadband service affordability, device access and affordability can serve as another barrier to successful internet usage. The costs of these devices, as well as ongoing repairs and maintenance, can pose structural impediments to adopting the internet, where the average device can cost $900 - $1,100 at market rates. These costs are especially prohibitive for low-income residents, who make up a significant portion of unconnected residents.

To address this, organizations and communities can directly distribute devices, offer grants to community organizations, or implement programs to refurbish and redistribute existing devices. For example, #OaklandUndivided, a joint effort between the Oakland Mayor's Office of Education and local non-profits, has raised over $12.5 million for 25,000 laptops and 10,000 hotspots for impacted Oakland residents. Other similar programs have been launched across the country and can be used as models for launching new programs, e.g., as a joint effort with a broadband expansion initiative, local non-profits, schools and education institutions, and philanthropic funders.

Digital literacy

Digital access means little without the skills and knowledge to meaningfully interact with the digital ecosystem and tools. Residents who have not had exposure to digital tools can have difficulty learning how to access the internet or operate devices, which can discourage internet adoption and utilization. According to the National Skills Coalition, almost 13% of US citizens are digitally illiterate, with the number rising to 35% within Hispanic communities. However, there are a variety of levers communities can use to support citizens in accessing and using the internet. Organizations can organize presentations, workshops, and other events to raise awareness of the opportunities that internet access can provide. These should be done in partnership with local stakeholders (schools, libraries, community organizations, and other anchor institutions) to increase penetration and cultivate a digitally enabled community.

Expanding broadband will not be effective without addressing service affordability, device access, and digital literacy.

Cities and anchor institutions can also consider implementing a Digital Navigator system in their communities. Digital Navigators help members of their community enroll in internet services, obtain devices, and build digital literacy skills. They can offer training, technical support, and advice on securing services, including signing up for low-cost or subsidized programs. Sourcing Digital Navigators from within a community is a critical step in building trust around internet and service programs. Navigators that are ingrained in the communities they support not only enjoy a higher level of trust, but also have greater insight and visibility into the day-to-day needs and concerns of their community. A survey conducted by BCG and Comcast found that Navigators significantly improved the digital life outcomes across 1,507 program participants. 66% of participants now have internet or an internet enabled device at home, 86% had used more technology, and 80% reported feeling more confident and safer using technology. Through programs like these, communities can empower citizens with the digital literacy they need to fully take advantage of expanded broadband.

4. How can we fund initiatives to address the digital divide?

In response to the heightened need for broadband access and adoption driven by the pandemic, broadband connectivity has become a high priority for key funders, presenting billions of dollars of funding for broadband over the next few years. There has never been a better time to address this critical need with long-term, systemic solutions.

This section details large programs from the federal level, as well as specific opportunities Solano County can pursue to fund broadband access and adoption initiatives. Additional details on these grant opportunities and others can be found in the Appendix.

4.1 Upcoming Federal programs for broadband access & adoption

In November 2021, Congress enacted the Infrastructure Investment and Jobs Act (IIJA), which was signed into law by President Biden. This legislation made broadband access and adoption a high priority, providing unprecedented levels of financial support for infrastructure expansion and digital equity initiatives. Through IIJA, Congress allocated ~$65B for broadband to be disseminated largely to states through formula and competitive grant programs.

The Broadband Equity, Access, and Deployment program (BEAD) is the largest source, providing over $42B to states. The focus of BEAD is to close the gap for unserved (no access to 25/3 Mbps) and underserved (no access to 100/20 Mbps) areas, as well as community anchor institutions. States that apply will be granted funding using a formula that is based on the state's proportion of unserved households, and they will then run their own grant programs to distribute the funding, using the priorities set out in the law (focusing first on projects to connect unserved households). Letters of intent for this program are due in July 2022 (California already submitted its LOI), and each state will receive a minimum of $100M (likely substantially more for California given numbers of underserved households in rural, tribal, and urban areas).

With over $65 billion, there has never been a better time to address this critical need with long-term, systemic solutions.

Another program, the Digital Equity Act, will allocate $1.5B of its total $2.75B directly to states. Allocations will be determined by the state's population, 'covered' populations (e.g., low-income, minority, veterans, incarcerated, rural, etc.), and availability and adoption of broadband. Governors will select entities to administer this program, with broader flexibility for projects that enhance digital equity for traditionally underserved groups. Planning applications for the Digital Equity program are due July 2022. IIJA also allocates over $14B for the Affordable Connectivity Program; while this funding does not go to states, it allows ISPs to offer low-cost broadband services to low-income, qualifying consumers; over 1.5M eligible households in California are enrolled in this program.

These IIJA programs are in addition to other federal funding sources directed to states, such as the Capital Projects Fund administered by the Treasury, and are focused on high-quality broadband, connectivity infrastructure, equipment, and devices. The Capital Projects Fund will provide over $540M to California, with the deadline to submit grant plans in September 2022. The American Rescue Plan also provided states with substantial funding for connectivity-related projects, which led to California's $6B investment in broadband projects.

4.2 Opportunities Solano County and local stakeholders can pursue for funding

Across Federal, State, and other funding opportunities, local governments and other stakeholders have many potential funding sources for broadband connectivity initiatives. The most significant opportunities will be from formula and competitive grants by The State of California, funded through ARPA, IIJA programs (e.g., BEAD, DEA) and SB 156, a 2021 bill passed by CA legislature to fund $6B for broadband deployment in unserved communities.

A significant portion of this funding will be administered by the California Public Utilities Commission (CPUC). The CPUC's Last Mile Federal Funding Account (FFA) will be an important opportunity for Solano County and its stakeholders, as it currently has approximately $17,000,000 allocated for local governments, ISPs, and other stakeholders to apply for broadband infrastructure grants across the county. The FFA is meant to fund projects that will deliver 100/100 Mbps to unserved areas (priority areas to be released by CPUC in Fall 2022), with a preference for fiber. However, FFA will allow for projects that deliver 100/20 Mbps service that is scalable to 100/100 Mbps should geography, topography, and/or excessive costs make 100/100 Mbps service impractical at this time. The FFA will also prioritize projects that partner with local governments or tribal communities, and provide affordable service, e.g., through low-cost plans or Lifeline. Applicants will be scored on 10 criteria based on the applicant, project type, and affordability to end customers, and selected for the County's more than $17,000,000 allocation based on those scores. Applicants will be able to apply for multiple, non-contiguous project areas in one application. The CPUC will release its application deadline in Fall 2022.

Another important program administered by the CPUC is the California Advanced Services Fund (CASF), which manages several grant opportunities. One such opportunity is the CASF Infrastructure Grant Account, which provides funding for broadband infrastructure projects in areas with < 10/1 Mbps, followed by <25 /3 (with focus on <10/1 Mbps in areas of too many applications, followed by lowest to highest income areas). Applicants can have all or a portion of broadband projects covered by the program, up to 100% for areas with no internet connectivity. For areas at or below 10 /1 Mbps, 60% of construction costs can be reimbursed, and for those greater than 10 /1, 40% of costs can be covered. Applicants may have additional costs defrayed based on project characteristics, such as ability to access the region and the availability of affordable subscription plans and programs for served customers.

CASF also includes programs such as the CASF Public Housing Account, which provides $15,000,000 in competitive funding for broadband projects within low-income housing communities (applications due July 2022 and January 2023); CASF Adoption Account, which provides $20,000,000 in competitive funding for publicly-available or afterschool broadband access and digital inclusion activities (applications due July 2022, January 2023, July 2023); and the California Teleconnect Fund, which subsidizes connectivity services at 50%. Other pending state programs include the Local Agency Technical Assistance Program ($50,000,000) and Loan Loss Reserve Fund ($750,000,000).

It is important to note that local governments and organizations, like Solano County and its stakeholders will also be eligible to apply for several broadband IIJA programs, such as the Digital Equity Competitive Grant Program ($1,250,000,000), Tribal Connectivity Fund ($2,000,000,000), Middle Mile Infrastructure Fund ($1,000,000,000), and private activity bonds. For example, the Middle Mile Infrastructure Fund, which will fund efforts that lower costs to connect unserved and underserved areas, with priority to projects with fiscally sustainable strategies (applications for Middle Mile are due September 2022). Effective 2022, private activity bonds are also an allowable financing tool for projects that expand broadband to rural, underserved areas.

In addition to IIJA, there are several other federal programs to support broadband infrastructure and digital equity. For example, the U.S. Department of Agriculture funds the Telecommunications

Infrastructure Program, which finances construction, maintenance, and improvement of telephone and broadband services in rural areas, as well as the Community Facilities Direct Loan and Grant Program, which also funds utility services in rural areas. More information on these cross-department federal broadband funding sources can be found in the Appendix.

Finally, local entities may partner with local communities, such as cities and tribes, to access funding allocated to them via ARPA and other stimulus sources.

5. What is the current state of broadband in Solano County?

To understand the current state of broadband access and adoption in Solano County, this study conducted an extensive coverage gap analysis to identify underserved and unserved areas of the county. This study also engaged 30+ stakeholders across county agencies, local cities, internet service providers, and other organizations.

5.1 Current state of broadband access and infrastructure

For broadband access, this study focused on identifying broadband need in **unincorporated** areas of Solano County, as cities in Solano County are developing their own broadband plans and received additional funding. While cities were included in the coverage gap analysis, the focus of this report's project recommendations (Section 6) is in unincorporated areas.

This section discusses the summary of these findings, with further details in the Appendix.

Coverage gap analysis context

Using numerous data sources, this study conducted a broadband coverage gap analysis of Solano County to identify unserved (broadband coverage under 25/3 Mbps) and underserved (broadband coverage between 25/3 Mbps and 100/20 Mbps) areas. Input sources included publicly available data, ISP data and data stored by Solano County.

Primary data sources included:

- **FCC - Form 477:** All facilities-based broadband providers are required to file data with the FCC twice a year (Form 477) on where they offer Internet access service at speeds exceeding 200 Kbps in at least one direction.[17] This study used broadband coverage and provider data for census blocks and census tracts.
- **NTIA - Indicators of Broadband Need Map:** The Indicators of Broadband Need Map was created by the United States Department of Commerce and the National Telecommunications and Information Administration (NTIA). The map uses several different data sources to show information on broadband availability within the United States. Layers in this map were created using data sourced from the American Community Survey (collected by the U.S. Census), Ookla, Measurement Lab (M-Lab), Microsoft and the Federal Communications Commission (FCC).[18]
- **BroadbandNow - National Broadband Map:** BroadbandNow provides an up-to-date map of broadband availability and speeds, as well as a national view of pricing down to the census block.[19] This study used provider information and broadband speeds for each zip code in Solano County.
- **California Public Utilities Commission – Annual Collected Broadband Data:** ISPs in California are required annually to submit broadband deployment and speeds to the CPUC. The CPUC collects this data to provide California residents a means to look up information about the broadband services available to them via the California Interactive Broadband Map. The data also provides a first look at area eligibility for California Advanced Services Fund (CASF) applicants.[20]

[17] FCC Form 477
[18] NTIA Indicators of Broadband Need Map
[19] Broadband Now
[20] CPUC Broadband Mapping Program

- **Census & American Community Survey:** This data was collected from the latest available American Community Survey results (2020) on population with a computer and broadband internet subscription in Solano County.[21]
- **ISP Data:** Several ISPs that participated in the study provided spatial files with their coverage area in Solano County.
- **Solano County data:** Solano County had certain data sets stored that were useful for this broadband study, such as infrastructure locations, building data, and demographic data.

Taking the different public and ISP data sources, the study analyzed coverage across Solano County and identified underserved and unserved census blocks. Using address point data stored by Solano County, the study could determine which homes and businesses lacked adequate broadband service. This helped to identify project areas (under/unserved polygons) and the households, businesses and residents impacted. The study could validate which areas were truly unserved by triangulating different data sources, and how to leverage existing assets for projects, using County and ISP infrastructure data.

We defined served areas as having broadband speeds over 100/20 Mbps, underserved areas between 25/3 Mbps and 100/20 Mbps and unserved areas under 25/3 Mbps. This definition was taken from the CPUC, as stated in their Decision Adopting Federal Funding Account Rules.

Broadband coverage gap analysis findings

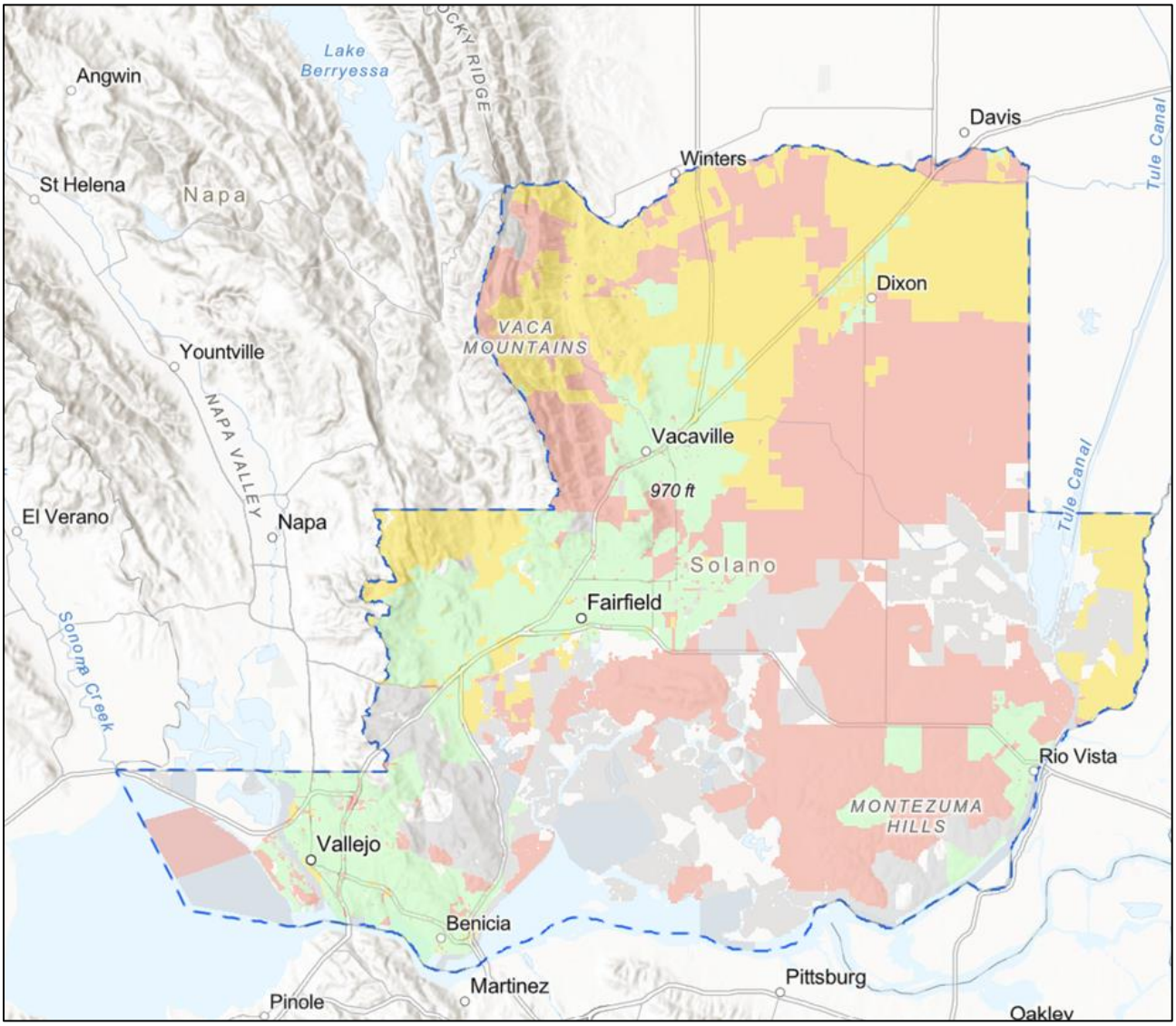
The broadband coverage gap analysis found approximately 1,800 **unserved** households, businesses, and other buildings in **unincorporated** Solano County, which is around 3,000 residents. Additionally, the analysis found there are around 3,900 **underserved** households, businesses, and other buildings households in **unincorporated** Solano County, which equates to roughly 6,800 residents.

The map on the next page shows served, underserved and unserved census blocks throughout the County. The green blocks are served (coverage greater than 100/20 Mbps), the yellow blocks are underserved (coverage between 25/3 Mbps and 100/20 Mbps), and the red blocks are unserved (coverage is less than 25/3 Mbps).

In unincorporated Solano County, 5,700 households, businesses, or other buildings and 9,800 residents do not have robust access to broadband.

[21] American Community Survey data

Figure 1: Solano County Broadband Coverage (Fiber, Cable, Fixed Wireless)



City boundaries are in black

Sources: FCC 477, NTIA, U.S. Census, American Community Survey, CPUC, BroadbandNow, Local ISPs

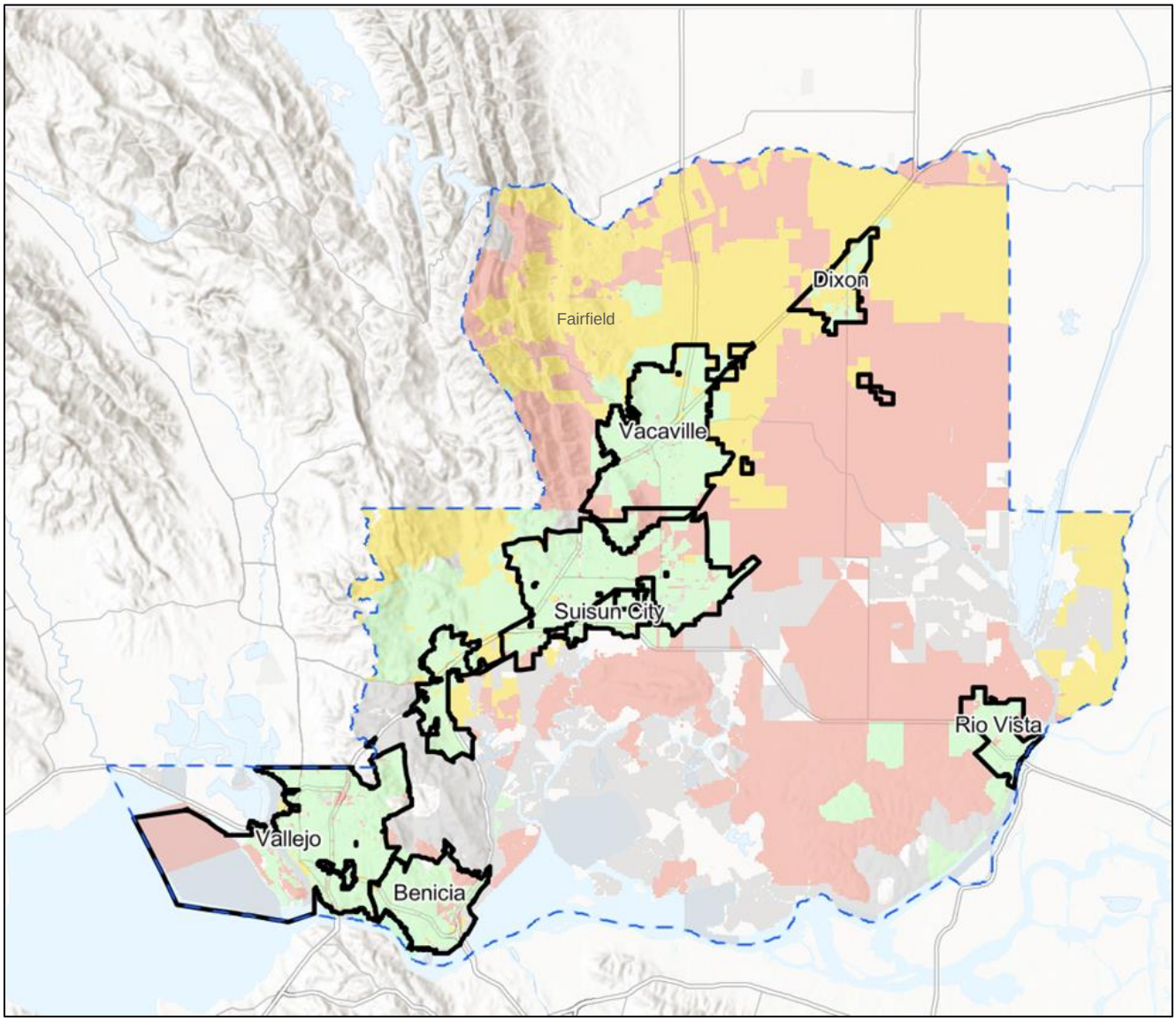
Legend

- Served (>100/20 Mbps)
- Underserved (between 25/3 and 100/20 Mbps)
- Unserved (<25/3 Mbps)
- No data available

Served census blocks

As expected, served census blocks are largely within the seven cities of Solano County: Vallejo, Benicia, Fairfield, Suisun City, Vacaville, Dixon, and Rio Vista. Certain census blocks within cities came up as unserved or lacking data, such as census blocks in northern Vallejo.

Figure 2: Solano County Broadband Coverage with City Boundaries Overlay



City boundaries are in black

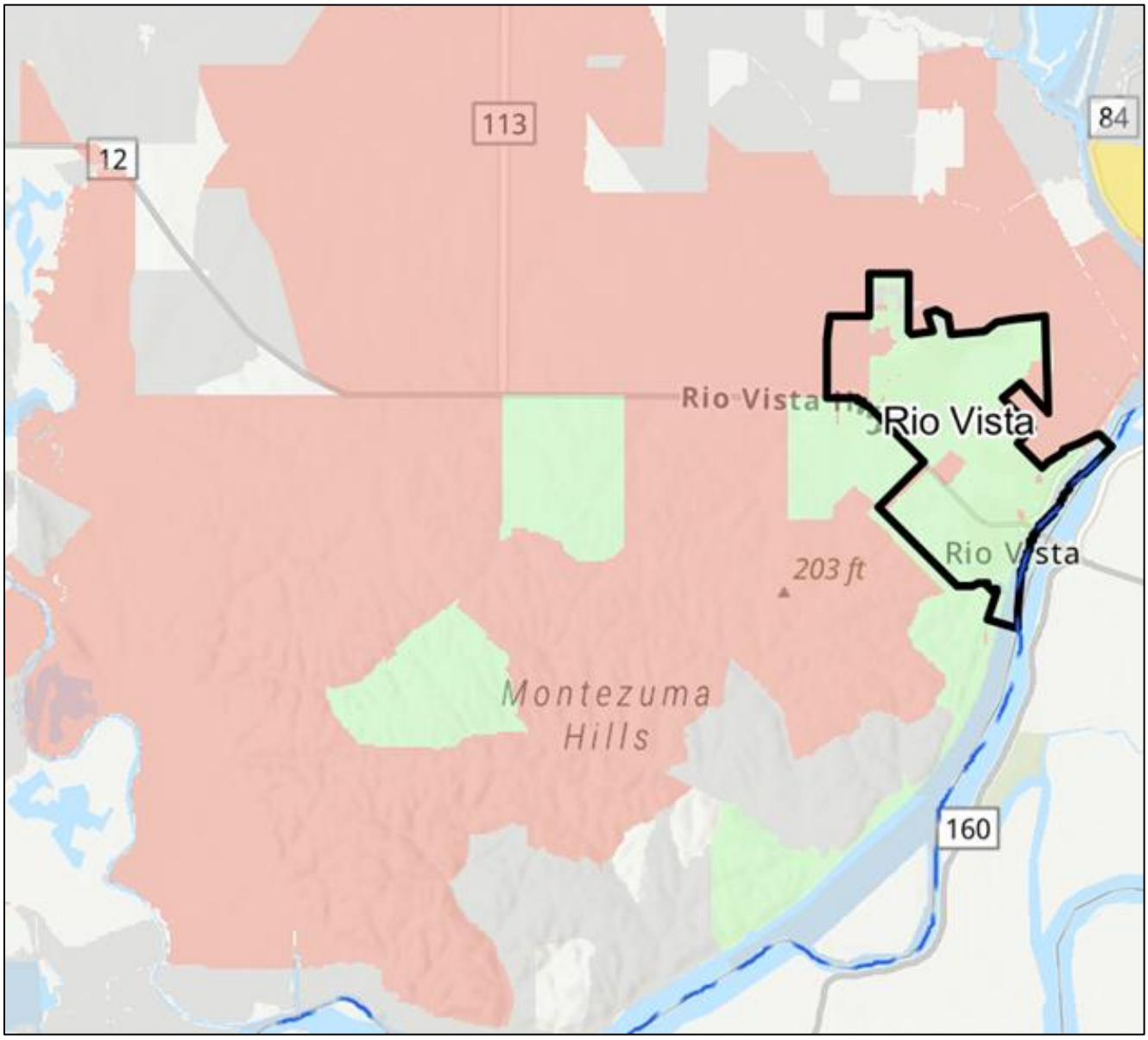
Sources: FCC 477, NTIA, U.S. Census, American Community Survey, CPUC, BroadbandNow, Local ISPs

Legend

- Served (>100/20 Mbps)
- Underserved (between 25/3 and 100/20 Mbps)
- Unserved (<25/3 Mbps)
- No data available

Solano County has several served areas that fall outside of city boundaries, such as served census blocks in the Montezuma Hills, south of Highway 12 and west of Rio Vista. There is also a served block between English Hills and Allendale. Additional served areas outside of city boundaries include Rockville, Pierce, parts of Green Valley, and the area northeast of Creston.

Figure 3: Served Census Blocks in Montezuma Hills

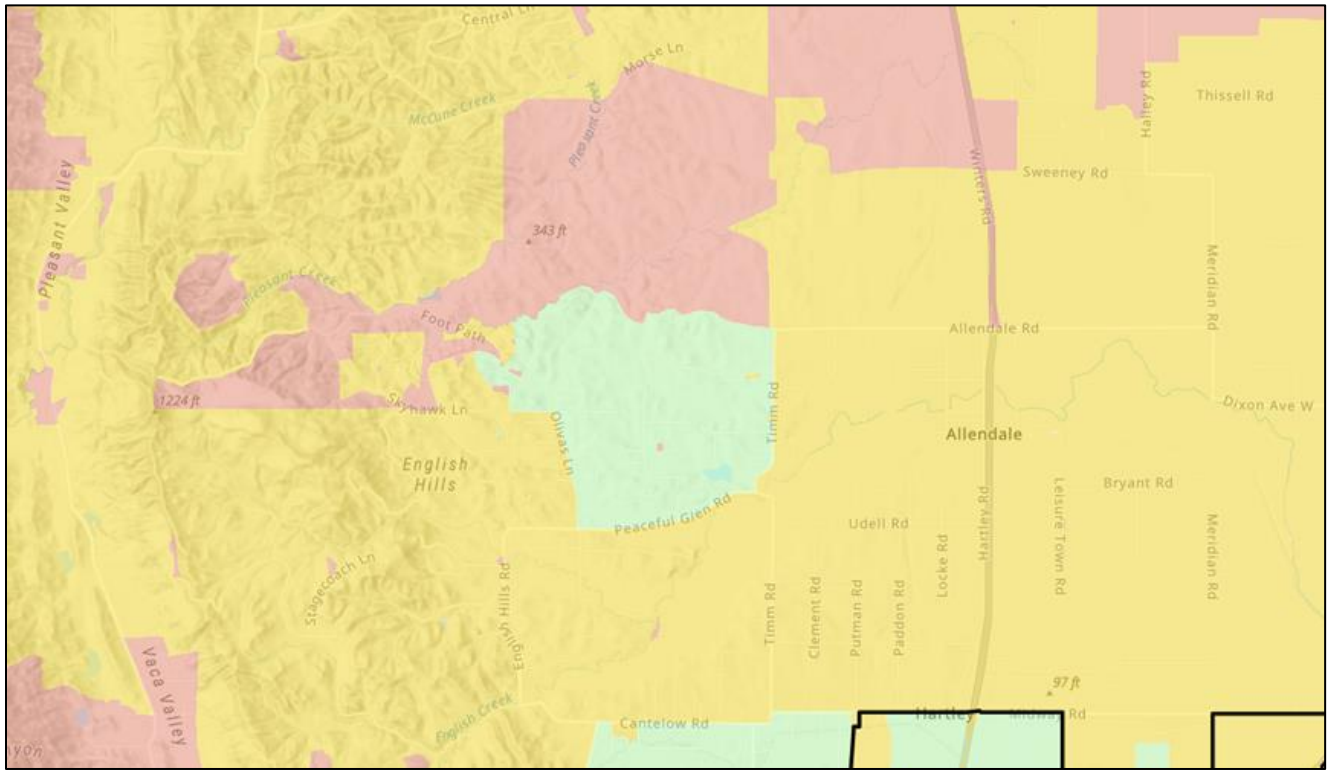


City boundaries are in black

Legend

- Served (>100/20 Mbps)
- Underserved (between 25/3 and 100/20 Mbps)
- Unserved (<25/3 Mbps)
- No data available

Figure 4: Served Census Block between English Hills and Allendale



City boundaries are in black

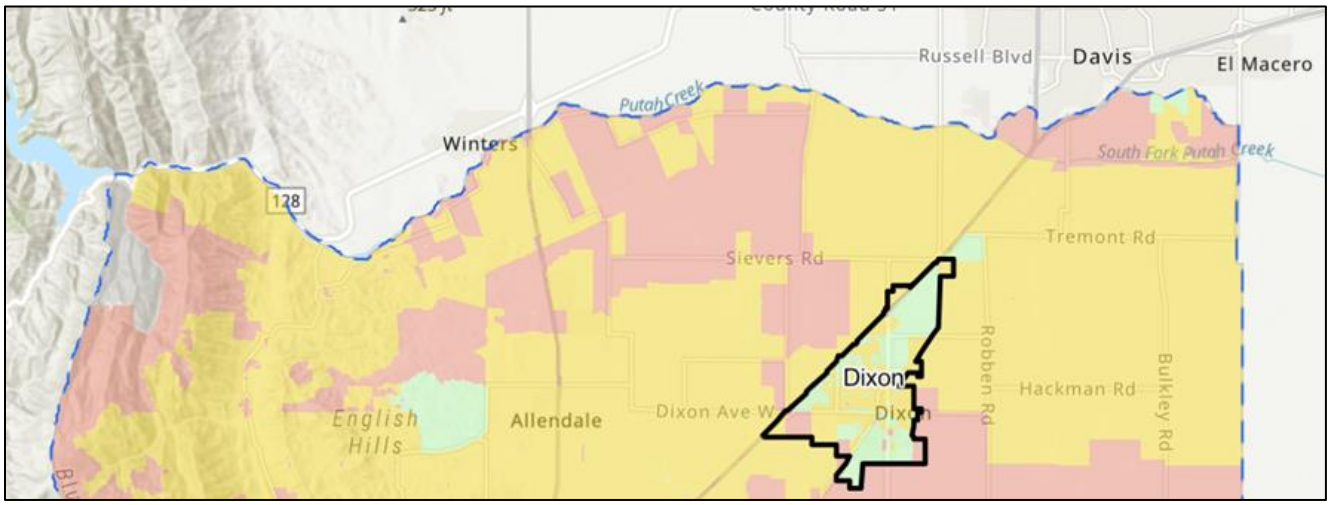
Legend

- Served (>100/20 Mbps)
- Underserved (between 25/3 and 100/20 Mbps)
- Unserved (<25/3 Mbps)
- No data available

Underserved census blocks

Underserved areas in Solano County are largely comprised of rural residential areas, such as Mankas Corner, the northern part of Green Valley, Allendale, English Hills, Pleasants Valley, the areas north and east of Dixon, and Ryer Island.

Figure 5: Underserved Census Blocks in Northern Solano County

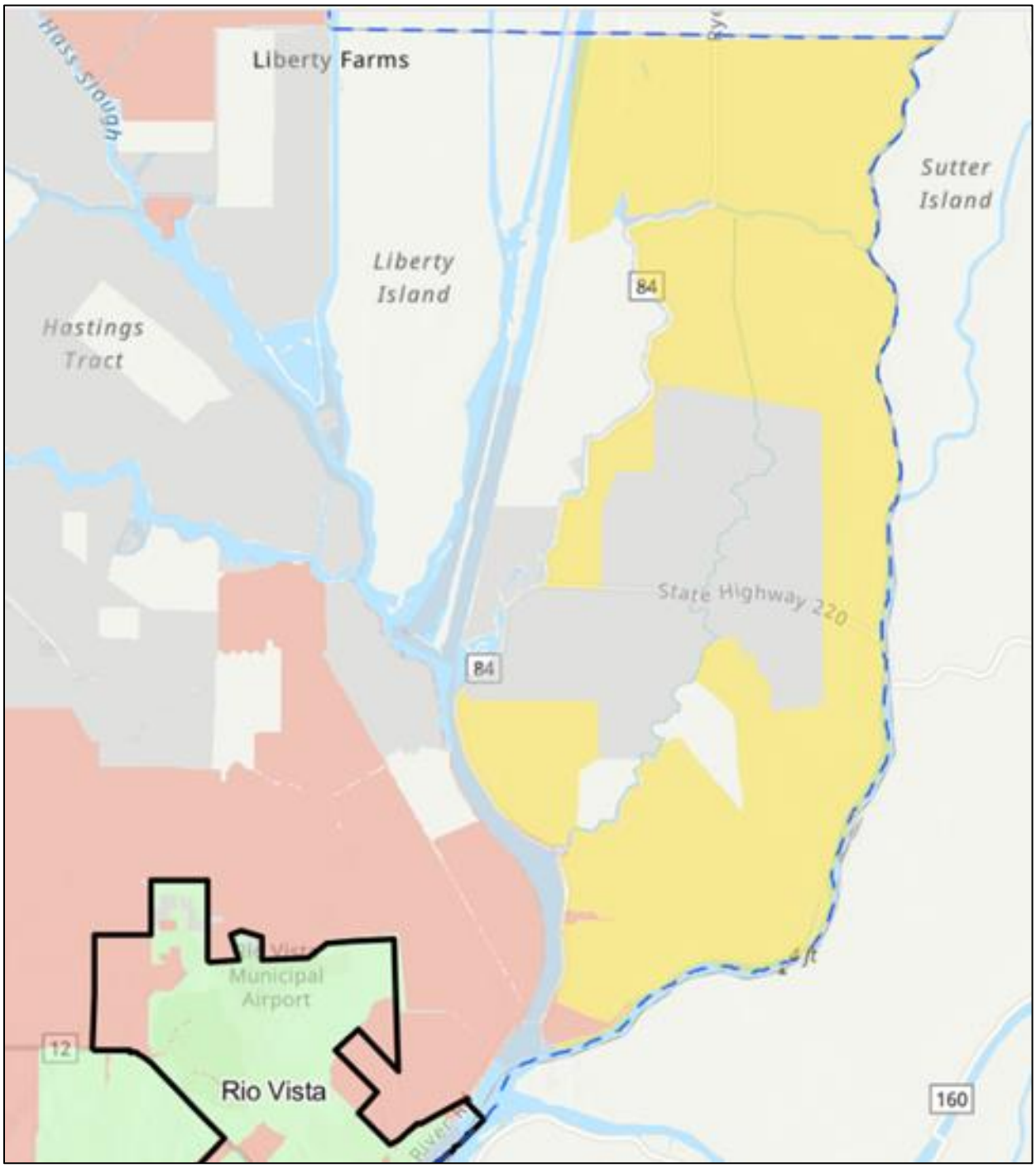


City boundaries are in black

Legend

- Served (>100/20 Mbps)
- Underserved (between 25/3 and 100/20 Mbps)
- Unserved (<25/3 Mbps)
- No data available

Figure 6: Underserved Census Blocks on Ryer Island



City boundaries are in black

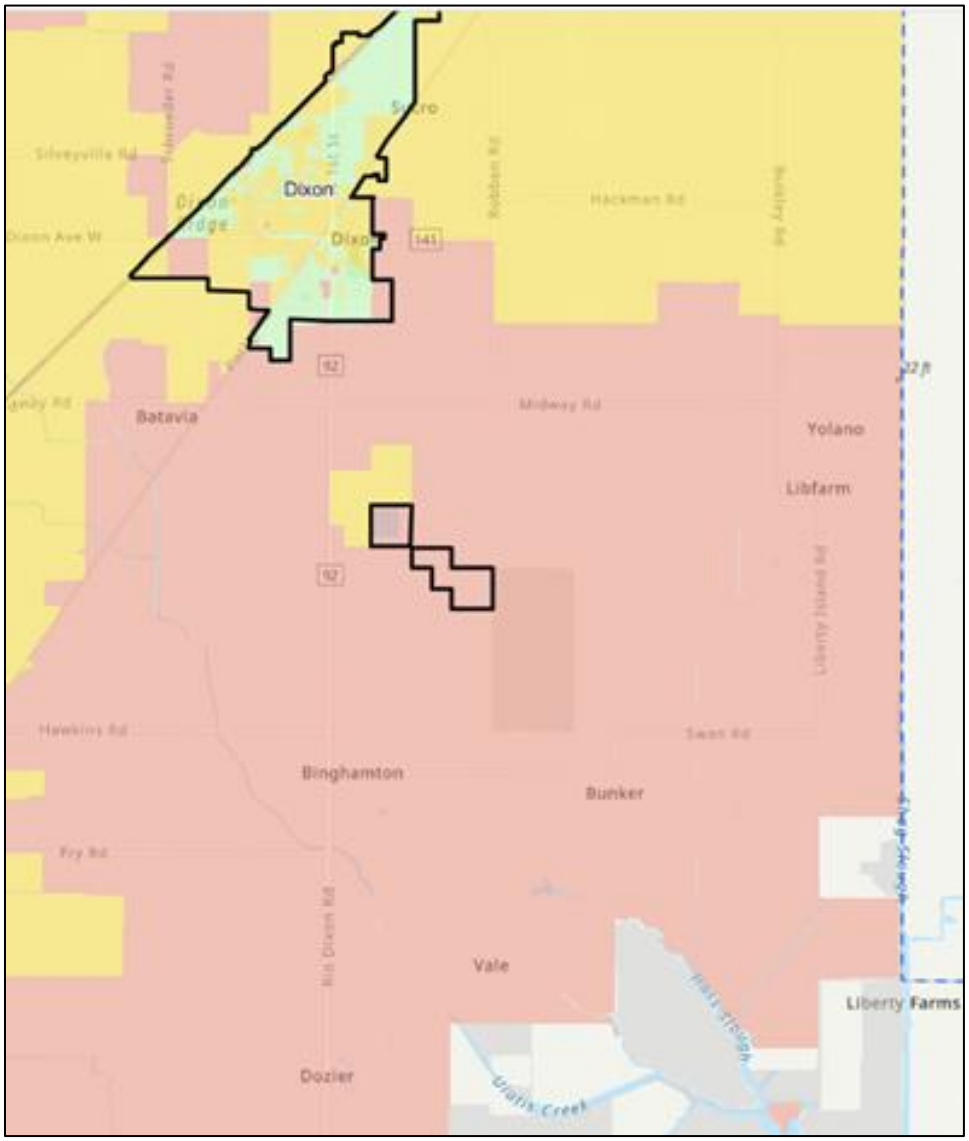
Legend

- Served (>100/20 Mbps)
- Underserved (between 25/3 and 100/20 Mbps)
- Unserved (<25/3 Mbps)
- No data available

Unserved census blocks

Unserved census blocks are primarily in rural or unincorporated areas of the County, with fewer homes and businesses. The largest unserved area is on the eastern side of the County, south of I-80 and bordering Dixon and Vacaville. This area largely comprises of farmland, and includes Batavia, Yolano, Libfarm, Bunker, Binghamton, Vale, Dozier, Maine Prairie and Olcott.

