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TOWN OF TIBURON, CA

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# Broadband Strategic Plan

DRAFT: JUNE 2022



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# 1. Executive Summary

The Town of Tiburon partnered with Magellan Advisors to develop a Broadband Strategic Plan to ensure equal access to high-speed internet, known as broadband, throughout the Tiburon community and surrounding peninsula. The need for quality, affordable, reliable broadband is becoming a paramount concern for cities and towns to support their residents and businesses. As the technology advances, the availability of high-speed internet affects many aspects of communities, from economic development to property values. To provide the benefits of broadband, Tiburon has decided to take an active role in planning for this critical infrastructure on behalf of its constituents.

## 1.1 SUMMARY OF FINDINGS

To ascertain the needs and current state of broadband in Tiburon, Magellan conducted two resident workshops, various interviews with Town personnel and utilities providers, and an online survey. Magellan's team also collected information about existing broadband assets such as fiber, conduit, and pole infrastructure in Tiburon that could be leveraged and expanded to create a more robust network. Additionally, market research was conducted to identify incumbent internet service providers and their offerings, and a business model and partnership evaluation was performed to determine how the Town could work with others across the region to implement a sustainable municipal broadband program that would bring the most benefits to the community.

Key findings of this research indicated that:

- Tiburon currently has two main competitors providing fixed broadband, although not all service offerings are available in all locations and the infrastructure is dated.
- Overall, survey respondents are satisfied with their current broadband; however, price and reliability are concerns.
- Underserved pockets, in which actual speeds are below the federal definition of broadband<sup>1</sup>, exist in some areas on the peninsula, although these are not widespread.
- Tiburon residents expressed concerns about future needs for broadband.
- Little, if any, fiber-optic broadband infrastructure exists today on the peninsula.
- Private Internet Service Providers (ISPs) are interested in partnering with the Town to bring a competitive fiber network to all the residents in Tiburon and surrounding unincorporated county areas on the peninsula.
- .

<sup>1</sup> The Federal Communications Commission (FCC) defines broadband as high-speed internet connections that meet or exceed 25 megabits per second download and 3 megabits per second upload, commonly abbreviated as 25/3 mbps.

Upon completion of this research, it became clear that if the Town of Tiburon seeks a high quality, reliable, competitive broadband environment, the Town should take a role in creating solutions across the peninsula. The Tiburon peninsula has geographic and density barriers that preclude new ISPs from entering the market due to the high construction costs and relatively long return on investment. High construction cost coupled with low density, with homes on big lots that are not close together, make it difficult for-profit companies to build in areas like Tiburon. However, the Town can take steps to invest in new fiber-optic infrastructure that will lower barriers to entry, creating a more competitive environment to put downward pressure on prices and provide a choice in service providers.

Based on the current broadband needs in Tiburon, as well as the capacity and organizational structure of the Town itself, we do not recommend that Tiburon enter the market offering retail services. Rather, Tiburon should strategically fund, build, and opportunistically lease fiber along Tiburon Boulevard from Highway 101 to Ferry Boat Landing to make it easier for new entrants to reach Tiburon's neighborhoods. Tiburon has a prime opportunity for significant costs in constructing this fiber because Caltrans has an upcoming project from Highway 131 from highway 101 to Ferry Boat Landing that can be leveraged to limit excavation, restoration, and traffic disruption.

This fiber should be leased at competitive rates to accelerate deployments and upgrades through public-private partnership agreements. Ideally, the project could be structured such that committed service provider lease fees and would cover financial requirements for the build. This can be accomplished by conducting a competitive procurement process in tandem with the design of the fiber route to identify partners that will lease the fiber and what they will pay.

Once this first leg is built and providers have greater access to the peninsula, Tiburon should encourage a third-party internet service provider to build fiber into neighborhoods, including the laterals and drops to each household. At least two ISPs, Astound and Open 5G, have already expressed interest in partnering with the Town.

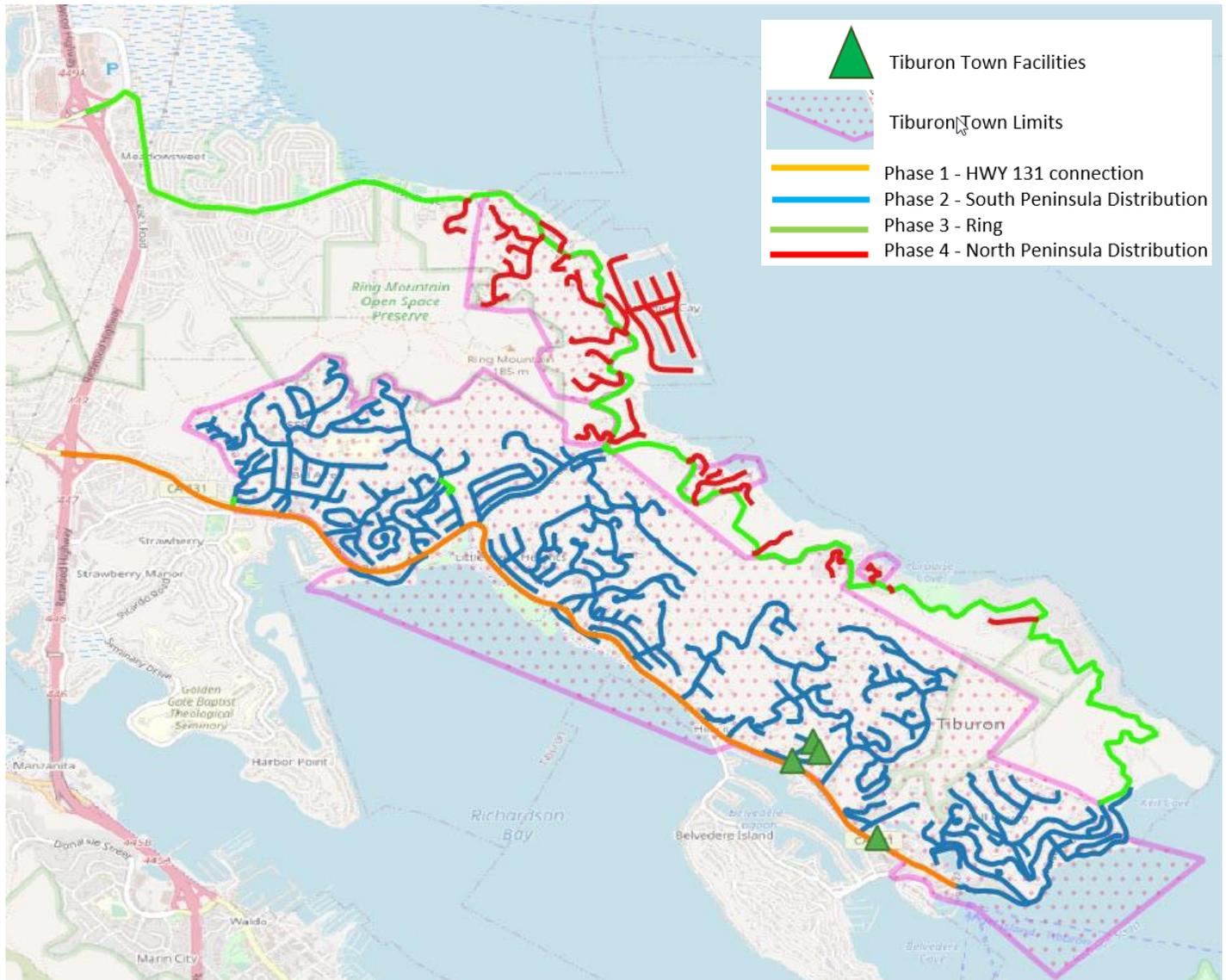
To align with this vision, Magellan created a network design for the Town to leverage existing infrastructure, joint build with planned projects such as the Caltrans construction along Highway 101 and invest in new fiber-optic infrastructure that will meet the broadband needs of residents across the peninsula. A high-level cost analysis was conducted, as well as research about options for funding the network through federal and state programs.

## 1.2 NETWORK DESIGN

The proposed network (see Figure 1-1 below) is designed as a fiber-to-the-premises architecture bringing fiber connectivity to the edge of all properties in the area. The network should be built in four (4) phases, addressing the areas of greatest need first. The full network will create a redundant ring that will provide uninterrupted service to residents and businesses; the ring

ensures that even if the fiber is cut in one location, data can continue to be sent and received from the other direction.

Figure 1-1. High-Level Design by Phase



We recommend that only Phase 1 be built by the Town of Tiburon and Phases 2-4 be built by a partnering ISP through a negotiated agreement after a competitive procurement process. Phases 2-4 are shown and evaluated to demonstrate what the partner would be expected to handle as part of the agreement.

The Town should begin planning for Phase 1 by conducting design engineering and pursuing funding opportunities, while simultaneously engaging with internet service providers who are interested in the use of the asset. Construction should begin only after a partnership can be arranged and entered into in order to ensure that the asset will be used and provide the Town with a return on investment. The Town may also decide to allow the partner to construct Phase 1 as part of the partnership if funding is not available.

### 1.3 FINANCIAL IMPACT AND FUNDING

Based on current estimates for labor and materials in areas like Tiburon, we estimate the total cost of the network construction, without contingencies, to be approximately \$16.86 million, shown by phase in the table below. However, the financial impact to the Town would be for the construction of Phase 1 only, totaling approximately \$2.17 million. The remaining construction, drops, installation, and maintenance should be handled by the partner via the partnership agreement.

Table 1-1. Construction Numbers by Phase

Phase	Feet	Miles	Labor	Material	Design/Eng.	Sum of Total
Phase 1 Backbone	24,076.50	4.56	\$ 1,852,335.51	\$ 286,868.55	\$ 37,099.00	\$ 2,176,303.06
Phase 2 Distribution	245,848.05	46.57	\$ 8,017,131.40	\$ 1,657,566.20	\$ 374,683.00	\$ 10,049,380.60
Phase 3 Ring	50,862.35	9.64	\$ 1,424,178.99	\$ 356,147.27	\$ 78,081.00	\$ 1,858,407.26
Phase 4 Distribution	69,671.00	13.20	\$ 2,212,272.62	\$ 461,754.57	\$ 106,272.00	\$ 2,780,299.19
<b>Grand Total</b>	<b>390,457.90</b>	<b>73.97</b>	<b>\$ 13,505,918.52</b>	<b>\$ 2,762,336.59</b>	<b>\$ 596,135.00</b>	<b>\$ 16,864,390.11</b>

Due to Tiburon’s higher-than-average economic demographics and because the Town is considered relatively well-served in comparison to more rural environments, there is little, if any, federal grant funding available for which the Town will qualify. However, the State of California funded \$50M and is offering up to \$500k in Local Area Technical Assistance (LATA) grants, that the Town should apply for to aid in the planning, design, and engineering of the network. Other funding sources may include earmarked allocations from elected officials who take an interest in the project as well as grants from the \$150M in annual funding from the California Advanced Services Fund (CASF). Additionally, Tiburon should work with Caltrans to achieve cost savings by joint building with the planned project on Highway 131.