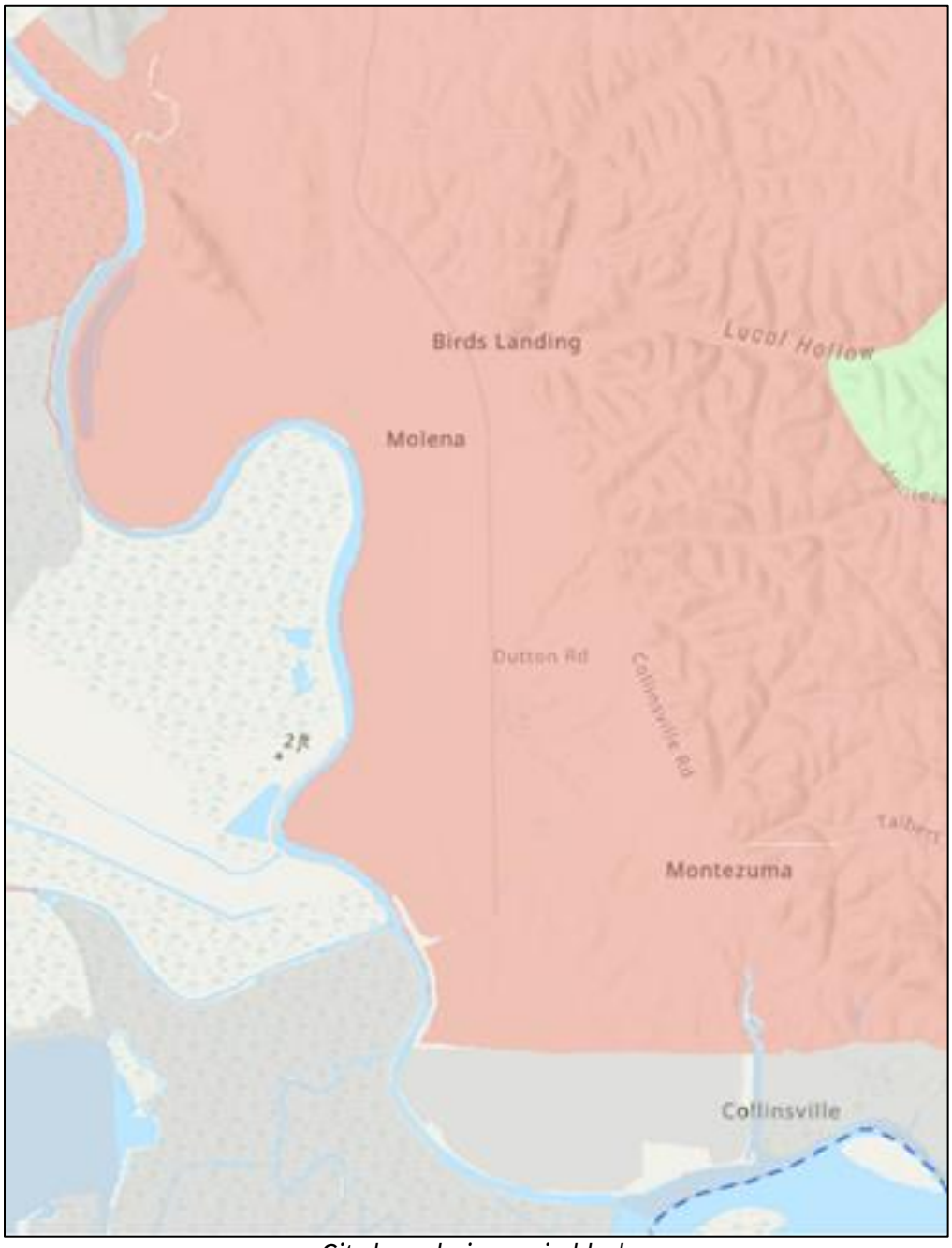
Figure 7: Unserved Census Blocks South of Dixon



City boundaries are in black

Another significant unserved area is Birds Landing, which is a rural unincorporated community within the southeastern portion of Solano County.

Figure 8: Unserved Census Blocks in Birds Landing



City boundaries are in black

Legend

- Served (>100/20 Mbps)
- Underserved (between 25/3 and 100/20 Mbps)
- Unserved (<25/3 Mbps)
- No data available

Using this analysis of served, underserved and unserved census blocks within the County, project areas were identified for further development. The proposed projects would connect ~2,550 households, businesses, and other buildings and ~6,400 individuals to robust broadband access.

5.2 Current state of broadband adoption & digital equity

Our conversations with stakeholders across the county including county agencies, anchor institutions (e.g., schools, libraries, and other community-based organizations), and nonprofits reveal that Solano County has and continues to face many roadblocks to broadband adoption and digital inclusion.

While there are areas in Solano County that have no broadband service and many areas that are underserved with insufficient speeds, stakeholders reveal that access to broadband has generally improved since the various hotspot lending programs that emerged from the COVID-19 pandemic. Instead, the most common areas of concern shared by stakeholders are the lack of device accessibility, affordability, and digital literacy, particularly among lower income populations, seniors, and homeless or foster youths. Even in urban cities such as Fairfield, pockets of low-income populations in the heart of the city often struggle to pay for broadband subscriptions, much less devices.

Many stakeholders including Solano County's Department of Health and Social Services, which serves one third of Solano's population, have created online versions of their programs and resources that are more efficient. However, the lack of devices and digital literacy have prevented the uptake of such online options, resulting in processes to be more burdensome for both the organization and its clients. Furthermore, there is a need and demand for digital access and literacy beyond its ability to help community members navigate resources. For example, Digital Literacy Rocks, a nonprofit providing small group computer training, has clients from all age groups and industries enrolling in their program for reasons ranging from seeking employment to learning how to connect with family members.

Without an affordable broadband connection and access to devices, community members cannot begin to develop digital literacy skills. Solano County must prioritize helping its residents with accessing basic digital needs from broadband to devices.

There are several organizations with promising programs that tackle these digital equity issues; however, most are working in silos and suffer from a lack of funding, resources, and capacity. However, there is a need to support these organizations and enable them to create more impact.

Service affordability interventions

Currently, the most important program supporting affordable broadband access is FCC's Affordable Connectivity Program (ACP). The ACP is a benefit program providing discounts of up to $30 per month toward internet service for eligible households and up to $75 per month for households on qualifying Tribal lands. Eligible households can also receive a one-time discount of up to $100 to purchase a laptop, desktop computer, or tablet from participating providers if they contribute more than $10 and less than $50 toward the purchase price.

A household is eligible for this program if the household income is or below 200% of the Federal Poverty Guidelines, or if a member of the household already participates in other federal assistance programs such as Supplemental Nutrition Assistance Program (SNAP), Medicaid, and Social Security (SSI). The application is a two-step process. First, households apply through the program online, by mail, or by contacting their current ISP. Once the application is approved, the household will submit their approved application ID to an ISP providing ACP discounts.

In Solano County, only 10,500 eligible households out of at least 70,000 are enrolled in the Affordable Connectivity Program. With help, they can all be connected to the internet for free.

There are over 40 ISPs across Solano County that offer ACP discounts, with many offering programs that are free when combined with the ACP discount. For example, Comcast's Internet Essentials program and AT&T's Access program are both 100/10 Mbps subscriptions plans that are free with ACP. Based on the HSS data of active households enrolled in qualifying federal assistance programs, at least 70,000 households can qualify for the ACP as of June 2022; however, only 10,500 are enrolled as of June 1, 2022. Besides ACP, FCC's Lifeline Program provides eligible consumers with a monthly discount for phone and internet service of up to $9.25 and up to $34.25 for eligible consumers living on Tribal lands. The program also has a similar two-step sign-up process as that of the ACP.

There is also the E-rate program, which provides discounts to assist eligible schools and libraries to obtain affordable internet access and telecommunications services.

From our conversations with stakeholders, there has been a limited effort to increase awareness and enrollment into these programs. Helping eligible households become aware of and navigate these programs can significantly improve the large disconnect.

Device access interventions

Many stakeholders across Solano, especially schools and organizations working with youth, have purchased and implemented hotspots and Chromebook lending programs as remote learning became prevalent during the COVID-19 pandemic. For example, Solano Community College ensured all students had access to the internet and a computer. Fairfield-Suisan Unified School District utilized ECF funds to pay for 700 hotspot devices.[22]

The Solano County Public Library also began a hotspot & Chromebook lending program beginning March 2022. The program currently has 54 Chromebooks and 172 hotspots available to be rented for three weeks at a time. However, the program has consistently experienced a waitlist with an average wait time of three to four weeks. The Library has hoped to increase the number of devices available; however, lack of funding and resources have hindered expansion efforts.

Besides these programs, there is limited device access intervention efforts in Solano County. Leaven Kids, a nonprofit organization providing after school learning centers for youths, has eight centers that provide free internet and accessible computers through partnerships with Comcast's Lift Zone program. However, not all Lift Zones have laptops, and there is also a limit on capacity. The Solano County

[22] Stakeholder interviews with educational institutions

Workforce Development Board also has two laptop centers; however, it is underutilized due to a lack of awareness.

According to the American Community Survey, 4.7% or ~6,600 Solano County households do not have a computer. There is a strong need for more efforts and partnerships to increase device accessibility in Solano County.

Digital literacy interventions

Currently, there are minimal digital literacy interventions in Solano County. A search of "Digital Literacy Solano" reveals only one organization, Digital Literacy Rocks (DLR), a nonprofit founded in 2017 providing digital literacy intervention training to help individuals learn how to use computers, access the internet, and use important software (e.g., email, Microsoft Office programs, Zoom). From 2018-2021, DLR provided training to approximately 70 individuals from all social-economic backgrounds with ages ranging from 25-89. While the program has a 78% completion outcome and many benefit significantly from the program including finding employment, our conversation with DLR revealed that they have struggled to expand their services due to a shortage of funding and capacity. In fact, DLR lost its physical center along with 40% of students and 100% of their volunteers due to the COVID-19 pandemic and are now only able to offer online lessons.

Beyond DLR, there are some schools that partner with California's Parent Institute for Quality Education, which provides parents with digital literacy skills. However, there is a need for digital literacy training to become more prevalent and accessible to all residents. For example, Solano County Workforce Development Board also provides workforce training in partnership with the Solano County Housing and Social Services Department (HSS), which could be expanded to regularly include digital skills training. Furthermore, Solano County can benefit from creating a program that connects and shares digital literacy training and resources such as a Digital Navigator system.

6. What projects should we pursue to address the digital divide?

To address Solano County's broadband access and adoption needs, this study identified 15 actionable broadband infrastructure projects and 4 actionable digital equity projects the County and its stakeholders can pursue starting in 2022. This section provides summaries of each project recommendation. Further detail for each project, including cost estimates, potential partners, and funding opportunities, can be found in the Appendix.

6.1 Broadband infrastructure project recommendations

Expanding broadband infrastructure in unincorporated Solano County is critical to providing internet access to unserved or underserved communities. The proposed projects in this study will provide robust broadband access to ~2,550 households, businesses, and other buildings, and ~6,400 individuals. The projects can leverage existing funding opportunities (e.g., upcoming Federal and State grants, corporate matching), expand on existing infrastructure in Solano County, and reach the most rural pockets to serve populations most in need.

Figure 9: Broadband Infrastructure Project Recommendations for Solano County

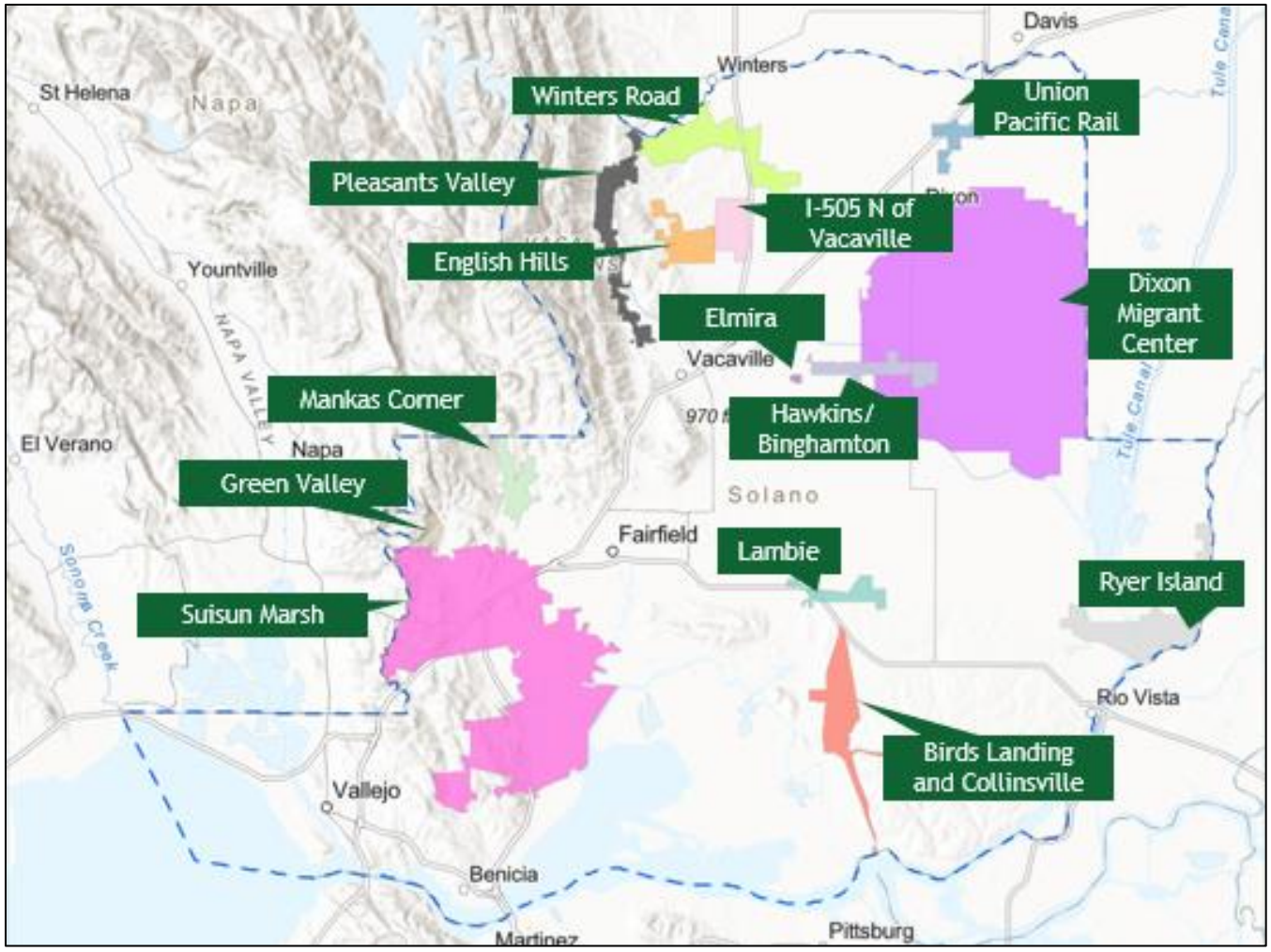


Figure 10: Summary table of physical infrastructure projects

Supervisor District	Broadband Region *Project Name in parentheses*	Potential Impact (Buildings)
District 5[23]	Elmira (Elmira)	~101 buildings
Districts 1 & 2	Benicia-Cordelia, Jameson Canyon, and Suisun Marsh (Suisun Marsh)	~91 buildings
District 2	Green Valley (Green Valley)	~14 buildings
District 3	Suisun Valley (Mankas Corner)	~220 buildings
District 4	Dixon Rural (Union Pacific Rail to Industrial Ag Services)	~61 buildings
District 4	Allendale-Hartley (505 North of Vacaville)	~435 buildings
District 4	English Hills (English Hills)	~325 buildings
District 4	Olive School and South Winters Unincorporated (Winters Road)	~325 buildings
District 4	Pleasants Valley (Pleasants Valley)	~243 buildings
Districts 4 and 5	Dixon Rural (Dixon Migrant Center)	~388 buildings
District 5	Ryer Island (Ryer Island)	~219 buildings
District 5	Rio Vista Rural (Lambie Industrial Park)	~26 buildings
District 5	Elmira and Dixon Rural (Hawkins Road to Binghamton)	~39 buildings
District 5	Rio Vista Rural (Birds Landing to Collinsville)	~63 buildings
	Total Buildings Connected	**~2,550** buildings

Detail Summaries of infrastructure project recommendations

1. Solano County Broadband Infrastructure Contractor(s)

The Solano County Broadband Infrastructure Program Contractor(s) will serve as a pivotal resource to pursue funding opportunities for physical infrastructure projects. The role of a Program Contractor would include identifying geographies for broadband infrastructure projects and overseeing the design of a subgrantee and grants management process, which will require technical, financial, and legal expertise to expertly vet grantees for award. This person or team could either lead the grants evaluation team and administer funding according to the principles established by Solano County's broadband strategy or work to identify and coordinate ISP partners to apply for prioritized infrastructure projects. They would also establish internal reporting requirements against which grant performance will need to be tracked and lead federal and state funding reporting to ensure successful program delivery and compliance. Given the need to interface with federal funding compliance requirements, the person in this role should be well-versed in legislation and reporting requirements. The Broadband Infrastructure Program Contractor(s) would supervise the launch, pilot, and expansion of major broadband programs, including those detailed by this report. The cost to deliver this work over a two-year period likely constitutes an eligible use of ARPA Coronavirus State and Local Fiscal Recovery Funds (SLFRF).

[23] Project listed first to reflect prioritization based on near-term ISP plans to expand broadband infrastructure; subsequent projects listed by district number and broadband region

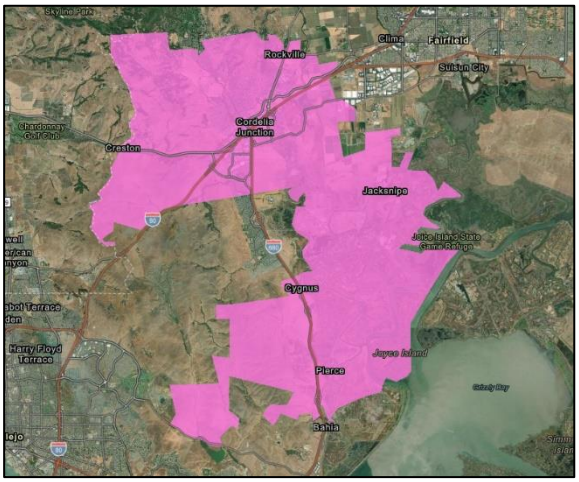
2: Expanding fiber connection to Elmira

The proposed project area contains ~101 buildings consisting of ~114 individuals who are considered underserved (service below 100/20 Mbps). For this project in Elmira and neighboring areas, ~121 buildings consisting of ~281 residents are within areas designated by the California Advanced Services Fund (CASF) as "Eligible" or "Priority Eligible", meaning that they do not have Internet Service faster than 25/3. CASF-eligible areas comprise a total area of 5.7 square miles.

Multiple major internet service providers have expressed interest in organic expansion to the Elmira area. A local ISP has finalized engineering work for a proposed fiber buildout and is willing to pay 50% of total project costs. They are currently seeking another partner to pay the remaining ~$250,000 and have expressed interest on partnering with Solano County.

To execute this project, an existing local ISP such as AT&T or Comcast could build fiber to the premises (FTTP) to unserved and underserved households, businesses, and other buildings in Elmira.

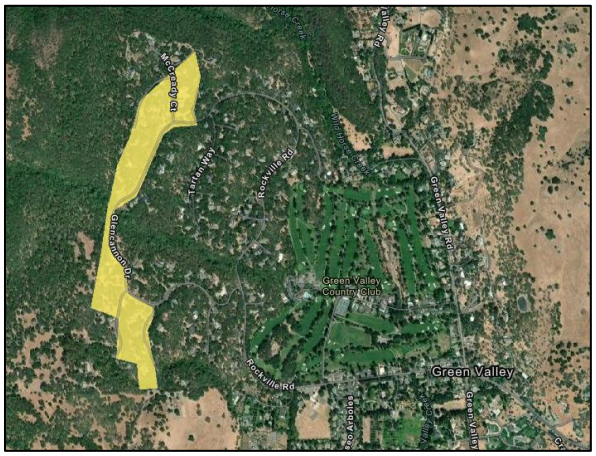
3: Expanding wireless coverage to homes within Suisun Marsh



Large areas of unserved need include areas along Gold Hill Road and Cordelia Road. The proposed project contains ~91 buildings consisting of ~64 residents who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). Within the project area, ~51 households and ~217 individuals are within areas designated by the California Advanced Services Fund (CASF) as "Priority Eligible" or "Eligible", meaning that they do not have Internet Service faster than 25/3 Mbps. The larger number of CASF eligible residents is due to some CASF eligible residents being within the borders of Cordelia or Fairfield, who would be served at no additional project cost. CASF-eligible areas comprise a total area of 11 square miles.

To execute this project, an existing local ISP such as Valley Internet, DigitalPath Inc., or Internet Planet could build a tower on Baptiste Ranch.

4: Expanding fiber to Green Valley unincorporated community



Green Valley has mostly wired connectivity, with multiple major ISPs expressing interest in expanding services in this area. The proposed project area contains ~14 buildings consisting of ~40 individuals who are considered underserved (service below 100/20 Mbps). Within the project area, ~18 households and ~53 individuals are within areas designated by the California Advanced Services Fund (CASF) as "Priority Eligible" or "Eligible", meaning that they do not have Internet Service faster than 25/3 Mbps. CASF-eligible areas comprise a total area of .06 square miles.

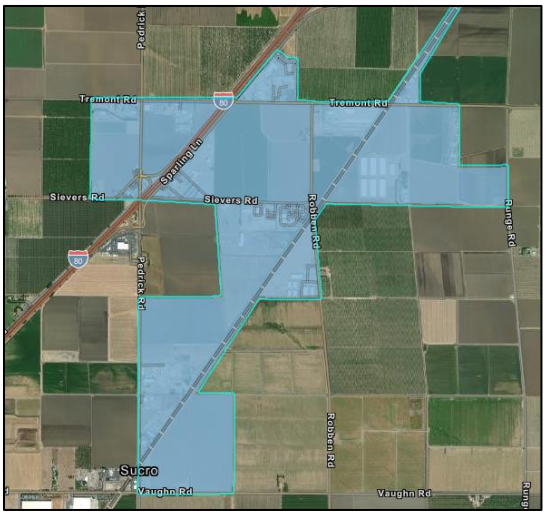
To execute this project, an existing local ISP such as AT&T or Comcast could build fiber to the premises (FTTP) to unserved and underserved households, businesses, and other buildings in Green Valley.

5: Expanding fiber to Mankas Corner unincorporated community

Mankas Corner has mostly fixed wireless and satellite connectivity. Most homes in the region northwest of Suisun Valley K-8 School have no wired providers providing speeds of 25/3 Mbps or faster. The proposed project area contains ~220 buildings consisting of ~429 residents who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). As of the 2020 Census, ~260 households consisting of ~708 individuals are within census blocks intersecting the project area designated by the California Advanced Services Fund (CASF) as "Priority Eligible" or "Eligible", meaning that they do not have Internet Service faster than 25/3. CASF-eligible areas comprise a total area of 16.84 square miles.

To execute this project, an existing local ISP such as AT&T or Comcast could build fiber to the premises (FTTP) to unserved and underserved households, businesses, and other buildings in Mankas Corner.

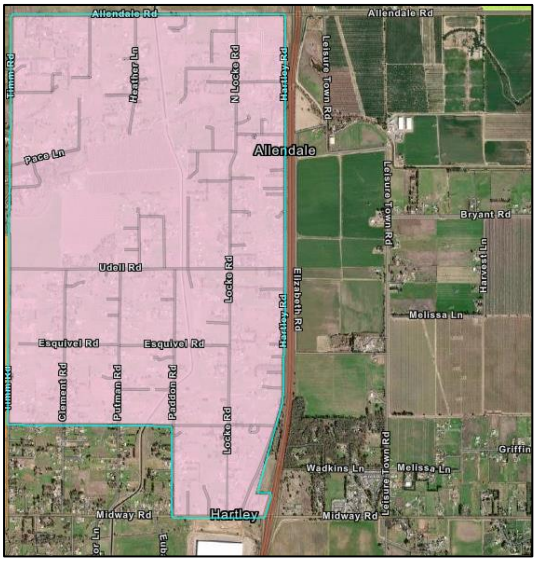
6: Expanding fiber connections to Industrial Agricultural Services, leveraging Union Pacific Rail



The Industrial Ag Services (IAS) district north of Dixon has been highlighted by Solano County Planning Services as an area of interest for business development within Solano County. The proposed project area contains ~61 buildings consisting of ~75 individuals who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). As of the 2020 Census, ~19 households consisting of ~79 individuals are within areas designated by the California Advanced Services Fund (CASF) as "Priority Eligible", meaning that they do not have Internet Service faster than 10/1. Priority eligible areas include a total of 3.93 square miles and are automatically qualified for a baseline 60% funding.

To execute this project, an existing local ISP such as Astound Broadband Powered by Wave or AT&T could build fiber to the premises (FTTP) to unserved and underserved households, businesses, and other buildings in Industrial Ag Services.

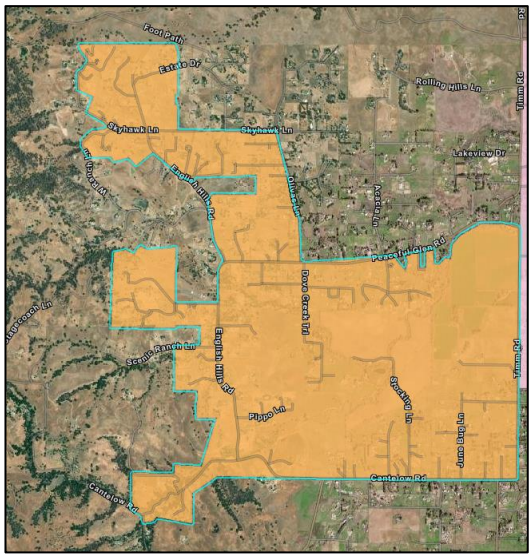
7: Expanding fiber connections residential areas along the I-505, north of Vacaville



The residential area along the I-505 north of Vacaville is largely comprised of homes and several commercial retailers that are unserved and underserved. The largest areas of need are along the I-505 between Allendale and Hartley. The proposed project area contains ~435 buildings consisting of ~1,247 individuals who are underserved, meaning they have internet speeds between 25/3 and 100/20 Mbps. Within the project area, 5 households and 49 individuals are within areas designated by the California Advanced Services Fund (CASF) as "Eligible", meaning that they do not have internet service faster than 25/3 Mbps. CASF-eligible areas comprise a total area of 2.2 square miles. Currently, the only wired provider in the area is AT&T.

To execute this project, an existing local ISP such as AT&T or Comcast could build fiber to the premises (FTTP) to unserved and underserved households, businesses, and other buildings along the I-505.

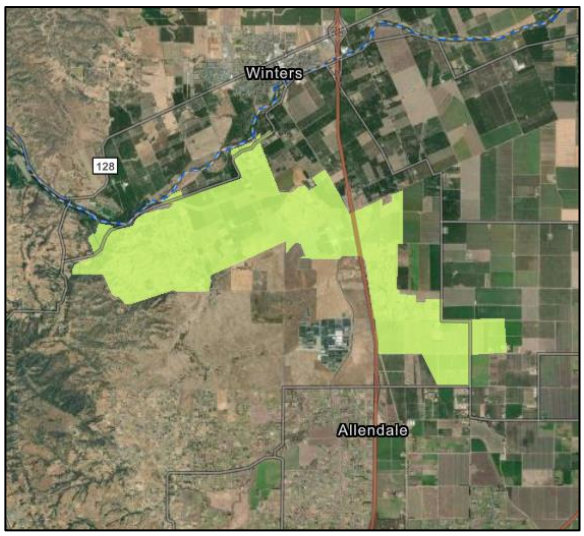
8: Expanding fiber connections to the English Hills Community



There are significant pockets of unserved and underserved need within this community, specifically along English Hills, Cantelow, and Peaceful Glen Roads. The proposed project area comprises ~325 buildings consisting of ~1,120 individuals who are considered unserved (service below 25/3 Mbps) and underserved (service below 100/20 Mbps). Around 43 households consisting of ~85 residents are within census blocks intersecting the project area designated by the California Advanced Services Fund (CASF) as "Eligible", meaning that they do not have Internet Service faster than 25/3 Mbps. CASF-eligible areas comprise a total area of 1 square mile. Leveraging the proposed project to expand fiber to residential and commercial properties along the I-505 north of Vacaville could reduce cost and prevent overbuilding.

To execute this project, an existing local ISP such as AT&T or Comcast could build fiber to the premises (FTTP) to unserved and underserved households, businesses, and other buildings in English Hills.

9: Expanding fiber connections to areas south of Winters (Winters Road)

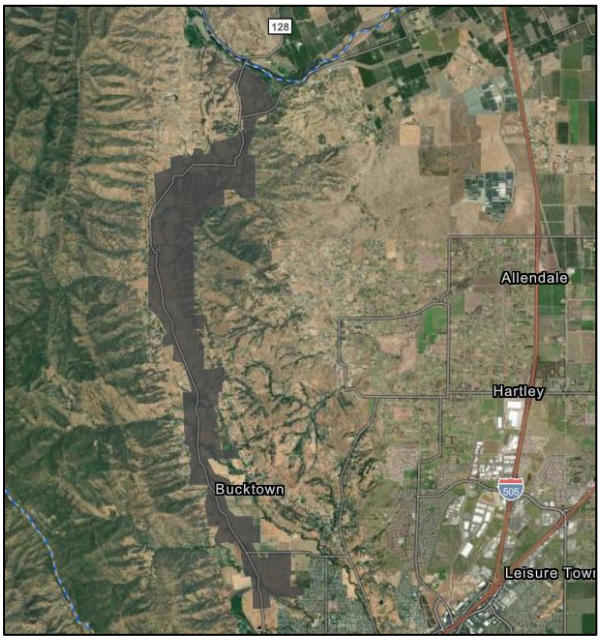


There are significant pockets of unserved and underserved need south of Winters, specifically along the I-505 and near Olive School Lane. The proposed project area comprises ~325 buildings consisting of ~528 individuals who are considered unserved (service below 25/3 Mbps) and underserved (service below 100/20 Mbps). Around 19 households consisting of ~96 residents are within census blocks intersecting the project area designated by the California Advanced Services Fund (CASF) as "Eligible" or "Priority Eligible", meaning that they do not have Internet Service faster than 25/3. CASF-eligible areas comprise a total area of 4.3 square miles. AT&T has expressed some interest in this project if they could leverage existing utility poles to deploy aerial fiber.

To execute this project, an existing local ISP such as AT&T or Cal.Net could build fiber to the premises (FTTP) to unserved and underserved households, businesses, and other buildings along Winters Road.

10: Expanding fiber or wireless coverage to Pleasants Valley unincorporated area

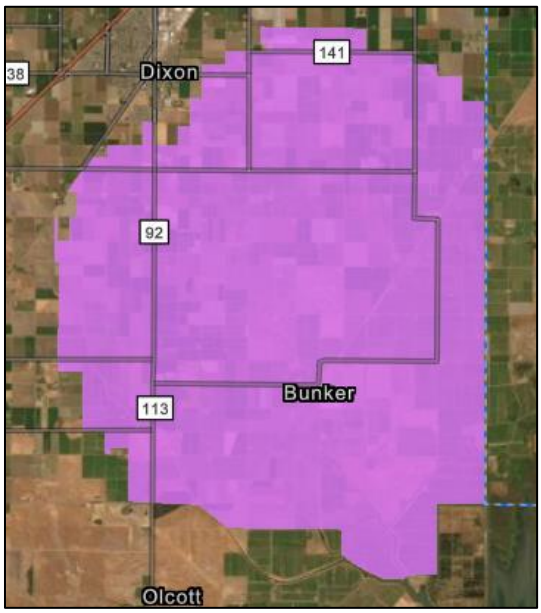
This project would serve large areas of unserved need including areas along Pleasants Valley Road. The proposed project area contains ~243 buildings consisting of ~1,075 individuals who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). Around 485 households and ~1,043 individuals are within census blocks intersecting the project area that are designated by the California Advanced Services Fund (CASF) as "Priority Eligible" or "Eligible", meaning that they do not have Internet Service faster than 25/3. CASF-eligible areas comprise a total area of 76.1 square miles.



To execute this project, an existing local ISP such as DigitalPath Inc., Internet Planet, or Valley Internet could build several wireless towers, or an existing local ISP such as AT&T or Comcast could build fiber to the premises (FTTP) to unserved and underserved households, businesses, and other buildings in Pleasants Valley.

11: Expanding wireless coverage to rural areas outside of Dixon and fiber to Dixon Migrant Center

Large areas of unserved need exist through this area, with many residents depending on unreliable and slow satellite internet. The area south of Dixon is largely rural agricultural land. The proposed project area contains ~388 buildings consisting of ~987 individuals who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). Within the project area, 256 households comprising of 705 individuals are within areas designated by the California Advanced Services Fund (CASF) as "Eligible", meaning that they do not have internet service faster than 25/3 Mbps. Potentially CASF-eligible areas comprise a total area of 61.1 square miles.



To expand service, Solano County could partner with a wireless service provider to mount a relay on top of the Voice of America Radio Tower on Radio Station Road, leveraging the height of the existing structure to provide wireless service to a large area at a lower cost. Due to its proximity to the Voice of America Radio Tower, an additional fiber line connection to the tower can be passed to the local Dixon Migrant Center.

12: Expanding fiber connections to Ryer Island

Ryer Island is a large area of need, as the entirety of the island is unserved or underserved, with peak speeds of 75/20 Mbps, and multiple census blocks that are entirely unserved. The proposed project area contains ~219 buildings consisting of ~229 individuals who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). As of the 2020 Census, ~127 households consisting of ~281 individuals are within census blocks intersecting project areas designated by the California Advanced Services Fund (CASF) as "Priority Eligible", meaning that they do not have Internet Service faster than 10/1.

To execute this project, an existing local ISP such as Frontier could build fiber to the premises (FTTP) to unserved and underserved households, businesses, and other buildings on Ryer Island.

13: Expanding fiber lines to Lambie Industrial Park and Delta Conservation Camp #8 near Fairfield

Lambie Industrial Park is a privately-owned industrial area located near Fairfield, which was highlighted by Solano Planning Services as a future business development opportunity. The proposed project area contains ~26 buildings consisting of ~123 individuals who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). With the proposed project area, ~14 buildings and ~81 residents are within areas designated by the California Advanced Services Fund (CASF) as "Eligible", meaning that they do not have Internet Service faster than 25/3. CASF-eligible areas comprise a total area of 4.2 square miles.

To execute this project, an existing local ISP such as AT&T, Comcast or Frontier could build fiber to the premises (FTTP) to unserved and underserved households, businesses, and other buildings in Lambie Industrial Park and Delta Conservation Camp #8.

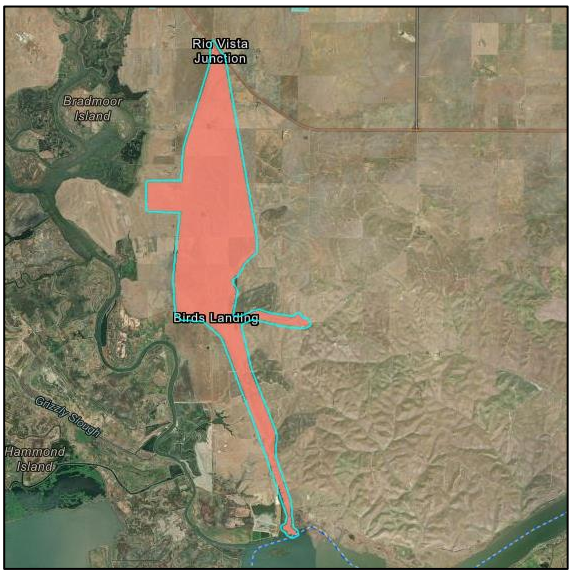
14: Expanding fiber connections to Binghamton and houses along Hawkins and Fry Roads

Binghamton has a large area of unserved and underserved residents, including contiguous pockets along Fry Road. The proposed project area comprises ~39 buildings consisting of ~149 individuals who are considered unserved (service below 25/3 Mbps) and underserved (service below 100/20 Mbps). Around 63 households consisting of ~218 residents are within census blocks intersecting the project area designated by the California Advanced Services Fund (CASF) as "Eligible" or "Priority Eligible", meaning that they do not have Internet Service faster than 25/3. CASF-eligible areas comprise a total area of 9.3 square miles.

To execute this project, an existing local ISP such as AT&T or Comcast could build fiber to the premises (FTTP) to unserved and underserved households, businesses, and other buildings in Binghamton and along Hawkins and Fry Roads.

15: Expanding fiber or wireless coverage to Birds Landing and Collinsville

The proposed coverage area is almost entirely unserved with a few pockets of wired connectivity. Birds Landing and Collinsville are rural unincorporated communities within the southeastern portion of Solano County. Large areas of unserved need include areas along Collinsville Road and Birds Landing Road. The proposed project contains ~63 buildings consisting of ~180 individuals who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). Within the project area, ~40 households and ~76 individuals are within areas designated by the California Advanced Services Fund (CASF) as "Priority Eligible" or "Eligible", meaning that they do not have Internet Service faster than 25/3 Mbps.



Because of the varied topography comprised of many small hills, a mesh network of multiple relays would be required to serve this area. There is a possible business need for faster connectivity in the area, as the southern region of the proposed coverage area is part of the Shiloh Wind Farm, owned by EDF Renewables.

6.2 Digital equity project recommendations

Driving digital equity across cities and unincorporated areas of Solano County will be critical to truly impact broadband adoption address the digital divide, especially for low-income, rural, and other underserved communities. The proposed projects in this study will: create the programmatic infrastructure needed to coordinate digital equity initiatives across Solano County; raise the awareness of digital resources to 3,000 – 5,000 residents; and establish 10 pilot programs driven by local stakeholders to launch or expand digital equity programs—all with the support of a permanent digital equity coalition of 30+ stakeholders eager to collaborate on digital equity initiatives, including county agencies, cities, ISPs, anchor institutions, and other organizations.

1: Digital Equity Program Contractor

The County must ensure enabling conditions are in place for broadband adoption, affordability, and inclusion to be successful. These conditions include engaged stakeholders, availability of funding sources and resources, favorable policies, and tracking of milestones. Most importantly, as Solano County develops its Strategic Broadband Development plan, successful execution will require a dedicated leader and structure that can carry out these digital equity programs.

A Digital Equity Program Contractor, together with the "Solano Connected" coalition, will enable the County in bridging the digital divide.

We propose for Solano County to hire a Digital Equity Program Contractor whose role would be to spearhead and build long-term digital equity plans through engagement with stakeholders across the full digital ecosystem, including public entities, ISPs, anchor institutions, and nonprofits. The Digital Equity Program Contractor will have the capabilities and expertise to lead and assist in implementing digital equity projects and serve as a strategy expert for ongoing programs. They will establish clear KPIs for projects and ensure continued measurement. They will also act as a central resource hub and oversee projects including the "Solano Connected" digital equity coalition, and Solano County's digital equity seed funding program.

They will drive initiatives to improve digital equity by:

- Serving as an important point of contact for digital equity questions for residents
- Identifying and building future projects, programs, partners
- Leading grant proposals and new programs
- Managing a Solano County digital equity coalition of stakeholders across the county

Qualification considerations should include demonstrated technical knowledge and experience in broadband planning/regulation, leading planning projects with multiple stakeholders, managing contracts and grants, and partnering experience with entities at the federal, state, and local level.

2: "Solano Connected" digital equity coalition & Digital Navigator system

There exist many organizations with digital inclusion efforts in Solano County including those of anchor institutions, CBOs, and nonprofits. While many can make some impact, our conversations with them reveal the common themes of struggles from a lack of resources, knowledge, and next steps. Smaller nonprofits such as Digital Literacy Rocks often lack the capacity and resources to expand their projects, while larger organizations with other programs beyond digital inclusion such as Solano County's Public

Library lack awareness of needs outside of their immediate community. Oftentimes, organizations also lack awareness of other digital inclusion projects, resulting in them to be unable to refer clients to resources they cannot provide. The lack of a central network and understanding may also result in duplicative efforts, competition for funding, and other inefficiencies. There is a need for a county-wide Digital Navigator system (refer to section 2) that can help community members navigate the digital divide.

We propose for Solano County to establish a "Solano Connected" digital equity coalition, led by the Digital Equity Program Contractor, in charge of building a county-wide Digital Navigator system. In addition to building the Digital Navigator system, the coalition will engage stakeholders across the full digital inclusion ecosystem to play three roles: steer strategic decision, enable success of digital equity programs, and raise awareness

1) **Steer strategic decision:** Each member of the coalition will bring unique perspectives and insights and will work with the Digital Equity Program Contractor to develop best practices and strategies for expanding internet access and proficiency in Solano County.

2) **Enable success of digital equity program:** The coalition will serve as a hub for stakeholders to collaborate on providing resources, funding, and expertise. The coalition will be empowered to work with the Digital Equity Program Contractor to support and launch initiatives to support the success of other digital equity programs.

3) **Raise awareness:** The coalition will raise awareness of the digital equity needs of residents upstream to stakeholders such as elected officials, department leadership, and the media. They will also create material and administer programs designed to raise awareness of digital equity programs downstream to residents.

3: Digital Resource Awareness Campaign

Numerous local, state, and national studies have shown that many citizens are caught in the digital divide and do not have adequate access to online resources. According to a study released in 2021 by the University of Southern California, 16% of Californians are unconnected and 10% depend on smartphones. Based on the American Community Survey data, in Solano County, approximately 12,000 households do not have a broadband subscription plan, and 6,600 households do not have a computer at home. There are Federal and State subsidies targeted towards low-income individuals who may not be able to afford a monthly internet subscription service available to them, including the FCC's $30 per month subsidy and one-time discount of $100 for devices through the Affordable Connectivity Program, as well as Lifeline and California's CASF Line Extension Program. Many Solano County households are eligible to receive subsidies for internet subscription and low-cost devices, but anecdotal evidence and nationwide trends show that these subsidy programs are undersubscribed. In fact, based on enrollment in federal programs that qualify households for ACP in Solano County, there are an estimated 70,000 households eligible for the ACP but only 10,500 households are actively enrolled as of June 2022.

ISPs also have low-cost broadband programs such as Comcast's Internet Essentials and AT&T's Access which, when paired with the subsidy from ACP, provide households with free internet. Beyond these subsidies, there are also already existing programs in Solano that can be of help that should continue to be advertised. Solano Public Library has a free Chromebook and hotspot lending program that can provide free digital access for Solano households, Digital Literacy Rocks provides low-cost, one-on-one digital literacy training programs, and Solano County Workforce Development Board has free laptop centers. Many of these resources, however, are not widely publicized.

The underutilization of these programs is primarily driven by a lack of awareness that they exist and how to apply for them. With proper outreach and communication, many households can become connected instantly at no cost. We propose launching a multi-channel awareness campaign (e.g., email newsletters, informational flyers at anchor institutions, mailers to qualifying census blocks, local television, or radio advertisements) of subsidies, programs available, and benefits of broadband to 3,000 to 5,000 Solano County residents and businesses. We also recommend ACP enrollment drives in areas with high need where volunteers promote and support households with completing ACP and other registration forms in-person. Coordination and creation of this campaign can be managed by the Digital Equity Program Contractor, and outreach can be amplified by local community partners that work with Solano County's vulnerable populations at a grassroots level. When possible, each partnering organization should add details of how households will benefit from free internet. For example, the Department of Health and Social Services can mention how having internet would allow households to access most resources and applications online, which would help households eliminate the burden of going to an office.

4: Digital Equity Seed Funding Program

There are many organizations in Solano County that may be fostering their own innovative ideas or already have their own programs addressing issues relating to digital equity and inclusion. Our discussions with many organizations, however, reveal organizations facing significant roadblocks in funding and resources. For example, the Solano County Public Library's device lending program has consistently experienced shortages, with waitlists and wait times of up to three weeks. Another example is Digital Literacy Rocks, a nonprofit providing digital literacy programs, having to shut down their physical location and losing 40% of their students due to a lack of resources. If funding was made available, both organizations can immediately expand their programs and create impact.

We propose for Solano County to establish a community innovation fund with $100,000 in seed funding to fund 10 ideas relating to digital equity efforts. This competitive grant should serve as a vehicle to bring promising local ideas up and seed these ideas with initial funding. At the end of the first year, the County could select the two most successful programs and provide additional funding to expand on their success in the consecutive years. This seed funding program will have a formal RFP process and the projects proposals can be brought to the “Solano Connected” coalition for review. The program can be overseen by the Digital Equity Program Contractor, with final approval from funding given by the Board of Supervisors.

5: Solano County Library device lending program

The Solano County Library serves six of the seven cities in the County - Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, and Vallejo - with a mission to spark curiosity, inspire creativity, and champion learning. They have nine libraries across the county and offer various programs that serve many populations including their Adult Literacy Program, College/career readiness program, and Veteran’s Connect program. In 2020, the library had a total of 1.5 million visits, 102 events, and 545 virtual programs. The Library offers public Wi-Fi in its buildings and is currently working to expand Wi-Fi access to the surrounding areas just outside the libraries. They currently have a highly demanded hotspot (172 devices) and Chromebook (54 laptops) lending program, which can support additional devices should they be made available.

We propose for Solano County to further fund this program in order to increase the number of WiFi-enabled laptops and hotspots available to residents. These devices would be loaned out to residents for short periods of time (e.g., up to three months), enabling the Library to support more residents.

7. How will we make this plan a reality?

Executing these projects will be a multi-year effort that requires collaboration across Solano County. To ensure the success of this broadband strategy, a roadmap has been developed for Solano County over the next 24+ months, as well as details about key roles and leadership positions to manage broadband efforts and ensure long-term success. Engaging a broad base of community stakeholders, ISPs, non-profits, and anchor institutions will also drive success in this effort.

7.1 Securing funding for broadband project recommendations

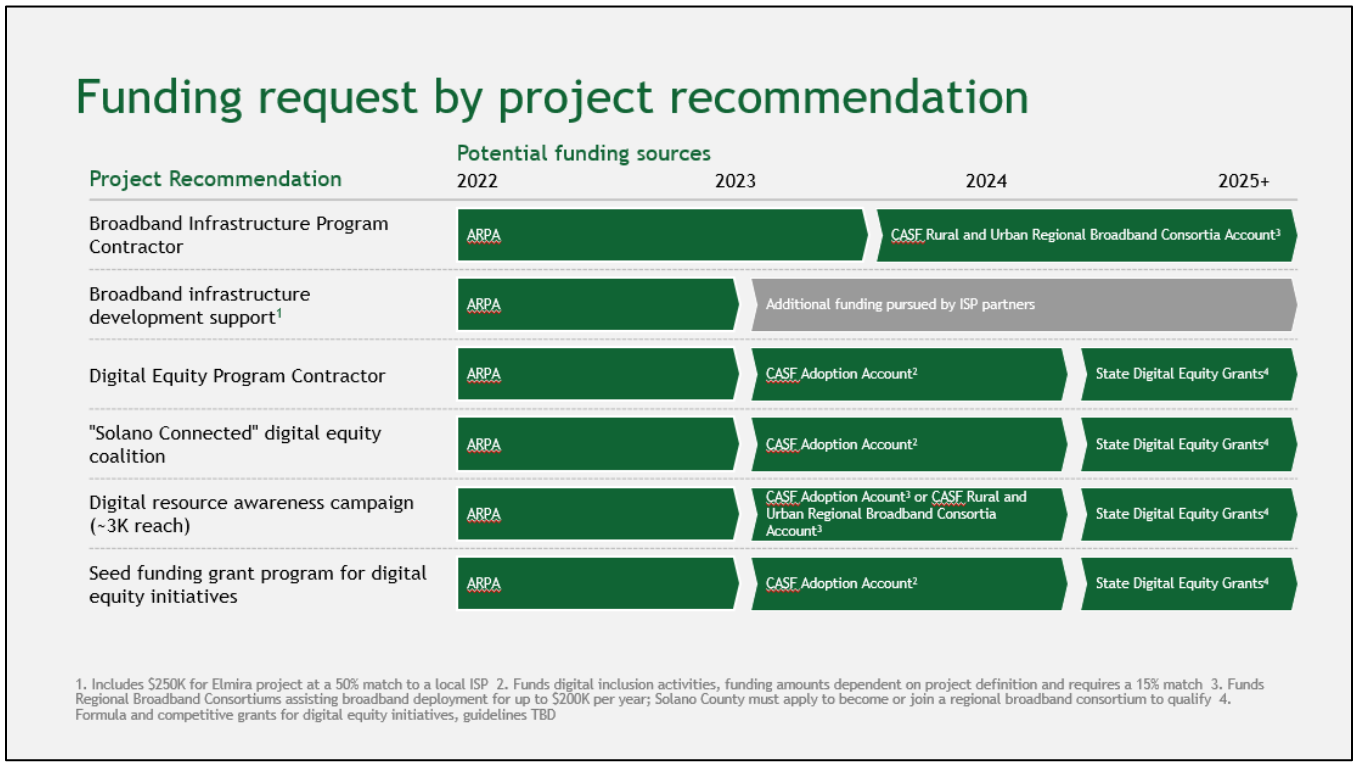
Securing federal, state, and other funding will be critical for Solano County to execute project recommendations. To differentiate Solano County as an applicant and increase the attractiveness of proposed initiatives, it can complete three activities:

1. Develop enhanced GIS mapping, using highly granular data at the Census block level to determine exact needs, underserved areas, and eligibility. This will be key to validate broadband access needs in grant applications.
2. Establish broad partnerships with ISPs and stakeholders, with the aim that ISP partnerships will help secure funding and community partnerships will aid in the strategy development and execution. These partnerships will enable Solano County, ISPs, and/or other stakeholders to qualify for certain funding and make their grant applications more competitive for upcoming Federal and State broadband funding.
3. Hire a Broadband Infrastructure Program Contractor and Digital Equity Program Contractor to further broadband planning, coordinate execution of projects, and help pursue funding.

Given the multitude of funding sources, Solano County leaders and stakeholders, including ISPs, will need to pay close attention to the timelines and deadlines of various funding sources to best meet submission requirements for each application. For example, for funding sources focused on physical infrastructure, immediate attention should be paid to continuing broadband planning through the Local Agency Technical Assistance Program, which will begin August 2022. The Capital Projects Fund will also be available in August 2022, the Last Mile Federal Funding Account will follow in September, followed by the second round of RDOF in November and BEAD in December. It is expected that CASF, BEAD, and RDOF will all run at least through July 2023.

It is important to note that for the broadband infrastructure projects, Solano County can choose to apply for the funding directly as the grantee or provide letters of support to select ISP partners in their grant applications. Should the County choose to pursue grant funding, it would be able to control project prioritization, solicit partners to execute projects through competitive RFPs, and lease access to ISPs; however, it would then be responsible for grant application, management, reporting, and ongoing maintenance, billing, and customer service of the infrastructure. Should the County choose to provide letters of support to ISPs to pursue funding for specific projects, it would enable Solano County to influence project regions to help ensure 100% broadband coverage in unincorporated Solano County without applying for grant funding or managing subsequent RFQs, reporting, maintenance, billing, customer service, and more. However, it would not be able to control project prioritization or own the broadband infrastructure.

Figure 11: Summary of funding need for project recommendations



Beyond the large upcoming broadband infrastructure programs, there are several other funding opportunities for the priority project recommendations in the near future:

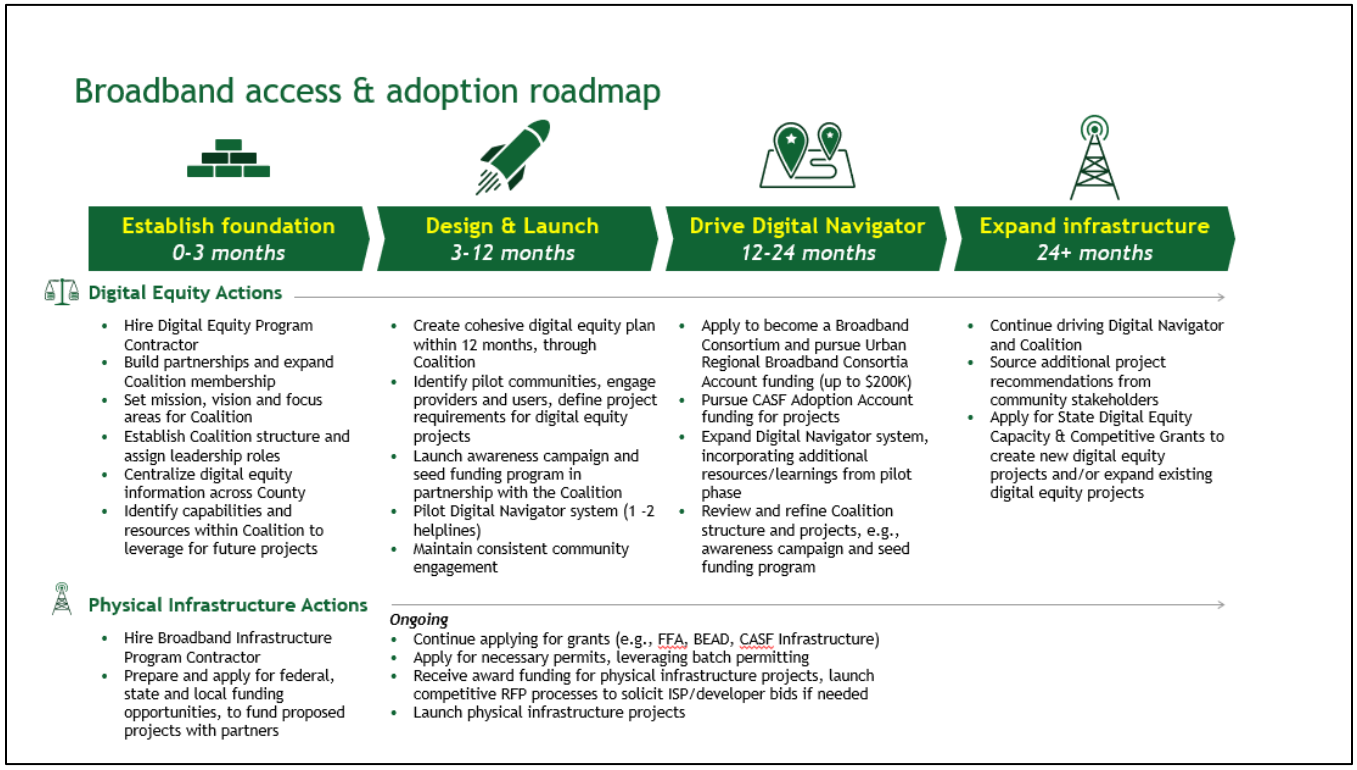
- **Broadband Infrastructure Program Contractor:** Solano County can utilize ARPA funding to hire contractors for up to a two-year period to coordinate the planning and launch of broadband infrastructure projects while additional funding, should the County pursue a regional broadband consortium in order to qualify for the CASF Rural and Urban Regional Broadband Consortia Account in 2023.
- **Broadband infrastructure development support:** Solano County can utilize ARPA funding to further broadband infrastructure development through activities such as executing additional surveys of project areas to clarify unserved and underserved households and enabling ISP partners to develop additional proposed project areas with matching funds.
- **Digital Equity Program Contractor:** Solano County can utilize ARPA funding to hire contractors for up to a two-year period to plan and execute digital equity initiatives with a Digital Equity Program Contractor. For 2023, Solano County should apply for funding from the CASF Adoption Account which allows funding to be allocated to the cost of staff running digital equity programs funded by the same account. Starting in 2024, Solano County should apply for the funds allocated to California from the State Digital Equity Capacity Grant Program, and/or apply directly to the Competitive Grant Program, which are grants that provide funding for digital equity projects.
- **"Solano Connected" digital equity coalition and Digital Navigator system:** Solano County can utilize ARPA funding for up to a two-year period to fund the development of a pilot Digital Navigator system. For 2023, Solano County should apply for funding from the CASF Adoption Account which provides funding for digital inclusion programs including setting up digital navigator centers. Starting in 2024, Solano County should apply for the Digital Equity Act programs as mentioned above.

- **Digital Resource Awareness Campaign:** Solano County can utilize ARPA funding for the first year to fund the initial phase of the awareness campaign. For 2023, Solano County should apply for funding from the CASF Adoption Account which provides funding for digital inclusion programs including community outreach. The County should also apply for the CASF Rural and Urban Regional Broadband Consortia Account which can provide up to $200,000 a year of additional funding for the coalition to support the expansion of broadband in Solano County. Starting in 2024, Solano County should apply for the Digital Equity Act programs as mentioned above.
- **Digital Equity Seed Funding Program:** Solano County can utilize ARPA funding for the first year to fund the initial $100,000 of grants for the seed funding program. For 2023, Solano County should assist the top performing programs in applying for funding from the CASF Adoption Account which provides funding for digital inclusion programs including digital literacy projects and broadband adoption projects. Starting in 2024, Solano County should apply directly or assist programs in applying for the Digital Equity Act programs as mentioned above.

7.2 Broadband project recommendation execution roadmap

As part of the study, an execution roadmap was developed to outline actions over the next 24+ months, across digital equity and physical infrastructure for Solano County.

Figure 12: Broadband access and adoption roadmap



The proposed roadmap is focused on four stages, which will extend over two years until infrastructure enhancements are completed. During the first three months, leaders will focus on establishing the foundation for future developments. To support physical infrastructure, the team should hire the Broadband Infrastructure Contractor in this stage, as well as determine its path to pursue project

funding, e.g., apply for grants directly and/or provide letters of supports to partners. For digital equity, this will require tasks such as securing approval for the Digital Equity Program Contractor; forming partnerships; setting mission and vision; establishing the coalition structure, roles, and capabilities; and centralizing digital equity information across the County, such as through a website. To support digital equity, the Digital Equity Program Contractor should be hired and begin to launch the "Solano Connected" digital equity coalition, including identifying members, establishing the coalition's mission, values, and goals, and collate digital equity resources to share with coalition members and other Solano County stakeholders.

Solano County should prioritize establishing foundational pieces, partnerships, and pilot projects that will help position Solano County for success when future funding sources become available.

The next phase, from months 3-12, will focus on the design and launch of infrastructure projects and digital equity projects. To support physical infrastructure in this phase, the County can pursue funding for infrastructure projects and/or provide letters of support to local ISPs to pursue funding (e.g., FFA, CASF, BEAD), apply for and approve necessary permits, launch RFP processes to solicit ISP bids (should the County pursue funding), and launch infrastructure projects once ISPs / developers are selected. These activities for physical infrastructure will continue into the third phase. To support digital equity, the Digital Equity Program Contractor should identify communities and engage providers and users to prepare a pilot the Digital Navigator system (e.g., 1-2 helplines with 1-2 part-time employees), as well as launch the digital resource awareness campaign and seed funding grant program. In this phase, it will be especially important to leverage the coalition in initial launch activities and ongoing program management. Broader stakeholder engagement with diverse community groups will also be essential.

Phase 3, from 12 to 24 months will focus on driving Digital Navigator efforts, applying to make the "Solano Connected" digital equity coalition a Regional Broadband Consortium, and pursuing new digital equity project funding (e.g., CASF Rural & Urban Regional Broadband Consortia Account, CASF Adoption Account). With these efforts, the Digital Navigator system can use its insights from the pilot phase to successfully expand and improve the program, expanding access and tailoring services to community needs. Coalition structure and projects can also be reviewed, and digital inclusion assessments can be completed, examining opportunities for continued improvements.

Finally, after two years, efforts will be centered on expanding infrastructure. The County can continue to apply for grants, issue RFPs to solicit bids from ISPs, and launch development projects. Continued focus on digital equity, including investing in Digital Navigators and the coalition, will also be important to ensure community members are able to successfully access and adopt the growing supply of physical infrastructure options.

7.3 Roadmap for "Solano Connected" digital equity coalition and Digital Navigator System

One of our proposed priorities for the Solano County Digital Equity Program Contractor and "Solano Connected" digital equity coalition will be the creation and administration of a Solano County Digital Navigator system (Digital Navigator system definition in Section 2). Digital Navigators are an important tool for raising awareness about and implementing digital equity programs in unconnected

communities. The Digital Equity Program Contractor will provide oversight over the program, and the coalition will be empowered to position Digital Navigators in the community through anchor institutions represented on the coalition. These anchor institutions will be able to support Navigators by providing resources and connecting them with segments of their communities that are most in need of digital literacy support. In addition to building a Digital Navigator system, the coalition will serve as a permanent group of county stakeholders to meet regularly and play three key roles: steering strategic decision, enabling success of digital equity programs, and raising awareness (See further detail in Section 6).

Below is a suggested timeline for the building of the coalition and Digital Navigator System.

- **Months 0-3** (**Establish Partnerships and Foundation**)
    - Build partnerships and expand coalition membership
    - Establish coalition's Mission, Vision, Focus Areas, Operating Structure and Framework
    - Centralize digital equity information across County
    - Identify capabilities and resources within coalition to leverage for future projects
    - Begin developing pilot Digital Navigator system

- **Months 3-12** (**Design & Launch**)
    - Create cohesive digital equity plan within 12 months through coalition
    - Identify pilot communities, engage providers and users, define project requirements
    - Launch pilot Digital Navigator system
    - Leverage coalition in initial program launches
    - Continue coalition outreach and enroll more players
    - Maintain consistent community engagement
    - Prepare Grant application for CASF Adoption Program & CASF Rural and Urban Regional Broadband Consortium Account

- **Months 12-24** (**Drive Digital Navigator**)
    - Expand Digital Navigator system, incorporating additional resources/learnings from pilot phase
    - Review and refine coalition structure and projects

All stakeholders in the Coalition have vital roles to play to enable success in tackling the digital divide. Below are descriptions of what is needed from each stakeholder.

Community Orgs, County Departments, Nonprofits
Continue to work to understand the connectivity and digital skill needs of community residents. Form partnerships with other organizations to bolster awareness, adoption, and skill development, delivering digital literacy programs. When needed, directly fund the disbursement of digital tools and devices. Work with Digital Navigators to connect residents to advice on internet access, technical support, and digital literacy tools.

Anchor Institutions
Develop a strategy for helping the County and community meet its digital equity needs. Consider engaging stakeholders, sharing solutions, and serving as a hub for local broadband resources. Examine the programs being developed by other community organizations and use the anchor institutions to scale these initiatives and reach more disconnected and under-connected residents. Help administer the Digital Navigator system.

Solano County ISPs
ISPs will be encouraged to partner with Solano County and cities to support broadband adoption and digital literacy. This could include grant applications, cost matching for new infrastructure, raising awareness for affordability programs and drive adoption, tech support to vulnerable families, and ad-hoc partnerships with other organizations to close the digital divide.

This plan described above will set Solano County on a path to success in expanding broadband access, adoption, and awareness. By developing advanced mapping capabilities, launching a variety of community partnerships, and getting a head start on grant activities, including hiring a Broadband Infrastructure Program Contractor and Digital Equity Program Contractor, the County will be well-positioned to secure essential funding from federal, state, and local sources.

This funding will enable the County to follow the designed roadmap, advancing from laying the foundation (months 0-3), designing, and launching programming (months 3-12), driving Digital Navigator programs (months 12-24), and expanding infrastructure (months 24+). This proposed plan dedicates sufficient attention and investment not only to the physical infrastructure, but digital equity components. The enabling conditions proposed, including dedicated leadership and coalition capacity, community partnerships, stakeholder engagement, and focus on continuous improvement, will enhance the County's long-term outcomes related to broadband and connectivity.

Success in this effort will require input and buy-in from a diverse set of stakeholders. The Broadband Infrastructure Program Contractor and Digital Equity Program Contractor, along with the "Solano Connected" digital equity coalition, should be sure to engage community organizations and non-profits, anchor institutions (higher education, healthcare, libraries, etc.), and ISPs in the digital equity planning and execution. Engaging all stakeholders in the ecosystem will ensure that the plan and programming delivers the highest quality technology, but with a focus on the holistic supports needed to promote adoption.

8. Conclusion

Solano County has a tremendous opportunity to become a leader in broadband and has shown its commitment to this effort through the pursuit of this study and its broadband access and adoption project recommendations. It will be set up for success through the collaboration of local ISPs who are eager to partner with the County on broadband infrastructure projects, and 30+ local stakeholder organizations to participate in a permanent coalition to address digital equity. And with access to potentially millions of dollars of funding through current and upcoming federal and state grant programs, Solano County can access the funding it will need to see this plan through.

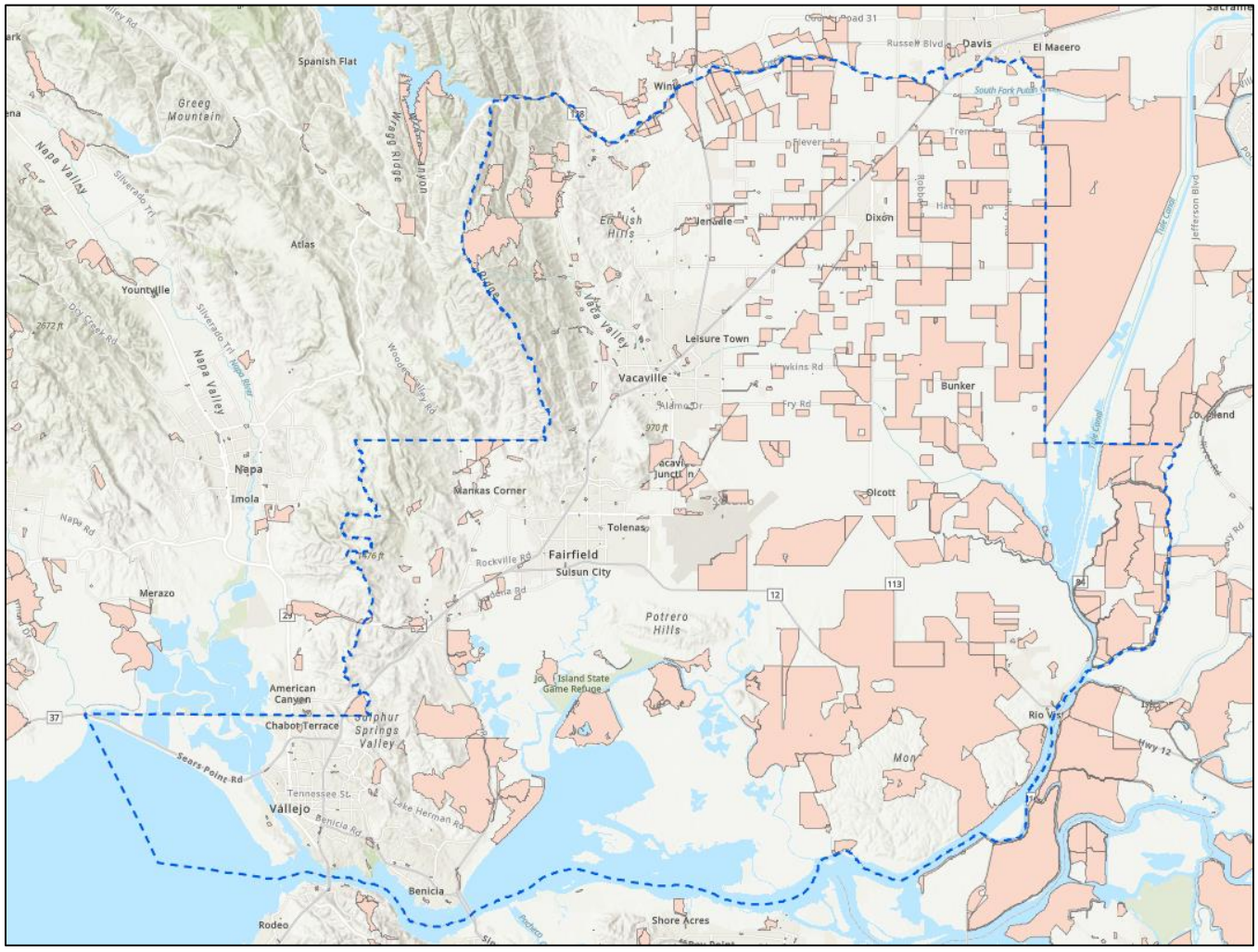
With the County's leadership and the partnership of local county agencies, cities, ISPs, anchor institutions, and other organizations, Solano County can meaningfully expand broadband coverage across unincorporated Solano County and address the digital divide for all residents.

9. Appendix

9.1 Supplementary coverage gap analysis output

Section 5 of this report details the coverage gap analysis output. This section contains additional supplemental spatial output that may be helpful in further contextualizing the coverage gap analysis.

Figure 13: CASF Infrastructure Eligible Areas, from CPUC

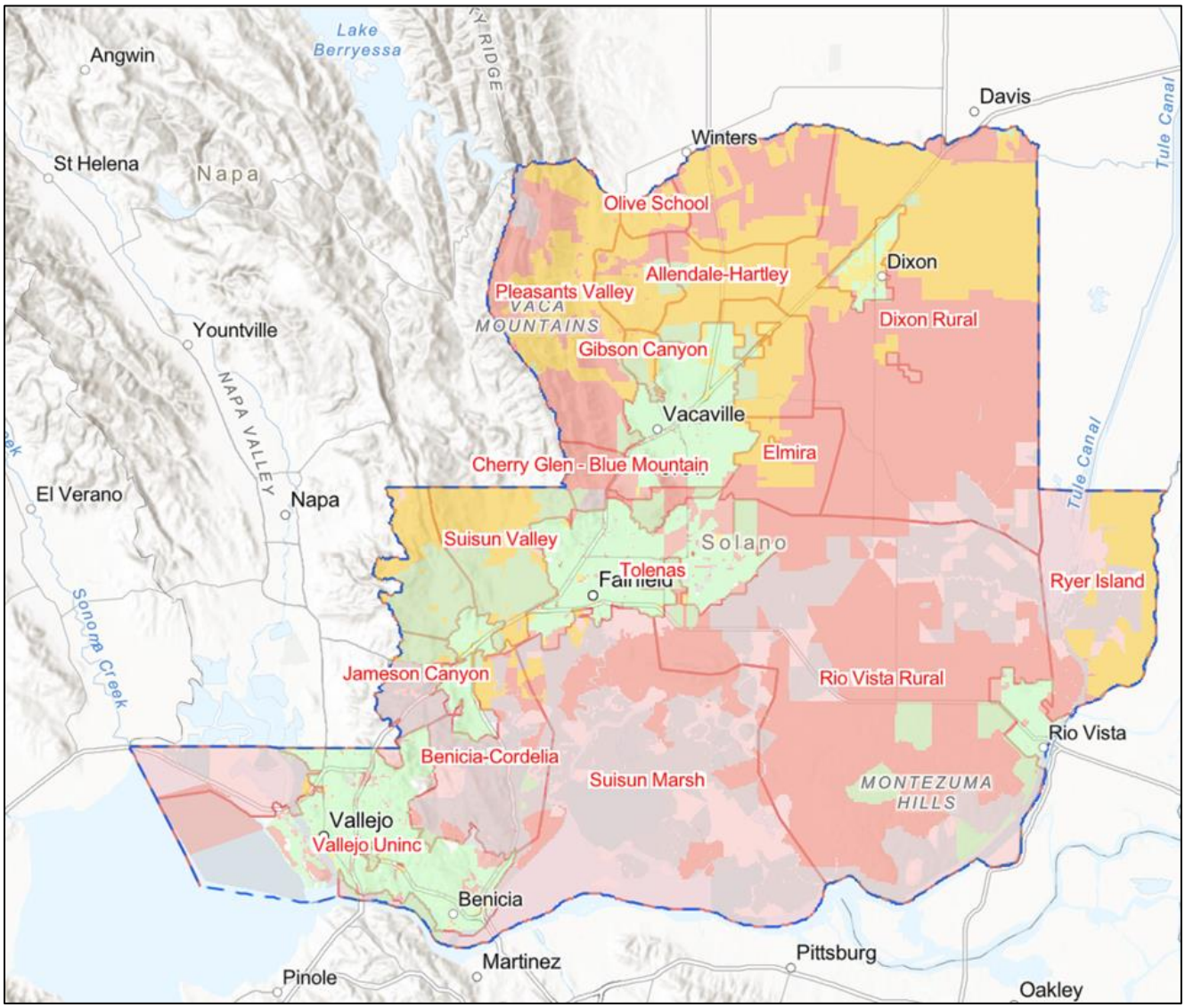


Source: CPUC

Legend

CASF Infrastructure Eligible

Figure 14: Coverage Gap Analysis by Broadband Regions

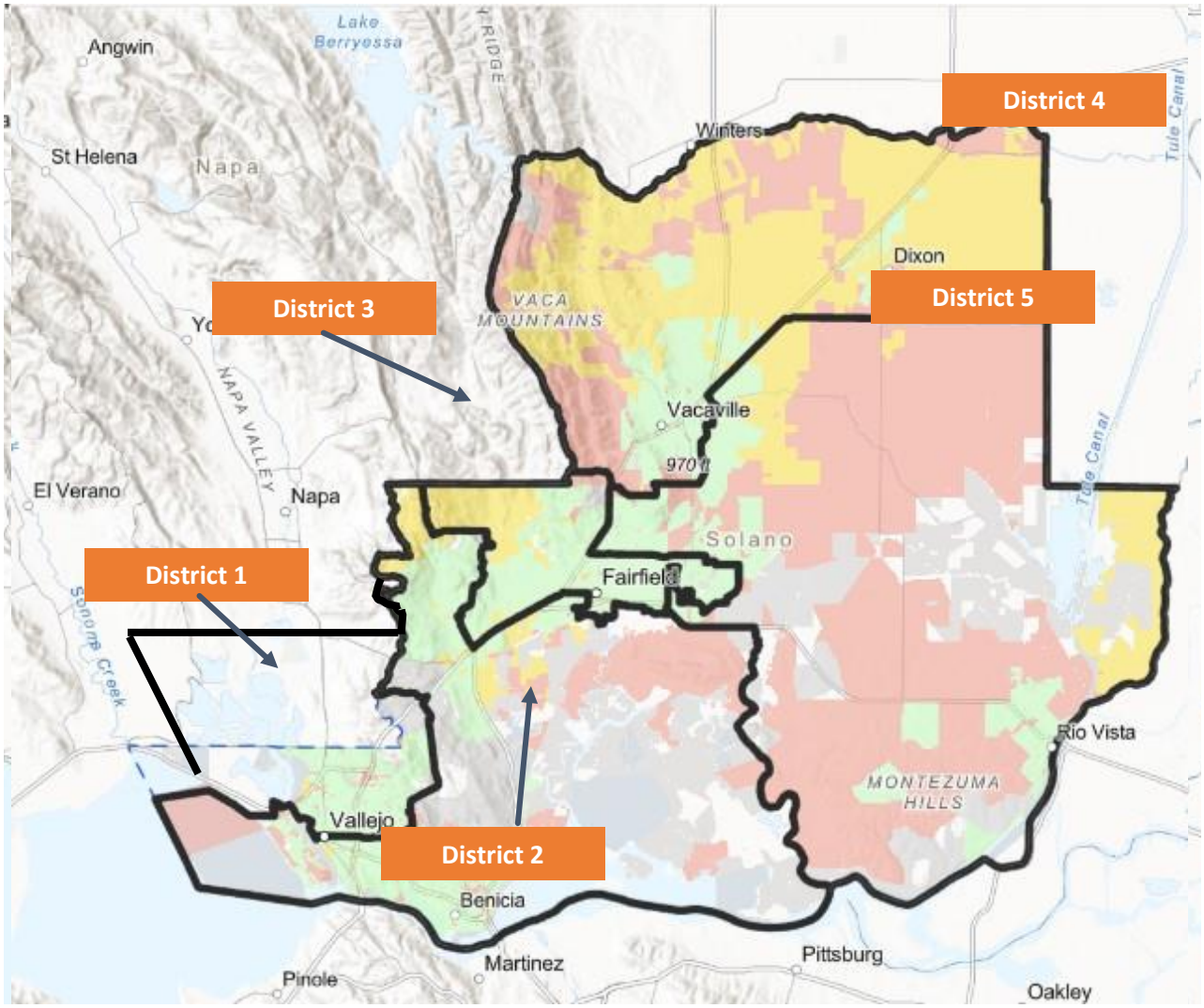


Sources: FCC 477, NTIA, U.S. Census, American Community Survey, CPUC, BroadbandNow, Local ISPs

Legend

- Served (>100/20 Mbps)
- Underserved (between 25/3 and 100/20 Mbps)
- Unserved (<25/3 Mbps)
- No data available

Figure 15: Coverage Gap Analysis by Supervisor District



City boundaries are in black

Sources: FCC 477, NTIA, U.S. Census, American Community Survey, CPUC, BroadbandNow, Local ISPs

Legend

- Served (>100/20 Mbps)
- Underserved (between 25/3 and 100/20 Mbps)
- Unserved (<25/3 Mbps)
- No data available

9.2 Stakeholder interview findings

County Agencies

Solano County Farm Bureau

Solano County Farm Bureau (SCFB) represents and advocates on behalf of its 450 member farms across Solano County. Agricultural land represents 62% of all land across the county, with most farms being small family operations. As of 2012, 82% of principal farm operators had internet access in Solano County, but reliability and speed are continued concerns[24].

The largest infrastructure need among SCFB members is increasing reliability and speed of connectivity to support their business goals. Without reliable wireline or fixed wireless services, many farmers rely on satellite connections, which can be intermittent and fails to scale to meet peak demand. Digital literacy is not a concern, as farmers have worked with each other to build digital skills. Key areas that lack connectivity include the outskirts of Dixon and Rio Vista. SCFB is not pursuing their own broadband plan currently but is willing to utilize their communications channels to promote initiatives such as spreading awareness of ACP-compliant low-cost internet plans. Building a fixed wireless tower east of Dixon could improve reliability and speed of internet access for rural farmers located on unincorporated Solano County land.

Solano County Department of Health and Social Services (HSS)

Solano County Department of Health and Social Services works in 22 offices throughout the county and serves seven program service areas: Behavior Health Services, Child Welfare Services. Employment & eligibility services, Medical and Health Insurance, Older and Disabled Adult Services, Public Authority, and Public Health Services. They are a vital department that works with 1/3 of the population in Solano and serves a high number of children, elderly population, and people of color (Latino, Filipino, African American).

Regarding digital equity, HSS observes significant concerns about their clients' inability to access resources through online options. This is largely driven by the populations' lack of an appropriate device and/or their lack of digital literacy. For many of the homeless population, HSS notes that more than half do not even have access to a smart phone. Tackling the issue of device accessibility can significantly improve efficiency and benefit many vulnerable populations as the use of online options can eliminate the need for office visits and additional paperwork. While HSS does not currently have programs that directly tackle digital equity, they have many resources and partnerships that could be leveraged to increase existing and future digital equity programs. For example, HSS has mobile clinics, mailer programs, and partnerships with foodbanks and healthcare providers that could be used to increase awareness for affordable internet and devices for vulnerable populations. Furthermore, HSS' homeless program also has boots on the ground social workers that provide in-person support such as enrolling into government program. Collaboration with HSS would be significant as many of the population they work with are likely to quality for consumer subsidy programs such as ACP, Lifeline, and CASF line extension.

Solano County Office of Education (SCOE) & IT Directors

Solano County Office of Education is a partner to Solano County's six school districts, providing services and oversight that help them serve over 64,000 students from Pre-K to G12. County offices of education

[24] Kiesel and Spalding, 2019

are the intermediate level of the public education system in California, and they ensure school districts remain fiscally solvent and in compliance with state and federal law.