The revenues from the Phase 1 build will come from leasing the fiber strands to the partner with a long term, assumed 20-year IRU. The rates are based on averages found in the San Francisco Bay Area and around the country. The number fiber strands leased is estimated on expected use of the cable by the partner for the backhaul, internet connection, connection to their services, and for use a part of the distribution network. This does not include any possible use by mobile carriers wanting to deploy additional 4G and 5G towers, potentially creating a far greater revenue to the town.

Based on these assumptions, we estimate a total of \$3.18 million cumulative revenue after 20 years, with annual revenues of nearly \$200,000, as shown in the table below.

Table 1-2. Potential Revenues for Phase 1

Potential Service Revenues				
	2025	2030	2035	2040
Year #	5	10	15	20
Est Dark Fiber Leased Strands	36	36	36	36
Lease Rate \$/Mile/Strand/month	\$100.00	\$100.00	\$100.00	\$100.00

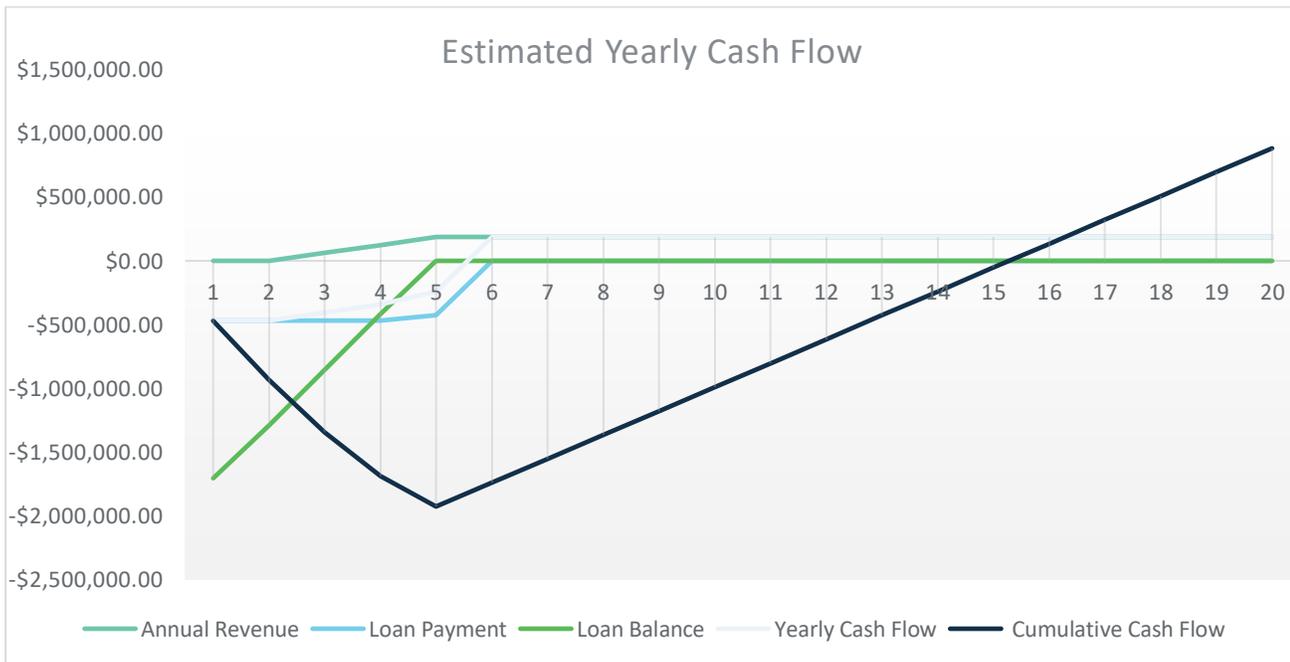
Miles Leased	4.34	4.34	4.34	4.34
<b>Total Yearly Lease Revenue</b>	<b>\$187,488.00</b>	<b>\$187,488.00</b>	<b>\$187,488.00</b>	<b>\$187,488.00</b>
<b>Cumulative</b>	<b>\$374,976.00</b>	<b>\$1,312,416.00</b>	<b>\$2,249,856.00</b>	<b>\$3,187,296.00</b>

If the Town of Tiburon invests in the full cost of Phase 1 of and finds a partner to lease fiber at the assumed rates, the Town’s investment via a loan with a 3.0% rate would reach breakeven around Year 15. Monthly payments, total loan payback, and estimated cash flow are displayed below.

Table 1-3. Loan Summary – Phase 1 Only

Funding Source - Loan	
Loan Amount	\$ 2,176,000.00
Interest Rate	3%
Terms (Months)	\$ 60.00
Compounded periods per year	12
Monthly Payment	\$ 39,099.87
<b>Total Loan payback</b>	<b>\$ 2,345,992.25</b>

Figure 1-2. Estimated Cash Flow – Phase 1 Only



### 1.3 RECOMMENDATION SUMMARY

The study allowed Magellan to develop an actionable Plan for the Town of Tiburon to accomplish the goals of supporting broadband not only in Tiburon, but also the Tiburon

peninsula, including the unincorporated parts of Marin County. Next steps for implementing this Broadband Strategic Plan include:

1. Investigate and track notices of funding opportunities for LATA and CASF grants through the State of California and other grant and loan programs that may arise. LATA grants can help cover the costs of design engineering Phase 1 of the network build, which will cost approximately \$38,000, as well as detailed design on subsequent phases, which will cost significantly more. CASF grants will also contribute to funding of future infrastructure and network expansion.
2. Apply for LATA funding for design engineering for building the Highway 131 route, connecting the Town facilities along the way, during the Phase 1 network deployment. This untapped potential fiber path has the highest impact on private companies' return on investment and will continue to prevent private investment in Tiburon. To offset these concerns, the Town should invest in this path into Tiburon to attract future ISP investment in the region.
3. Develop a partnership with local ISPs for the engineering, construction, management, and maintenance of the new fiber-optic network. To start the partnership process, the Town will need to issue an RFP and engage with local ISPs and negotiate a beneficial partnership including considerations for capital that the ISP may contribute to construction, ownership of assets, revenue sharing, and other terms for the maintenance and operations of the network. Two entities, Astound and Open 5G, have already expressed interest in partnering with the Town.
4. Continue conversations with Caltrans to leverage their Hwy 131 project as much as possible to realize cost savings for joint build. This project, which is entering design phase, is a key piece of implementing Phase 1 of this Plan and is a prime opportunity to save on construction and restoration costs, as well as to minimize disruptions to the public right-of-way and traffic patterns.
5. Continue discussions with Caltrans to support the replacement of the traffic signals along Tiburon Boulevard by supplying the fiber needed to connect those signals to the Caltrans traffic control network.
6. Continue to leverage Dig Once policies and utility coordination practices to explore opportunities for joint building new conduit and fiber across the peninsula among public and private agencies. Any undergrounding projects, including initiatives being undertaken by assessment districts or other entities, should also be required to add conduit and/or fiber infrastructure while excavations are being done.
7. Investigate and set Town standards for microtrenching construction methodology that aligns with the Town's current Public Works standards for work done the public right-of-way. Because microtrenching has been developed recently, this is an evolving subject that Tiburon should consider when choosing a partner to build. Depth of the fiber, location of placement, and restoration methods should all be considered and researched to ensure that they are acceptable to Tiburon prior to allowing for this kind of construction.

8. Follow up with elected officials to propose possible ear marks and other funding options that may cover the costs of the network. Leverage these relationships to promote a sense of partnership throughout the region including ensuring alignment with other state agencies such as Caltrans.
9. Once Phase 1 is completed, work with partner ISPs to continue the construction into the neighborhoods in the southern peninsula during Phase 2. During Phase 3, work with providers to build the additional backbone route in the northern half of the peninsula, creating a redundant ring. Finally, during Phase 4, work with providers to connect homes in the northern half of the peninsula, completing the network's construction.

## 2. Current Broadband Market

### 2.1 OVERVIEW

Magellan Advisors analyzed the broadband landscape in the Town of Tiburon to determine the available options available to residents and businesses. The analysis focused on internet speeds and pricing from commercial internet service providers (ISPs). Emphasis was on “facilities-based” carriers, or those that own their own physical infrastructure including fiber, copper, and coaxial cables as well as those that own wireless infrastructure including wireless radios and satellites. This market assessment describes findings of this research and makes observations regarding the services currently offered in the area. The conclusion of these findings supports enabling increased competition, which would exert downward pressure on the price of service offerings. This competition will allow more affordable, reliable high-speed broadband options for the area's residents, businesses, and anchor institutions.

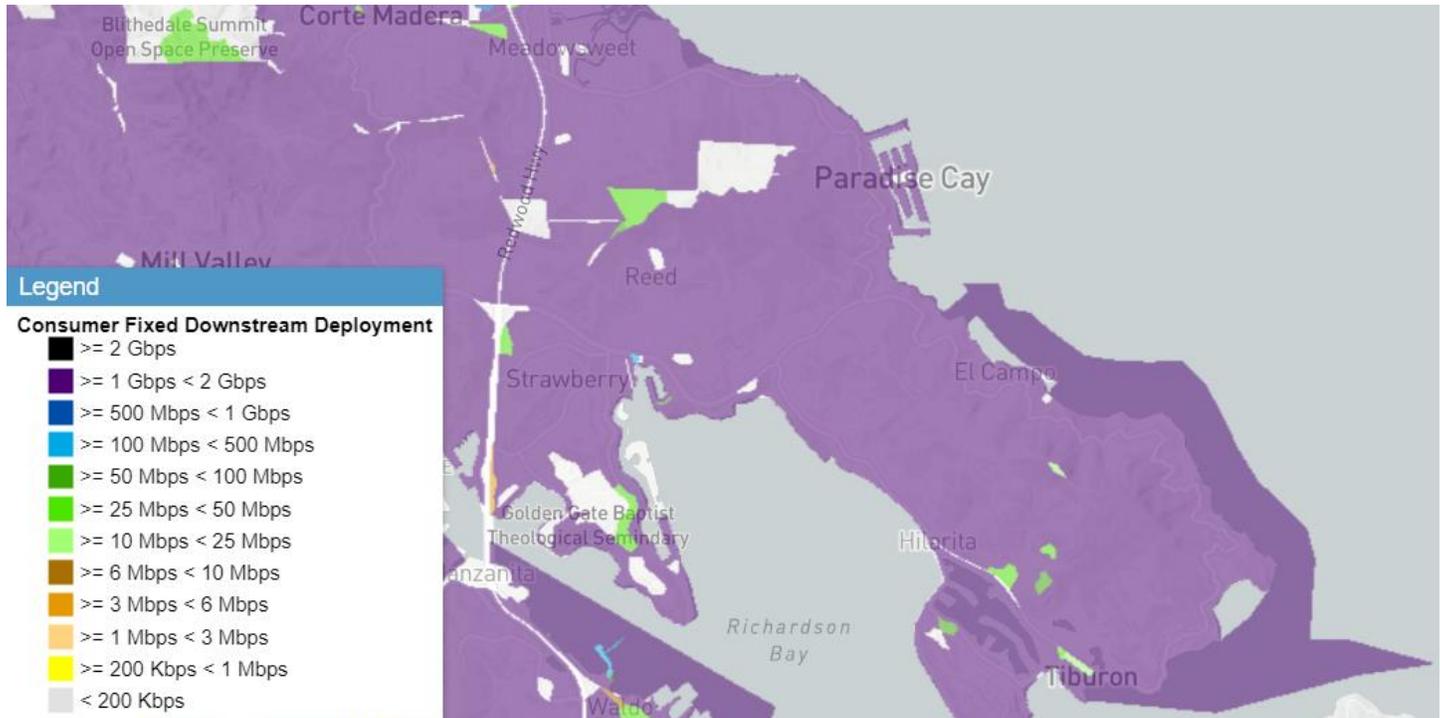
### 2.2 MARKET HIGHLIGHTS

1. The Town of Tiburon is considered served since there is at least one provider offering the federal standard of 25/3 Mbps service (Comcast) in most of the residences. See image 2-1 below.
2. The largest provider in the area is Comcast.
3. The lack of fiber connectivity into the downtown area is a roadblock mentioned by local ISPs wishing to enter the Tiburon broadband market.
4. The number of households in Tiburon coupled with the large lot sizes increases the cost of construction and presents a major challenge to private companies to meet return on investment.
5. Cellular 4G coverage is lacking by T-Mobile and, to a lesser extent, AT&T.
  - a. 5G coverage will likely lag behind other communities too.

### 2.3 MARKET ANALYSIS

According to the current California State Interactive Broadband Map (see Figure 2-1 below), Tiburon is fully served. The common current technologies used in Tiburon are digital subscriber lines (DSL) and cable (coax). There are a few businesses, including the Town Center, that have fiber-optic connections.

Figure 2-1. Broadband Coverage in Tiburon<sup>2</sup>



The two main internet service providers in Tiburon are Comcast, which offers services via coax copper cable, and AT&T, which offers services over DSL.

### Comcast Corporation

Comcast is a multinational telecommunications and media conglomerate and is the largest cable TV company and the largest internet provider in the U.S. They have over 30 million residential subscribers and 2.2 million business customers across 40 states. Net income in 2020 was over \$10 billion.

In Tiburon, Comcast delivers internet via coax cable infrastructure. Coax is a copper cable delivering speeds significantly slower than fiber and can only handle fast speeds over short distances, leading to cable companies using fiber to shorten the distances while saving costs by utilizing the existing copper/coax infrastructure. This type of system is called a hybrid fiber coax plant (HFC). Cable systems are non-symmetrical, meaning the download speeds are faster than the upload speeds.

<sup>2</sup> Source: California Interactive Broadband Map

As the legacy cable TV provider in Tiburon, Comcast has the most coverage of all the providers, offering service to most residents and businesses. They provide the traditional “Triple-Play Bundle” of voice, Cable TV and Internet. They have leveraged their installed hybrid fiber-coax (HFC) network and the DOCSIS cable data standards to provide a common set of service throughout the Town.

The focus of this study is on internet access only as we believe cable TV will become a streaming internet application. For internet access service, Comcast’s recent offerings start at 50 Mbps for \$20/month for 12 months with a one-year agreement. It also includes a discount of \$10/month for automatic electronic billing. The monthly rate jumps to \$45/month for the second year and \$60/month beyond then. This package includes 1.2 TB of data per month with 50 GB blocks automatically added at \$10 each.

Beyond this entry level offer, their recent promotional rates were 600 Mbps, 900 Mbps and 1200 Mbps for \$50/mo., \$60/mo., and \$70/mo. respectively. These rates are for 24 months with a 1-year contract. They all jump an additional \$40/mo. after the first two years. These offers include 1.2 TB of data per month with 50 GB blocks automatically added at \$10 each.

Comcast also offers a range of data rate services with no term agreement or a 1-year agreement. No term agreements add \$30/month and one-year agreements added \$10/month to the current promotional rates. A list of Comcast offerings in Tiburon is shown in Table 2-1.

*Table 2-1. Comcast Offerings in Tiburon*

<b>OFFER</b>	<b>DOWNSTREAM “UP TO” DATA RATE</b>	<b>MONTHLY PRICES</b>
<b>CURRENT PROMOTIONS</b>		
INTERNET CONNECT	50 Mbps	\$20/mo. For 12 Months, \$60/month afterwards
INTERNET SUPERFAST	600 Mbps	\$50/mo. For 24 Months, \$80/month afterwards
INTERNET ULTRAFAST	900 Mbps	\$60/mo. For 24 Months, \$90/month afterwards
INTERNET GIGABIT	1200 Mbps	\$70/mo. For 24 Months, \$100/month afterwards
<b>OTHER OFFERS</b>		
	100 Mbps	\$40/mo. For 12 months with 1 year agreement
	100 Mbps	\$60/mo. with NO agreement
	300 Mbps	\$50/mo. For 12 months with 1 year agreement
	300 Mbps	\$70/mo. with NO agreement
	600 Mbps	\$60/mo. For 12 months with 1 year agreement
	600 Mbps	\$80/mo. with NO agreement
	900 Mbps	\$70/mo. For 12 months with 1 year agreement
	900 Mbps	\$90/mo. with NO agreement

	1200 Mbps	\$80/mo. For 12 months with 1 year agreement
	1200 Mbps	\$100/mo. with NO agreement

In addition to higher speed modems, Comcast is investing in technologies and solutions to improve the overall customer experience and raise the bar for competitors and new entrants. For example, they are offering enhanced secure whole-home Wi-Fi to improve performance throughout the home and reduce Wi-Fi related call center activity. They are also integrating streaming video services, such as Netflix, into their Cable TV offering to create a seamless integration with traditional Cable TV and the new streaming services.

They are also adding new consumer services to enhance their 'bundle' and increase consumer switching costs when moving to a new provider. New services include home security with 24-hour monitoring and mobile cellular offerings. The mobile offerings are based on an MVNO (Mobile Virtual Network Operator) agreement with Verizon Wireless that gives them a Comcast-branded national wireless footprint on the Verizon Network. As of 2Q21, Comcast has over 3.4 million wireless customers generating over \$2 billion per year in revenues.

### AT&T

AT&T is the incumbent local exchange company (ILEC) or the legacy telephone company in Tiburon. Typically, the ILEC have near 100% coverage. However, our research found that in Tiburon, AT&T does not serve close to 40% of homes, mostly in the northwest corner of the town.

For broadband internet, they have legacy investments in DSL (Digital Subscriber Lines) technologies which enable data services over their installed base of copper phone wires. The data rates supported by DSL depends on the length of the copper wire and the type of DSL deployed. Thus, AT&T's offerings starts as low as 768 Kbps (8 Hillcrest Rd) and reaches a maximum of "up to" 18 Mbps (75 Round Hill Rd). 1.5 Mbps, 5 Mbps and 10 Mbps data rates were the most common.

AT&T charges the same \$45/month regardless of the actual data rate provided over their DSL infrastructure. These fees do not include the DSL modem/Wi-Fi router which adds another \$10/month "modem lease" fee making their offering even more non-competitive with Comcast Xfinity.

There does not appear to be any AT&T fiber deployed to single family units in Tiburon. Table 2-2 displays AT&T's service offerings in Tiburon.

Table 2-2. AT&T Offerings in Tiburon

AT&T OFFERINGS	DATA RATES	MONTHLY PRICES	EXTRA CHARGES
INTERNET BASICS	Up to 768 Kbps	\$45/mo.	+\$10/mo. Modem lease

			+ \$10/50GB of overage beyond 1 TB
<b>INTERNET BASICS</b>	Up to 1.5 Mbps	\$45/mo.	+\$10/mo. Modem lease
			+ \$10/50GB of overage beyond 1 TB
<b>INTERNET 10</b>	Up to 10 Mbps	\$45/mo.	+\$10/mo. Modem lease
			+ \$10/50GB of overage beyond 1 TB
<b>INTERNET 18</b>	Up to 18 Mbps	\$45/mo.	+\$10/mo. Modem lease
			+ \$10/50GB of overage beyond 1 TB

Since the pandemic and the accompanying wide-spread realization that broadband and internet access were essential to modern life, AT&T has made numerous public statements about their goal to deploy fiber to ‘pass’ millions of customers throughout their footprint.

AT&T has a large ILEC footprint across the USA as well as in California. AT&T is, in reality, SBC (Southwestern Bell Corporation) which bought AT&T Long Distance years ago and kept the well-known AT&T brand name. SBC also bought fellow ILECs Pacific Bell, Ameritech and Bell South resulting in their huge footprint. They also have a nation-wide mobile network and are deploying a lot of fiber to support towers and small cells as they expand their 5G coverage.