With the increase of remote learning and assignments that require digital tools, schools in Solano have observed needs for high-speed internet and device accessibility, particularly among low-income, foster, and homeless students. Beyond access and affordability issues, schools in Solano are also seeing a need for digital literacy and technical support among parents, teachers, and ESL families. Many schools are addressing such needs through hotspot and Chromebook lending programs, increasing awareness of low-cost plans from ISPs, and through hiring technical support staff that speak the languages of migrant families (e.g., Spanish, Tagalog). Several schools also have partnered with the Parent Institute for Quality Education (PIQE) to provide training for parents. Going forward, schools are willing to partner with Solano County to survey students and families to get more information on needs. They hope to utilize the data to target families with high data usage and encourage them to enroll in low-cost programs.

Solano County Planning Services

Solano County Planning Services (SCPS) guides development and land use decisions within Solano County. In their role supporting the Solano County Planning Commission, they aid applicants in preparing and obtaining permits, understanding the Zoning and Subdivision Codes, and providing timely information to applications and the general public on pending projects. Their policy planning activities include development of Green Valley, an area of interest for broadband buildout.

Business development is a key goal of SCPS, and particularly ensuring internet connectivity is not an obstacle to attracting new industries to Solano County. To that end, SCPS has highlighted the Industrial Ag Services district, north of Dixon, and Lambie Industrial Park, south of Travis Air Force Base as areas that should be prioritized for fiber buildout. Additionally, Pleasants Valley, a rural area near Vacaville, has both commercial ranches and new residential developments that lack connectivity. SCPS can support Solano County's broadband plan by providing visibility on future developments that could require additional infrastructure or future plans that could be leveraged to include new middle-mile fiber connections.

Solano Transportation Authority

Solano Transportation Authority is the County-level transit authority in Solano that plans, funds, and manages Solano's transportation infrastructure. STA works closely with California Department of Transportation. Our conversation with STA revealed that they currently do not have programs or plans tied to broadband in the near future but are willing to work with Caltrans to coordinate Solano County and the State of California's broadband plans.

Potential projects Solano County could pursue with STA include utilizing I-505 to link communities near Vacaville, and Highway 12 to link Collinsville and Birds Landing.

Cities

Benicia

Benicia is a waterfront city with a population of approximately 28,000. It has Solano County's largest industrial park with over 450 businesses, many of them in manufacturing, healthcare, and the social assistance sector. Benicia borders Vallejo, and there is an existing conduit that runs along Columbus Parkway. There is potential to tap into the proposed fiber backbone that Vallejo plans to build.

The primary challenge facing Benicia is lack of competition between ISPs which has decreased access to affordable broadband. This has particularly impacted the largely underserved community of low-income, senior, and homeless populations. Currently, Benicia has no fiber between their water plan and the industrial park. Benicia has attempted to draft a city-wide broadband plan; however, a lack of budget has stalled the process.

Dixon

Dixon is the sixth largest city in Solano County, with over 20,000 residents. Dixon is surrounded primarily by agricultural land and borders I-80, an important corridor for the California Open-Access Middle-Mile network, potentially reducing the cost of last-mile fiber construction.

The largest infrastructure needs are increasing reliability and speed for surrounding farms. Currently, most farmers utilize satellite connections which fail to meet their business needs. Dixon's goals with regards to digital equity includes ensuring Dixon Unified School District has the resources to improve technical literacy. Deploying fixed wireless infrastructure east of Dixon could improve signal reliability and connection speed for rural farmers located on unincorporated Solano County land.

Fairfield

Fairfield is the county seat of Solano County and the second largest city, with over 120,000 residents. Only 9% of residents have access to residential fiber[25]. Currently, they are wrapping up work on a broadband plan with the primary goal of increasing speeds and lowering costs for city residents.

The largest infrastructure needs are neighboring unincorporated community Cordelia and upgrading aging infrastructure in the center of Fairfield. Fairfield's goals with regards to digital equity include supporting their senior population, workforce development, and digital literacy for their high school and college population. They have a strong desire to work with existing nonprofits within Fairfield to achieve these goals. To this end, they've allocated $10M to achieving the goals outlined in their broadband plan. Fiber in Fairfield could be leveraged to provide a fiber connection to Lambie Industrial Park, an area of interest for increased broadband connectivity.

Rio Vista

Rio Vista is located at the Eastern end of Solano County in the Sacramento River Delta. It has a population of approximately 7,400.

The largest infrastructure need that Rio Vista currently faces is broadband reliability and a lack of service especially in the southeast region which has a larger population of homeless and low-income individuals. Beyond this, they have experienced issues with service drops affecting critical municipal buildings such as City Hall and the Fire and Police Departments. While they have made efforts to address these needs, Rio Vista has experienced roadblocks in qualifying for available grants targeting low-income populations as wealthier neighborhoods skew the median income beyond the threshold for grant qualification.

[25] BroadbandNow, 2020

Suisun City

Suisan City is the 4th largest city in Solano County with a population of approximately 28,000. The city borders Fairfield off the I-80 in central Solano County, which is an important corridor for the California Open-Access Middle-Mile network, potentially reducing the cost of last-mile fiber construction.

Currently, several rural areas of Suisun Marsh and Grizzly Island may not have reliable broadband access. The mayor and city council have expressed interest in building out free municipal Wi-Fi to address these areas, as well as improve overall internet speed for its residents. Challenges to implementing these goals have included low budget and political turnover. In terms of digital equity initiatives, Suisan could potentially benefit from and partner with programs in Fairfield as they are both members of the Fairfield-Suisun Unified School District.

Vacaville

Vacaville is the third largest city in Solano County, with over 102,000 residents. It sits at the intersection of I-505 and I-80, both important corridors for the California Open-Access Middle-Mile network, potentially making fiber construction costs cheaper. The city has contracted Magellan Advisors to produce a broadband plan, to be unveiled in September.

The largest infrastructure needs are a lack of fiber in the commercial district and attracting advanced industry north of the city with higher speed broadband. Vacaville's goals with regards to digital equity include supporting their senior population and increasing broadband connectivity in downtown areas along Alamo Drive and Foxborough Parkway. They plan to address supporting their senior population through library programs and expect their broadband plan to provide a roadmap for solving connectivity issues in downtown Vacaville. Comcast has shown some interest in deploying fiber to the premises to businesses in the commercial areas surrounding Nut Tree Airport.

Vallejo

Vallejo is the largest city in Solano County, with over 126,000 residents. Currently, 21% of Vallejo residents have access to residential fiber. Vallejo has a published broadband plan and is concluding a Request for Proposal (RFP) to select a partner to implement their plan[26]. This will entail the construction of key middle-mile fiber segments to create a resilient ring, at an estimated cost of $700,000 and connecting key infrastructure and anchor institutions to the planned ring at an estimated cost of $1.1M.

The largest infrastructure needs beyond the scope of their current plan include connecting City of Vallejo infrastructure assets in other areas of Solano County, such as American Canyon and Travis Air Force Base, to their fiber lines. Vallejo's goals with regards to digital equity include partnering with nonprofit organizations already existing in Vallejo to promote digital literacy and promoting ACP-compliant low-cost broadband services from providers such as Verizon and AT&T. Building key middle mile sections such as fiber connecting American Canyon to the northern sections of Vallejo's planned ring could help Vallejo complete their objectives and promote the building of last-mile fiber connections to residences in unincorporated land outside the city.

[26] City of Vallejo Broadband Project

Internet Service Providers (ISPs)

Astound Broadband Powered by Wave
Astound Broadband Powered by Wave is the sixth largest home ISP in the U.S. Within Solano County, they primarily serve the city of Dixon, offering 1G/20Mbps plans for $49.95, available to 89.5% of Dixon residents. They also participate in ACP and provides several discounted plans. They are actively conducting marketing outreach to increase subscribers.

Currently, while they have no concrete plans to expand, Astound Broadband Powered by Wave is interested in areas surrounding Dixon and Vacaville through Highway 113 and I-80 respectively. They have also expressed interest in expanding from Winters into the Putah Creek area but want to be deliberate with expansion.

AT&T

AT&T is the second largest home ISP in the U.S. They serve most of Solano County and is the only provider of Fiber in Vallejo. AT&T is a participant of ACP and Lifeline; their AT&T Access is a free plan offering speeds of up to 100/100 Mbps to eligible households. AT&T hopes to continue to promote this plan to eligible residents in Solano County.

AT&T have expressed preferences for projects which do not include price regulations as part of the grant. Our conversation reveal that they have spent $150M in capital in Solano from 2018-2020, and in the past have provided matching funds for project costs when working on expansion projects.

Cal.Net

Cal.Net is an ISP largely serving rural areas in Northern California. Within Solano County, they serve the northern portions of Vacaville and Dixon, offering internet plans starting at $53/mo. with speeds of up to 250 Mbps. Cal.Net participates in ACP and have their own programs promoting digital equity; they regularly meet with community colleges to offer digital literacy programs to students and works with 15 other organizations to advance digital equity.

Currently, Cal.Net's main challenge is their lack of trained employees capable of building out infrastructure. They are actively addressing this problem through partnering with organizations to train and certify employees. They won $50M from Connect America (CAF-II) and Rural Digital Opportunity Funds (RDOF) to build out fixed wireless service for a significant portion of Solano County.

Comcast

Comcast is the largest ISP in the United States and Solano County. Comcast's cable offerings are available to 372,738 residents of Solano County, covering over 90% of county residents, with notable holes in the eastern areas of the county[27]. Comcast does not offer fiber or fixed wireless in Solano County currently, and offers cable to Vallejo, Fairfield, and Vacaville, with holes in parts of Fairfield and all of Dixon. It is also a participant in the Affordable Connectivity Program (ACP), Lifeline and has committed $1B over 10 years to addressing digital equity, including its Lift Zone program, which creates safe distance learning and remote work centers with free Wi-Fi, digital skills content, and devices (depending on location).

Comcast's current goals for expansion are to both upgrade coverage in Vallejo and provide new coverage to Elmira. They are interested in partnerships to fill gaps in coverage in Fairfield, including

[27] BestNeighborhood, 2020.

near Nut Tree airport, and connecting Rio Vista municipal utilities to broadband. As part of their expansion, they have indicated a strong preference for aerial fiber utilizing existing utility poles, rather than underground fiber lines, due to cost.

Digital Path

Digital Path is a Wireless ISP (WISP) largely serving areas in Northern and Central California. They serve both urban and rural areas and offers internet plans with download speeds of up to 50 Mbps, according to CPUC data. Within Solano County, they offer wireless services in areas east of Dixon, Pleasants Valley Road, and the northeastern corner of Solano.

Currently, Digital Path does not have significant plans for expansion in Solano County primarily due to their ineligibility for BEAD grants given they do not offer wired internet. They point to reducing the level of permitting overhead for leasing state and county infrastructure (such as radio towers and PG&E poles) as a lever that would accelerate broadband buildout.

Frontier Communications

Frontier Communications is the 5th largest provider of wired broadband in the United States. Within Solano County, they are primarily focused on the city of Rio Vista. As part of their focus on digital equity, they offer two ACP-compliant plans: Frontier Essentials Internet and Frontier Fiber Internet (capped at 100 Mbps).

They provide exclusively fiber to the home and have experience working with CASF grants in Solano County. They are interested in evaluating opportunities to expand their broadband coverage to include Birds Landing, Collinsville, and Ryer Island.

Internet Planet

Internet Planet is the largest WISP in Solano County, with a primary focus on providing service to Rio Vista, particularly the Trilogy community. They also offer fiber exclusively in Vacaville. They pointed to Ryer Island, Suisun Marsh, Pleasants Valley and Green Valley as key areas of need. They have no immediate plans for expansion but are interested in expansion to Berryessa Peak, Pleasants Valley, and Quail Canyon.

Roadblocks preventing them from expanding include the permitting cost for new projects, which could be waived by Solano County, should the County enter a partnership with them.

Valley Internet

Valley Internet is an ISP based in Fairfield, largely serving rural homes and businesses in Northern California. They offer both fiber and fixed wireless plans and participate in the ACP. Valley Internet has a community support program which offer free public hotspots in specific areas and provides free internet connections for local fire stations.

Currently, Valley Internet hopes to partner with Solano County to build three towers on Mangels and Baptist Ranches to expand broadband connectivity to rural areas of the county such as Suisun Marsh and Green Valley; they have already obtained the landowners agreements. They estimate each tower to cost between $150-$200,000.

Anchor Institutions (e.g., schools, libraries) & Other Organizations

Digital Literacy Rocks

Digital Literacy Rocks is a nonprofit organization based in Solano County that focuses on providing digital literacy intervention training to help individuals learn how to use computers, access the internet, and use important software (e.g., email, Microsoft Office programs, Zoom). From 2018-2021, Digital Literacy Rocks provided training to 70+ individuals from all social-economic backgrounds with ages ranging from 25-89. Digital Literacy Rocks has developed a 6-week curriculum and methodology for providing digital literacy training in individual or small group settings. Students are provided with instruction and technical support from paid and volunteer employees. Individuals seek out their services when seeking employment, at the referral of their employers (who sometimes subsidize the class for their employees), and for self-enrichment.

After having lost their physical office due to the pandemic, Digital Literacy Rocks is currently only offering lessons online. The lack of physical location has made it more difficult to loan and provide devices, to provide hands-on mentorship, and to provide visibility/outreach. It has also made it more difficult for them to find volunteers. Beyond their virtual digital literacy program, they are currently working on expanding their reach through partnering with Solano County's Health and Social Services to lead digital literacy training for low income and unemployed population. They are also developing a board, which they hope will be a vehicle for increasing capacity, expertise, and partnership. They are continuously looking for long-term funding opportunities, as it will allow them to stabilize their operations and pursue projects such a digital navigator program, which will increase adoption and address the often-overlooked need for technical support across the County.

Solano County Community College

Solano Community College (SCC) serves over 9,500 students across the communities of Benicia, Dixon, Fairfield, Suisun, Vacaville, Vallejo, Winters, and the Travis Air Force Base. SCC provides academic programs as well as occupational training programs and serves a diverse range of students from all social economic backgrounds. SCC's main campus is located in Fairfield California with three satellite campuses in Vallejo, Vacaville, and Travis Air Force Base, which are all open to the public.

Our conversations with SCC's President, Dean of Academic Support Services, and Dean of Counseling Services showed SCC's lack of and great need for effective technology and tech support for its students. While SCC was able to utilize CARE funds during the pandemic to provide roughly 350 students with hotspots and Chromebooks, it was quickly revealed that the Chromebooks often cannot accommodate the software and speed needed for college education, leading students to have to resort to completing assignments on their smart phones. Furthermore, even with access to devices, many students, especially formerly incarcerated students, lack basic digital literacy and have difficulties including connecting to the internet and navigating basic software. Such problems are exacerbated by SCC not having any formal IT support services or digital literacy training programs. SCC is currently in its early phases of building a plan to tackle such digital equity issues and have a new Learning Resource Center which could be a potential partner for a digital navigator program.

Solano County Economic Development Forum

The Solano Economic Development Corporation (SEDC) is a nonprofit organization of public and private partnerships focused on growing the Solano County economy. SEDC's main goals are to scale local traded sector industries, attract new jobs and investment, and maintain Solano's competitive advantage. SEDC acts as a resource hub for new and existing businesses, providing numerous services including financing assistance, site location assistance, and workforce development.

Many of SEDC's current projects have potential to include elements of digital literacy. For example, SEDC has partnered with schools across Solano to assist in building career-technical education (CTE) programs, which they anticipate will demand more digital skills. Another example is the various workforce development programs that they conduct. SEDC expects digital literacy to play a key role in such programs in the near future.

Solano Community Foundation

Solano Community Foundation is a grant making organization supporting philanthropic activities that focus on enhancing the community and quality of life in Solano County. Since 2006, they have made over $7.4 million in grants and scholarships and in 2018, they awarded over $660,000 to nonprofits and educational institutions. Solano Community Foundation has two main grantmaking programs: "Education Plus!" which focuses on grants for organizations working to increase student education outcomes, and the "Nonprofit Partnership Program" which offers nonprofit members capacity-building workshops, trainings, and grants for professional development.

Regarding digital equity, many of the nonprofits that the community foundation works with observe a need for more fundamental broadband infrastructure and hardware. The lack of access to the internet and devices for many of the vulnerable populations have in turn created a roadblock for digital literacy. To address these issues, Solano Community Foundation recently partnered with the Solano Work Force Development Board to host a listening session on the digital divide with over 40 organizations. Their extensive network of nonprofits and resources can be leveraged for outreach, data sharing, and other partnerships. Beyond these avenues, Solano Community Foundation has had success in reaching vulnerable populations through funding small local organizations such as churches. Solano Community Foundation has also expressed interest in becoming a partner with other organizations to pursue funding.

Solano County Public Library

Solano County Library serves six of the seven cities in the County - Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, and Vallejo - with a mission to spark curiosity, inspire creativity, and champion learning. They have nine libraries across the county and offer various programs that serve many populations including their Adult Literacy Program, College/career readiness program, and Veteran's Connect program. In 2020, the library had a total of 1.5 million visits, 102 events, and 545 virtual programs.

The Library offers public Wi-Fi in its buildings and is currently working to expand Wi-Fi access to the surrounding areas just outside the libraries. They currently have a highly demanded hotspot (172 devices) and Chromebook (54 laptops) lending program, which can support additional devices should they be made available. The Library hopes to increase the efficiency and availability of such device lending programs by creating automatic lending/vending machines outside of the libraries, which would allow clients to loan and return laptops without staff assistance. The Library also plans to obtain an Outreach Van that can serve as a mobile resource center that expands existing home visits and outreach efforts. There is also potential to leverage the Library's existing programs and outreach channels to increase awareness of accessible programs.

Tech Exchange

Tech Exchange is a nonprofit organization that refurbishes computers and other devices to provide to low-income families across the Bay Area, as well as assist with devices, internet access, and digital literacy skills. Tech Exchange is a founding partner of the #OaklandUndivided campaign, which has provided over 29,000 laptops to Oakland families through partnership with Oakland Mayor Libby

Schaaf's Office of Education. Tech Exchange sources used computers from businesses, refurbishes them at their warehouse, and distributed them across the community. Beyond providing devices, they have a "Tech Hub" office where trained staff provide digital literacy training, tech support, and sign-up support for affordable internet programs. Tech Exchange also partners with Comcast and T-Mobile to provide hotspot devices.

Currently, Tech Exchange has a strong historic presence in Alameda County and has a growing footprint in San Francisco, Contra Costa, and Santa Clara Counties. They have distributed over 85,000 free and low-cost computers to date and are interested in expanding their reach to Solano County. With 25 years of experience, Tech Exchange has the know-how of device-refurbishing programs that could be of help to Solano County.

Workforce Development Board of Solano County

The Workforce Development Board (WDB) of Solano County is a nonprofit organization providing employment-related services for job seekers and businesses. Their programs are largely funded by the Workforce Investment and Opportunity ACT of 2014 and by the California Workforce Development Board. The WDB provides a range of services and training programs to adults, veterans, and youths through recruitment fairs and resource centers. Through a contract with Solano County's department of Health and Social Services, the WDB operates CalWorks programming to support individuals with job training.

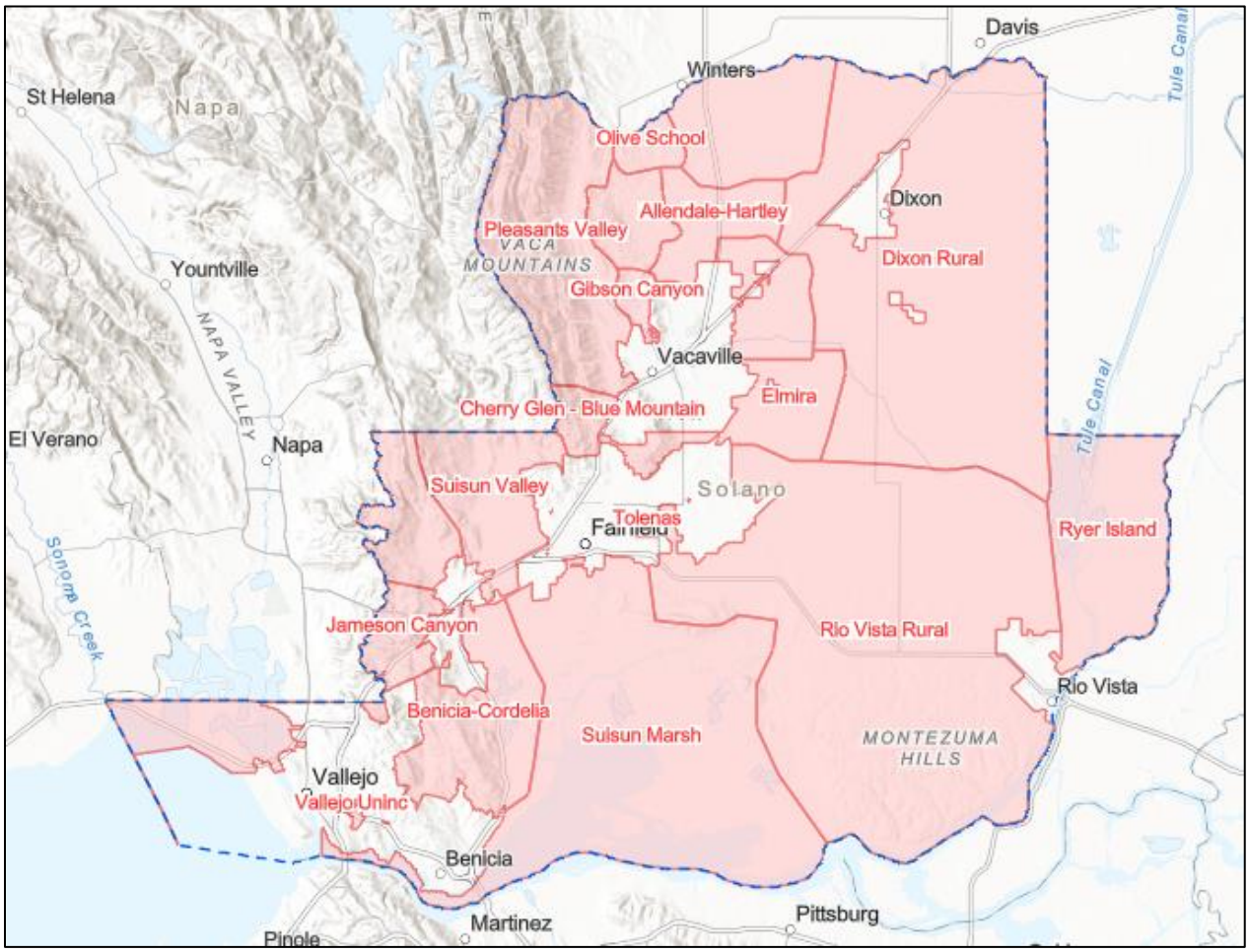
In regard to digital equity, the WDB sees a strong need for digital literacy as most jobs require technical skills. They have observed that access to digital tools have also been an issue not only for job seekers and small businesses, but also for their partner organizations. They are actively addressing roadblocks to accessibility and digital literacy through providing spaces with public Wi-Fi, low-cost devices, and digital literacy training. They also have two laptop centers in Fairfield and Vallejo which are currently underutilized; the WDB hopes to invite organizations to utilize the space. Recently, the WDB hosted a round table discussion with many adult schools and community colleges to discuss the digital divide. One key insight was the need to tie digital literacy programs to existing programs as many do not voluntarily attend digital literacy programs as they believe they do not need them. The WDB has expressed interest in partnerships and have offered to help with pursuing future funding as well as potentially providing their own funds to support a full-time employee or events supporting digital equity initiatives.

9.3 Infrastructure Project Recommendations

This section contains infrastructure project recommendations for Solano County, organized by wireless and fiber.

To develop project recommendations, the study divided unincorporated Solano County into Broadband Regions (pictured on the next page), to better identify project areas and areas of need.

Figure 16: Broadband Regions in Solano County



9.3.1 Wireless Infrastructure Projects in Solano County

The need for expansion of wireless broadband infrastructure

Wireless broadband connects a home or business to the Internet using a radio link between the customer's location and the service provider's facility. Fixed wireless refers to wireless broadband services that allow consumers to access the Internet from a fixed point while stationary and often require a direct line-of-sight between the wireless transmitter and receiver.[28] Building wireless infrastructure can be more challenging in mountainous or hilly terrain, due to physical barriers interfering with the direct line-of-sight needed.

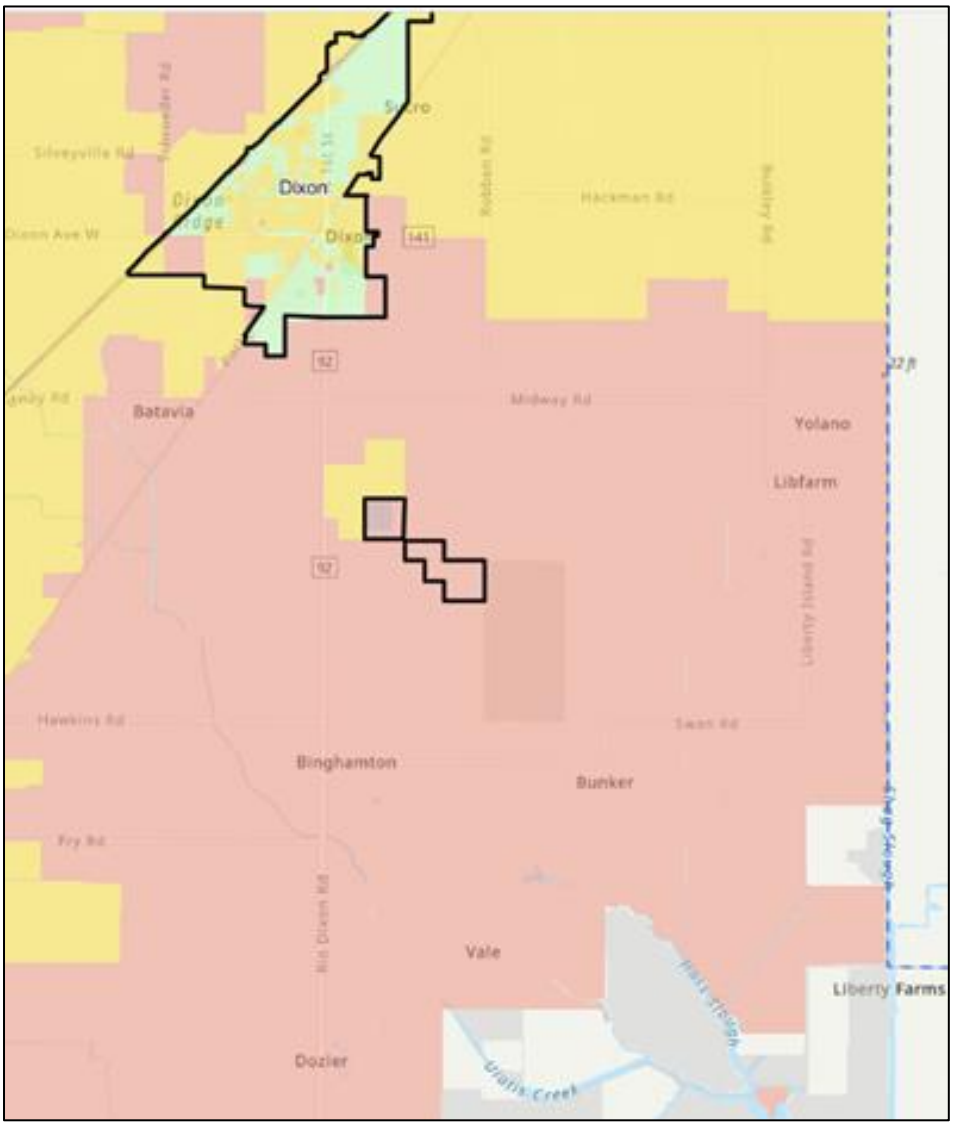
Wireless can be a cheaper alternative to fiber, with wireless links able to be deployed at a fraction of the cost of fiber. The time to build a wireless connection can also be significantly shorter than building fiber. In Solano County, wireless may be a better option in rural areas where fiber is more difficult and expensive to deploy. This study worked extensively with ISPs and other stakeholders to discuss the tradeoffs between fiber and fixed wireless for each project area, and determined the areas where wireless was a more viable alternative. For example, in highly rural areas of unincorporated Solano

[28] FCC – Types of Broadband Connections

County, there may be no existing fiber infrastructure nearby to connect to – therefore making wireless infrastructure necessary for a project.

There are areas of Solano County where large rural or agricultural areas need broadband, and wireless may be the best option. For example, the largely agricultural area south of Dixon is unserved, very flat, and lacks fiber infrastructure.

Figure 17: Coverage gap analysis in rural area south of Dixon



City boundaries are in black

Sources: FCC 477, NTIA, U.S. Census, American Community Survey, CPUC, BroadbandNow, Local ISPs

Legend

- Served (>100/20 Mbps)
- Underserved (between 25/3 and 100/20 Mbps)
- Unserved (<25/3 Mbps)
- No data available

Recommended Projects

We are recommending 1 fixed wireless infrastructure project, and 3 projects that involve fixed wireless and/or fiber infrastructure. The project that is solely fixed wireless is Suisun Marsh, which will connect 91 buildings and 64 people. The projects that are fixed wireless and/or fiber infrastructure are Pleasants Valley, Dixon Migrant Center and Birds Landing and Collinsville, which will connect a combined 694 buildings and 2,242 people.

These projects impact 6 broadband regions: Benicia-Cordelia, Jameson Canyon, Suisun Marsh, Dixon Rural, Pleasants Valley, and Rio Vista Rural.

Each project recommendation is detailed on the subsequent pages.

Project Recommendation: Expanding wireless coverage to homes within Suisun Marsh

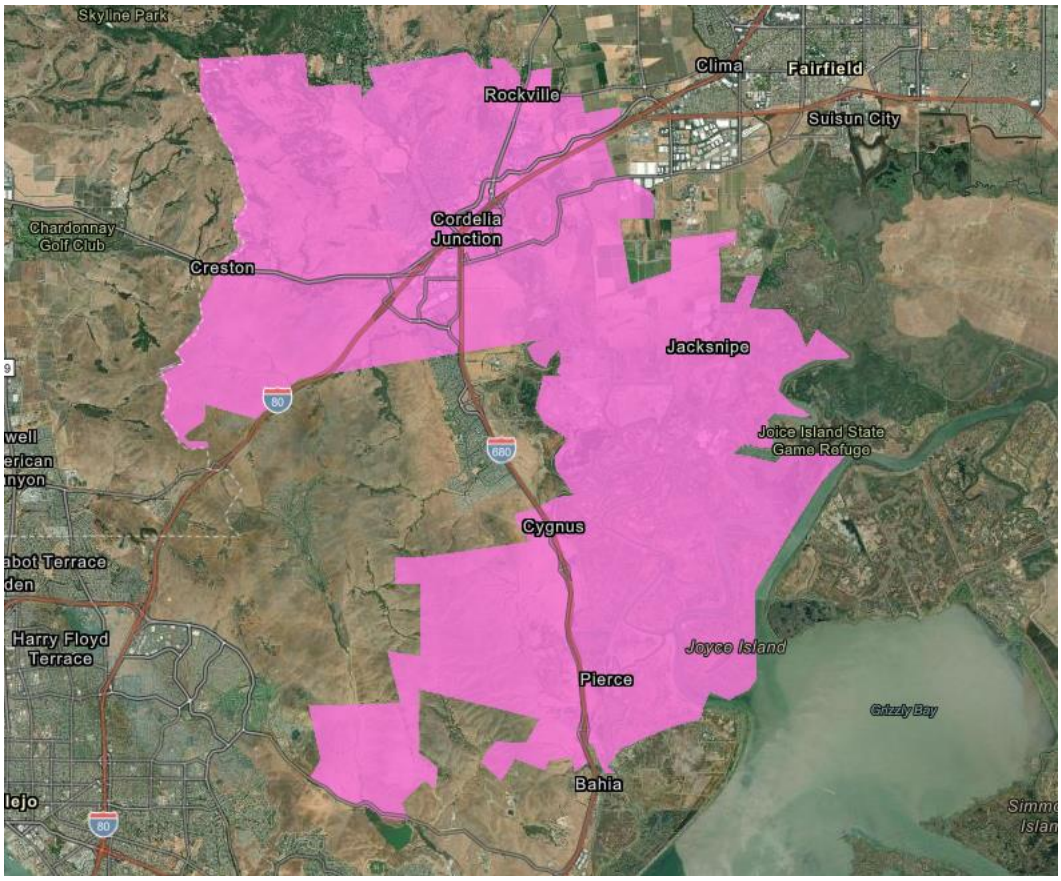
Category	Detail
Name	Expanding wireless coverage to homes within Suisun Marsh
Broadband Region	Benicia-Cordelia, Jameson Canyon, and Suisun Marsh
Description of Need	Suisun Marsh is a geographic area in southeastern Solano County and northwest of Benicia. There are several small communities within the proposed coverage area, including Hiddenbrooke, along with others outside Cordelia. Large areas of unserved need include areas along Gold Hill Road and Cordelia Road. The proposed project contains ~91 buildings consisting of ~64 residents who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). Within the project area, ~51 households and ~217 individuals are within areas designated by the California Advanced Services Fund (CASF) as "Priority Eligible" or "Eligible", meaning that they do not have Internet Service faster than 25/3. The larger number of CASF eligible residents is due to some CASF eligible residents being within the borders of Cordelia or Fairfield, who will be served at no additional project cost. CASF-eligible areas comprise a total area of 11 square miles. Suisun Marsh has mostly fixed wireless connectivity and large pockets of underserved and unserved homes exist. Publicly available speed data from the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA) indicate the majority of census blocks within this area have 1 or less provider serving speeds of 25/3, and very few provide 100/10. While Napanet and Valley Internet are the main providers of fixed wireless in this area, Valley has been unable to reach this area with its current coverage and towers, due to a lack of capital to cover upfront costs.
Buildings Connected	~91 houses, businesses, and other buildings
Population Impacted	~64 residents
Potential Partners	Potential partners include existing local internet service providers, such as DigitalPath Inc., Internet Planet, Valley Internet. Ownership, maintenance, repair, and upgrades of the fiber connection could be performed by any of these potential partners. In the case of a partnership with Valley Internet, Valley Internet has additionally offered to waive labor.
Interdependencies	Valley Internet has already obtained permission from the property owner of Baptiste Ranch to build the tower.
Potential Funding Opportunities	60% of this project may be eligible to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines).

<table>
<tr><td></td><td>This project may be eligible for the Last Mile Federal Funding Account with 90/130 potential points.[29]</td></tr>
<tr><td>Target Outcomes</td><td>The project would pass ~91 buildings and connect ~64 residents, at a cost per passing of $2,473.</td></tr>
<tr><td>Cost</td><td>Fixed Wireless: $225,000

<table><tr><th>Cost Breakdown</th><th></th><th>Source</th></tr><tr><td>Backhaul (11 Ghz)</td><td>$10,000</td><td>Local WISP Cost Estimate</td></tr><tr><td>Design and Engineering</td><td>$15,000</td><td></td></tr><tr><td>Permits</td><td>$15,000</td><td></td></tr><tr><td>Power (solar)</td><td>$40,000</td><td></td></tr><tr><td>Tower (12m)</td><td>$40,000</td><td></td></tr><tr><td>Labor</td><td>$75,000</td><td></td></tr><tr><td>Total Cost</td><td>$225,000</td><td></td></tr></table></td></tr>
<tr><td>Location</td><td>Baptiste Ranch, Solano County, CA

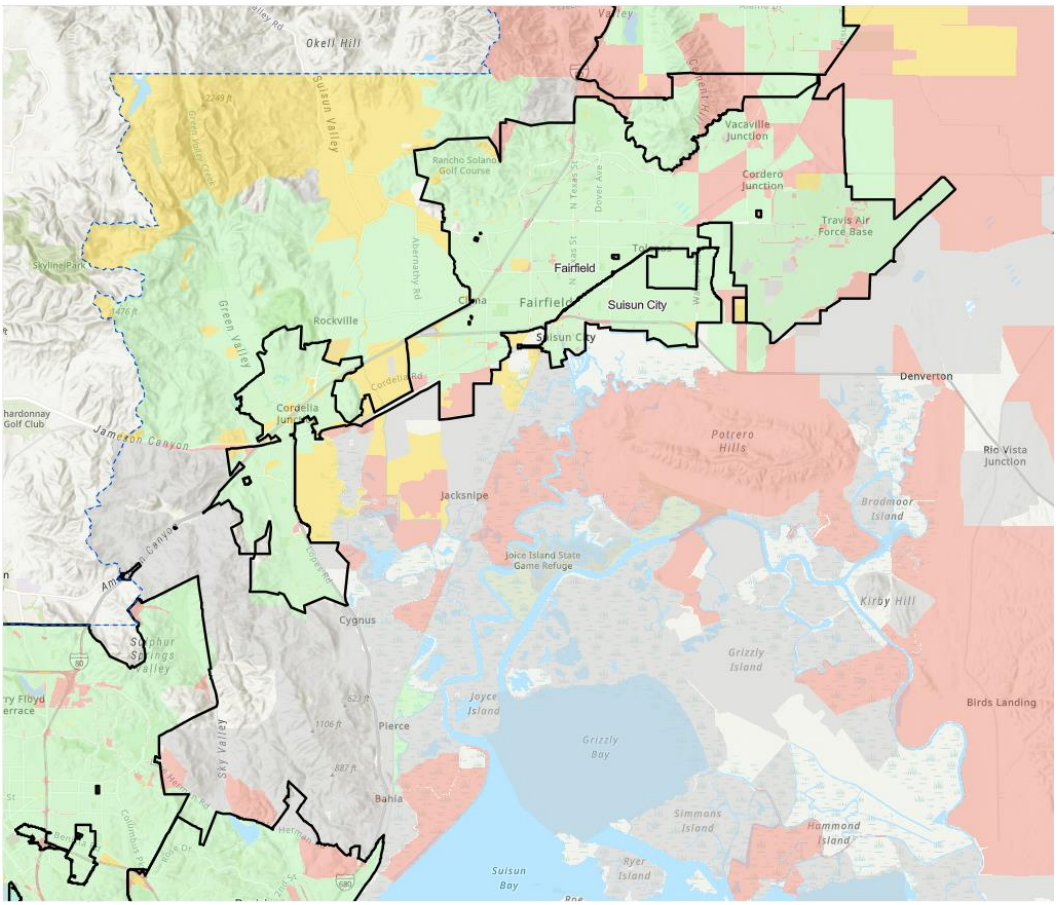
Location of proposed project depicted on next page:</td></tr>
</table>

[29] Last Mile FFA points analysis excludes projects that contain costs greater than $9.3K per household passed and includes projects with areas that have wired connections greater than 25/3 Mbps, which may require additional review by CPUC to approve.



Coverage gap analysis of proposed project area depicted on following page:

Note: Given this is a fixed wireless project, the proposed coverage area may cover census blocks that are already served (in green) at no additional cost. Those areas have still been included in the project area given that they will be served by the tower.



City boundaries are in black

Legend

- Served (>100/20 mbps)
- Underserved (between 25/3 and 100/20 mbps)
- Unserved (<25/3 mbps)
- No data available

Project Recommendation: Expanding wireless coverage to agricultural land east of Dixon and fiber to the premises for Dixon Migrant Center

Category	Detail
Name	Expanding wireless coverage to agricultural land east of Dixon and fiber to the premises for Dixon Migrant Center
Broadband Region	Dixon Rural
Description of Need	The area south of Dixon is largely rural agricultural land. Large areas of unserved need exist through this area, with many residents depending on unreliable and slow satellite internet. The proposed project area contains ~388 buildings consisting of ~987 individuals who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). Within the project area, 256 households comprising of 705 individuals are within areas designated by the California Advanced Services Fund (CASF) as "Eligible", meaning that they do not have internet service faster than 25/3 Mbps. Potentially CASF-eligible areas comprise a total area of 61.1 square miles. The proposed coverage area is almost entirely unserved with one pocket of wireless connectivity. Publicly available speed data from the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA) indicate the majority of census blocks within this area have no providers serving 25/3 Mbps, and there is 1 census block with a wireline connection from Astound Broadband Powered by Wave, which qualifies as underserved (coverage under 100/10 Mbps). While Astound Broadband Powered by Wave is the main provider of wireline services in Dixon, the rural nature of the area has made it difficult to expand wired services. Coverage can be expanded to the proposed coverage area via either a wireless or fiber connection. To expand wireless service, Solano County can partner with a wireless service provider to mount a relay on top of the Voice of America Radio Tower on Radio Station Road, leveraging the height of the existing structure to provide wireless service to a large area at a lower cost. Alternatively, fiber can be expanded to the area, particularly the Dixon Migrant Center. The Dixon Migrant Center, which provides childcare to the children of migrant workers represents a strong opportunity for expanding digital literacy. Due to its close proximity to the Voice of America Radio Tower, the fiber line connection to the tower can be passed to the Migrant Center.
Buildings Connected	~388 houses, businesses, and other buildings
Population Impacted	~987 residents
Potential Partners	Potential partners include existing local internet service providers, such as Valley Internet, DigitalPath Inc., and Astound Broadband Powered by Wave through a partnership. AT&T is a potential partner that can provide fiber connection to the area.

	Ownership, maintenance, repair, and upgrades of the fiber connection could be performed by any of these potential partners. In the case of a potential partnership between Astound Broadband Powered by Wave and Valley Internet, maintenance, repair, and upgrades of the tower could be handled by Valley Internet, and Valley Internet has additionally offered to waive labor. Ownership, maintenance, repair, and upgrades of the backhaul fiber connection could be performed by a fiber internet service provider, such as Astound Broadband Powered by Wave. AT&T has also expressed interest in providing both fiber and fixed wireless services in this area, given they have fiber service in the vicinity.
Interdependencies	The fixed wireless portion of this project will require permission from the operators of the Voice of America Radio Tower to build a fixed wireless tower on its roof.
Potential Funding Opportunities	70% of this project may be eligible to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines). This project may be eligible for the Last Mile Federal Funding Account with 110/130 potential points.[30]
Target Outcomes	The project would pass ~388 buildings and connect ~987 residents, at a cost per passing of $979 - $1,956
Cost	$379,790 - $758,785 Cost breakdown given on the next page.

[30] Last Mile FFA points analysis excludes projects that contain costs greater than $9.3K per household passed and includes projects with areas that have wired connections greater than 25/3 Mbps, which may require additional review by CPUC to approve.

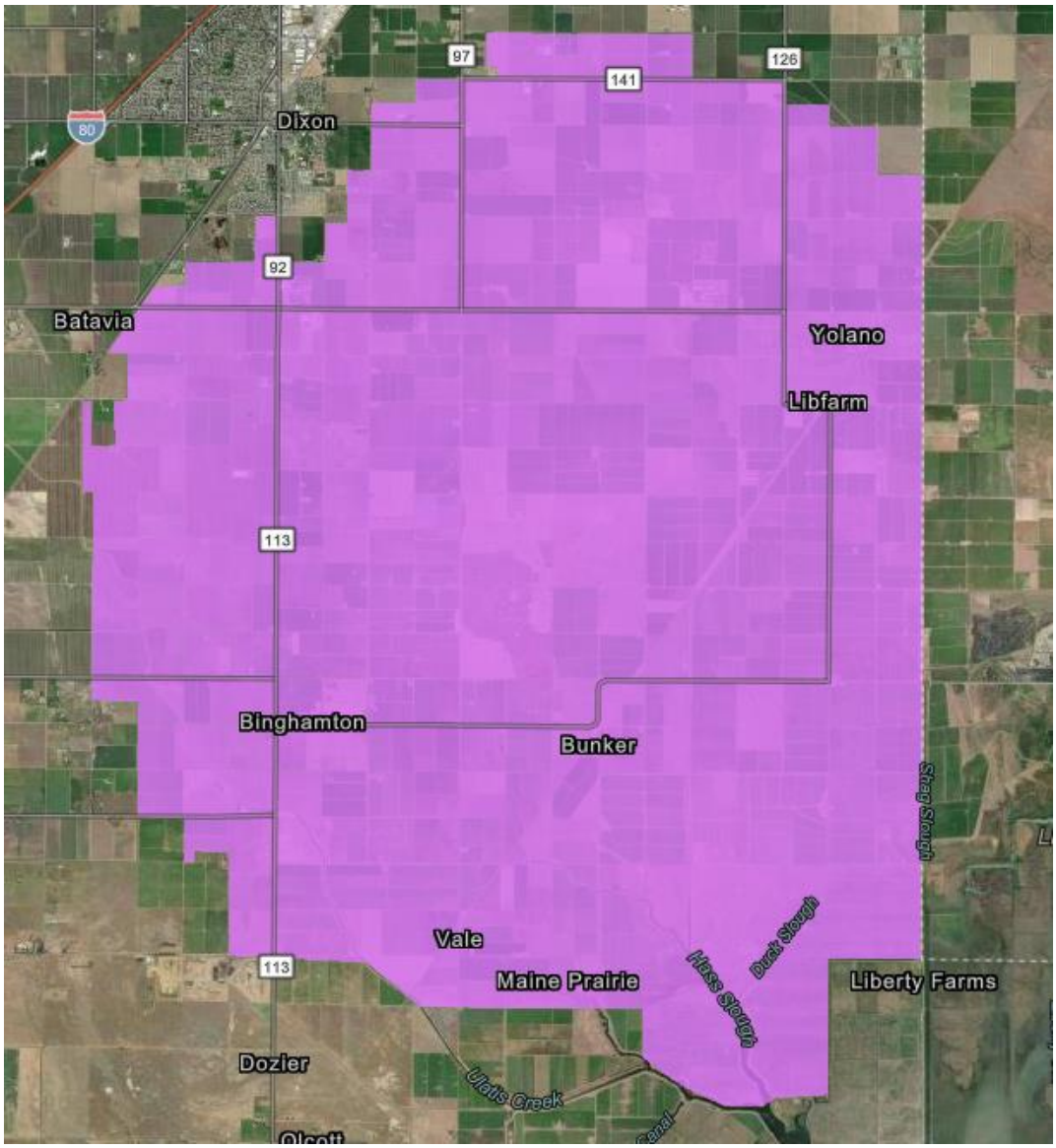
<table>
<tr><td></td><td>
<table>
<tr><th>Cost Breakdown</th><th>Value</th><th>Source</th></tr>
<tr><td>$/Mile of Middle Mile Fiber</td><td>$ 27,000-66,640</td><td>US Telecom | Yuba County Broadband Plan</td></tr>
<tr><td>Miles Required</td><td>8.07</td><td>Distance from edge of Astound Broadband Powered by Wave Service in Dixon</td></tr>
<tr><td>Middle Mile Fiber Cost</td><td>$217,890 - $537,785</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>$/Building Passed (Aerial Fiber and Underground)</td><td>$1,700 - $3,000</td><td>Broadband Master Plan & Digital Equity Strategy (for City of Vallejo)</td></tr>
<tr><td>Buildings Passed</td><td>7</td><td>GIS Data stored by Solano County</td></tr>
<tr><td>Last Mile Fiber Cost</td><td>$11,900-$21,000</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Tower Cost</td><td>$150,000-$200,000</td><td>Conversation with Local WISP</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Total Cost</td><td>$379,790 - $758,785</td><td></td></tr>
</table>

Does not include:
• County Planning Fees: $5,000-$10,000 (waivable by Solano County)
• Civil Engineer Blueprint: $10,000-$15,000

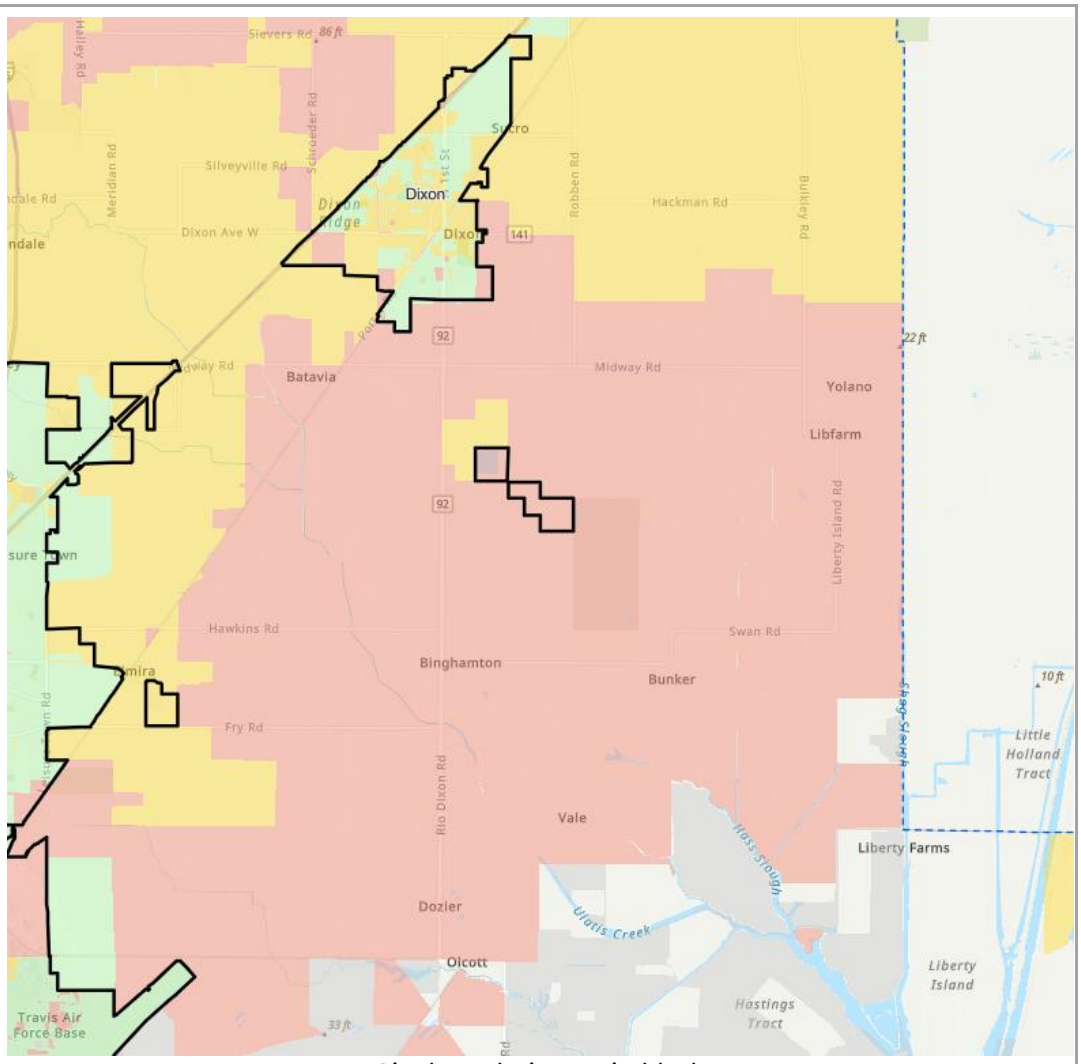
Costs are based on market but could be lowered by leveraging existing infrastructure.

"Buildings passed" within the cost breakdown refers to only buildings on-site at Dixon Migrant Center and Voice of America Radio Tower.
</td></tr>
<tr><td>Location</td><td>Dixon Migrant Center and Voice of America Towers on Radio Station Road, Dixon, CA

Location of proposed project depicted on next page.</td></tr>
</table>



Coverage gap analysis of proposed project area depicted on next page.



City boundaries are in black

Project recommendation: Expanding fiber or wireless coverage to Pleasants Valley unincorporated area

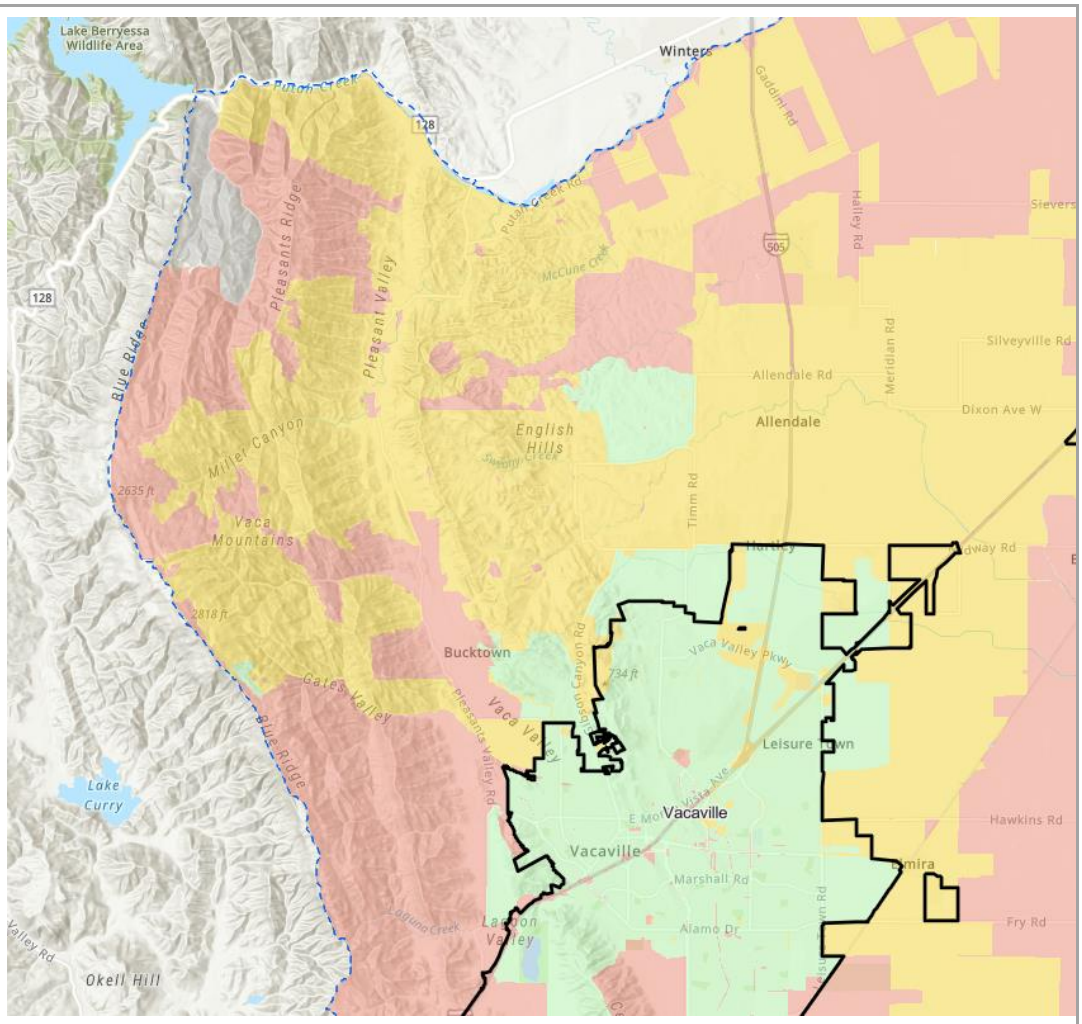
Category	Detail
Name	Expanding fiber or wireless coverage to Pleasants Valley unincorporated area
Broadband Region	Pleasants Valley
Description of Need	Pleasants Valley is a census-designated place on the northwestern edge of Vacaville. Large areas of unserved need include areas along Pleasants Valley Road. The median income of homes within the area was $71,379 and the number of households was 1,159 as of the 2020 census. Pleasants Valley is a rural residential area surrounded by undeveloped land and hills. The proposed project area contains ~243 buildings consisting of ~1,075 individuals who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). 485 households and 1,043 individuals are within census blocks intersecting the project area that are designated by the California Advanced Services Fund (CASF) as "Priority Eligible" or "Eligible", meaning that they do not have Internet Service faster than 25/3. CASF-eligible areas comprise a total area of 76.1 square miles. While AT&T is the main provider in the Pleasant Valley area, their wireline services have not reached many residents. There has been interest from multiple internet services providers on partnering with Solano County to cover this area, and both fixed wireless and fiber options to serve the community have been proposed. Cost estimates for both are presented below. Fixed wireless has the advantage of reaching all residents in Pleasants Valley regardless of distance from the roadway and is cheaper, while fiber offers a faster, more reliable connection and is significantly more future proof. There are several small businesses within the coverage gap which would likely benefit from Valley Internet's business-specific Internet plans.
Households Impacted	~243 homes, businesses, and other buildings
Population Impacted	~1,075 residents
Potential Partners	Potential partners include existing local internet service providers, such as Valley Internet, DigitalPath Inc., and Internet Planet. Ownership, maintenance, repair, and upgrades of the fiber connection could be performed by any of these potential partners. In the case of a partnership with Valley Internet, Valley Internet has additionally offered to waive labor. AT&T has also expressed interest in providing fiber to the premises (FTTP) following Pleasants Valley Road.

Interdependencies	As Pleasants Valley Road is county property, Solano County can easily grant Right-of-Way agreements for laying underground fiber.
Potential Funding Opportunities	70% of this project may be eligible to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines). This project may be eligible for the Last Mile Federal Funding Account with 130/130 potential points.[31]
Target Outcomes	The project would pass ~243 buildings and connect ~1075 individuals. For fixed wireless, the cost per household passed would be $925, a lower cost than the average cost per household passed for CASF-approved fixed wireless projects ($2,639). However, one tower would fall short of providing full coverage to Pleasants Valley and additional on-site surveys would be required to determine coverage needs. For fiber, the cost per household passed would be $2,726 - $5,534, significantly lower than the average cost per household passed for CASF-approved middle and last mile fiber projects ($103,744), and in-line with the average cost per household passed for CASF-approved last mile fiber projects ($22,817).
Cost	Fixed Wireless: $225,000 Fiber: $662,580 - $1,344,754 Cost breakdowns for fixed wireless given on the next page.

[31] Last Mile FFA points analysis excludes projects that contain costs greater than $9.3K per household passed and includes projects with areas that have wired connections greater than 25/3 Mbps, which may require additional review by CPUC to approve.

	<table><tr><th>Cost Breakdown</th><th></th><th>Source</th></tr><tr><td>Backhaul (11 Ghz)</td><td>$10,000</td><td>Local WISP Cost Estimate</td></tr><tr><td>Design and Engineering</td><td>$15,000</td><td></td></tr><tr><td>Permits</td><td>$15,000</td><td></td></tr><tr><td>Power (solar)</td><td>$40,000</td><td></td></tr><tr><td>Tower (12m)</td><td>$40,000</td><td></td></tr><tr><td>Labor</td><td>$75,000</td><td></td></tr><tr><td>Total Cost</td><td>$225,000</td><td></td></tr></table> Cost breakdowns for fiber given on the next page. <table><tr><th>Cost Breakdown (Fiber)</th><th></th><th>Source</th></tr><tr><td>Cost Analysis</td><td></td><td></td></tr><tr><td>Cost / Mile of Middle Mile Fiber ($/mile)</td><td>$27,000-$66,640</td><td>US Telecom \| Yuba County Broadband Plan</td></tr><tr><td>Distance from AT&T Service Area (miles)</td><td>9.24</td><td>Distance from edge of AT&T service area in Fairfield</td></tr><tr><td>Middle Mile Fiber ($)</td><td>$249,480 - $615,754</td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>$/Building Passed (Aerial Fiber and Underground)</td><td>$ 1,700-$3,000</td><td>Broadband Master Plan & Digital Equity Strategy (for City of Vallejo)</td></tr><tr><td>Buildings Passed</td><td>243</td><td>GIS Data stored by Solano County</td></tr><tr><td>Last Mile Fiber Cost</td><td>$413,100 - $729,000</td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>Total Cost</td><td>$662,580 - $1,344,754</td><td></td></tr></table>
Location	Pleasants Valley Road, Vacaville, CA

	Proposed project area depicted on the next page.  Coverage gap analysis of proposed project area depicted on the next page.



City boundaries are in black

Project Recommendation: Expanding fiber or wireless coverage to Birds Landing and Collinsville

Category	Detail
Name	Expanding fiber or wireless coverage to Birds Landing and Collinsville
Broadband Region	Rio Vista Rural
Description of Need	Birds Landing and Collinsville are rural unincorporated communities within the southeastern portion of Solano County. Large areas of unserved need include areas along Collinsville Road and Birds Landing Road. The proposed project area contains ~63 buildings consisting of ~180 individuals who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). Within the project area, ~40 households and ~76 individuals are within areas designated by the California Advanced Services Fund (CASF) as "Priority Eligible" or "Eligible", meaning that they do not have Internet Service faster than 25/3 Mbps. The proposed coverage area is almost entirely unserved with a few pockets of wired connectivity. Publicly available speed data from the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA) indicate the majority of census blocks within this area have no providers serving 25/3 Mbps, and there are 3 census blocks comprising 26 residents receiving wireline connections from Frontier. While Frontier is the main provider of wired services in the proposed area, the rural nature of the area has made it difficult to expand wired services. Because of the varied topography comprised of many small hills, a mesh network of multiple relays has been suggested as an alternative to fiber expansion in this area. There is a possible business need for faster connectivity in the area, as the southern region of the proposed coverage area is part of the Shiloh Wind Farm, owned by EDF Renewables.
Buildings Connected	~63 houses, businesses, and other buildings
Population Impacted	~180 residents
Potential Partners	Potential partners include existing local internet service providers, such as Valley Internet, or Internet Planet. Ownership, maintenance, repair, and upgrades of the fiber connection could be performed by any of these potential partners. In the case of a partnership with Valley Internet, Valley Internet has additionally offered to waive labor. Frontier and Comcast have both shown some interest as potential partners for fiber buildout.

Interdependencies	Land ownership could be a potential roadblock due to the number of relays that would need to be mounted on structures.
Potential Funding Opportunities	Certain areas within this project may be eligible for up to 70% of this project to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines).
Target Outcomes	The project would pass ~63 buildings, at a cost per passing of $9,500 - $22,251 (fiber) or $1,515 - $2,272 (fixed wireless). A separate benchmark provided by a nationwide ISP with fiber coverage in Solano estimates a cost per passing of $6,900 for fiber, for reference.

<table>
<tr>
<td>Cost</td>
<td>Fixed Wireless: $195,403 - $293,104
Fiber: $598,500 - $1,401,848 (A local ISP estimates $434,700)

Cost breakdown for fixed wireless:

<table>
<tr><td>Cost Estimate (Fixed Wireless)</td><td></td><td></td></tr>
<tr><td>Number of Relays for Pleasants Valley (low)</td><td>20.00</td><td>Conversation with Internet Planet</td></tr>
<tr><td>Number of Relays for Pleasants Valley (high)</td><td>30.00</td><td>Conversation with Internet Planet</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Pleasants Valley project area (mi^2)</td><td>59.38</td><td></td></tr>
<tr><td>Birds Landing-Collinsville project area (mi^2)</td><td>96.70</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Area Multiple</td><td>1.63</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Number of Relays for Pleasants Valley (low)</td><td>33</td><td></td></tr>
<tr><td>Number of Relays for Pleasants Valley (high)</td><td>49</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Cost / relay</td><td>$5,000</td><td>Conversation with Internet Planet</td></tr>
<tr><td>Permitting cost / relay</td><td>$1,000</td><td>Conversation with Internet Planet</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Total Cost (tower only, low)</td><td>$162,836</td><td></td></tr>
<tr><td>Total Cost (tower only, high)</td><td>$244,253</td><td></td></tr>
<tr><td>Total Cost (both, low)</td><td>$195,403</td><td></td></tr>
<tr><td>Total Cost (both, high)</td><td>$293,104</td><td></td></tr>
</table>

Does not include:

County Planning Fees: $5-10K (waivable by Solano County)
Civil Engineer Blueprint: $10-15K

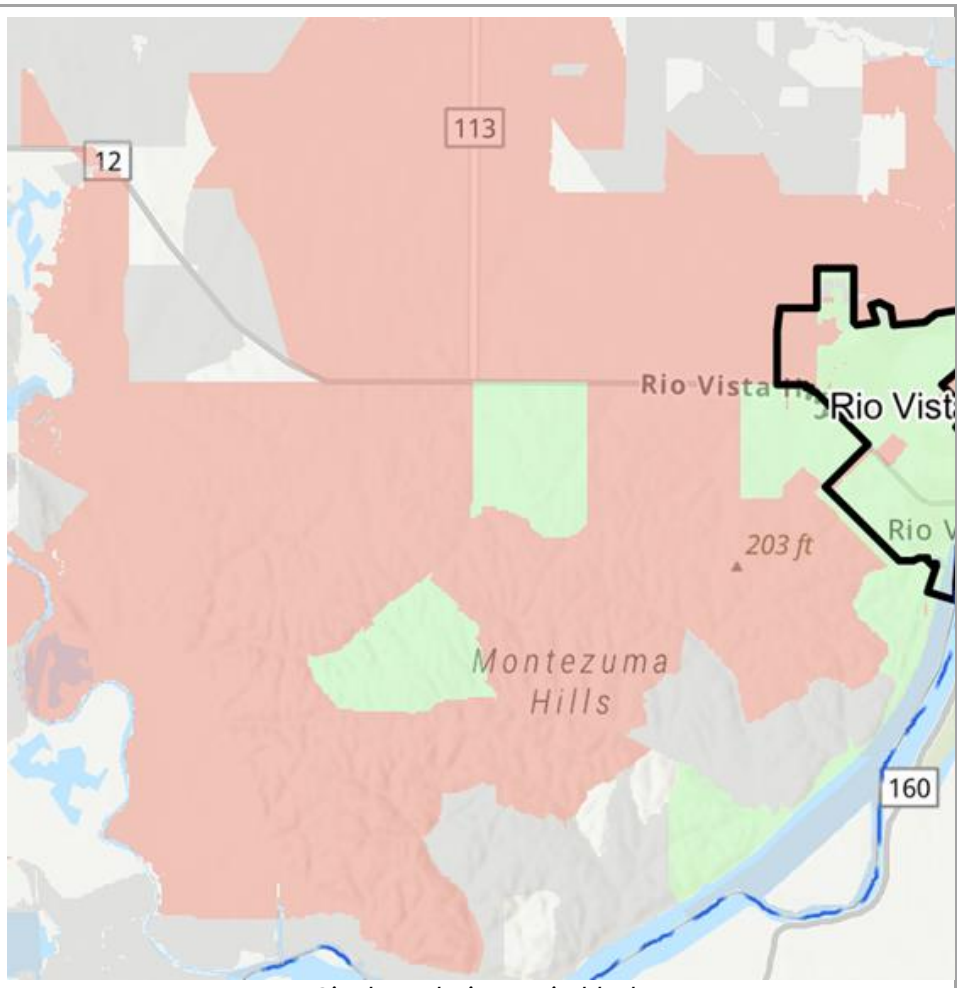
</td>
</tr>
</table>

<table>
<tr><td></td><td>Cost breakdown for fiber given on the next page

<table>
<tr><td>Cost Estimate (Fiber)</td><td></td><td>Source</td></tr>
<tr><td>Cost Analysis</td><td></td><td></td></tr>
<tr><td>Cost / Mile of Middle Mile Fiber ($/mile)</td><td>$27,000-$66,640</td><td>US Telecom | Yuba County Broadband Plan</td></tr>
<tr><td>Distance from AT&T Service Area (miles)</td><td>18.2</td><td>Distance from edge of Comcast and Frontier service area in Rio Vista</td></tr>
<tr><td>Middle Mile Fiber ($)</td><td>$491,400 - $1,212,848</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>$/Building Passed (Aerial Fiber and Underground)</td><td>$ 1,700-$3,000</td><td>Broadband Master Plan & Digital Equity Strategy (for City of Vallejo)</td></tr>
<tr><td>Buildings Passed</td><td>63</td><td>GIS Data stored by Solano County</td></tr>
<tr><td>Last Mile Fiber Cost</td><td>$107,100 - $189,000</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Total Cost</td><td>$598,500 - $1,401,848</td><td></td></tr>
</table></td></tr>
<tr><td>Location</td><td>Birds Landing and Collinsville, Solano County, CA

Proposed project area depicted on next page.</td></tr>
</table>

Coverage gap analysis of proposed project area depicted on next page.



City boundaries are in black

Legend

- Served (>100/20 mbps)
- Underserved (between 25/3 and 100/20 mbps)
- Unserved (<25/3 mbps)
- No data available

9.3.2 Fiber Infrastructure Projects in Solano County

The need for expansion of fiber broadband infrastructure

Fiber optic technology converts electrical signals carrying data to light and sends the light through transparent glass fibers about the diameter of a human hair. Fiber transmits data at speeds far exceeding current DSL or cable modem speeds, typically by tens or even hundreds of Mbps.[32] This is because fiber uses light instead of electricity to transmit data at higher frequencies. Fiber-optic cables, which are made of glass or plastic, are also less susceptible to electromagnetic interference than metal cables.[33] According to the Fiber Broadband Association, 43% of American households have access to fiber.[34]

If fiber infrastructure is available in an area, it is most attractive due to its high speed (~1 Gbps) and reliability. Additionally, fiber can give the same speed for download and upload (symmetrical speeds), which cannot be done by a fixed wireless connection.

However, fiber infrastructure is more expensive to install than fixed wireless and can be challenging to deploy to highly rural areas. Working extensively with ISPs and other stakeholders, this study determined which project recommendations would be feasible for fiber infrastructure and how they could connect to existing fiber infrastructure.

Project recommendations

We are recommending 10 fiber infrastructure projects, that will connect 2,550 buildings and 6,360 people.

These projects impact 9 broadband regions: Elmira, Green Valley, Suisun Valley, Dixon Rural, Allendale-Hartley, English Hills, Olive School and South Winters Unincorporated, Ryer Island, and Rio Vista Rural.

Each project recommendation is detailed on the subsequent pages.

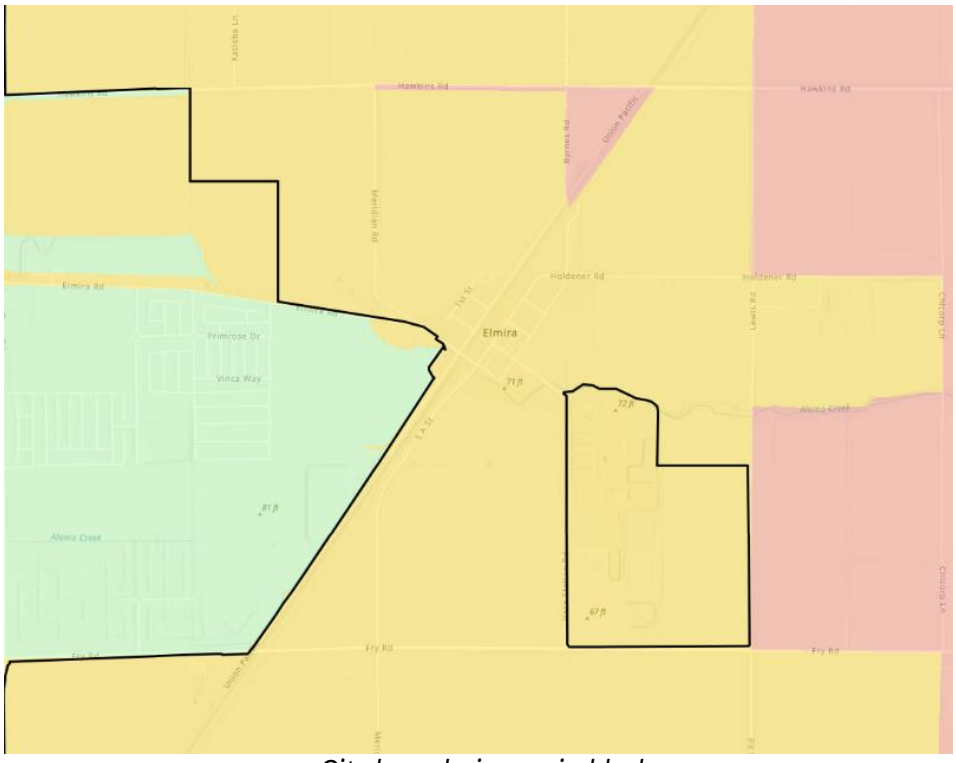
[32] FCC – Types of Broadband Connections
[33] BroadbandNow
[34] Fiber Broadband Association

Project recommendation: Expanding fiber lines to the unincorporated community of Elmira, east of Vacaville

Category	Detail
Name	Expanding fiber lines to the unincorporated community of Elmira, east of Vacaville
Broadband Region	Elmira
Description of Need	Elmira is a census designated place east of Vacaville and north of Travis Air Force Base. As of the 2020 Census, the population of Elmira was 193, with a median income of $62,010. The proposed project area contains ~101 buildings consisting of ~114 individuals who are considered underserved (service below 100/20 Mbps). For this project in Elmira and neighboring areas, ~121 buildings consisting of ~281 residents are within areas designated by the California Advanced Services Fund (CASF) as "Eligible" or "Priority Eligible", meaning that they do not have Internet Service faster than 25/3. CASF-eligible areas comprise a total area of 5.7 square miles. While Comcast, AT&T, and Valley Internet are in neighboring Vacaville, their service areas have not expanded to include Elmira at this time. A major ISP with fiber coverage in Solano has finalized engineering work for a proposed fiber buildout and is willing to pay 50% of total project costs. They are currently seeking another partner to pay the remaining ~$250,000 and have expressed interest on partnering with Solano County.
Buildings Connected	~101 households, businesses, and buildings
Population Impacted	~114 residents
Potential Partners	Potential partners include existing local internet service providers, such as Comcast or AT&T, both of which already offer wired services in the area. Ownership, maintenance, repair, and upgrades of the fiber connection could be performed by any of these potential partners.
Interdependencies	N/A
Potential Funding Opportunities	ARPA funding may be used to pay for the estimated $250K contribution a local ISP would require to begin their buildout. Additionally, 70% of this project may be eligible to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines). This project may be eligible for the Last Mile Federal Funding Account with 120/130 potential points.[35]

[35] Last Mile FFA points analysis excludes projects that contain costs greater than $9.3K per household passed and includes projects with areas that have wired connections greater than 25/3 Mbps, which may require additional review by CPUC to approve.

Target Outcomes	The project would pass ~101 buildings and connect ~114 residents, at a cost per passing of $2,101 - $3990 (County contribution from proposed partnership with major ISP: $2,475)
Cost	$250,000 (In case of a potential partnership with major ISP, they would plan to contribute the additional $250,000).
Location	Elmira, CA Location of proposed project:  Coverage gap analysis of proposed project area depicted on the next page.

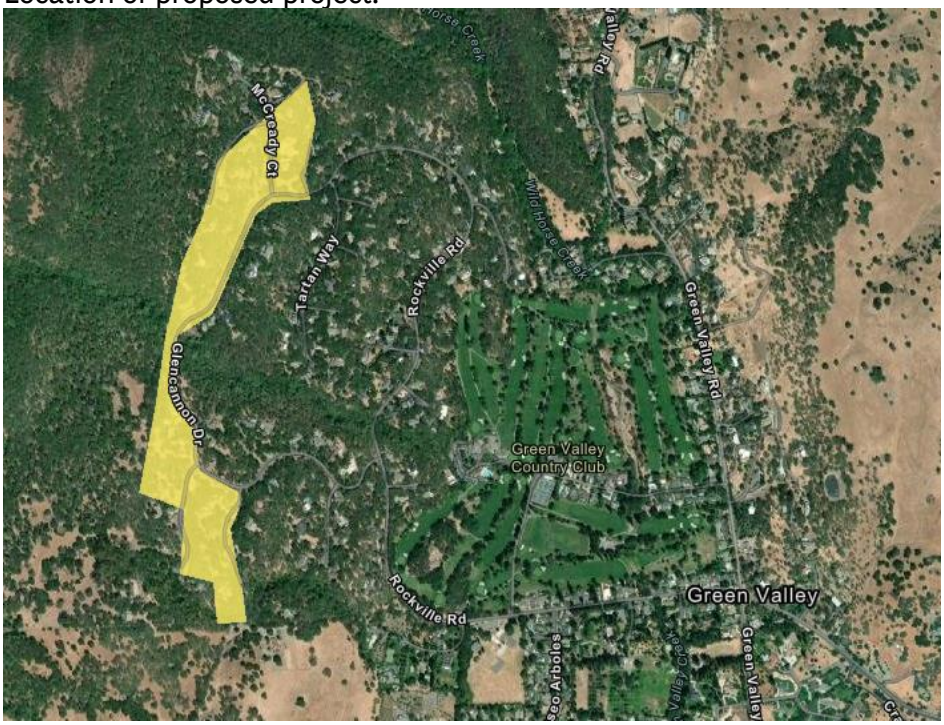


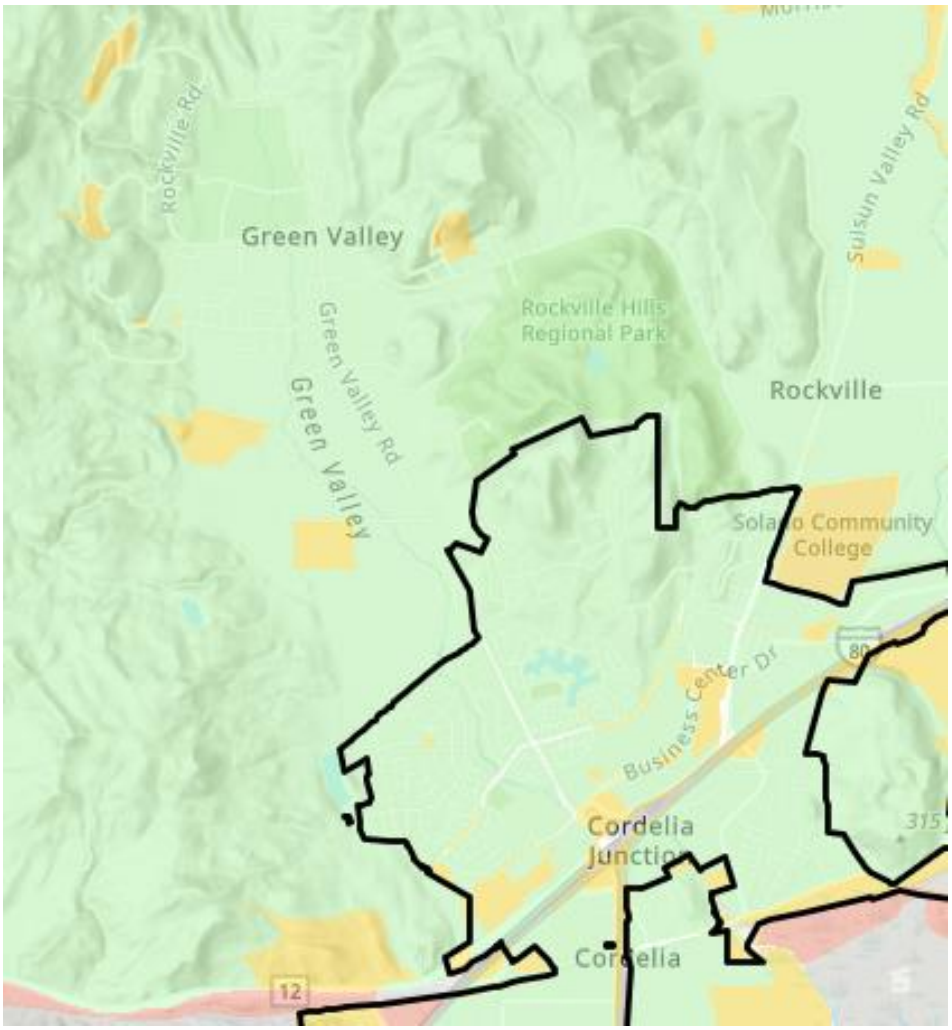
City boundaries are in black

Project Recommendation: Expanding fiber coverage to Green Valley unincorporated area

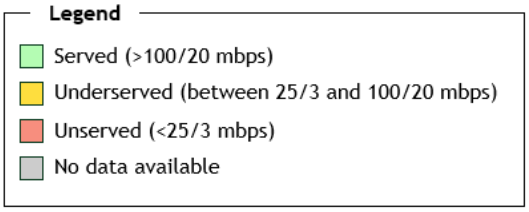
Category	Detail
Name	Expanding fiber coverage to Green Valley unincorporated area
Broadband Region	Green Valley
Description of Need	Green Valley is a census-designated place on the western edge of Solano County and northwest of Rockville and Cordelia. As of the 2020 census, its population was 1,654 and has a total area of 8.3 square miles. The median income of Green Valley households was $108,393 and the number of households was 661 as of the 2020 census. Green Valley is a rural residential area surrounded by undeveloped land and hills. Green Valley has mostly wired connectivity and a pocket of homes along Rockville Road that have scarce connectivity. The proposed project area contains ~14 buildings consisting of ~40 individuals who are considered underserved (service below 100/20 Mbps). Within the project area, ~18 households and ~53 individuals are within areas designated by the California Advanced Services Fund (CASF) as "Priority Eligible" or "Eligible", meaning that they do not have Internet Service faster than 25/3 Mbps. CASF-eligible areas comprise a total area of 0.6 square miles. While Valley Internet is the main provider in the Green Valley area, Valley has been unable to reach this area with its current coverage and towers, due to a lack of capital to cover upfront costs. Because of the varied topography, rural nature of the area, and low number of unserved residents, a fixed wireless project involving a tower placed on Mangels Ranch has been suggested as a lower-cost option than fiber buildout. However, this project is being considered primarily as a fiber project due to the strong connectivity in the surrounding area, which could make the large coverage area of fixed wireless superfluous.
Buildings Connected	~14 houses, businesses, and other buildings
Population Impacted	~40 residents
Potential Partners	AT&T and Comcast have also expressed interest in serving this area with fiber.
Interdependencies	Land ownership and permitting in a primarily residential area.
Potential Funding Opportunities	70% of this project may be eligible to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines).
Target Outcomes	The project would pass ~14 buildings and connect ~40 residents, at a cost per passing of $9,800 - $22,992 (fiber) or $16,071 (fixed wireless). The

<table>
<tr><td></td><td>tower would offer additional coverage to residents within the proposed Suisun Marsh project area.</td></tr>
<tr><td>Cost</td><td>Fixed Wireless $225,000
Fiber: $137,200 - $321,888
<table>
<tr><th>Cost Breakdown</th><th></th><th>Source</th></tr>
<tr><td>Backhaul (11 Ghz)</td><td>$10,000</td><td>Local WISP Cost Estimate</td></tr>
<tr><td>Design and Engineering</td><td>$15,000</td><td></td></tr>
<tr><td>Permits</td><td>$15,000</td><td></td></tr>
<tr><td>Power (solar)</td><td>$40,000</td><td></td></tr>
<tr><td>Tower (12m)</td><td>$40,000</td><td></td></tr>
<tr><td>Labor</td><td>$75,000</td><td></td></tr>
<tr><td>Total Cost</td><td>$225,000</td><td></td></tr>
</table>
<table>
<tr><th>Cost Estimate (Fiber)</th><th></th><th>Source</th></tr>
<tr><td>Cost Analysis</td><td></td><td></td></tr>
<tr><td>Cost / Mile of Middle Mile Fiber ($/mile)</td><td>$27,000-$66,640</td><td>US Telecom | Yuba County Broadband Plan</td></tr>
<tr><td>Distance from AT&T Service Area (miles)</td><td>4.20</td><td>Distance from North edge of project area to South edge, centered on AT&T service area</td></tr>
<tr><td>Middle Mile Fiber ($)</td><td>$113,400 - $279,888</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>$/Building Passed (Aerial/Underground Fiber)</td><td>$ 1,700-$3,000</td><td>Broadband Master Plan & Digital Equity Strategy (for City of Vallejo)</td></tr>
<tr><td>Buildings Passed</td><td>14</td><td>GIS Data stored by Solano County</td></tr>
<tr><td>Last Mile Fiber Cost</td><td>$23,800 - $42,000</td><td></td></tr>
<tr><td>Total Cost</td><td>$137,200 - $321,888</td><td></td></tr>
</table></td></tr>
</table>

Location	Mangels Ranch, Fairfield, CA Location of proposed project:  Coverage gap analysis of proposed project area on next page.