Figure 2-2. AT&T ILEC Footprint

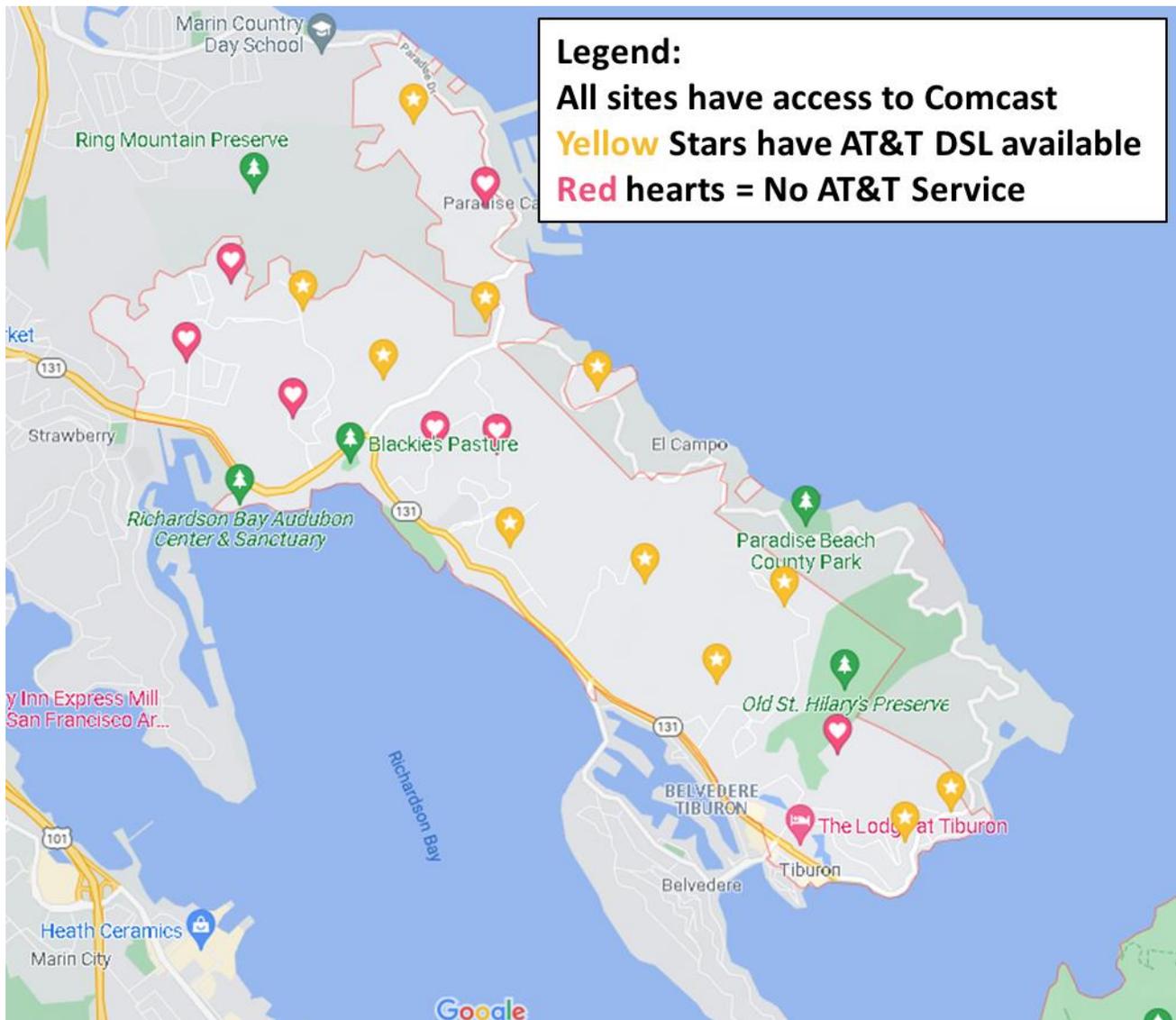


Their yearly capital budgets may be measured in the tens of billions of dollars, but this must be spent throughout their footprint as well as for national 5G rollouts. The issue for Tiburon is when and where AT&T will deploy fiber in the Town.

### Comcast and AT&T Coverage in Tiburon

To verify coverage randomly selected eighteen (18) addresses throughout the Town, shown in the map below.

Figure 2-3. Map of Addresses Tested



Using each of these addresses, we collected actual data from Comcast and AT&T about their service offerings at each location. All addresses surveyed were served by Comcast and were offered the full range of service tiers. At least one AT&T offering was available at eleven of the eighteen addresses, although top speeds offered varied.

A full list of findings is located in Appendix A.

## 2.4 NEW FIBER ENTRANTS

Given the current dynamics in Tiburon and massive amounts of investment capital, we do believe that a new fiber entrant would gain sufficient market share (take rate) to achieve sustainability. However, the issue for the Town is scale. According to the 2020 U.S. Census Department, Tiburon has 3,595 households and 1509 employers, many of which are in home

businesses. As detailed later in this Plan, in the two resident workshops conducted during this project, the majority shared concerns over competition, customer service, reliability of service, and cost for those services. Many also shared that they would be willing and are ready for another broadband option to switch to.

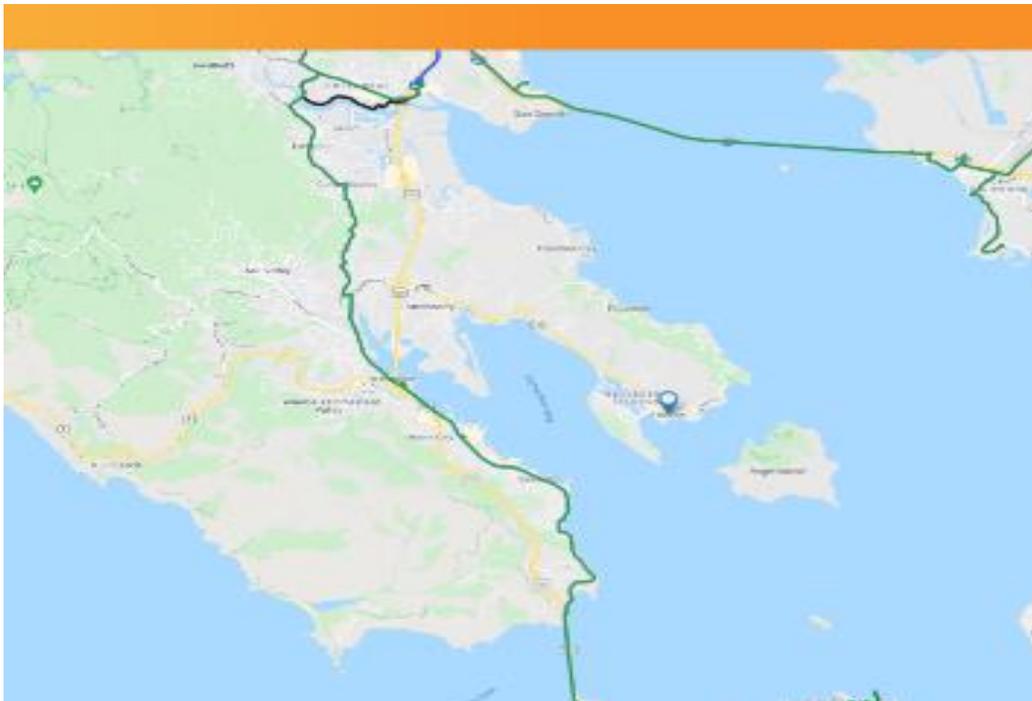
Obviously, these concerns and lack of competition lend well to a new fiber broadband provider to enter the market and gaining at least a 35-40% market share.

## 2.5 METRO FIBER, MIDDLE MILE AND EDGE DATA CENTERS

As illustrated in Figure 2-4 below, from FiberLocator, there is no reported fiber on the Tiburon peninsula. Comcast and AT&T may have fiber as part of their own infrastructure in Tiburon, however, they don't publicly report it and do not often offer it to other providers.

This lack of middle mile fiber is an issue for any new broadband provider in the Town. This applies to both public and private entities. The new broadband provider would have to deploy new fiber to connect to the fiber routes running down Camino Alto and intersecting with Highway 101 to San Francisco. Therefore, a key component of the strategy laid out in this Plan is for the Town to deploy fiber that will connect these areas, as detailed later in this document. The Town, or a private company, could also create a path redundant connection to edge data centers located in Berkely and Oakland.

Figure 2-4. Fiber in Tiburon<sup>3</sup>



<sup>3</sup> Source: FiberLocator

## 2.6 WIRELESS BROADBAND SOLUTIONS

Wireless broadband refers to the many different types of communication that are delivered without wires. Although wireless networks do not use wires, coax, or fiber as the connection to the device, all these services require a fiber backbone to transfer the wireless signal from the antenna to an internet access facility.

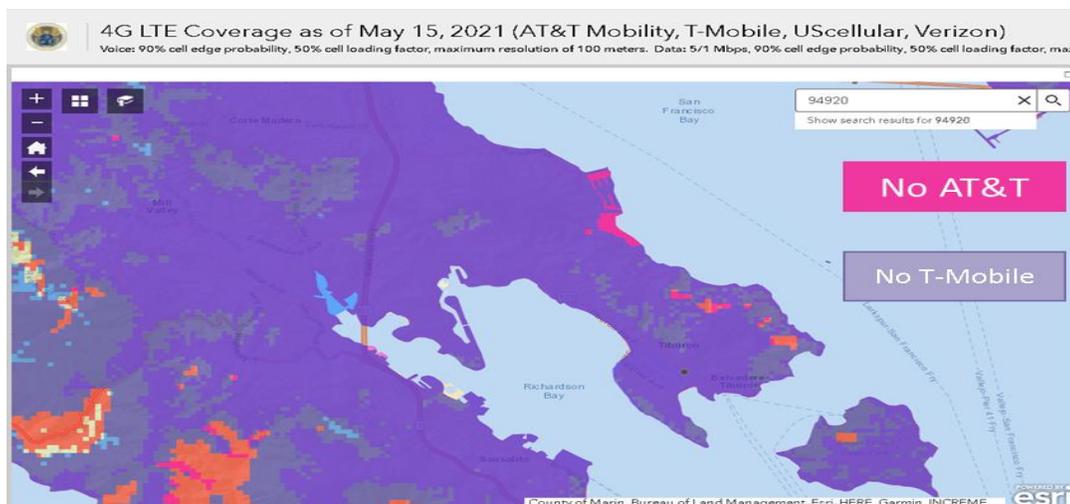
Not all wireless networks are created equal, and all have strengths and weaknesses, some shared and others specifically for a certain technology. Cellular, Wi-Fi, Citizens Broadband Radio Service (CBRS), and satellite are some of the different types. All wireless technologies have limitations in bandwidth and distance constraints, so wireless-fiber hybrid networks are the likely future of broadband deployment.

### Cellular 4G/5G Mobile Network Operators (MNOs)

In addition to the desired competitive gigabit broadband services, each community should have full coverage by the three Mobile Network Operators (MNOs) offering cellular service. Cellular is the technology used by cell phones and other devices. Cellular technology has been improving over the years with many major upgrades, from 2G, 3G 4G, 4G LTE, and now 5G and coming soon 6G. The technology focuses on how information is packaged and transmitted between devices and the cellular providers. The inherent issue with cellular is the interference with buildings, concrete, mountains, among other structures that impede the signal.

As shown in the map below, according to the FCC, only Verizon Wireless covers the entire peninsula of Tiburon with 4G today. AT&T covers the Town of Tiburon, and T-Mobile's coverage, including recently acquired Sprint, has poor coverage in the southeast part of the peninsula and the residential areas off Tiburon Boulevard.

Figure 2-5. 4G Coverage<sup>4</sup>



<sup>4</sup> Source: FCC

These companies have each have spent billions on spectrum licenses and AT&T and Verizon each spend over \$3 billion/year on advertising. They are looking to leverage this previous investment and their brand names to establish a presence in the local broadband market without having to invest in last-mile fiber. The next generation wireless standard, 5G, is being deployed today and requires more cell sites and more fiber to those sites. All three MNOs would need to deploy or lease new fiber infrastructure in Tiburon to effectively serve the Town with a fixed wireless offering. The lack of 4G, and lack of 5G upgrades, could make Tiburon a laggard in future mobile applications and services.