City boundaries are in black



Note: While FCC and NTIA data show Green Valley as a largely served area, there are census blocks with 14 buildings and 40 individuals considered underserved in the project area. AT&T has also noted that they have been unable to reach areas of Green Valley with their existing infrastructure.

Project recommendation: Expanding fiber to Mankas Corner unincorporated community

Category	Detail
Name	Expanding fiber to Mankas Corner unincorporated community
Broadband Region	Suisun Valley
Description of Need	Mankas Corner is a census-designated place on the western edge of Solano County and northwest of Rockville and Cordelia. Mankas Corner is a rural residential area surrounded by undeveloped land and vineyards. Mankas Corner has mostly fixed wireless and satellite connectivity. The majority of homes in the region northwest of Suisun Valley K-8 School have no wired providers providing speeds of 25/3 or faster. The proposed project area contains ~220 buildings consisting of ~429 residents who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). As of the 2020 Census, ~260 households consisting of ~708 individuals are within census blocks intersecting the project area designated by the California Advanced Services Fund (CASF) as "Priority Eligible" or "Eligible", meaning that they do not have Internet Service faster than 25/3. CASF-eligible areas comprise a total area of 16.84 square miles. Valley Internet and AT&T are the main providers in the area, but AT&T has not expanded their coverage beyond Suisun Valley K-8 school, which has a fiber line connection. To execute this project, an existing local ISP such as AT&T or Comcast could build fiber to the premises (FTTP) to unserved and underserved households, businesses, and other buildings in Mankas Corner.
Buildings Connected	~220 households, businesses, and other buildings
Population Impacted	~429 residents
Potential Partners	Potential partners include existing local wired internet service providers such as AT&T and Comcast, which provide service to the nearby Rancho Solano golf course. AT&T has expressed interest in serving this area with fiber, as their existing infrastructure reaches as far as Suisun Valley K-8 school on Mankas Corner Road. Ownership, maintenance, repair, and upgrades of the fiber connection could be performed by any of these potential partners.
Interdependencies	To pass fiber through this area, agreements would have to be made with local landowners.
Potential Funding Opportunities	70% of this project may be eligible to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines).

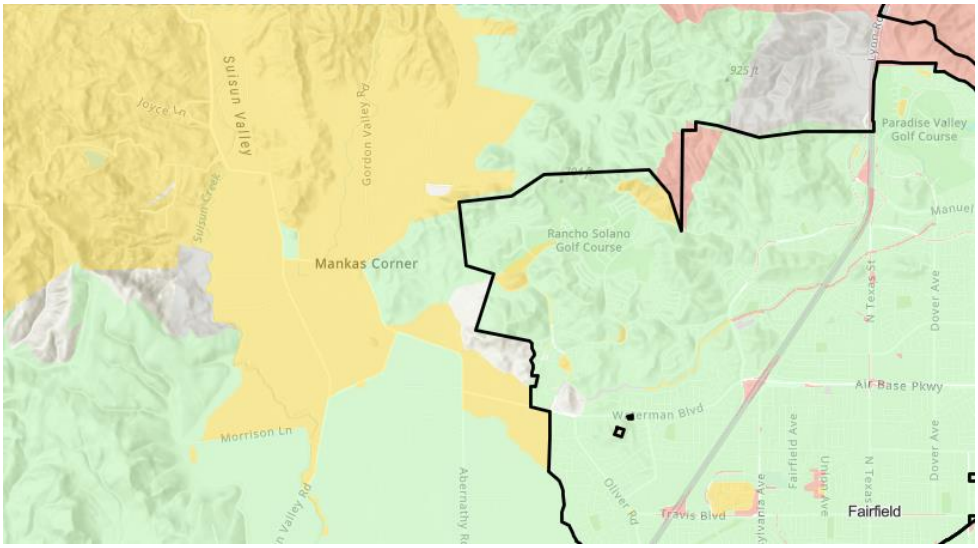
<table>
<tr><td></td><td>This project may be eligible for the Last Mile Federal Funding Account with 120/130 potential points.[36]</td></tr>
<tr><td>Target Outcomes</td><td>The project would pass ~220 buildings and connect ~429 residents, at a cost per passing of $2,294 - $4,466.</td></tr>
<tr><td>Cost</td><td>$504,680 - $982,538

<table><tr><th>Cost Breakdown</th><th>Value</th><th>Source</th></tr><tr><td>$/Mile of Middle Mile Fiber</td><td>$ 27,000 - $66,640</td><td>US Telecom | Yuba County Broadband Plan</td></tr><tr><td>Miles Required</td><td>4.84</td><td>Distance from edge of AT&T Service Area</td></tr><tr><td>Middle Mile Fiber Cost</td><td>$130,680 - $322,538</td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>$/Building Passed (Aerial Fiber and Underground)</td><td>$ 1,700 - $3,000</td><td>Broadband Master Plan & Digital Equity Strategy (for City of Vallejo)</td></tr><tr><td>Buildings Passed</td><td>220</td><td>GIS Data stored by Solano County</td></tr><tr><td>Last Mile Fiber Cost</td><td>$374,000 - $660,000</td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>Total Cost</td><td>$504,680 - $982,538</td><td></td></tr></table></td></tr>
<tr><td>Location</td><td>Mankas Corner, CA

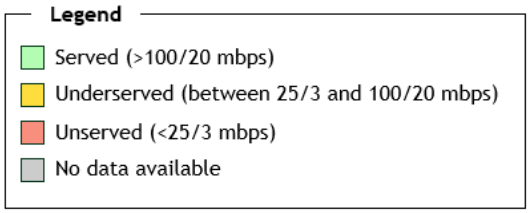
Location of proposed project depicted on the next page.</td></tr>
</table>

[36] Last Mile FFA points analysis excludes projects that contain costs greater than $9.3K per household passed and includes projects with areas that have wired connections greater than 25/3 Mbps, which may require additional review by CPUC to approve.

Coverage gap analysis of proposed project area:



City boundaries are in black



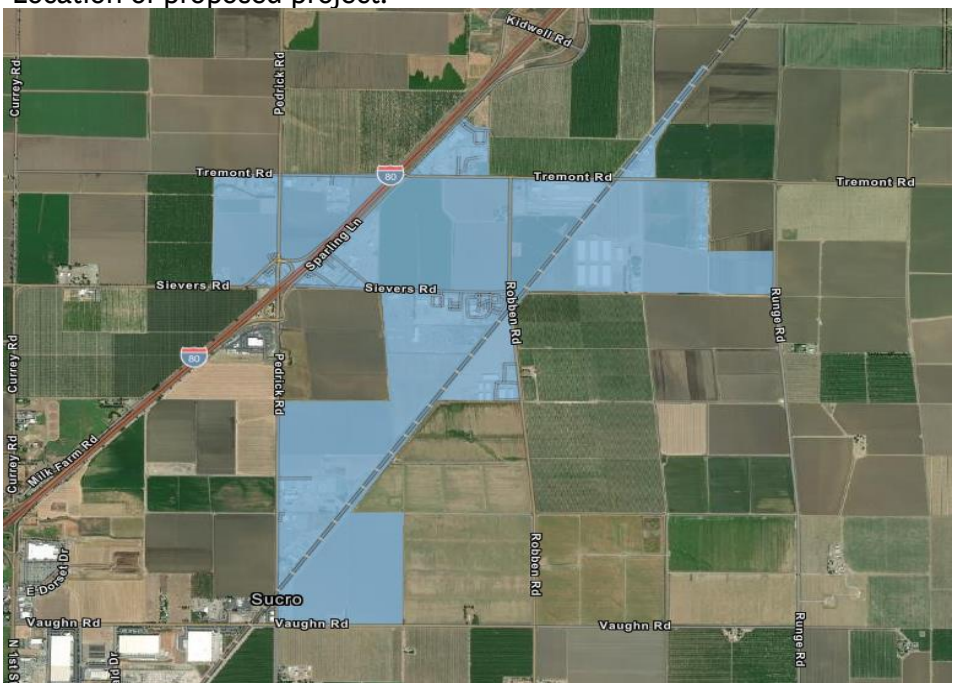
Project recommendation: Expanding fiber connections to Industrial Agricultural Services, leveraging Union Pacific Rail

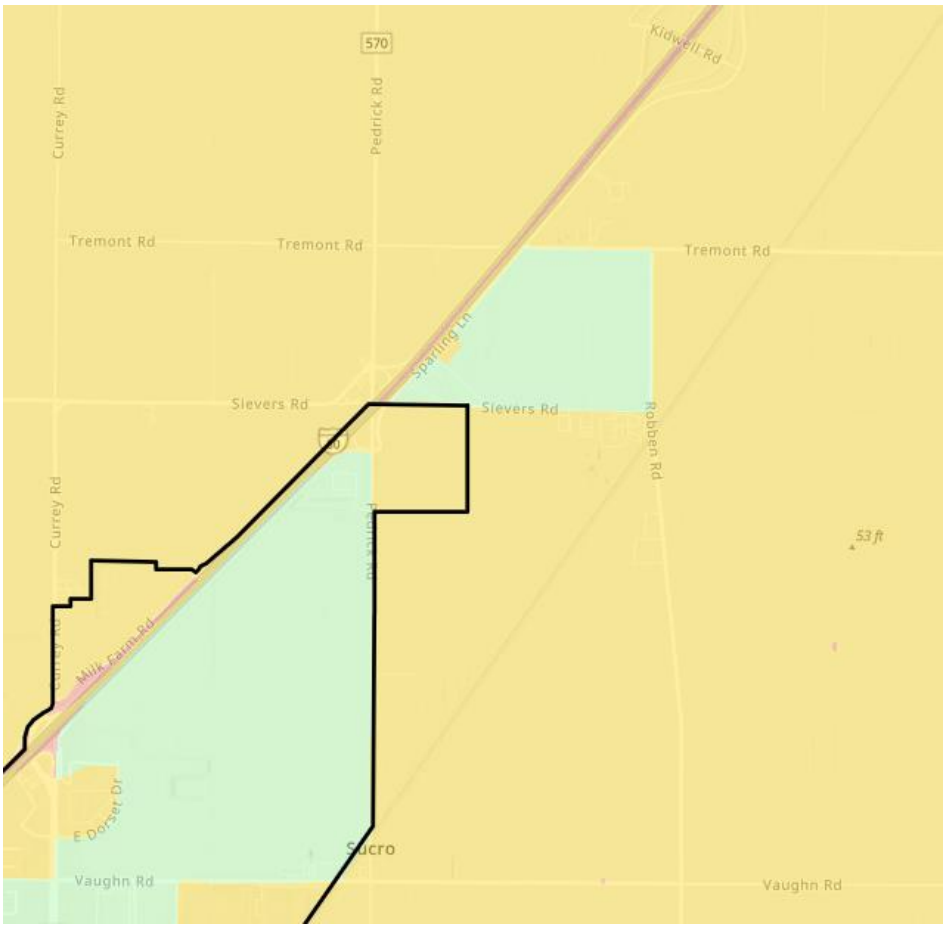
Category	Detail
Name	Expanding fiber lines to Industrial Agricultural Services north of Dixon.
Broadband Region	Dixon Rural
Description of Need	The Industrial Agricultural Services (IAS) district north of Dixon has been highlighted by Solano County Planning Services as an area of interest for business development within Solano County. Additionally, there are a significant number of houses located within CASF-designated "Priority Eligible" census blocks along Tremont Road, which meets the Union Pacific Rail line north from Dixon at the site of the IAS district. The area is comprised exclusively of industrial property, surrounded by agricultural land. The proposed project area contains ~61 buildings consisting of ~75 individuals who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). As of the 2020 Census, ~19 households consisting of ~79 individuals are within areas designated by the California Advanced Services Fund (CASF) as "Priority Eligible", meaning that they do not have Internet Service faster than 10/1. Priority eligible areas include a total of 3.93 square miles and are automatically qualified for a baseline 60% funding.
Buildings Connected	~61 households, businesses, and buildings
Population Impacted	~75 residents
Potential Partners	Potential partners include existing local internet service providers, such as AT&T, or Astound Broadband Powered by Wave. Ownership, maintenance, repair, and upgrades of the fiber connection could be performed by either of these potential partners.
Interdependencies	Existing utility poles follow the Union Pacific Rail line north from Dixon, which could be leveraged, would likely require leasing from PG&E and AT&T.
Potential Funding Opportunities	90% of this project may be eligible to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines). This project may be eligible for the Last Mile Federal Funding Account with 130/130 potential points.[37]
Target Outcomes	The project would pass ~61 buildings and connect ~75 residents, at a cost per passing of $5,300 - $11,882.

[37] Last Mile FFA points analysis excludes projects that contain costs greater than $9.3K per household passed and includes projects with areas that have wired connections greater than 25/3 Mbps, which may require additional review by CPUC to approve.

<table>
<tr><td>Cost</td><td>$323,100 - $724,783

<table>
<tr><th>Cost Breakdown</th><th>Value</th><th>Source</th></tr>
<tr><td>$/Mile of Middle Mile Fiber</td><td>$ 27,000-66,640</td><td>US Telecom | Yuba County Broadband Plan</td></tr>
<tr><td>Miles Required</td><td>8.13</td><td>Distance from edge of Wave service area in Dixon</td></tr>
<tr><td>Middle Mile Fiber Cost</td><td>$ 219,510 - $581,783</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>$/Building Passed (Aerial Fiber and Underground))</td><td>$ 1,700 - $3,000</td><td>Broadband Master Plan & Digital Equity Strategy (for City of Vallejo)</td></tr>
<tr><td>Buildings Passed</td><td>61</td><td>Census 2020</td></tr>
<tr><td>Last Mile Fiber Cost</td><td>$103,700 - $183,000</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Total Cost</td><td>$323,100 - $724,783</td><td></td></tr>
</table></td></tr>
</table>

Location	Industrial Agricultural Services Area, Dixon, CA Location of proposed project:  Coverage gap analysis of proposed project area depicted on the next page.



City boundaries are in black

Legend

- Served (>100/20 mbps)
- Underserved (between 25/3 and 100/20 mbps)
- Unserved (<25/3 mbps)
- No data available

Project recommendation: Expanding fiber lines to residential areas north of Vacaville along I-505

Category	Detail
Name	Expanding fiber lines to residential areas north of Vacaville along I-505
Broadband Region	Allendale - Hartley
Description of Need	Residential areas north of Vacaville along I-505 have higher density than agricultural land but are still largely underserved. The median income of households in the proposed area was $107,053 as of the 2020 census. The proposed project area contains ~435 buildings consisting of ~1,247 individuals who are underserved, meaning they have internet speeds between 25/3 and 100/20 Mbps. The surrounding area is largely comprised of residential homes and a number of commercial retailers. The largest areas of need are along the I-505. Within the project area, 5 households and 49 individuals are within areas designated by the California Advanced Services Fund (CASF) as "Eligible", meaning that they do not have internet service faster than 25/3 Mbps. CASF-eligible areas comprise a total area of 2.2 square miles. Currently, the only wired provider in the area is AT&T. Due to the number of commercial properties around this area and difficulty in expanding due to the I-80, Comcast has also expressed interest in increasing service in this area. To execute this project, an existing local ISP such as AT&T or Comcast could build fiber to the premises (FTTP) to unserved and underserved households, businesses, and other buildings along the I-505.
Buildings Connected	~435 houses, businesses, and other buildings
Population Impacted	~1,247 residents
Potential Partners	Potential partners include existing local internet service providers, such as Comcast and AT&T. Comcast and AT&T both already have service nearby and have expressed interest in increasing their presence in this area. Ownership, maintenance, repair, and upgrades of the fiber connection could be performed by any of these potential partners.
Interdependencies	Land ownership and permitting in a primarily residential area and interconnection with planned state Open-Access Middle Mile fiber segments following the I-505.
Potential Funding Opportunities	Certain areas of this project may be eligible for up to 70% to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines).

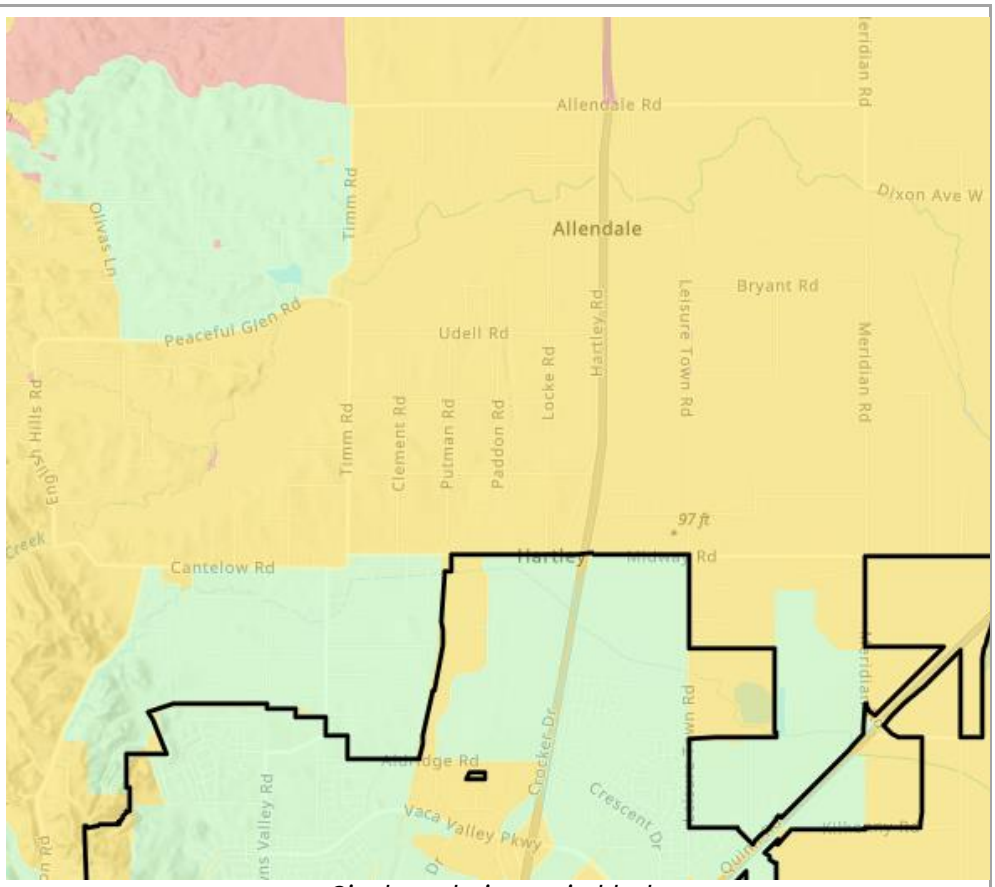
<table>
<tr><td></td><td>This project may be eligible for the Last Mile Federal Funding Account with 130/130 potential points.[38]</td></tr>
<tr><td>Target Outcomes</td><td>The project would pass ~435 buildings and connect ~1,247 residents, at a cost per passing of $2,021- $3,793.</td></tr>
<tr><td>Cost</td><td>$879, 360 - $1,650,195

<table><tr><th>Cost Breakdown</th><th>Value</th><th>Source</th></tr><tr><td>$/Mile of Middle Mile Fiber</td><td>$ 27,000-66,640</td><td>US Telecom | Yuba County Broadband Plan</td></tr><tr><td>Miles Required</td><td>5.18</td><td>Distance from edge of Comcast service area in Vacaville</td></tr><tr><td>Middle Mile Fiber Cost</td><td>$ 139,860-$345,195</td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>$/Building Passed (Aerial Fiber and Underground)</td><td>$ 1,700-$3,000</td><td>Broadband Master Plan & Digital Equity Strategy (for City of Vallejo)</td></tr><tr><td>Buildings Passed</td><td>435</td><td>GIS Data stored by Solano County</td></tr><tr><td>Last Mile Fiber Cost</td><td>$739,500-$1,305,000</td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>Total Cost</td><td>$879, 360 - $1,650,195</td><td></td></tr></table></td></tr>
<tr><td>Location</td><td>Residential areas between Allendale and Hartley

Location of proposed project depicted on the next page.</td></tr>
</table>

[38] Last Mile FFA points analysis excludes projects that contain costs greater than $9.3K per household passed and includes projects with areas that have wired connections greater than 25/3 Mbps, which may require additional review by CPUC to approve.

Coverage gap analysis of proposed project area depicted on the next page.



City boundaries are in black

Project recommendation: Expanding fiber lines to the English Hills community west of the I-505 north of Vacaville

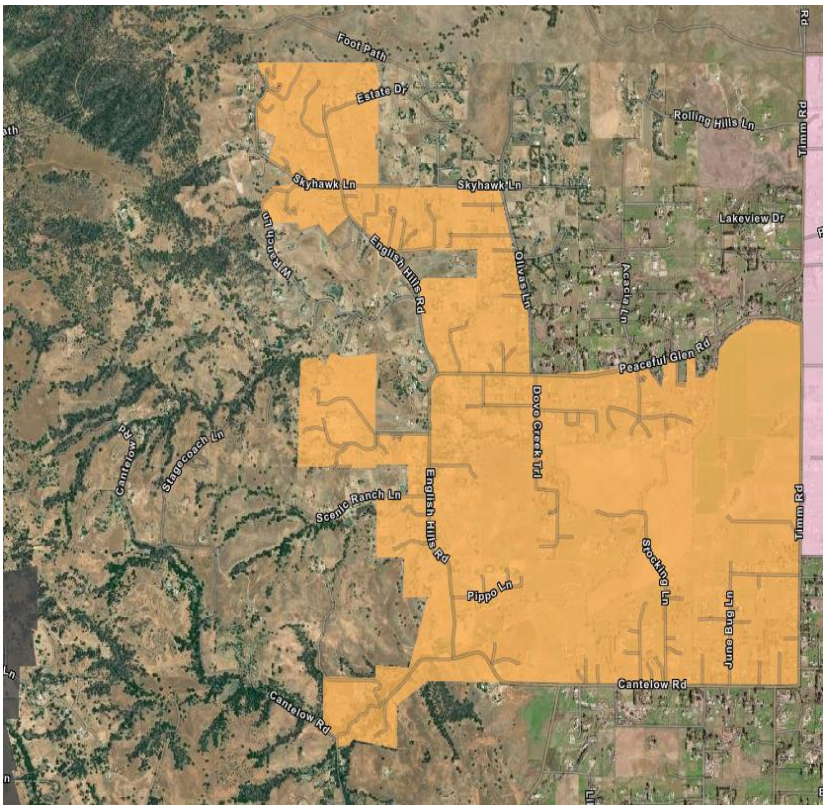
Category	Detail
Name	Expanding fiber lines to the English Hills community west of the I-505 north of Vacaville
Broadband Region	English Hills
Description of Need	The English Hills community is a small community near the I-505, north of Vacaville and west of Allendale and Hartley. There are significant pockets of unserved and underserved need within this community, specifically along English Hills, Cantelow, and Peaceful Glen Roads. The proposed project area comprises ~325 buildings consisting of ~1,120 individuals who are considered unserved (service below 25/3 Mbps) and underserved (service below 100/20 Mbps). Around 43 households consisting of ~85 residents are within census blocks intersecting the project area designated by the California Advanced Services Fund (CASF) as "Eligible", meaning that they do not have Internet Service faster than 25/3 Mbps. CASF-eligible areas comprise a total area of 1 square mile. While AT&T and Comcast have service areas close to the proposed project area, none have expanded to the proposed project area, due, in part, to the difficulty in crossing the I-505. AT&T and Comcast have both expressed some interest in this project. Leveraging the proposed project to expand fiber to residential and commercial properties along the I-505 north of Vacaville could reduce cost and prevent overbuilding.
Buildings Connected	~325 households, businesses, and other buildings
Population Impacted	~1,120 residents
Potential Partners	Potential partners include existing local internet service providers, such as Comcast and AT&T, all of which already offer wired services south of the proposed project area. Ownership, maintenance, repair, and upgrades of the fiber connection could be performed by any of these potential partners.
Interdependencies	Land ownership and permitting in a primarily residential area and interconnection with planned state Open-Access Middle Mile fiber segments following the I-505.
Potential Funding Opportunities	70% of this project may be eligible to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines).

<table>
<tr><td></td><td>This project may be eligible for the Last Mile Federal Funding Account with 110/130 potential points.[39]</td></tr>
<tr><td>Target Outcomes</td><td>The project would pass ~325 buildings and connect ~1,120 residents, at a cost per passing of $1,953 - $3,623.</td></tr>
<tr><td>Cost</td><td>$634,580 - $1,177,586

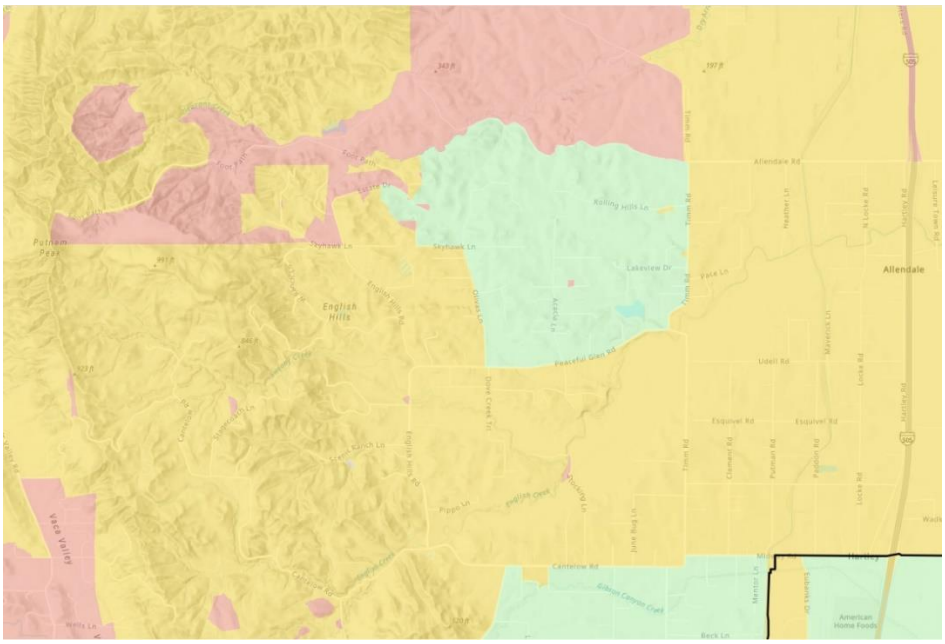
<table><tr><th>Cost Breakdown</th><th>Value</th><th>Source</th></tr><tr><td>$/Mile of Middle Mile Fiber</td><td>$ 27,000-66,640</td><td>US Telecom | Yuba County Broadband Plan</td></tr><tr><td>Miles Required</td><td>3.04</td><td>Distance from edge of AT&T service area north of Vacaville</td></tr><tr><td>Middle Mile Fiber Cost</td><td>$82,080-$202,586</td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>$/Building Passed (Aerial Fiber and Underground)</td><td>$1,700 - $3,000</td><td>Broadband Master Plan & Digital Equity Strategy (for City of Vallejo)</td></tr><tr><td>Buildings Passed</td><td>325</td><td>GIS Data stored by Solano County</td></tr><tr><td>Last Mile Fiber Cost</td><td>$552,500 - $975,000</td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>Total Cost</td><td>$634,580 - $1,177,586</td><td></td></tr></table></td></tr>
<tr><td>Location</td><td>English Hills, CA

Location of proposed project depicted on the next page.</td></tr>
</table>

[39] Last Mile FFA points analysis excludes projects that contain costs greater than $9.3K per household passed and includes projects with areas that have wired connections greater than 25/3 Mbps, which may require additional review by CPUC to approve.



Coverage gap analysis of proposed project area depicted on the next page.



City boundaries are in black

Legend

- Served (>100/20 mbps)
- Underserved (between 25/3 and 100/20 mbps)
- Unserved (<25/3 mbps)
- No data available

Project recommendation: Expanding fiber lines following the I-505 to reach underserved areas around Olive School Lane near Winters

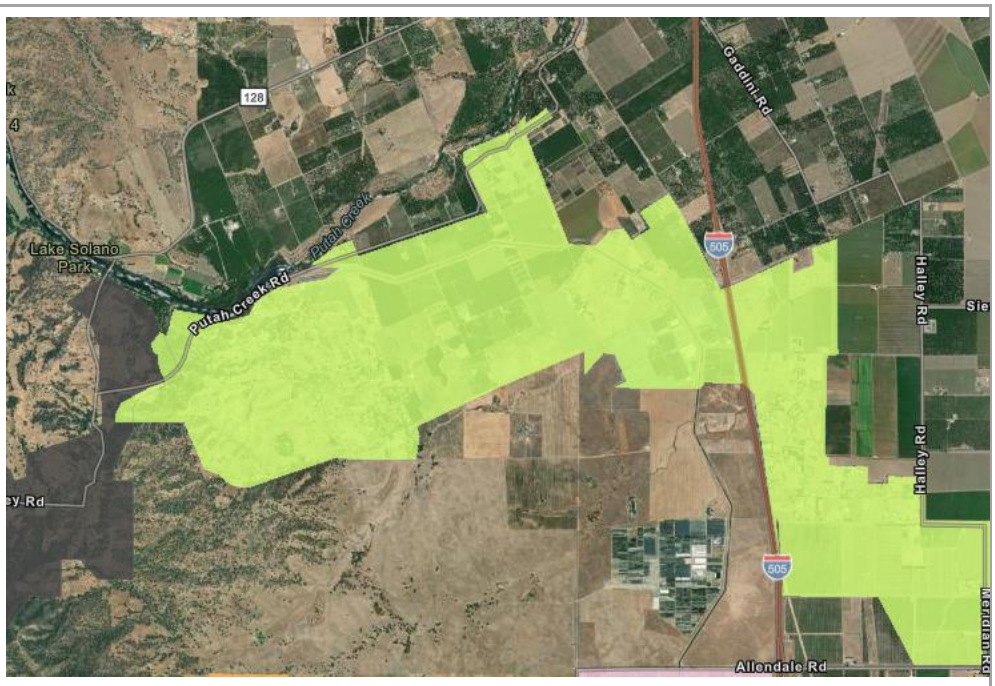
Category	Detail
Name	Expanding fiber lines following the I-505 to reach underserved areas around Olive School Lane near Winters
Broadband Region	Olive School and South Winters Unincorporated
Description of Need	Winters is a city in neighboring Yolo County, on the border with Solano County. There are significant pockets of unserved and underserved need south of Winters, specifically along the I-505 and near Olive School Lane. The proposed project area comprises ~325 buildings consisting of ~528 individuals who are considered unserved (service below 25/3 Mbps) and underserved (service below 100/20 Mbps). Around 19 households consisting of ~96 residents are within census blocks intersecting the project area designated by the California Advanced Services Fund (CASF) as "Eligible" or "Priority Eligible", meaning that they do not have Internet Service faster than 25/3. CASF-eligible areas comprise a total area of 4.3 square miles. While AT&T and Cal.Net have service areas close to the proposed project area, none have expanded to the proposed project area, due to its rural nature. AT&T has expressed some interest in this project if they could leverage existing utility poles to deploy aerial fiber.
Buildings Connected	~325 households, businesses, and other buildings
Population Impacted	~528
Potential Partners	Potential partners include existing local internet service providers, such as AT&T, which already offers wired services near the proposed project area. Ownership, maintenance, repair, and upgrades of the fiber connection could be performed by this potential partner.
Interdependencies	Land ownership and permitting in a primarily residential area and interconnection with planned state Open-Access Middle Mile fiber segments following the I-505.
Potential Funding Opportunities	70% of this project may be eligible to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines). This project may be eligible for the Last Mile Federal Funding Account with 130/130 potential points.[40]

[40] Last Mile FFA points analysis excludes projects that contain costs greater than $9.3K per household passed and includes projects with areas that have wired connections greater than 25/3 Mbps, which may require additional review by CPUC to approve.

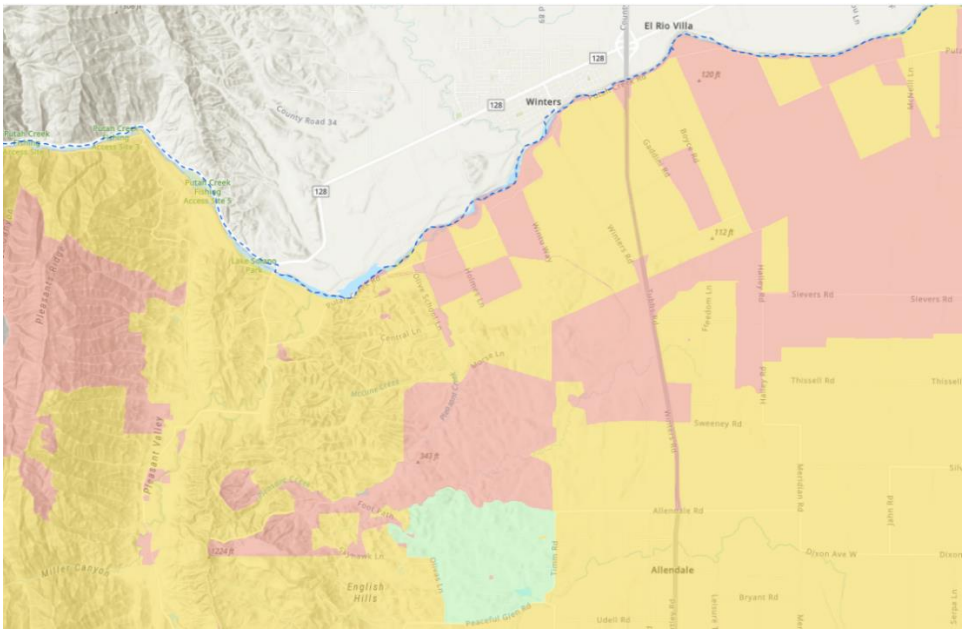
<table>
<tr><td>Target Outcomes</td><td>The project would pass ~325 buildings and connect ~528 residents, at a cost per passing of $2,205 - $4,247</td></tr>
<tr><td>Cost</td><td>$716,600 - $1,380,171

<table>
<tr><th>Cost Breakdown</th><th>Value</th><th>Source</th></tr>
<tr><td>$/Mile of Middle Mile Fiber</td><td>$ 27,000 - $66,640</td><td>US Telecom | Yuba County Broadband Plan</td></tr>
<tr><td>Miles Required</td><td>6.08</td><td>Distance from edge of AT&T Service Area north of Vacaville</td></tr>
<tr><td>Middle Mile Fiber Cost</td><td>$164,160- $405,171</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>$/Building Passed (Aerial Fiber and Underground)</td><td>$ 1,700 - $3,000</td><td>Broadband Master Plan & Digital Equity Strategy (for City of Vallejo)</td></tr>
<tr><td>Buildings Passed</td><td>325</td><td>GIS Data stored by Solano County</td></tr>
<tr><td>Last Mile Fiber Cost</td><td>$552,500 - $975,000</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Total Cost</td><td>$716,600 - $1,380,171</td><td></td></tr>
</table></td></tr>
<tr><td>Location</td><td>Near Winters, CA

Location of proposed project depicted on the next page.</td></tr>
</table>



Coverage gap analysis of proposed project area:



City boundaries are in black

Legend

- Served (>100/20 mbps)
- Underserved (between 25/3 and 100/20 mbps)
- Unserved (<25/3 mbps)
- No data available

Project recommendation: Expanding fiber lines to Ryer Island east of Rio Vista

Category	Detail
Name	Expanding fiber lines to Ryer Island east of Rio Vista.
Broadband Region	Ryer Island
Description of Need	Ryer Island is a geographic area within the Sacramento-San Joaquin River Delta, northeast of Rio Vista. A large area of need, the entirety of the island is unserved or underserved, with peak speeds of 75/20 Mbps, and multiple census blocks that are entirely unserved. The proposed project area contains ~219 buildings consisting of ~229 individuals who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). As of the 2020 Census, ~127 households consisting of ~281 individuals are within census blocks intersecting project areas designated by the California Advanced Services Fund (CASF) as "Priority Eligible", meaning that they do not have Internet Service faster than 10/1. Priority eligible areas include a total of 10.19 square miles and are automatically qualified for a baseline 60% funding. While Frontier and Comcast are in neighboring Rio Vista, the rural nature of Ryer Island and the lower density has made connecting the area a lower priority.
Buildings Connected	~219 households, businesses, and other buildings
Population Impacted	~229 residents
Potential Partners	Potential partners include existing local internet service providers, such as Frontier, which already offers wired services in the area. Ownership, maintenance, repair, and upgrades of the fiber connection could be performed by this potential partner.
Interdependencies	Fiber lines would need to cross the Miner Slough, which could necessitate portions of the project being underground.
Potential Funding Opportunities	90% of this project may be eligible to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines). This project may be eligible for the Last Mile Federal Funding Account with 130/130 potential points.[41]
Target Outcomes	The project would pass ~219 buildings and connect ~229 residents, at a cost per passing of $2,813 - $5,748 A nationwide ISP with local fiber coverage in Solano estimates $4,250.