### **Wireless Internet Service Providers (WISP)**

WISP offer internet access over a point-to-point wireless connection. These line-of-sight technologies deploy a radio antenna at the customer premises that creates the wireless Radio Frequency (RF) connection to a centralized antenna located many miles away. WISP need to backhaul traffic to the same interconnect facilities in major cities like San Francisco. The preferred method is to use fiber. When fiber is not available, many use point-to-point wireless microwave links to the facilities.

Tiburon is very hilly with lots of trees and growth that hinder the deployment of wireless RF technologies and claims of covering the entire Town may be overstated and cannot be substantiated.

There are at least two WISP serving Tiburon: Etheric Networks and Unwired.

- Etheric claims 100% coverage and has rate plans starting at \$99/month for 3 Mbps symmetrical and climb to \$350/month for 25 Mbps symmetrical with burst up to 100 Mbps.
- Unwired covers approximately 25% of Tiburon and plans start at \$50/month for 10Mbps/3Mbps and climb to \$130/month for 22Mbps/9Mbps.

### **Satellite**

Historically, there have been only two satellite internet companies servicing the entire continental USA: HughesNet and ViaSat. Recently Starlink, as of April 2019, entered the market and started offering limited services with 4425 satellites. In February of 2019 Starlink received approval to deploy vastly more satellites in the range of 30k, allowing for better line of sight coverage leading to better services and reducing the latency, from 650-700 ms to 30-35 ms. Even at the greatly reduced latency, service is not good enough for high-bandwidth activities such as online gaming, which relies on very low latency to work properly.

The number one constraint for satellite being a legitimate option for widescale broadband deployment is the "lag" or delay between sending signals between a home satellite dish, the satellite, and the base station connecting satellites to the internet. Although the signal travels at the speed of light, traveling an average of 46,000 mile round trip to space and back leads to significant latency. Latency is higher the further away the satellites are using satellites at

23,000 miles from earth Hughesnet and Viasat have much higher latency, whereas Starlink uses much lower satellites, providing better connectivity.

Latency is the most impactful constraint; however, it is not the only one. Line of sight requirements make it a difficult deployment in areas such as Tiburon, where hills and trees are prevalent. This, in combination with the latency, results in high jitter rate, an engineering term referring to the difference in time a signal should be received and when it is actually received. Pros and cons of satellite service are listed in the figure below. For these reasons, although options such as Starlink are beneficial in some remote and geographically appropriate areas, we do not consider satellite broadband as a viable primary option for urban and suburban users. However, this could be considered as a redundant back-up link for users in Tiburon.

Figure 2-6. Satellite Pros and Cons

Pros	Cons
✓ Available in rural areas	✗ Data limits (varies by carrier)
✓ Faster than dial-up	✗ High latency (varies by carrier)
✓ Growing number of providers	✗ Geographical limitations (can't service deep canyons or heavily wooded areas)
✓ Recent innovation is improving service	✗ High jitter (varies by carrier)

## 2.7 CONCLUSION

According to mapping sources and independently collected data, the Town of Tiburon is considered served by broadband. The Town is served by Comcast at most locations, with additional offerings from AT&T in some areas.

Although the Town of Tiburon has two internet service providers, only one broadband provider, Comcast, consistently offers high-speed internet access. The Town also lacks universal 4G coverage and infrastructure, including fiber, to support upgrades. The lack of competitive broadband options and infrastructure puts Tiburon in a position to bring in additional options for high-speed broadband to meet the needs of the residents and businesses of the area.

# 3. Needs Assessment

## 3.1 COMMUNITY MEETINGS

In order to assess the needs of the community, the Town and Magellan Advisors hosted a series of workshops that were open to residents and businesses of Tiburon. Two (2) virtual sessions were advertised by the Town and held in March 2022, both of which were well attended.

### Current Use

All participants of the workshops reported having service primarily through Comcast, as expected based on our market analysis. A few participants also had backup secondary connections to support their needs, including offerings from major cell carriers such as AT&T and T-Mobile. Overall, residents were concerned about the reliability of their services through Comcast, as well as the lack of competition in Tiburon.

Many stakeholder participants relied on high-speed internet connections to work from home, including running small businesses, online teaching and learning, and providing telemedicine services. Others used the internet primarily for leisure activities such as streaming. Several participants noted that during the height of COVID-19 stay-at-home order, when nearly everyone was working and learning from home, Comcast services were insufficient to meet the needs of the community, and residents encountered frustrating slow-downs and outages. Since then, some participants noted that Comcast had improved their services, while others were still experiencing issues with unreliable connections, including in locations near the top of Mount Tiburon and around the cove. The Town itself reported receiving complaints from residents both during and after the stay-at-home order, and said that at times people cannot get service, are kicked off, or aren't getting speeds that they are paying for.

The primary concern that most participants had was not so much about the quality of their service as it was about the lack of choice. Most agreed that Comcast had a monopoly on the market, although some options for satellite and fixed wireless services were available in some locations, and some residents were experimenting with new offerings from their cellular providers for in-home wireless connections. Furthermore, many participants noted that they are not getting the bandwidth that they pay for, but because there is no competition, they have no recourse in solving that issue or in getting more competitive pricing.

Another concern that was raised was spotty cell service in some areas, potentially caused by a lack of backhaul for cell towers in the area.

### Future Needs

Participants recognized the need for broadband to support their future activities, as well as those of the Town itself. Some noted that they will be working from home for the foreseeable future, and bandwidth needs are likely to continue to increase. Others noted the need for connectivity to support the emerging Internet of Things including autonomous vehicles,

automated food delivery services, and real-time bus services. They noted that needs will change rapidly as these technologies emerge, and it is important to have infrastructure that will support them and will not be obsolete in the coming years.

Several of the participants expressed a desire to expand broadband availability in order to close the digital divide. At least one attendee noted that access should be democratized, and that a great place to start would be to equip the Town’s library with superfast, free services. Others pointed to municipal broadband initiatives in places such as Walnut Creek as examples.

Overall, all participants were enthusiastic about ensuring that broadband needs of the Town are met, and many even offered to be of assistance as the Town considers implementing the recommendations of this Plan. As one participant noted,

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*“Internet is becoming like water and energy for us. The faster the better.”*

---

### 3.2 BROADBAND SURVEY

To gain further insight into the current state of broadband and need for future connectivity, Magellan Advisors and the Town of Tiburon conducted a broadband survey among businesses and residents. The survey was open for approximately eight weeks between November 2021 and January 2022 and received a total of 374 valid unique responses. As shown in the table below, most responses came from households in Tiburon.

*Table 3-1. Survey Responses by Type*

<b>Response Type</b>	
Household: Location is primarily a residence	374
Organization: Location is a business, government, non-profit, etc.	5
<b>Total</b>	<b>379</b>

Among residential respondents, the average household size was 2.80 people, very close to the 2.40 average size according to Census data. The median age of the youngest person in respondent households was 31.5 and the median of the oldest was 65, compared to the median age of 50.8 years as indicated in Census data. Thirty six percent (92) of residential respondents indicated that they were retired or otherwise out of the workforce, which is relatively close to Census data estimates that 40% of Tiburon residents ages 16+ are no longer in the workforce. About 43% of respondents (111) worked in Arts, Business, Management, or Science, about 11% (28) worked in Office or Sales, and the other 11% worked in Service (8% or 22 respondents), Construction, Maintenance, or Natural Resources (2% or 4 respondents), and Production or Transportation (1% or 2 respondents). Almost all residential respondents (99% or 254) indicated

having at least a Bachelor’s degree indicating that respondents had relatively higher levels of educational attainment than would be anticipated according to Census data<sup>5</sup>.

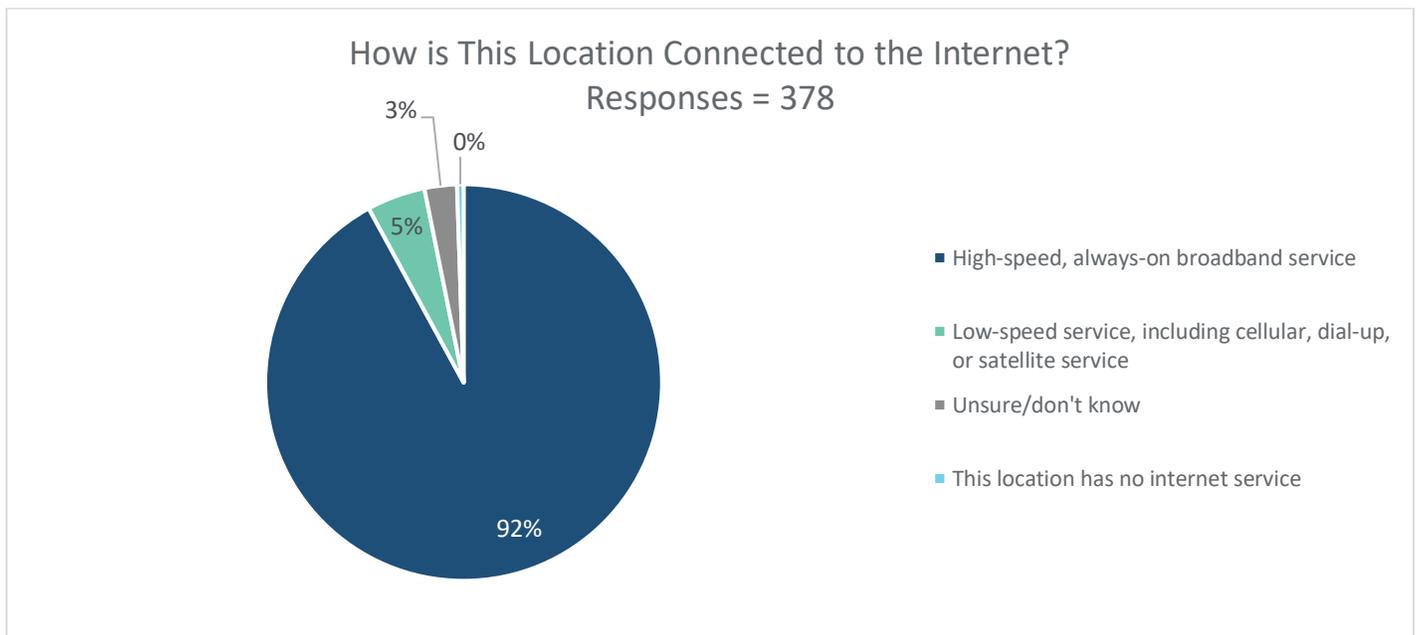
Survey respondents from organizations were asked to identify their industry sectors. Among the five responses, there were two responses from Other Services Except Public Administration, two responses from Information, and one response from Public Administration. Due to the low number of responses, it is difficult to draw conclusions about how well Tiburon’s industries are represented. However, we can say that the survey results document the experience and perspective of more than 350 households and organizations in Tiburon.