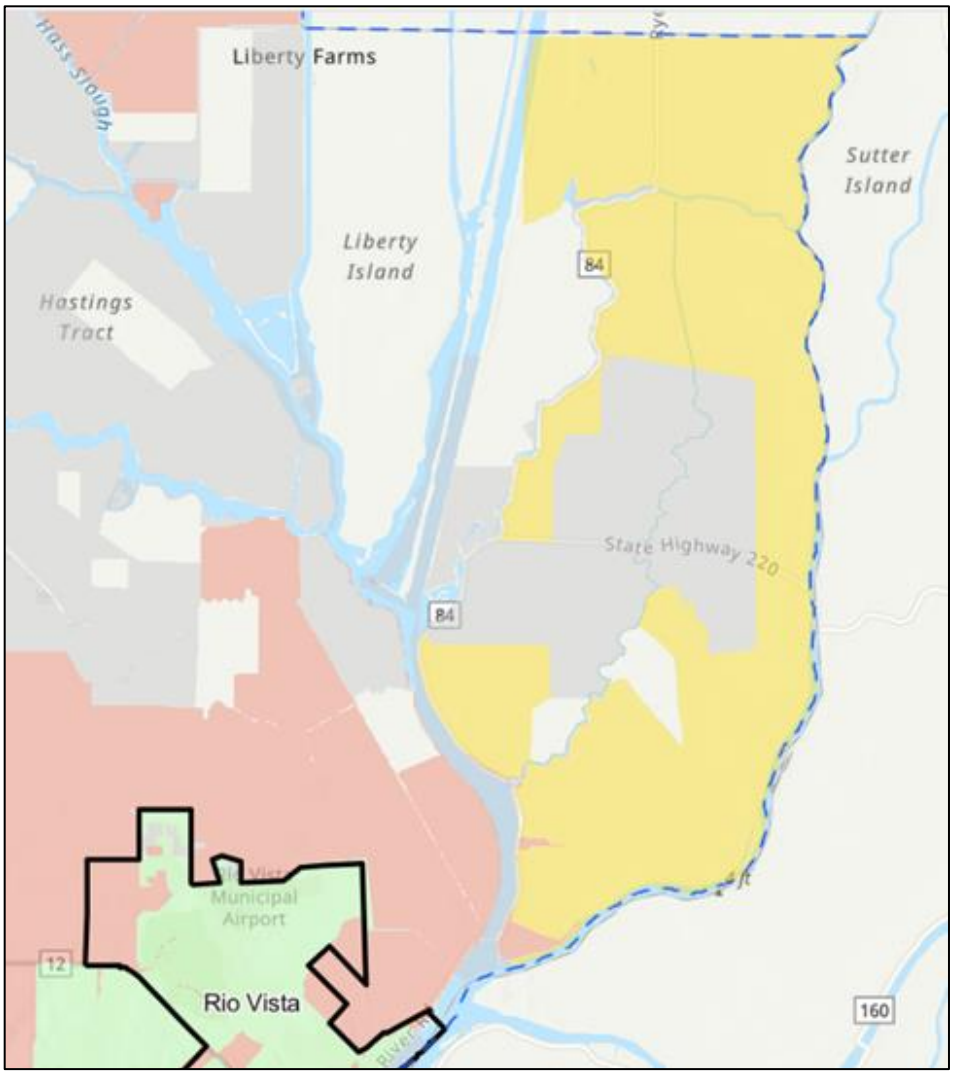
[41] Last Mile FFA points analysis excludes projects that contain costs greater than $9.3K per household passed and includes projects with areas that have wired connections greater than 25/3 Mbps, which may require additional review by CPUC to approve.

<table>
<tr><td>Cost</td><td>$616,110 - $1,258,759 (Local ISP estimates $930,750)

<table>
<tr><th>Cost Breakdown</th><th>Value</th><th>Source</th></tr>
<tr><td>$/Mile of Middle Mile Fiber</td><td>$ 27,000-66,640</td><td>US Telecom | Yuba County Broadband Plan</td></tr>
<tr><td>Miles Required</td><td>9.03</td><td>Distance from edge of Comcast service area in Rio Vista</td></tr>
<tr><td>Middle Mile Fiber Cost</td><td>$243,810 - $601,759</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>$/Building Passed (Aerial Fiber and Underground)</td><td>$ 1,700 - $3,000</td><td>Broadband Master Plan & Digital Equity Strategy (for City of Vallejo)</td></tr>
<tr><td>Buildings Passed</td><td>219</td><td>Census 2020</td></tr>
<tr><td>Last Mile Fiber Cost</td><td>$372,300 - $657,000</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Total Cost</td><td>$616,110 - $1,258,759</td><td></td></tr>
</table></td></tr>
<tr><td>Location</td><td>Ryer Island, CA

Location of proposed project:
 

Coverage gap analysis of proposed project area given on next page:</td></tr>
</table>



City boundaries are in black

Legend

- Served (>100/20 mbps)
- Underserved (between 25/3 and 100/20 mbps)
- Unserved (<25/3 mbps)
- No data available

Project recommendation: Expanding fiber lines to Lambie Industrial Park and Delta Conservation Camp #8 near Fairfield

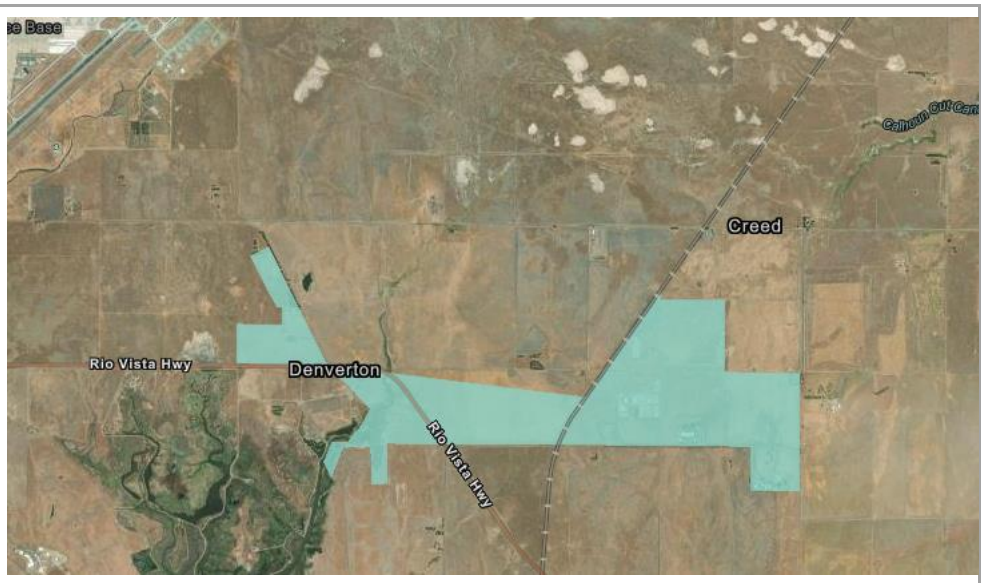
Category	Detail
Name	Expanding fiber lines to Lambie Industrial Park and Delta Conservation Camp #8 near Fairfield
Broadband Region	Rio Vista Rural
Description of Need	Delta Conservation Camp #8 is jointly operated by CDCR and CAL FIRE, providing fire crews for firefighting in Sonoma, Lake, Napa, and Solano counties. As of 2021, there were 58 individuals on-site, comprising 11 staff and 47 inmates. Lambie Industrial Park is a privately-owned industrial area located near Fairfield, which was highlighted by Solano Planning Services as a future business development opportunity. As of the 2020 census, there were 65 buildings on the premises, comprising various industrial services. The proposed project area contains ~26 buildings consisting of ~123 individuals who are considered unserved (service below 25/3 Mbps) or underserved (service below 100/20 Mbps). With the proposed project area, ~14 buildings and ~81 residents are within areas designated by the California Advanced Services Fund (CASF) as "Eligible", meaning that they do not have Internet Service faster than 25/3. CASF-eligible areas comprise a total area of 4.2 square miles. Due to the number of commercial properties, Comcast has expressed potential interest in increasing service to this area.
Buildings Connected	~26 households, businesses, and other buildings
Population Impacted	~123 residents
Potential Partners	Potential partners include existing local internet service providers, such as Comcast, AT&T, or Frontier. Comcast already has service nearby and has expressed interest in increasing their presence in the area. Ownership, maintenance, repair, and upgrades of the fiber connection could be performed by any of these potential partners.
Interdependencies	Highway 12 has PG&E poles, which would allow the usage of aerial fiber but likely would require leasing from PG&E and AT&T.
Potential Funding Opportunities	70% of this project may be eligible to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines).

<table>
<tr><td></td><td>This project may be eligible for the Last Mile Federal Funding Account with 100/130 potential points.[42]</td></tr>
<tr><td>Target Outcomes</td><td>The project would pass ~26 buildings, create a case for future business expansion in the area, and provide Delta Conservation Camp #8 a stable internet connection, which is crucial for emergency response, at a cost per passing of $8,003 - $18,558.</td></tr>
<tr><td>Cost</td><td>$208,090 - $482,505

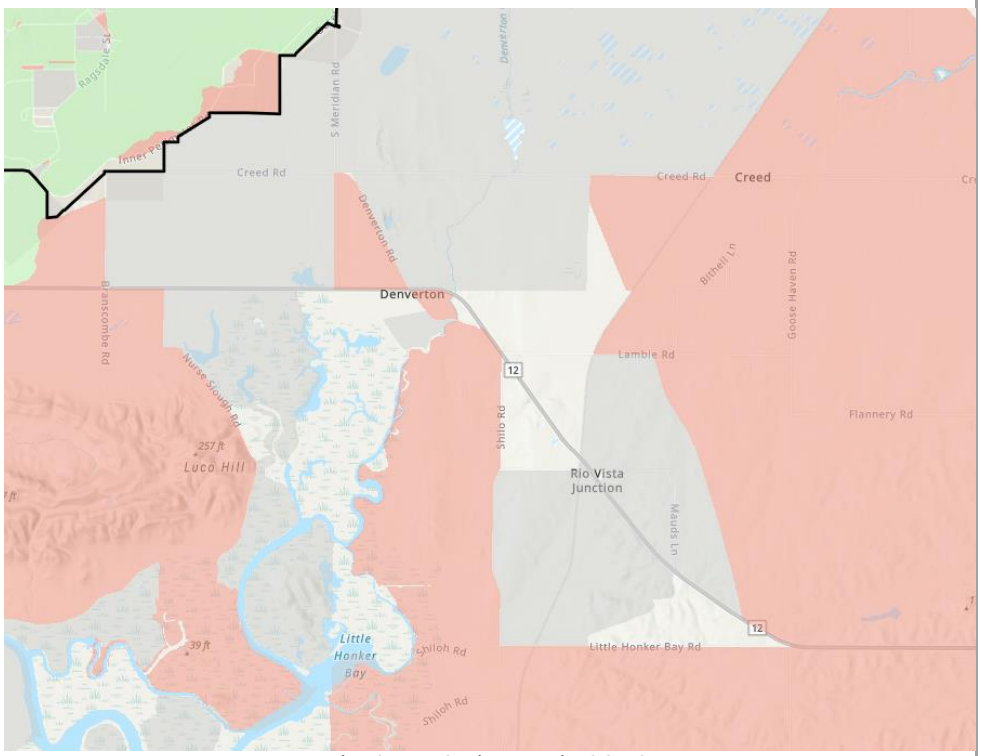
<table><tr><th>Cost Breakdown</th><th>Value</th><th>Source</th></tr><tr><td>$/Mile of Middle Mile Fiber</td><td>$ 27,000-66,640</td><td>US Telecom | Yuba County Broadband Plan</td></tr><tr><td>Miles Required</td><td>6.07</td><td>Distance from edge of Comcast service area in Fairfield</td></tr><tr><td>Middle Mile Fiber Cost</td><td>$ 163,890 - $404,505</td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>$/Building Passed (Aerial/Underground Fiber)</td><td>$ 1,700-$3,000</td><td>Broadband Master Plan & Digital Equity Strategy (for City of Vallejo)</td></tr><tr><td>Buildings Passed</td><td>26</td><td>GIS Data stored by Solano County</td></tr><tr><td>Last Mile Fiber Cost</td><td>$44,200-$78,000</td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>Total Cost</td><td>$208,090 - $482,505</td><td></td></tr></table></td></tr>
<tr><td>Location</td><td>Lambie Industrial Park, Fairfield CA

Location of proposed project depicted on next page.</td></tr>
</table>

[42] Last Mile FFA points analysis excludes projects that contain costs greater than $9.3K per household passed and includes projects with areas that have wired connections greater than 25/3 Mbps, which may require additional review by CPUC to approve.



Coverage gap analysis of proposed project area:



City boundaries are in black

Legend

- Served (>100/20 mbps)
- Underserved (between 25/3 and 100/20 mbps)
- Unserved (<25/3 mbps)
- No data available

Project recommendation: Expanding fiber lines following Hawkins Road to the unincorporated community of Binghamton

Category	Detail
Name	Expanding fiber lines following Hawkins Road to the unincorporated community of Binghamton
Broadband Region	Elmira and Dixon Rural
Description of Need	Binghamton is an unincorporated community east of Vacaville and Elmira and northeast of Travis Air Force Base. Binghamton has a large area of unserved and underserved residents, including contiguous pockets along Fry Road. The proposed project area comprises ~39 buildings consisting of ~149 individuals who are considered unserved (service below 25/3 Mbps) and underserved (service below 100/20 Mbps). Around 63 households consisting of ~218 residents are within census blocks intersecting the project area designated by the California Advanced Services Fund (CASF) as "Eligible" or "Priority Eligible", meaning that they do not have Internet Service faster than 25/3. CASF-eligible areas comprise a total area of 9.3 square miles. While Comcast and AT&T both are in neighboring Vacaville, their service areas have not expanded to include Binghamton at this time. This project could leverage the proposed project bringing fiber to the unincorporated community of Elmira as Fry Road intersects with the Union Pacific Rail line coming south from Elmira. Existing utility poles follow both Fry Road and the Union Pacific Rail line, which would allow the deployment of aerial fiber at a significant cost savings, as well as qualify for an additional 10% grant from CASF for using existing infrastructure.
Buildings Connected	~39 households, businesses, and other buildings
Population Impacted	~149 residents
Potential Partners	Potential partners include existing local internet service providers, such as AT&T and Comcast, both of which already offer wired services in the area. Ownership, maintenance, repair, and upgrades of the fiber connection could be performed by any of these potential partners.
Interdependencies	Land ownership and permitting in a primarily residential area.
Potential Funding Opportunities	70% of this project may be eligible to be funded by the CASF Broadband Infrastructure Grant Account, with the remaining costs funded by private matching from the ISP partner. This project may also be eligible for BEAD funding (dependent on pending grant guidelines).

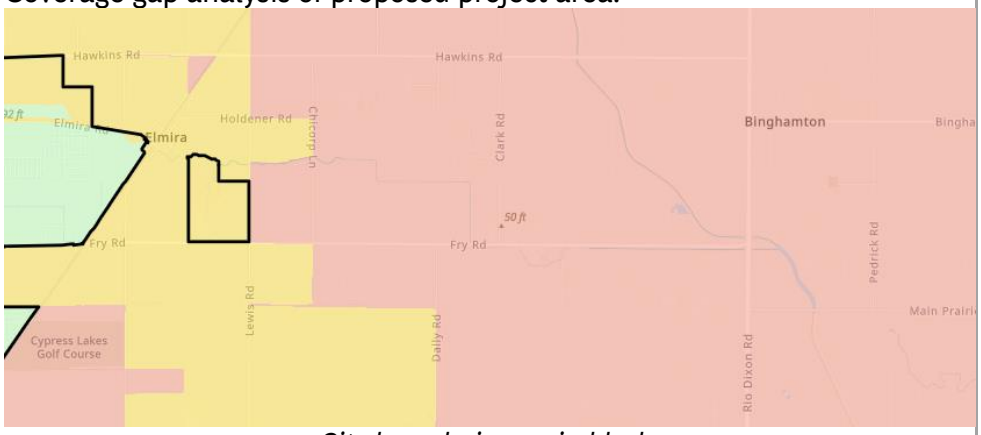
<table>
<tr><td></td><td>This project may be eligible for the Last Mile Federal Funding Account with 120/130 potential points.[43]</td></tr>
<tr><td>Target Outcomes</td><td>The project would pass ~39 buildings and connect ~149 residents, at a cost per passing of $6,131 - $13,936.</td></tr>
<tr><td>Cost</td><td>$239,100 - $543,496

<table><tr><th>Cost Breakdown</th><th>Value</th><th>Source</th></tr><tr><td>$/Mile of Middle Mile Fiber</td><td>$ 27,000-66,640</td><td>US Telecom | Yuba County Broadband Plan</td></tr><tr><td>Miles Required</td><td>6.40</td><td>Distance from edge of Comcast service area in Fairfield</td></tr><tr><td>Middle Mile Fiber Cost</td><td>$172,800-$426,496</td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>$/Building Passed (Aerial Fiber and Underground)</td><td>$ 1,700 - $3,000</td><td>Broadband Master Plan & Digital Equity Strategy (for City of Vallejo)</td></tr><tr><td>Buildings Passed</td><td>39</td><td>GIS Data stored by Solano County</td></tr><tr><td>Last Mile Fiber Cost</td><td>$66,300 - $117,000</td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>Total Cost</td><td>$239,100 - $543,496</td><td></td></tr></table></td></tr>
<tr><td>Location</td><td>Binghamton, CA

Location of proposed project depicted on the next page.</td></tr>
</table>

[43] Last Mile FFA points analysis excludes projects that contain costs greater than $9.3K per household passed and includes projects with areas that have wired connections greater than 25/3 Mbps, which may require additional review by CPUC to approve.

Coverage gap analysis of proposed project area:



City boundaries are in black

Legend

- Served (>100/20 mbps)
- Underserved (between 25/3 and 100/20 mbps)
- Unserved (<25/3 mbps)
- No data available

9.4 Digital Equity Project Recommendations

Project recommendation: Digital Equity Program Contractor

Category	Detail
Name	Digital Equity Program Contractor
Description of Need	The County must ensure enabling conditions are in place for broadband adoption, affordability, and inclusion to be successful. These conditions include engaged stakeholders, availability of funding sources and resources, favorable policies, and tracking of milestones. Most importantly, as Solano County develops its Strategic Broadband Development plan, successful execution will require a dedicated leader and structure that can carry out these digital equity programs.
Description of project	We propose for Solano County to hire a Digital Equity Program Contractor whose role would be to spearhead and build long-term digital equity plans through engagement with stakeholders across the full digital ecosystem, including public entities, ISPs, anchor institutions, and nonprofits. The Digital Equity Program Contractor will have the capabilities and expertise to lead and assist in implementing digital equity projects and serve as a strategy expert for ongoing programs. The Contractor will establish clear KPIs for projects and ensure continued measurement. The Contractor will also act as a central resource hub and oversee projects including the "Solano Connected" Coalition, and Solano County's Digital Equity Seed-Funding Program. **Key Accountabilities & Responsibilities** • Coordinate county level efforts, assisting in evaluating, understanding, and responding to digital equity needs • Advise on policies, programs, and funding opportunities to create, promote, and increase digital access, affordability, and adoption. • Build relationships and partnerships with stakeholders across the digital ecosystem to develop new opportunities for achieving greater digital equity and affordable broadband connectivity in Solano • Prepare recommendations and analyses to inform county and state officials, department leadership, and the public about digital needs in including any legislation, court decisions, FC rulings, or business practices that could have an impact on Solano County • Build and oversee the "Solano Connected" Coalition • Establish and oversee Digital Equity Seed-Funding program
Location	The Digital Equity Program Contractor will work within Solano County's Department Of Information Technology. The Digital Equity Program Contractor will work closely alongside the Broadband Infrastructure Program Contractor.

<table>
<tr><td>Potential Partners</td><td>The Digital Equity Program Contractor should build relationships and partnerships with stakeholders across the County, starting from sister County agencies, such as Health and Social Services and the Office of Education. Partnerships should also be made with anchor institutions including the Solano County Public Library, educational institutions, and family resource centers. Other potential partners include community-based organizations, nonprofits, healthcare providers, first respondents, and ISPs
.</td></tr>
<tr><td>Interdependencies</td><td>Broadband Infrastructure Program Contractor, Board of Supervisors</td></tr>
<tr><td>Potential Funding Opportunities</td><td>To hire a Digital Equity Program Contractor, Solano County will start off by utilizing ARPA funding for the first year. For 2023, Solano County should apply for funding from the CASF Adoption Account which allows funding to be allocated to the cost of staff running digital equity programs funded by the same account. Starting 2024, Solano County should apply for the funds allocated to California from the State Digital Equity Capacity Grant Program, and/or apply directly to the Competitive Grant Program. Solano County should actively begin planning and reaching out to California's state leaders to learn how the county can be engaged in the process.</td></tr>
<tr><td>Target Outcomes</td><td>The main target outcome for the Digital Equity Program Contractor in the first year is to establish partnerships and relationships with local stakeholders and begin implementing digital inclusion projects. The Digital Equity Program Contractor should prioritize:
Leading the development of a comprehensive digital equity plan across Solano County
Creating advertisement materials and coordinating the launch of the Awareness Campaign
Leading and assisting in establishing the Solano Connected Coalition
Establishing framework for Digital Equity Seed-Funding Program</td></tr>
<tr><td>Cost</td><td>$160,000-$180,000

<table><tr><th>Component</th><th>Cost</th></tr><tr><td>Salary & Benefits</td><td>160K-180K</td></tr><tr><td>Total</td><td>160K-180K</td></tr></table>Cost referenced from NTIA's State Digital Equity Planning Grant Program budget narrative sample, adjusted for State of California.

Source: NTIA</td></tr>
</table>

Project recommendation: "Solano Connected" digital equity coalition/Digital Navigator

Category	Detail
Name	"Solano Connected" Digital Equity Coalition/Digital Navigator
Description of Need	There exist many organizations with digital inclusion efforts in Solano including those of anchor institutions, community-based organizations, and nonprofits. While many are able to make some impact, our conversations with them reveal the common themes of struggles from a lack of resource, knowledge, and next steps. Smaller nonprofits such as Digital Literacy Rocks often lack the capacity and resources to expand their projects, while larger organizations with other programs beyond digital inclusion such as Solano County's Public Library lack awareness of needs outside of their immediate community. Oftentimes, organizations also lack awareness of other digital inclusion projects, resulting in them to be unable to refer clients to resources they cannot provide. The lack of a central network and understanding may also result in duplicative efforts, competition for funding, and other inefficiencies. There is a need for a county-wide system that can help community members navigate the digital divide from finding and signing up for affordable internet service plans to teaching basic computer skills. Such program, supported by the NTIA, is a Digital Navigator system that would greatly benefit Solano County.
Description of project	We propose for Solano County to establish a "Solano Connected" digital equity coalition, led by the Digital Equity Program Contractor, in charge of building a county-wide digital navigator system. A coalition uniquely acts as a catalyst that maximizes resources, partnerships, and insights, leading to more impactful efforts. Coalitions create three unique effects - advocacy effect, alignment effect, and network effect. Deliberately or not, by bringing a range of stakeholders together, coalitions raise the profile of digital inclusion for their communities, align perspectives and efforts between players for effective strategy, and create an instant network of information and insights. The Coalition will become the core space and group that will be able to coordinate and leverage each player's resources to implement a county-wide digital navigator system. Digital Navigators are an important tool for raising awareness about, and implementing, digital equity programs in unconnected communities. They can guide community members to resources that meet their needs, from helping with any technological such as signing up for the ACP, to referring to online services that help with healthcare, education, and employment. Essentially, digital navigators act as “case workers” who provide end-to-end support on the entire spectrum of digital needs. The Coalition will be empowered to position Digital Navigators in the community through anchor institutions represented on the Coalition. These anchor institutions will be able to support Navigators by providing resources and

	connecting them with segments of their communities that are most in need of digital literacy support. In addition to building Solano County's digital navigator system, the coalition will engage stakeholders across the full digital inclusion ecosystem and play three roles - Steer strategic decision, enable success of digital equity programs, and raise awareness. • **Steer strategic decision:** Each member of the coalition will bring unique perspectives and insights and will work with the Digital Equity Program Contractor to develop best practices and strategies for expanding internet access and proficiency in Solano County. • **Enable success of digital equity program:** The coalition will serve as a hub for stakeholders to collaborate on providing resources, funding, and expertise. The Coalition will be empowered to work with the Program Contractor to support and launch initiatives to support the success of other digital equity programs. • **Raise awareness:** The coalition will raise awareness of the digital equity needs of residents upstream to stakeholders such as elected officials, department leadership, and the media. They will also create material and administer programs designed to raise awareness of digital equity programs downstream to residents. One such proposed program will be a Solano County Digital Navigator Program.
Location	The Solano Connected coalition will involve partners and operations across the county, especially with organizations that work with Solano's most vulnerable populations. These include but are not limited to low-income, senior, and populations in rural areas with minimal broadband infrastructure.
Potential Partners	The coalition should involve all stakeholders across the county that can assist in developing, spreading, and implementing digital inclusion efforts. County agencies, anchor institutions, CBOs, ISPs, nonprofits etc. are all potential partners as each organization can provide perspectives and insights ranging from identifying the community's needs to helping raise awareness of available resources and programs. For the Digital Navigator system, the coalition should leverage any available staff or physical centers of partnering organizations that may be able to serve as digital navigators or serve as spaces for device/internet access. For example, Workforce Development Board has two laptop facilities that they welcome any organizations to use. Another example is Solano Community College's learning resource center which could become a potential partner in getting student volunteer Digital Navigators.
Interdependencies	Board of Supervisors

<table>
<tr><td>Potential Funding Opportunities</td><td>To establish the Solano Connected Coalition and the digital navigator system, the County should first utilize ARPA funding until further funding is available. For 2023, Solano County should apply for funding from the CASF Adoption Account which provides funding for digital inclusion programs including setting up digital navigator centers. The Coalition should also apply for the CASF Rural and Urban Regional Broadband Consortia Account which can provide additional funding for the Coalition to support the expansion of broadband in Solano county. Starting 2024, Solano County should apply for the funds allocated to California from the State Digital Equity Capacity Grant Program, and/or apply directly to the Competitive Grant Program. Solano County should actively begin planning and reaching out to California's state leaders to learn how the county can be engaged in the process. They should also begin the application for the CASF Adoption Account which can be applied for by January 1st, 2023.</td></tr>
<tr><td>Target Outcomes</td><td>The main target outcome for the Solano Connected Coalition is to establish partnerships and to build a digital navigator program for Solano County.
Enroll 30+ member organizations and apply to become a Regional Broadband Consortium
Lead the development of a county-wide Digital Navigator system
Increase awareness of community resources and serve as a resource hub for stakeholders
Initial request of $75K to establish two helplines each with one to two part-time Digital Navigators
Apply for CASF Rural and Urban Regional Broadband Consortia Account funding in 2023</td></tr>
<tr><td>Cost</td><td>$177,000

<table><tr><th>Component</th><th>Cost</th></tr><tr><td>5 helplines with 8+ part-time Digital Navigators[1]</td><td>$156,000</td></tr><tr><td>Additional Project Costs (e.g., Technology tools)</td><td>$21,000</td></tr><tr><td>Total</td><td>$177,000</td></tr></table>Helpline cost includes part-time staff compensation, training and development, and on-going resources

Source: Philadelphia Digital Navigator, Connect Arizona</td></tr>
</table>

Project recommendation: Digital resource awareness campaign (3K - 5K reach)

Category	Detail
Name	Digital Resources Awareness Campaign
Description of Need	Based on the American Community Survey, approximately 12K households in Solano County do not have a broadband subscription plan, and 6.6K households do not have a computer at home. Many of these low-income households are eligible to receive subsidies for internet subscription and low-cost devices, but anecdotal evidence and nation-wide trends show that these subsidy programs are undersubscribed. There are Federal and State subsidies targeted towards low-income individuals who may not be able to afford a monthly internet subscription service available to them, including the FCC's $30 per month subsidy and one-time discount of $100 for device through the Affordable Connectivity Program, as well as Lifeline and California's CASF Line Extension Program. In Solano County there are at least 70K households eligible for the ACP yet only 10.5K households are enrolled as of June 2022. ISPs also have low-cost broadband programs such as Comcast's Internet Essential and AT&T's Access which when paired with the subsidy from ACP, provides households with free internet. Beyond these subsidies, there are also already existing programs in Solano that can be of help that should be continued to be advertised. Solano Public Library has a free Chromebook and Hotspot lending program that can provide free digital access for Solano households; Digital Literacy Rocks provide low cost one on one digital literacy training programs; Workforce Development Board has free laptop centers. Many of these resources, however, are not widely publicized.
Description of project	The underutilization of these programs is primarily driven by a lack of awareness that they exist and how to apply for them. With proper outreach and communication, many households can become connected instantly at no cost. We propose launching a multi-channel awareness campaign (e.g., email newsletters, informational flyers at anchor institutions, mailers to qualifying census blocks, local television, or radio advertisements) of subsidies, programs available, and benefits of broadband to Solano County residents and businesses. We also recommend ACP enrollment drives in areas with high need wherein volunteers promote and supports households with completing ACP and other registration forms in-person. Coordination and creation of this campaign can be managed by the Digital Equity Program Contractor, and outreach can be amplified by local community partners that work with Solano County's vulnerable populations at a grassroot level. When possible, each partnering organization should add in details of how the households will benefit from free internet. For example, the Department of Health and Social Services can mention how having internet would allow households to access most resources and applications online, which would help households eliminate the burden of going to an office.

	Given many of the programs are subsidized by the Federal government or States, the awareness campaign has the potential to make significant impact at a low cost.
Location	These efforts would be focused on raising awareness across the county, especially for census blocks that qualify for ACP. ACP is the most important program and currently over 40 ISPs (according to ACP database) participate in it in Solano County. Households with incomes 200% or less than the Federal Poverty Guideline, households participating in certain government assistance programs such as SNAP, Medicaid, SSI, FPHA, free & reduced school lunch program, or households already receiving a Lifeline benefit can quality for the ACP. Therefore, partnering and leveraging local organizations' communication channels will be crucial for connecting with and gaining the trust of target households.
Potential Partners	Potential partners include public and private organizations in Solano County that work with Solano's vulnerable populations. With each partnership, it is vital for the Digital Equity Project Contractor to ensure the partnering organization's capacity to provide support with helping households through the sign-up process or ensure that they can refer households to get the help that they need regarding the advertised information. Over 30 stakeholders have expressed willingness in helping with outreach. The campaign should leverage these organizations' respective outreach channels and networks including but not limited to • Websites • Mailer list • Office space • Resource Centers in Schools • Mobile Clinics • Event drives •
Interdependencies	Volunteers may be required for the campaign, especially for elements of the campaign that deal with assistance and walking households through the sign-up process. These may be more common during sign up drives.
Potential Funding Opportunities	To execute this project, Solano County should utilize ARPA funding for the first year. For 2023, Solano County should apply for funding from the CASF Adoption Account which provides funding for digital inclusion programs including community outreach. The Solano Connected Coalition could also help in pursuing funding from the CASF Rural and Urban Regional Broadband Consortia Account, which provides funding for community outreach. Starting 2024, Solano County should apply for the funds allocated to California from the State Digital Equity Capacity Grant Program, and/or apply directly to the Competitive Grant Program. Solano County should actively begin planning and reaching out to California's state leaders to learn how the county can be engaged in the process. They should also begin the

<table>
<tr><td></td><td>application for the CASF Adoption Account which can be applied for by January 1st, 2023.</td></tr>
<tr><td>Target Outcomes</td><td>The main target outcome for the awareness campaign is to increase ACP participation for those who qualify and increase broadband subscriptions across the County. Beyond these targets of internet adoption however, the goal is also to increase awareness and utilization of existing programs in Solano that support digital inclusion. The Digital Equity Program Contractor should also aim to establish and continue the partnership network that will be created through this campaign.

The target would be to reach roughly 5,000 households in areas of high need and help enroll at least 1,000 households into the ACP program.</td></tr>
<tr><td>Cost</td><td>$150,000 - $250,000

<table><tr><th>Component</th><th>Cost</th></tr><tr><td>Design and Copywriting of materials and website</td><td>$10,000</td></tr><tr><td>Printing of Flyers, Brochures (2500 copies of each)</td><td>$1,000+</td></tr><tr><td>Distribution and Mailing Service</td><td>$3,000+</td></tr><tr><td>Local Newspaper Ads</td><td>$26,000+</td></tr><tr><td>Radio/TV ads</td><td>$30,000+</td></tr><tr><td>Sign up drives, door knocking, phone campaign</td><td>$80,000+</td></tr><tr><td>Total</td><td>$150,000 - $250,000</td></tr></table>
Source: BCG Analysis</td></tr>
</table>

Project recommendation: Seed funding grant program for digital equity initiatives

Category	Detail
Name	Digital Equity Seed Funding Program
Description of Need	There are many organizations in Solano County that may be fostering their own innovative ideas or already have their own programs addressing issues relating to digital equity and inclusion. Our discussions with many organizations, however, reveal organizations facing significant roadblock in funding and resources. For example, the Solano County Public Library's device lending program has consistently experienced a shortage with waitlists and wait times of three weeks. Another example is Digital Literacy Rocks, a nonprofit providing digital literacy programs, having to shut down their physical location and losing 40% of their students due to a lack of resources. If funding was made available, both organizations can immediately expand their program and create impact.
Description of project	We propose for Solano County to establish a community innovation funds with $100,000 in seed funding to fund five-ten ideas relating to digital equity efforts. This competitive grant should serve as a vehicle to bring great local ideas up and seed these ideas with some initial funding. At the end of the first year, the county could select the two most successful programs and provide additional fundings to expand on their success in the consecutive years. This digital equity seed funding program will have a formal RFP process and the projects proposals could be brought to the Solano Connected Coalition for review. The program can be overseen by the Digital Equity Program Contractor, with the final approval from funding given by the Board of Supervisors.
Location	Given the program will prioritize funding for projects tackling the populations that are most in need, projects that will pass will likely provide support in city pockets of low-income, senior, student populations as well as some unincorporated areas across the County.

Potential Partners	This program will require close partnership with the County Board of Supervisors given the seed-fundings will come from the County. The program will work closely with the Solano Connected Coalition for review of applications.
	
	In regard to potential partners and projects, there exists many organizations that already have ideas and plans for digital equity projects. Below is a list of organizations that have expressed interest and have provided a short description of their project ideas.
	• Digital Literacy Rocks
	  ○ County-wide Digital Navigator with Digital Literacy Rocks as the host
	• Solano County Public Library
	  ○ Expansion of device lending program
	  ○ Creation of Mobile Van/Resource center

<table>
<tr><td></td><td>Tech Exchange
Technical support and device refurbishment program within Solano County</td></tr>
<tr><td>Interdependencies</td><td>Board of Supervisors, “Solano Connected” digital equity coalition</td></tr>
<tr><td>Potential Funding Opportunities</td><td>To execute this project, Solano County should utilize ARPA funding for the first year. For 2023, Solano County should apply for funding from the CASF Adoption Account which provides funding for digital inclusion programs including community outreach. For 2023, Solano County should assist the top performing programs in applying for funding from the CASF Adoption Account which provides funding for digital inclusion programs including digital literacy projects and broadband adoption projects. Starting 2024, Solano County should apply for the funds allocated to California from the State Digital Equity Capacity Grant Program, and/or apply directly to the Competitive Grant Program. Solano County should actively begin planning and reaching out to California's state leaders to learn how the county can be engaged in the process. They should also begin the application for the CASF Adoption Account which can be applied for by January 1st, 2023.</td></tr>
<tr><td>Target Outcomes</td><td>The main target outcome of this funding is to incentivize and provide an opportunity for organizations to pursue digital equity projects. With the establishment of this program, the County should aim to see an increase of digital equity project ideas and see the successful development of the projects that were funded.