The survey yielded useful empirical indicators of broadband in the Town. Recognizing results of survey analysis as indicators, we report statistics but use approximate language in discussing the findings. Generally, these results should be considered the “best case” for the more affluent and informed residents of the community. Additional effort will be required to determine the situation for younger, less educated residents. The same applies to large, multi-location service and wholesale companies.

### Broadband Adoption

Most of the respondents (92%) had broadband connections, defined as high-speed, always on service. Approximately 5% of respondents had low-speed service including cellular, dial-up, or satellite, and another 3% were unsure of whether they had broadband. Less than one percent (2 respondents) reported not having internet service.

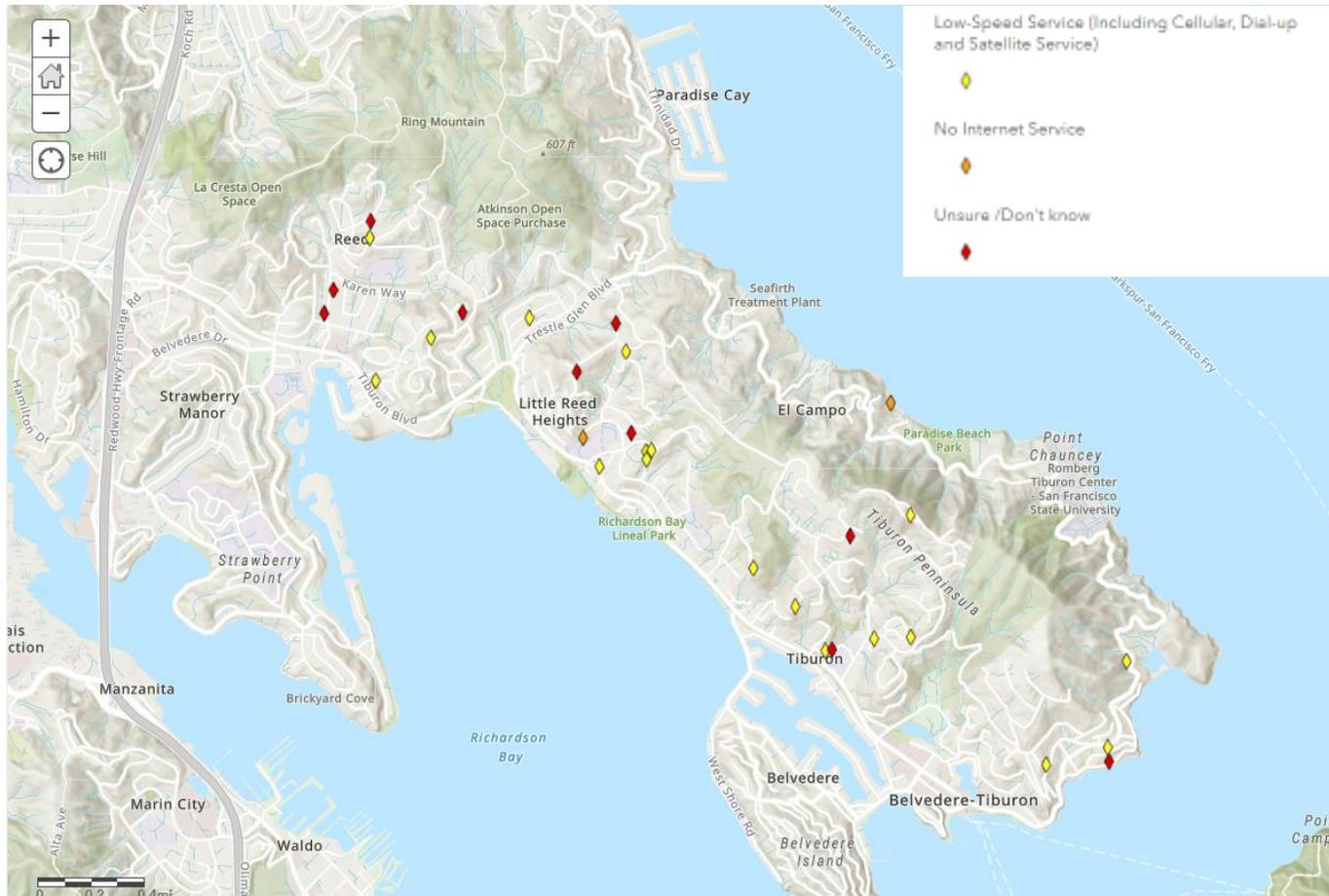
Figure 3-1. Respondents’ Type of Connection



<sup>5</sup> According to Census data, 76.2% of residents in Tiburon over the age of 25 have a Bachelor’s degree or higher. (Source: <https://www.census.gov/quickfacts/tiburontowncalifornia>)

To gain additional insight into where broadband service is not available, we created a map of the locations of respondents who said that their locations did not have broadband, displayed below. These locations were spread throughout the Town in various neighborhoods, which does not indicate that there are specific areas of Tiburon that are unserved or underserved. Although respondents were asked to rank the reason why their location did not have broadband by factors that included price, performance, lack of availability, accessing internet elsewhere, and not having the need for broadband, only one respondent answered this question and they indicated that none of these reasons applied.

Figure 3-2. Map of Locations Where Respondents Indicate Not Having Broadband



As expected based on the results of the market analysis, the majority (89%) of respondents had service through Xfinity Comcast, followed by AT&T (7%). A handful of respondents had service through other providers including Sonic (2%), Unwired (1%), and others such as T-Mobile and HughesNet, as shown in the figure below. Also displayed is a map of respondents' service provider, which indicates that service providers are relatively well distributed, although Sonic seems to primarily serve the southern half of the Town.

Figure 3-3. Respondents' Internet Service Provider

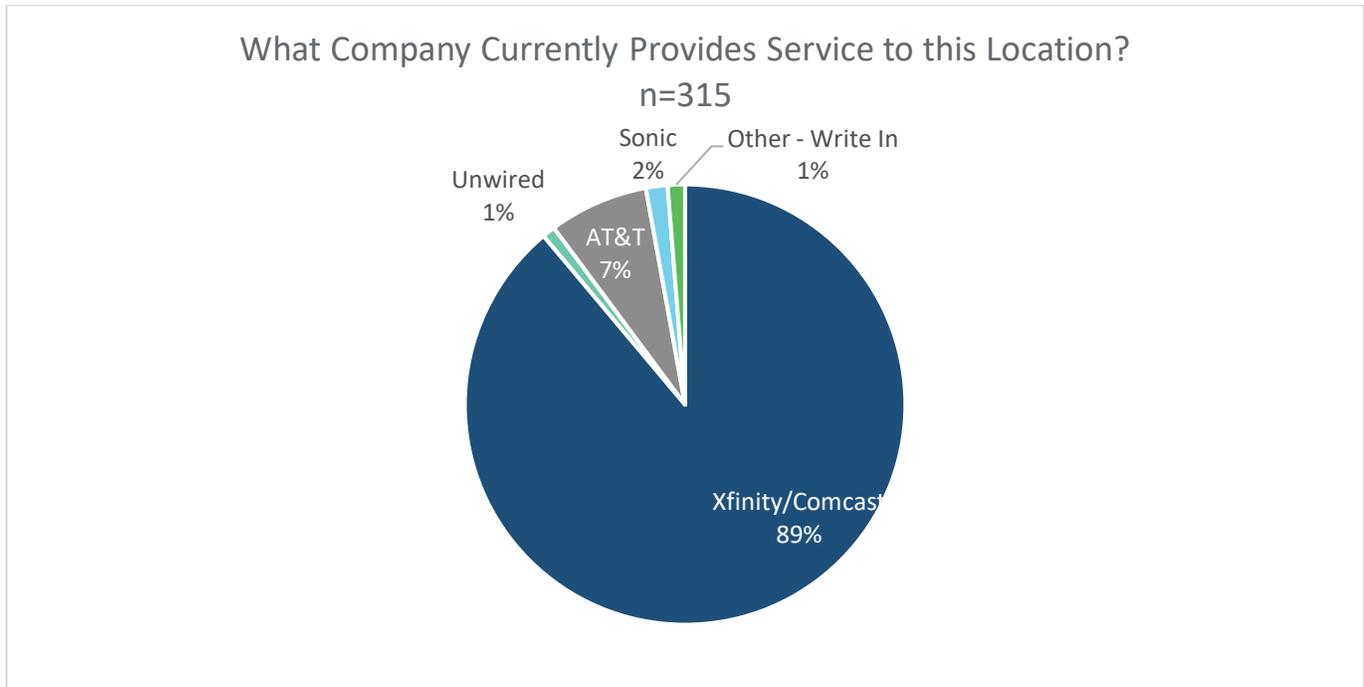
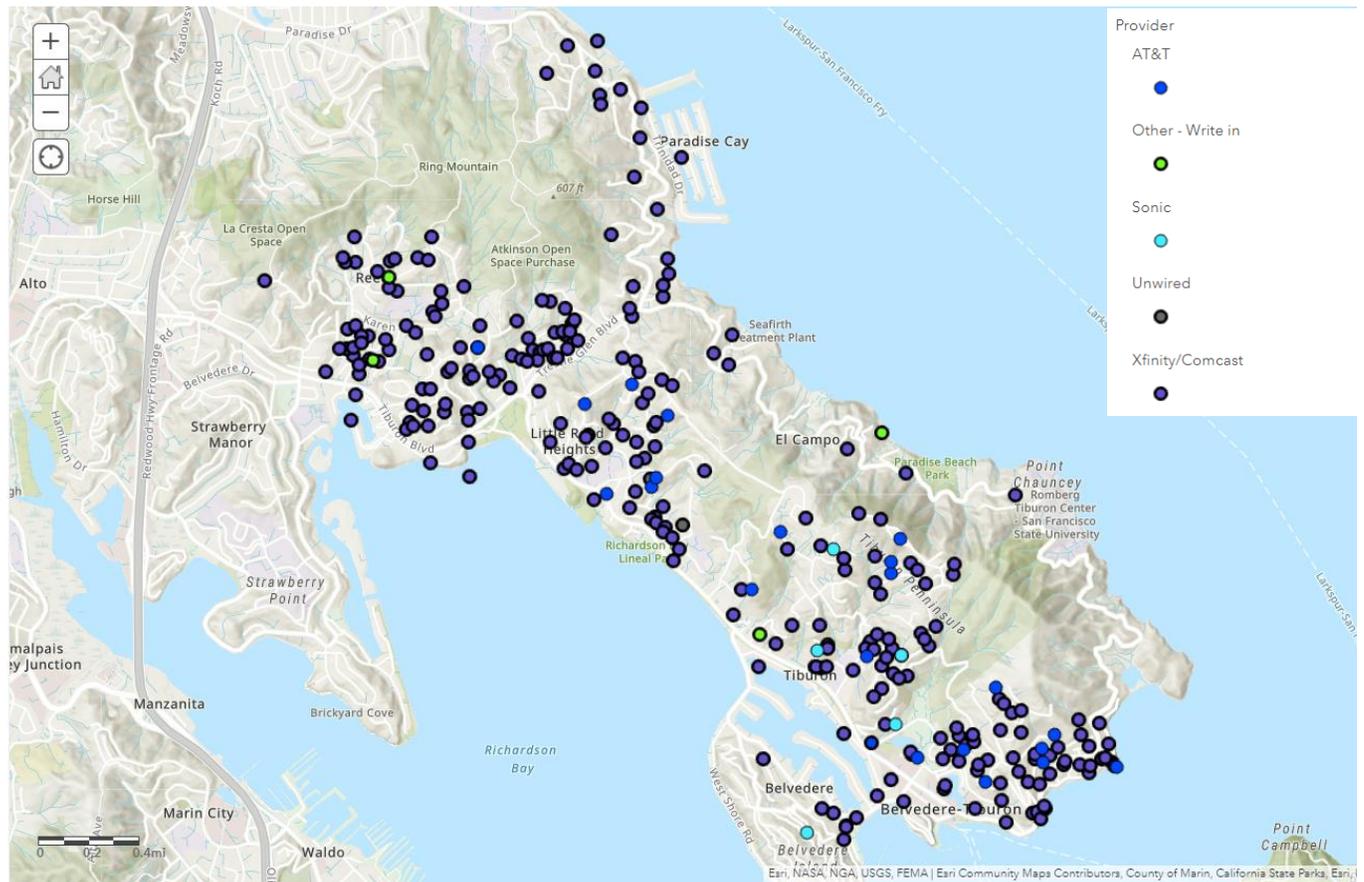


Figure 3-4. Respondents' Internet Service Provider by Location



## Performance

Respondents were asked how much they paid for broadband and related services and what contracted speeds they paid for. These were “best guesses” by the person responsible for choosing and paying for the service. Variance would diminish with more responses but should be assumed high in this situation. Actual performance was recorded automatically via a speed test integrated into the survey. But performance will vary over time based on network congestion and other factors. Therefore, we report a full set of descriptive statistics, including average, maximum, median, and minimum speeds.

On average, survey respondents reported contracted to receive speeds of approximately 261 mbps download and 203 mbps upload. To get a better understanding of actual performance, the survey contained an embedded speed test that respondents ran from their locations. The actual speed test results were much lower than contracted speeds, with an average download speed of 210 mbps and an upload speed of just 16 mbps.

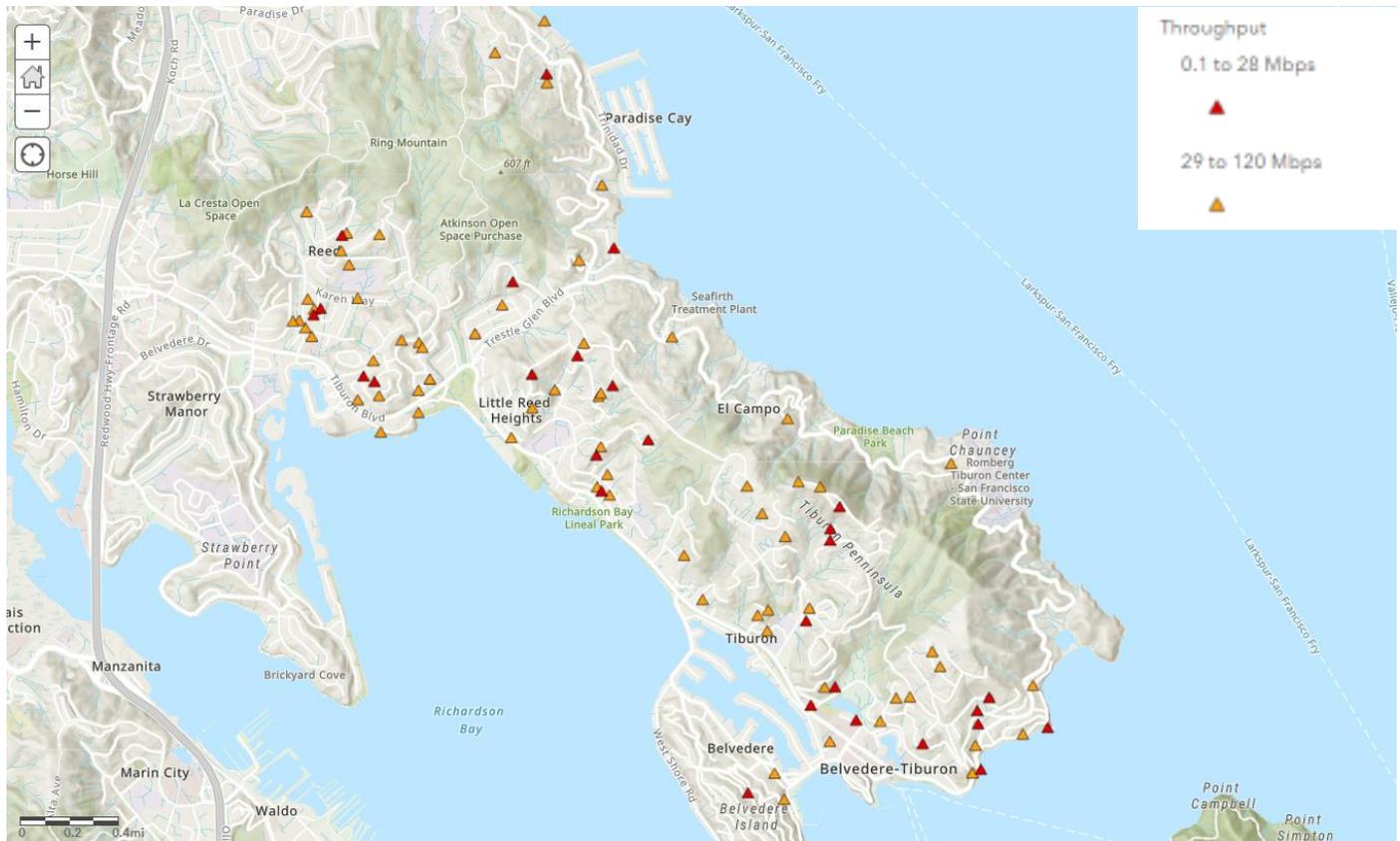
*Table 3-2. Descriptive Statistics for Broadband Cost and Performance Among Survey Respondents*

	Contracted		Actual		MRC	Cost Per Mbps
	Download	Upload	Download	Upload		
Average	561.11	203.32	209.68	15.80	\$ 100.68	\$0.28
Median	500	34.5	118.16	18.21	\$ 90.00	\$0.66
Mode	1000	10	87.53	12.14	\$ 100.00	\$1.00
Max	2000	2000	919.89	1590.35	\$ 400.00	\$0.16
Min	1	0.5	0.28	0.34	\$ 1.00	\$1.61
<b>Averages By Provider</b>						
Xfinity/Comcast - Average	598.31	216.85	227.96	159.07	\$ 104.31	\$0.27
AT&T - Average	80.46	75.95	25.11	97.93	\$ 60.47	\$0.49
Sonic - Average	24	3	17.18	2.0	\$ 61.25	\$3.19
Unwired - Average	10	4.5	25.32	6.77	\$ 150.00	\$4.67
Others - Average	12.5	15	57.42	35.56	\$ 64.50	\$0.69

On average, respondents who subscribed to services through Xfinity/Comcast were paying more than AT&T customers, and their average actual speeds were much higher. Respondents who identified Xfinity as their provider were getting the best value, with an average cost of \$0.27 per mbps per month.

Speed test results were mapped to indicate locations where respondents were receiving low speeds. The map below displays the locations of respondents whose total throughput (download speed plus upload speed) was under 28 mbps (representing the federal threshold of 25/3 mbps for broadband) and between 29 and 120 mbps (representing emerging guidelines for 100/20 mbps minimum speeds for broadband funding). There are more locations than expected with low speeds in Tiburon; however, they are not concentrated in any specific neighborhood, but are spread throughout the Town.

Figure 3-5. Locations of Respondents with Less Than 120 Mbps Total Throughput



The survey also asked respondents to rank their current internet service on a variety of factors, including price, customer service, and reliability. More than half of respondents ranked their services as Good or Excellent overall, but there was some dissatisfaction with price, customer service, and reliability.

Most respondents reported slowdowns and service outages, although they were relatively infrequent. Slowdowns appear to occur every few days to once a year and service goes out for an hour or two every few months to about once a year. About 20% of respondents did experience slow downs on a daily basis and about 15% of respondents were seeing outages every day.

## Use

To better understand how internet is being used, we asked household respondents to identify how essential it is for a variety of common uses. Most respondents found internet to be extremely useful or essential across all tasks, except generating income or selling things and streaming games or video, for which just under half of respondents found it to be essential.

We also asked respondents how often someone in their household was using internet for critical services such as schoolwork or training, telecommuting, operating a home-based business, or health monitoring. The most common of these uses was telecommuting, with nearly 60% of respondents indicating that someone in their household used internet for this purpose more than once a week. Almost half (45.6%) of respondents had someone who used internet for a home-based business or gig work once a week, and just over a quarter (35.8%) used it for schoolwork or training. Very few respondents (0.8%) had someone in their household who used it more than once a week for consulting a healthcare professional, although many respondents did use it a few times a year for this purpose.

Among organizational respondents, digital technologies were absolutely essential or very useful for all uses including management and administration, production, outbound logistics, and sales and marketing. To understand just how critical broadband is, we asked organizational respondents whether they would be willing to move their business for much faster, less expensive internet services. Respondents were split; of the six respondents, two said they definitely would move, two definitely would not move, and two were somewhere in between.

## 5.4 CONCLUSIONS

Generally, consumers in Tiburon are relatively satisfied with their broadband, although many expressed dissatisfaction with prices. Xfinity/Comcast appears to dominate the market, although there is some competition from others including AT&T, Sonic, and Unwired. Speed test data revealed that many locations are not getting adequate speeds that meet the emerging guidance for broadband to meet thresholds of at least 100/20 mbps, and some are not even getting the minimum Federal threshold of 25/3 mbps. The cost per capacity was also rather high across all providers.

Households recognize the importance of robust broadband, especially to telecommute, operate home-based businesses, and do online schoolwork. Connectivity was a critical issue for many organizational respondents, particularly for buying materials and management and operations.

Overall, survey results indicate that demand for bandwidth in Tiburon may be outpacing current service offerings, meaning that residents and businesses will require a more robust set of offerings than is currently available to work, learn, and thrive.