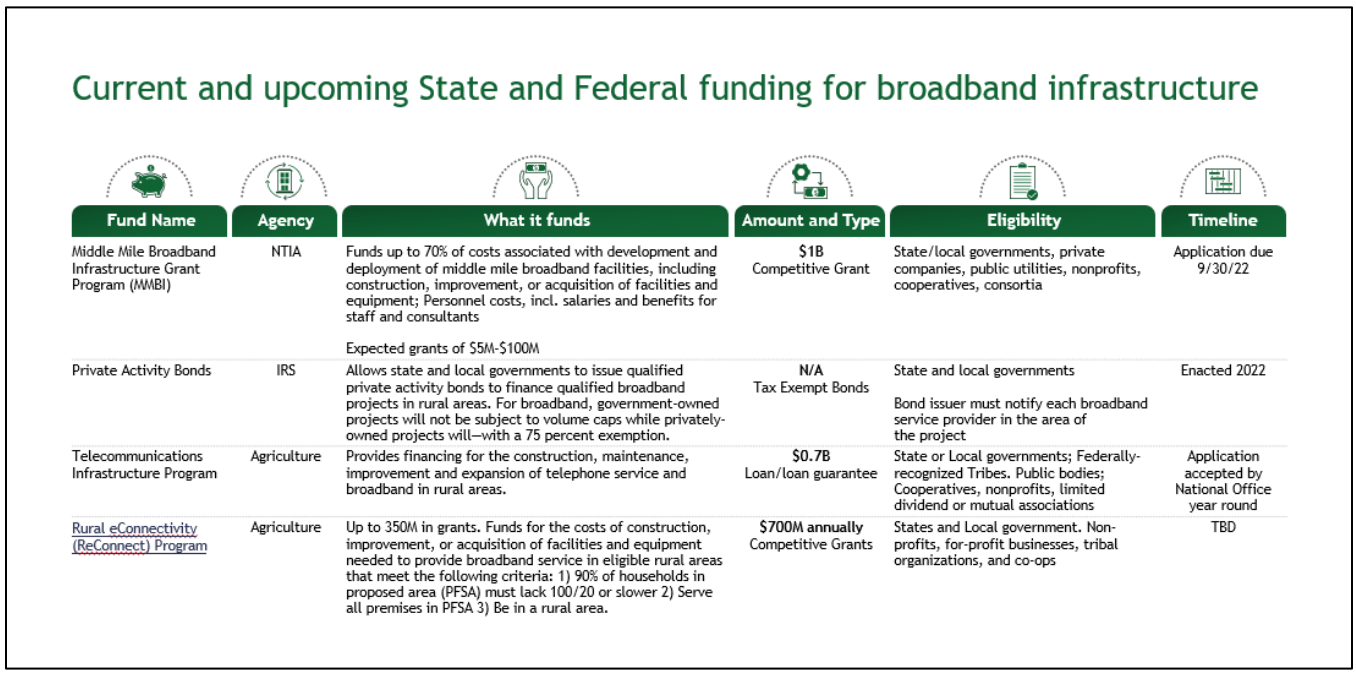
Given the funding will partner with the coalition for reviewing of the applications, the aim is to provide other support and resources for projects that are not selected for funding.</td></tr>
<tr><td>Cost</td><td>$100,000

<table><tr><th>Component</th><th>Cost</th></tr><tr><td>Funding for $10,000 grants to 10 organizations</td><td>$100,000</td></tr><tr><td>Total</td><td>$100,000</td></tr></table></td></tr>
</table>

9.5 Funding Opportunities

9.5.1 Current and upcoming Federal broadband funding programs

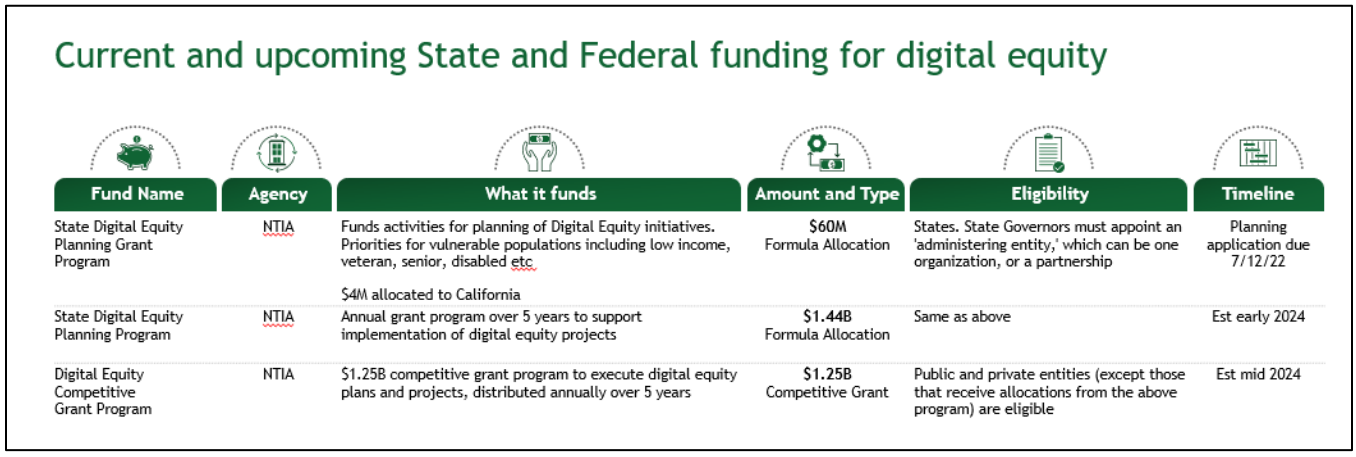
Figure 18: Current and upcoming State and Federal funding for broadband infrastructure



Current and upcoming State and Federal funding for broadband infrastructure

Fund Name	Agency	What it funds	Amount and Type	Eligibility	Timeline
Middle Mile Broadband Infrastructure Grant Program (MMBI)	NTIA	Funds up to 70% of costs associated with development and deployment of middle mile broadband facilities, including construction, improvement, or acquisition of facilities and equipment; Personnel costs, incl. salaries and benefits for staff and consultants Expected grants of $5M-$100M	$1B Competitive Grant	State/local governments, private companies, public utilities, nonprofits, cooperatives, consortia	Application due 9/30/22
Private Activity Bonds	IRS	Allows state and local governments to issue qualified private activity bonds to finance qualified broadband projects in rural areas. For broadband, government-owned projects will not be subject to volume caps while privately-owned projects will—with a 75 percent exemption.	N/A Tax Exempt Bonds	State and local governments Bond issuer must notify each broadband service provider in the area of the project	Enacted 2022
Telecommunications Infrastructure Program	Agriculture	Provides financing for the construction, maintenance, improvement and expansion of telephone service and broadband in rural areas.	$0.7B Loan/loan guarantee	State or Local governments; Federally-recognized Tribes. Public bodies; Cooperatives, nonprofits, limited dividend or mutual associations	Application accepted by National Office year round
Rural eConnectivity (ReConnect) Program	Agriculture	Up to 350M in grants. Funds for the costs of construction, improvement, or acquisition of facilities and equipment needed to provide broadband service in eligible rural areas that meet the following criteria: 1) 90% of households in proposed area (PFSA) must lack 100/20 or slower 2) Serve all premises in PFSA 3) Be in a rural area.	$700M annually Competitive Grants	States and Local government. Non-profits, for-profit businesses, tribal organizations, and co-ops	TBD

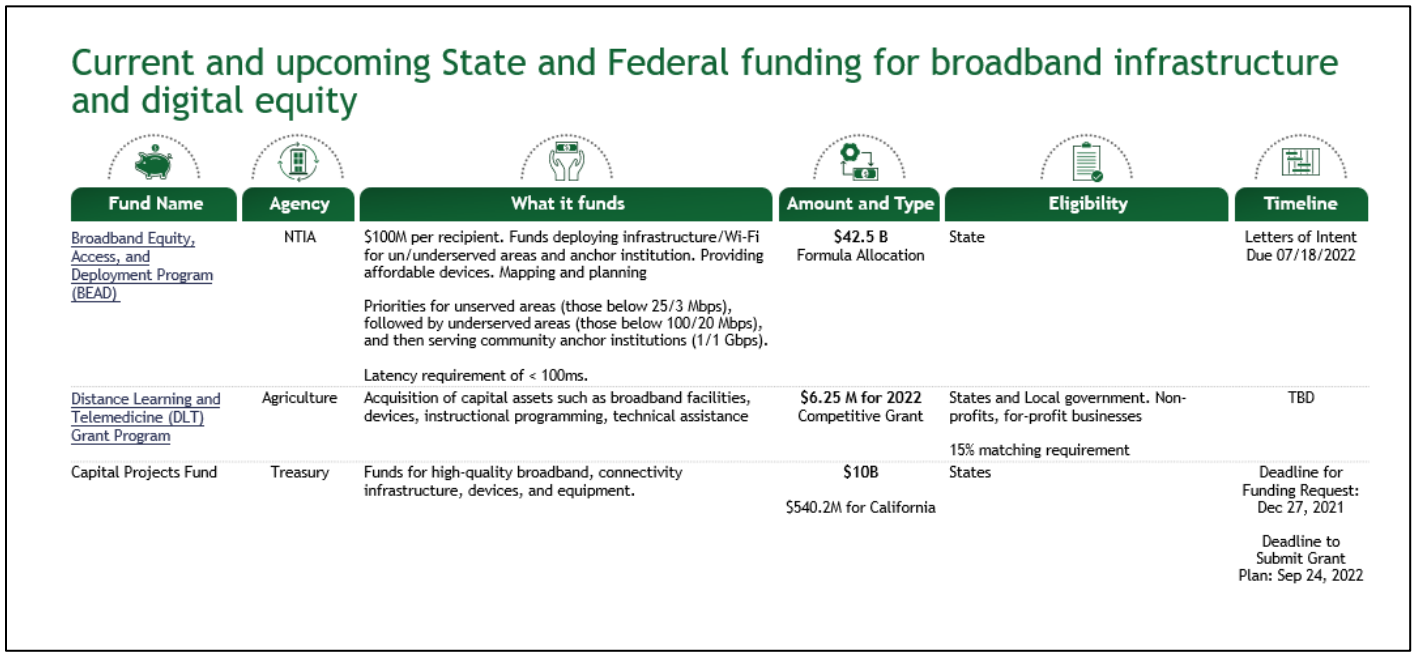
Figure 19: Current upcoming State and Federal funding for digital equity



Current and upcoming State and Federal funding for digital equity

Fund Name	Agency	What it funds	Amount and Type	Eligibility	Timeline
State Digital Equity Planning Grant Program	NTIA	Funds activities for planning of Digital Equity initiatives. Priorities for vulnerable populations including low income, veteran, senior, disabled etc $4M allocated to California	$60M Formula Allocation	States. State Governors must appoint an 'administering entity,' which can be one organization, or a partnership	Planning application due 7/12/22
State Digital Equity Planning Program	NTIA	Annual grant program over 5 years to support implementation of digital equity projects	$1.44B Formula Allocation	Same as above	Est early 2024
Digital Equity Competitive Grant Program	NTIA	$1.25B competitive grant program to execute digital equity plans and projects, distributed annually over 5 years	$1.25B Competitive Grant	Public and private entities (except those that receive allocations from the above program) are eligible	Est mid 2024

Figure 20: Current and upcoming State and Federal funding for broadband infrastructure and digital equity



Current and upcoming State and Federal funding for broadband infrastructure and digital equity

Fund Name	Agency	What it funds	Amount and Type	Eligibility	Timeline
Broadband Equity, Access, and Deployment Program (BEAD)	NTIA	$100M per recipient. Funds deploying infrastructure/Wi-Fi for un/underserved areas and anchor institution. Providing affordable devices. Mapping and planning Priorities for unserved areas (those below 25/3 Mbps), followed by underserved areas (those below 100/20 Mbps), and then serving community anchor institutions (1/1 Gbps). Latency requirement of < 100ms.	**$42.5 B** Formula Allocation	State	Letters of Intent Due 07/18/2022
Distance Learning and Telemedicine (DLT) Grant Program	Agriculture	Acquisition of capital assets such as broadband facilities, devices, instructional programming, technical assistance	**$6.25 M for 2022** Competitive Grant	States and Local government. Non-profits, for-profit businesses 15% matching requirement	TBD
Capital Projects Fund	Treasury	Funds for high-quality broadband, connectivity infrastructure, devices, and equipment.	**$10B** $540.2M for California	States	Deadline for Funding Request: Dec 27, 2021 Deadline to Submit Grant Plan: Sep 24, 2022

9.5.2 Current and upcoming broadband funding for local governments and stakeholders

Figure 21: Current and upcoming funding opportunities for broadband infrastructure Solano County and partners can pursue (1 of 2)

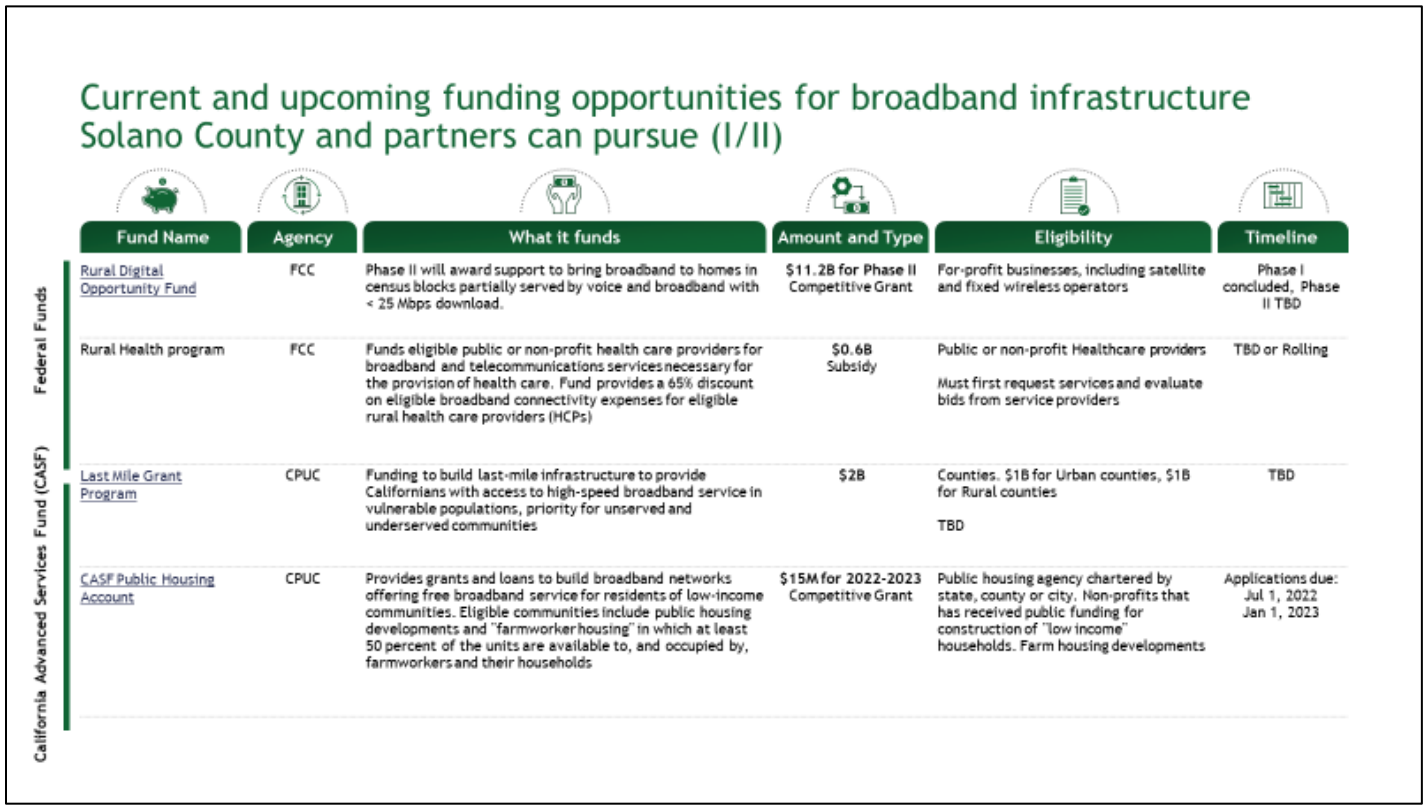


Figure 22: Current and upcoming funding opportunities for broadband infrastructure Solano County and partners can pursue (2 of 2)

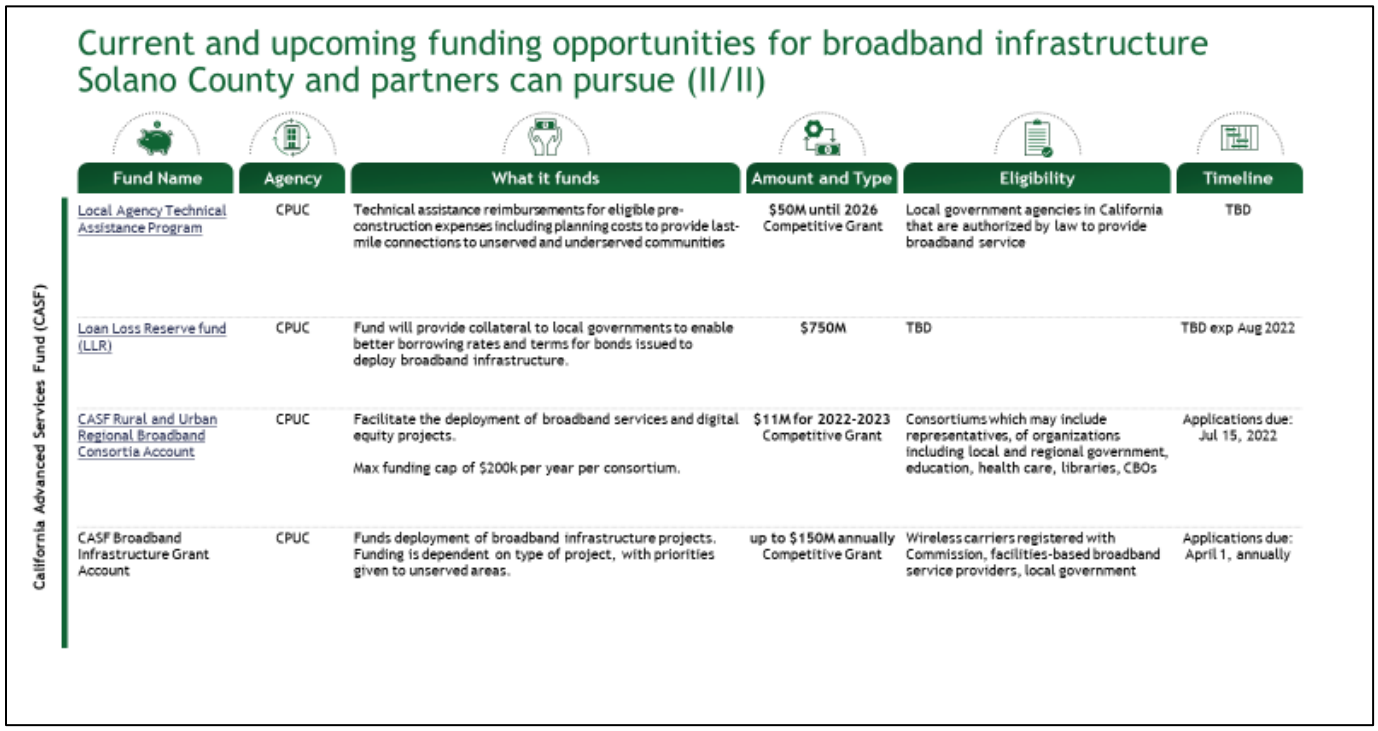


Figure 23: Current and upcoming funding opportunities for digital equity Solano County and partners can pursue

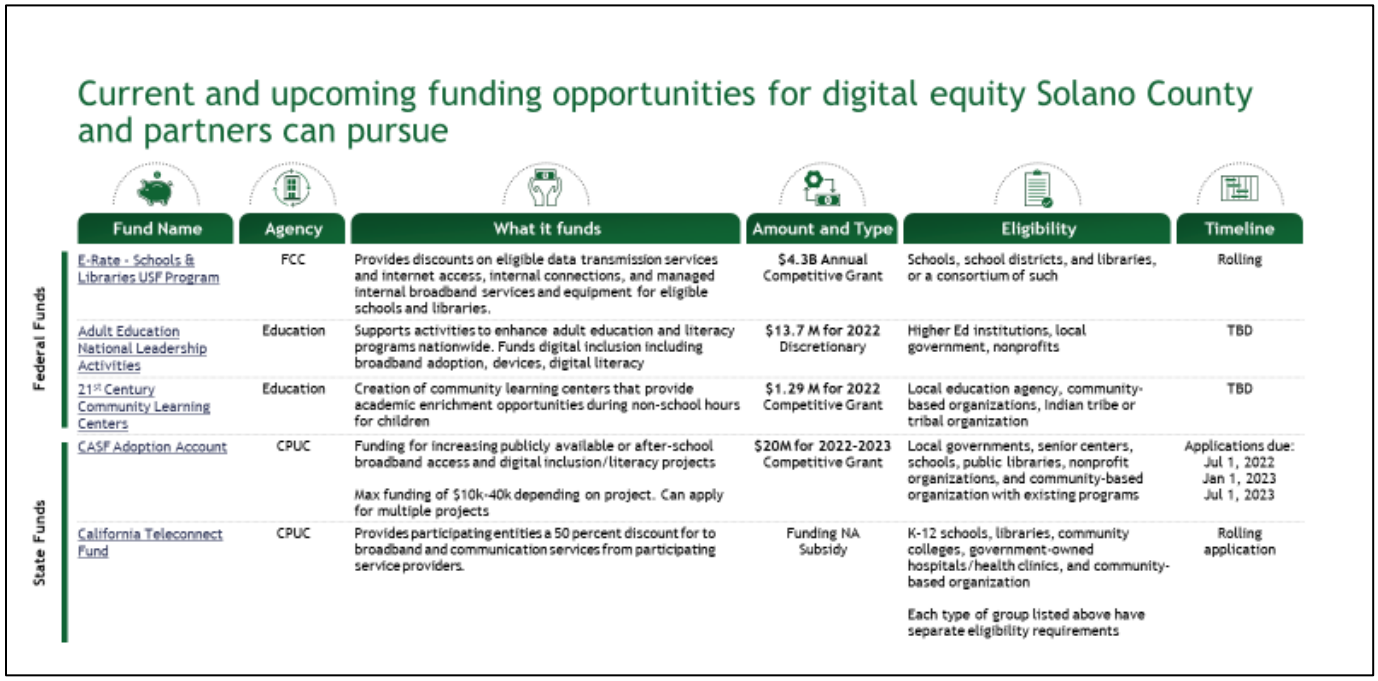
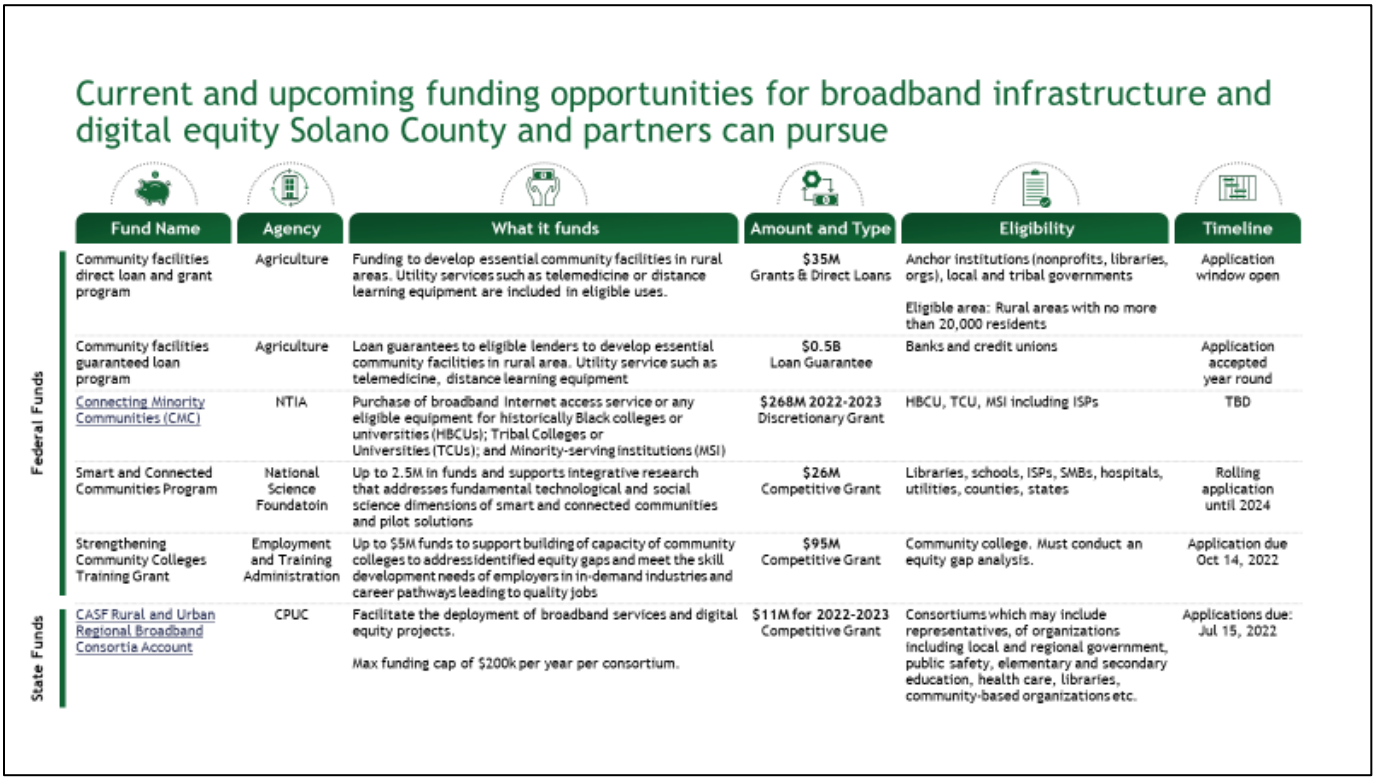


Figure 24: Current and upcoming funding opportunities for broadband infrastructure and digital equity Solano County and partners can pursue

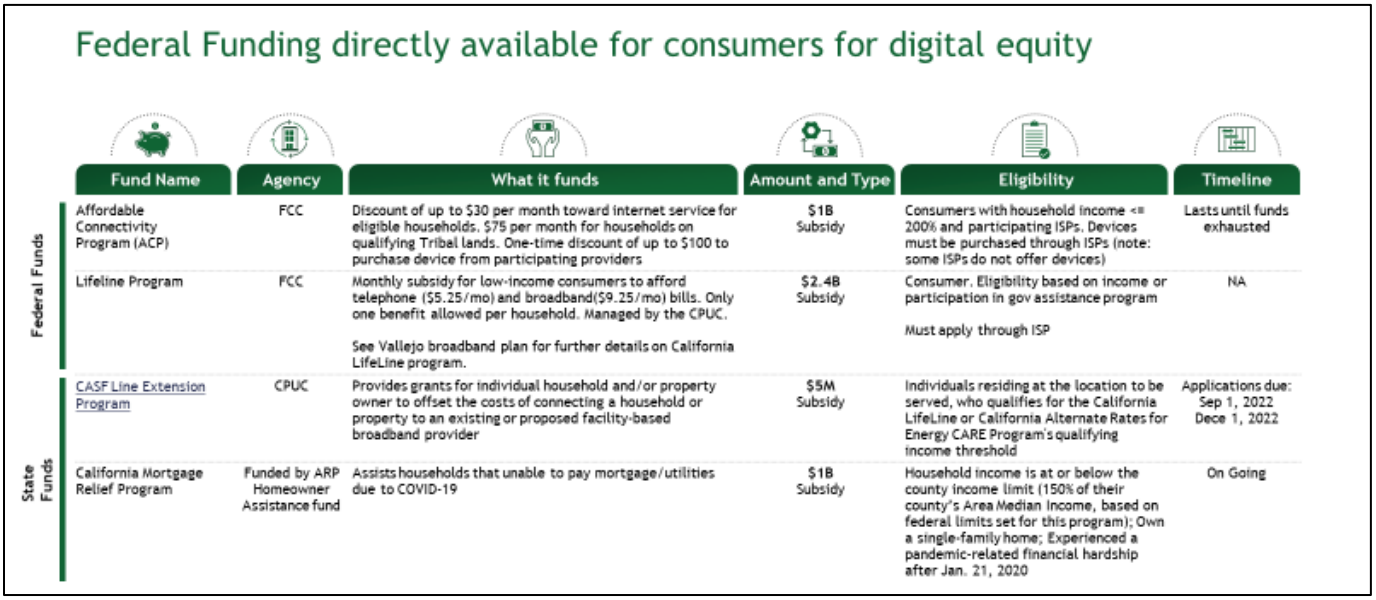


Current and upcoming funding opportunities for broadband infrastructure and digital equity Solano County and partners can pursue

	Fund Name	Agency	What it funds	Amount and Type	Eligibility	Timeline
Federal Funds	Community facilities direct loan and grant program	Agriculture	Funding to develop essential community facilities in rural areas. Utility services such as telemedicine or distance learning equipment are included in eligible uses.	$35M Grants & Direct Loans	Anchor institutions (nonprofits, libraries, orgs), local and tribal governments Eligible area: Rural areas with no more than 20,000 residents	Application window open
Federal Funds	Community facilities guaranteed loan program	Agriculture	Loan guarantees to eligible lenders to develop essential community facilities in rural area. Utility service such as telemedicine, distance learning equipment	$0.5B Loan Guarantee	Banks and credit unions	Application accepted year round
Federal Funds	Connecting Minority Communities (CMC)	NTIA	Purchase of broadband internet access service or any eligible equipment for historically Black colleges or universities (HBCUs); Tribal Colleges or Universities (TCUs); and Minority-serving institutions (MSI)	$268M 2022-2023 Discretionary Grant	HBCU, TCU, MSI including ISPs	TBD
Federal Funds	Smart and Connected Communities Program	National Science Foundatoin	Up to 2.5M in funds and supports integrative research that addresses fundamental technological and social science dimensions of smart and connected communities and pilot solutions	$26M Competitive Grant	Libraries, schools, ISPs, SMBs, hospitals, utilities, counties, states	Rolling application until 2024
Federal Funds	Strengthening Community Colleges Training Grant	Employment and Training Administration	Up to $5M funds to support building of capacity of community colleges to address identified equity gaps and meet the skill development needs of employers in in-demand industries and career pathways leading to quality jobs	$95M Competitive Grant	Community college. Must conduct an equity gap analysis.	Application due Oct 14, 2022
State Funds	CASF Rural and Urban Regional Broadband Consortia Account	CPUC	Facilitate the deployment of broadband services and digital equity projects. Max funding cap of $200k per year per consortium.	$11M for 2022-2023 Competitive Grant	Consortiums which may include representatives, of organizations including local and regional government, public safety, elementary and secondary education, health care, libraries, community-based organizations etc.	Applications due: Jul 15, 2022

9.5.3 Funding for consumers for broadband adoption

Figure 25: Federal funding directly available for consumers for digital equity



Federal Funding directly available for consumers for digital equity

	Fund Name	Agency	What it funds	Amount and Type	Eligibility	Timeline
Federal Funds	Affordable Connectivity Program (ACP)	FCC	Discount of up to $30 per month toward internet service for eligible households. $75 per month for households on qualifying Tribal lands. One-time discount of up to $100 to purchase device from participating providers	$1B Subsidy	Consumers with household income <= 200% and participating ISPs. Devices must be purchased through ISPs (note: some ISPs do not offer devices)	Lasts until funds exhausted
Federal Funds	Lifeline Program	FCC	Monthly subsidy for low-income consumers to afford telephone ($5.25/mo) and broadband($9.25/mo) bills. Only one benefit allowed per household. Managed by the CPUC. See Vallejo broadband plan for further details on California LifeLine program.	$2.4B Subsidy	Consumer. Eligibility based on income or participation in gov assistance program Must apply through ISP	NA
State Funds	CASF Line Extension Program	CPUC	Provides grants for individual household and/or property owner to offset the costs of connecting a household or property to an existing or proposed facility-based broadband provider	$5M Subsidy	Individuals residing at the location to be served, who qualifies for the California LifeLine or California Alternate Rates for Energy CARE Program's qualifying income threshold	Applications due: Sep 1, 2022 Dece 1, 2022
State Funds	California Mortgage Relief Program	Funded by ARP Homeowner Assistance fund	Assists households that unable to pay mortgage/utilities due to COVID-19	$1B Subsidy	Household income is at or below the county income limit (150% of their county's Area Median Income, based on federal limits set for this program); Own a single-family home; Experienced a pandemic-related financial hardship after Jan. 21, 2020	On Going

9.6 Community stakeholder study participants

Type of organization	Organization	1 on 1 Interview	Expressed Coalition Interest
Anchor Institution	Solano County Public Library	Yes	Yes
CBO	Florence E. Douglas Senior Citizens Center	No	Yes
CBO	Solano Hispanic Costa & Solano	No	Yes
City	City of Benicia	Yes	Yes
City	City of Dixon	Yes	Yes
City	City of Fairfield	Yes	Yes
City	City of Rio Vista	Yes	Yes
City	City of Vacaville	Yes	Yes
City	City of Vacaville	Yes	Yes
City	City of Vallejo	Yes	Yes
City	Suisan City	Yes	Yes
County Agency	Department of Health and Social Services	Yes	Yes
County Agency	Employment and Eligibility Services (HSS)	Yes	Yes
County Agency	Solano County Farm Bureau	Yes	Yes
County Agency	Solano County Office of Education	Yes	Yes
County Agency	Solano County Planning Services	Yes	Yes
County Agency	Solano Transportation Authority	Yes	Yes
ISP	Digital Path	Yes	
ISP	Astound Broadband Powered by Wave	Yes	Yes
ISP	AT&T	Yes	Yes
ISP	Comcast	Yes	Yes
ISP	Frontier Communications	Yes	Yes
ISP	Internet Planet	Yes	Yes
ISP	Valley Internet	Yes	Yes
ISP	Cal.Net	Yes	Yes
Nonprofit	Digital Literacy Rocks	Yes	Yes
Nonprofit	Solano County Community Foundation	Yes	Yes
Nonprofit	Solano County Economic Development Corporation	Yes	Yes
Nonprofit	Solano County Workforce Development Board	Yes	Yes
Nonprofit	Tech Exchange	Yes	Yes
Other	Trilogy Residential Community Rio Vista	No	
School	Benicia Unified School District	No	
School	Vacaville Unified School District	No	
School	Dixon Unified School District	Yes	Yes
School	Fairfield-Suisun School District	Yes	Yes
School	Solano Community College	Yes	Yes
School	Travis Unified School District	Yes	Yes
School	Vallejo City Unified School District	Yes	Yes
State Agency	California Department of Technology	No	
State Agency	CalTrans	No	

Additional Potential Partner Organizations

Type of organization	Organization Name
CBO	Cleo Gordon Family Resource Center
CBO	Benicia Family Resource Center
CBO	Dixon Family Services
CBO	Fairfield Adult Recreation Center
CBO	Fairfield-Suisan Healthy Start family Resource Center
CBO	Fighting Back Partnership's family resource center
CBO	Filipino Community of Solano County
CBO	Rio Vista CARE
CBO	Vacaville Family Resource Center
CBO	Dixon Migrant Center
County Agency	Solano Youth Coalition (program of Office of Ed)
County Agency	Tribal TANF
County Agency	Vibe Solano (Bureau of Solano County Public Health Division)
Nonprofit	Ability Now Bay Area
Nonprofit	EveryoneOn
Nonprofit	Faith in Action
Nonprofit	Foodbank of Contra Costa & Solano
Nonprofit	Homebase
Nonprofit	Leaven Kids
Nonprofit	Meals on Wheels Solano
Nonprofit	Solano Heals
Nonprofit	SparkPoint Solano

9.7 Works Cited

Bailey, V. (Aug. 6, 2021). Limited Broadband Poses a Significant Barrier to Telehealth Access. https://mhealthintelligence.com/news/limited-broadband-poses-a-significant-barrier-to-telehealth-access

Barrero, J. M., Bloom, N., Davis, S. J. (Sept. 2021). Internet Access and its Implications for Productivity, Inequality, and Resilience. https://www.nber.org/papers/w29102

BestNeighborhood. (n.d.). Cable internet providers and TV companies in Solano County, CA. BestNeighborhood. https://bestneighborhood.org/cable-tv-and-internet-solano-county-ca/

BroadbandNow. (2021, November 30). National Broadband Map. BroadbandNow. https://broadbandnow.com/national-broadband-map

BroadbandNow. (2022, July 14). The top 5 internet providers in Fairfield, CA (Jul 2022). BroadbandNow. https://broadbandnow.com/California/Fairfield

California Public Utilities Commission. (n.d.). California Advanced Services Fund (CASF). California Public Utilities Commission. https://www.cpuc.ca.gov/industries-and-topics/internet-and-phone/california-advanced-services-fund

Cigna (2021). Convenient, Cost-Effective, and High-Quality Virtual Care Is Here to Stay. https://newsroom.cigna.com/convenient-cost-effective-and-high-quality-virtual-care-is-here-to-stay

Columbia Telecommunications Corporation. (Apr. 29, 2022). Broadband Master Plan & Digital Equity Strategy Prepared for the City of Vallejo, California. City of Vallejo. https://www.myvallejo.com/broadband

Connect Arizona. (2022, April 6). Digital Navigators. Connect Arizona. https://connect-arizona.com/digital-navigators

Connected Nation. (2022, June 8). Broadband Related Funding. Connected Nation. https://connectednation.org/current-broadband-funding/

Federal Communications Commission. (2014, June 24). Types of broadband connections. Federal Communications Commission. https://www.fcc.gov/general/types-broadband-connections

Federal Communications Commission. (2021, November 10). Fixed Broadband deployment data from FCC Form 477. https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477

Federal Communications Commission. (2022, May 9). Affordable Connectivity Program. Federal Communications Commission. https://www.fcc.gov/acp

Grant, A., Tyner, W. E., DeBoer, L. (Aug. 2018). Estimation of the Net Benefits of Indiana Statewide Adoption of Rural Broadband. https://pcrd.purdue.edu/wp-content/uploads/2018/12/006-RPINsights-Indiana-Broadband-Study.pdf

Kiesel, K. and A. Spalding. (2019). “Towards a Solano County Local Food System." Feasibility Study of Sustainable Solano. https://kiesel.ucdavis.edu/Feasibility%20study%20Final_April%202019.pdf

Lo, J., Rae, M., Cox, C., Panchal, N., and Miller, B. F. (Mar. 15, 2022) Telehealth Has Played an Outsized Role Meeting Mental Health Needs During the COVID-19 Pandemic. https://www.kff.org/coronavirus-covid-19/issue-brief/telehealth-has-played-an-outsized-role-meeting-mental-health-needs-during-the-covid-19-pandemic/

National Digital Inclusion Alliance. (2022, July 7). National Digital Inclusion Alliance. https://www.digitalinclusion.org/

National Digital Inclusion Alliance. (Feb 24, 2022). Digital Inclusion Coalition Guidebook. https://www.digitalinclusion.org/blog/2022/02/24/ndia-publishes-new-digital-inclusion-coalition-guidebook/#

National Telecommunications and Information Administration. (n.d.). *Data & Mapping*. BroadbandUSA. https://broadbandusa.ntia.doc.gov/resources/data-and-mapping

National Telecommunications and Information Administration. (n.d.). Federal Funding. BroadbandUSA. https://broadbandusa.ntia.doc.gov/resources/federal/federal-funding

National Telecommunications and Information Administration. (n.d.). State Digital Equity Planning Grant Program. NTIA Grants Portal. https://grants.ntia.gov/grantsPortal/s/funding-program/a0g3d00000018OlAAI/state-digital-equity-planning-grant-program

Office of Innovation and Technology, Philadelphia’s Digital Navigator Report and Factsheet 2021 (2021). Philadelphia, Pennsylvania; City of Philadelphia. https://www.phila.gov/media/20211206155728/DigitalNavigatorReport.pdf

Pew Research Center, February 2022, COVID-19 Pandemic Continues to Reshape Work in America. https://www.pewresearch.org/social-trends/wp-content/uploads/sites/3/2022/02/PSDT_2.16.22_covid_work_report_clean.pdf

Queens University of Charlotte. (n.d.). Digital Charlotte. Digital Charlotte. https://www.queens.edu/about/centers/digital-charlotte.html

Roseth, B., Reyes, A. M., Amézaga, K. Y. (2021) Public Services and Digital Government During the Pandemic: Perspectives of Citizens, Civil Servants, and Government Institutions. https://publications.iadb.org/publications/english/document/Public-Services-and-Digital-Government-during-the-Pandemic-Perspectives-of-Citizens-Civil-Servants-and-Government-Institutions.pdf

Speedtest by Ookla. (May 2022). United States' Mobile and Fixed Broadband Internet Speeds. Speedtest Global Index.
https://www.speedtest.net/global-index/united-states#market-analysis

State of California. (n.d.). Broadband for All.
https://broadbandforall.cdt.ca.gov/

U.S. Congressional Research Service. Remote Learning for K-12 Schools During the COVID-19 Pandemic (R46883; Aug. 20, 2021), by Rita R. Zota and Goris Granovskly.
https://sgp.fas.org/crs/misc/R46883.pdf

U.S. Census Bureau. (2020). 2020 American Community Survey 5-Year Estimates: Selected Social Characteristics In the United States.
https://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t

U.S. Department of Education, National Center for Education Statistics (2022). Impact of the Coronavirus (COVID-19) Pandemic on Public and Private Elementary and Secondary Education in the United States (Preliminary Data): Results from the 2020-21 National Teacher and Principal Survey (NTPS).
https://nces.ed.gov/fastfacts/display.asp?id=79

U.S. Department of Education, National Center for Education Statistics (2019). Characteristics of Public and Private Elementary and Secondary Schools in the United States: Results From the 2017–18 National Teacher and Principal Survey First Look, Table 3.
https://nces.ed.gov/fastfacts/display.asp?id=79

U.S. Department of Health and Human Services (Dec. 3, 2021). New HHS Study Shows 63-Fold Increase in Medicare Telehealth Utilization During the Pandemic.
https://www.hhs.gov/about/news/2021/12/03/new-hhs-study-shows-63-fold-increase-in-medicare-telehealth-utilization-during-pandemic.html

U.S. Department of Health and Human Services (Dec. 3, 2021). New HHS Study Shows 63-Fold Increase in Medicare Telehealth Utilization During the Pandemic.
https://www.hhs.gov/about/news/2021/12/03/new-hhs-study-shows-63-fold-increase-in-medicare-telehealth-utilization-during-pandemic.html