## 4. Business Model, Partnerships, and Lease Opportunities

Selecting the right broadband business model for local government is highly dependent on several factors that will suggest the most appropriate option for the community. For example, understanding the community needs, knowing the competitive market factors that define what infrastructure options fit well within the community, and determining organizational and operational capabilities of the local government all play into the selection process. Equally important is an understanding of the financial commitments and risk and reward that participating organizations are willing to support to fund and sustain a successful broadband initiative.

Figure 4-1. Municipal Broadband Continuum



The commonly implemented business models fall on a continuum that ranges from low risk, low investment options to higher risk, high investment options. Figure 4-1 illustrates this continuum. Moving along the continuum of business model options involves increasing degrees of risk and reward: risks in terms of financial, operational, and regulatory risk; rewards in terms of community benefits, revenue generation, and over potential for profit. Moving “up” the continuum generally requires increasing levels of investment and implies greater local government participation in the delivery of broadband services.

The table below illustrates the differences among the business models that can be utilized to achieve the Town’s broadband goals. While there are variations of each model, they generally fall into the categories described. In many cases, multiple options may be selected by an organization; however, in some cases, a local government will not utilize multiple models, as they may conflict with one another. For example, local governments generally implement broadband-friendly public policy with any of the business models, as these policies will complement all other business model options. Conversely, a local government would not likely implement a retail model and public-private partnerships together, as these would lead to competition between the local government and one or more private partners.

Table 1. Comparison of Municipal Broadband Business Models

COMPARISON OF BROADBAND BUSINESS MODELS							
	Government Passive Models			Government Active Models			
	Public Policy Only	Infrastructure Only	Public-Private Partnerships (P3)	Public Services Provider	Open Access Wholesale	Retail Provider Business-Only	Retail Provider Residential & Business
<b>Services Provided</b>	None	Dark Fiber Only	None	Dark Fiber, Transport, Internet, Phone	Transport	Internet & Phone	Internet, TV, Phone & Value-Added Services
<b>Customers</b>	None	Broadband Providers	None	Public Organizations Only	Broadband Providers	Businesses	Businesses & Residents
<b>Funding Required</b>	Low	Moderate	Low to High	Moderate	Moderate	High	High
<b>Competing with Broadband Providers</b>	No	No	No	No	No	Yes	Yes
<b>Operational Requirements</b>	Low	Low	Low	Low	Moderate	High	Very High
<b>Regulatory Requirements</b>	Low	Low	Low	Low	Moderate	High	Very High
<b>Revenue Generation</b>	Low	Low	Low to High	Low	Moderate	High	Very High
<b>Operational Costs</b>	Low	Low	Low	Low	Moderate	High	Very High
<b>Financial Risk</b>	Low	Low	Low	Low	Moderate	High	Very High
<b>Execution Risk</b>	Low	Low	Moderate	Low	Moderate	High	Very High

Public policy and infrastructure only options are considered “passive” business models, where the government does not operate a broadband network as compared to “active” models such as Municipal Services Providers, Open Access Providers, and Retail Provider Options, where the local government operates all or part of the broadband network. Local governments must determine which business models meet their organization’s risk/reward tolerance to achieve the community’s broadband goals.

#### 4.1 STATUS OF DIGITAL INFRASTRUCTURE IN TIBURON

Twenty-first century communities need digital infrastructure that includes competitive facilities-based gigabit broadband, full 4G/5G mobile coverage by at least two of the three U.S. mobile network operators (MNOs) and high speed, low latency, access to the internet. Based on Magellan’s market assessment in Section 2 of this Plan, Tiburon has a single gigabit broadband provider and only Verizon Wireless has full coverage of the Town and peninsula. The Town lacks fiber, beyond Comcast and AT&T internal fiber, which could impact 4G upgrades and 5G densification. The lack of middle mile fiber will add to the upfront construction costs for a new entrant, public or private, to connect to the internet.

Currently, only Comcast serves the Town with ‘up to a gigabit’ data rates, and these are downstream rates. Upstream rates are still limited to tens of Mbps at best and will be limited until Comcast invests in upgrades. AT&T has not deployed fiber to the last mile in Tiburon and is relying on antiquated DSL technologies to serve parts of the town. The highest data rate we found from AT&T was 18 Mbps.

We do expect Comcast to upgrade their infrastructure; the question is when they will get to Tiburon given their huge national footprint and current monopoly status. The same is true of AT&T upgrading to fiber. AT&T executives continuously talk about large scale fiber deployments. However, given their huge last-mile footprint, their national 5G needs, and the limited available households in Tiburon it is uncertain when AT&T will upgrade the Town. The limited size of Tiburon, as measured by number of households, makes the addition of a new privately funded full-fiber entrant unlikely in the near term.

Mobile coverage of the peninsula is lacking too. According to the U.S. F.C.C., only Verizon Wireless has full coverage of The Town of Tiburon and the entire peninsula. AT&T and T-Mobile have areas without coverage throughout the town. The mobile network operators are in the process of a nation-wide upgrade to 5G. This requires new radios deployed on cell towers and the deployment of small cells to serve dense areas. Both 5G towers and small cell sites require fiber connectivity.

The remainder of this document will discuss broadband infrastructure models and how the Town of Tiburon can enable, encourage, and/ or participate in their future digital infrastructure.

#### **4.2 TIBURON BROADBAND MODEL**

Based on the current broadband needs in Tiburon, as well as the capacity and organizational structure of the Town itself, we do not recommend that Tiburon enter the market offering retail services. Rather, Tiburon should strategically fund, build, and opportunistically lease fiber along Tiburon Boulevard from Highway 101 to the Ferry Boat Landing to make it easier for new entrants to reach Tiburon’s neighborhoods. This fiber should be leased at competitive rates to accelerate deployments and upgrades through public-private partnership agreements. Ideally, the project could be structured such that committed service provider lease fees and would cover financial requirements for the build.

Once this first leg is built and providers have greater access to the peninsula, Tiburon should encourage a third party internet service provider to build fiber into neighborhoods, including the laterals and drops to each household. At least two ISPs, Astound and Open 5G, have already expressed interest in partnering with the Town.

There are numerous privately funded fiber companies in the U.S. looking for cities and towns to serve. The areas that are most attractive to these entities are those with cable monopolies and a DSL incumbent telephone company. The household density of Tiburon is also attractive. These are new companies with new full fiber business models. Many have raised hundreds of millions of dollars in private equity capital and are looking for medium size cities and large towns to serve. In the future, companies will be looking for growth opportunities and the characteristics of Tiburon are attractive.

Funding and building a fiber-to-the-home network throughout the Town is a major task with substantial risks. However, the risks can be reduced in several ways. First, the network assets should be built according to demand. Only build the laterals down a street where there is a minimum up-front take rate, often greater than 50%. Second, revenues from early active subscribers reduce the total amount of external capital required. Third, Tiburon's neighborhoods are dense, with an approximate average of 30 households per 1000 feet of road. Density enables the construction costs to be allocated over more households, thereby reducing the cost to pass and cost to serve each household.

In addition to Town uses, the fiber could be leased to Comcast and AT&T for their fiber expansions, mobile network operators for 5G densification and improved coverage, wireless access providers (WISPs) and private transport providers servicing businesses. This could be the backbone of the Town and could spur additional private investments. This could also be extended over time around the peninsula on Paradise Drive and completing a ring along Trestle Glen Boulevard.

Future capital improvement projects should also be coordinated with service providers to ensure their needs are met in a manner consistent with the town's goals and objectives. This can be implemented through Dig Once and utility coordination policies and practices.

As described in the following section, the network design has been developed based on using this model to first build a Phase 1 Hwy 131 fiber route and leveraging this new cable in a partnership with a local ISP. We recommend that the Town of Tiburon set aside funds for designing this first phase and pursue funding opportunities to cover the cost of the build, while simultaneously engaging with ISPs interested in the use of the fiber. This will be best accomplished through a competitive procurement process to estimate the return on investment for the build.

Prior to beginning construction, the Town should have an agreement in place with an entity for the use of the fiber in order to mitigate risk and ensure that the asset will have a financial return.

## 5. Conceptual Network Design

Conceptual network designs are intended to give guidance and information about the network requirements including footages, costing, and other key information about the nature of the new assets. The conceptual design is not intended to be construction engineering or permit drawings; rather is show the best options for meeting the network requirements such as redundancy, construction methodology, and incorporating any existing infrastructure.

Magellan recommends a phased approach to complete the network. Tiburon should begin by completing detailed design engineering to build Phase 1. Once that segment is underway, the Town should find a partner to build Phases 2-4 as part of a negotiated agreement. Although the Town should focus only on building Phase 1 at this time, all four phases are described in this section to provide a comprehensive understanding of the whole project and what would be expected from a future partner.

### 5.1 EXISTING TOWN INFRASTRUCTURE

The Town of Tiburon owns about 2000 feet of empty conduit on Tiburon Blvd put in as part of a utility undergrounding project. There is no other infrastructure, fiber, conduits, that the town owns. Tiburon may have space or real-estate that could also be leveraged in a possible partnership.

### 5.2 CONSTRUCTION METHODS

Tiburon should use three different construction methods for the deployment of the network. Each construction method has particular use cases and has been carefully evaluated to balance the network stability with cost-effective buildout. The most stable network construction method is using boring (direction drilling); however, boring costs four to five times the cost of aerial construction.

#### **Boring**

Boring, also known as directional drilling, uses a machine that uses 1.5" flexible steel rods that are twisted, drilled, horizontally into the ground. Pits are dug at both ends of the planned bore path. All utilities crossed must be physically located through potholing before the bore can be completed. To connect these bore pits together, the bore machine uses the steel rods. Once the steel rods connect the two pits together, conduit is attached to the end of the steel rods. The boring machine then pulls the conduit back through the hole created by the rods. Boring can achieve any depth needed, from as shallow as 2 feet to as deep as 100 feet or more with proper planning.

Boring is used when depth over 2 feet is needed, on difficult crossings like highways, railroads, or rivers, and when traffic cannot be stopped to allow for open trenching.

#### **Microtrenching**

Microtrenching is a newer construction method developed within the last ten years. In this process, a carbide tipped saw blade is used to cut a 1.5" wide trench into any material, asphalt, concrete, rock, or dirt. The trench can be from 0"-24" deep where conduit and/or fiber cable is placed at the bottom of the trench and covered with a very hard sealant to protect the conduit from damage. Microtrenching is very effective in areas that a boring machine does not fit, where depth of cover can be shallower, and in areas where restoration is a big concern. Microtrenching is a far more cost-effective construction method and is incorporated into the distribution network designs (Phases 2 and 4) extensively.

When microtrenching is used, inspection during the construction process is essential to ensure the depth is maintained and the restoration meets Town standards.

### **Aerial**

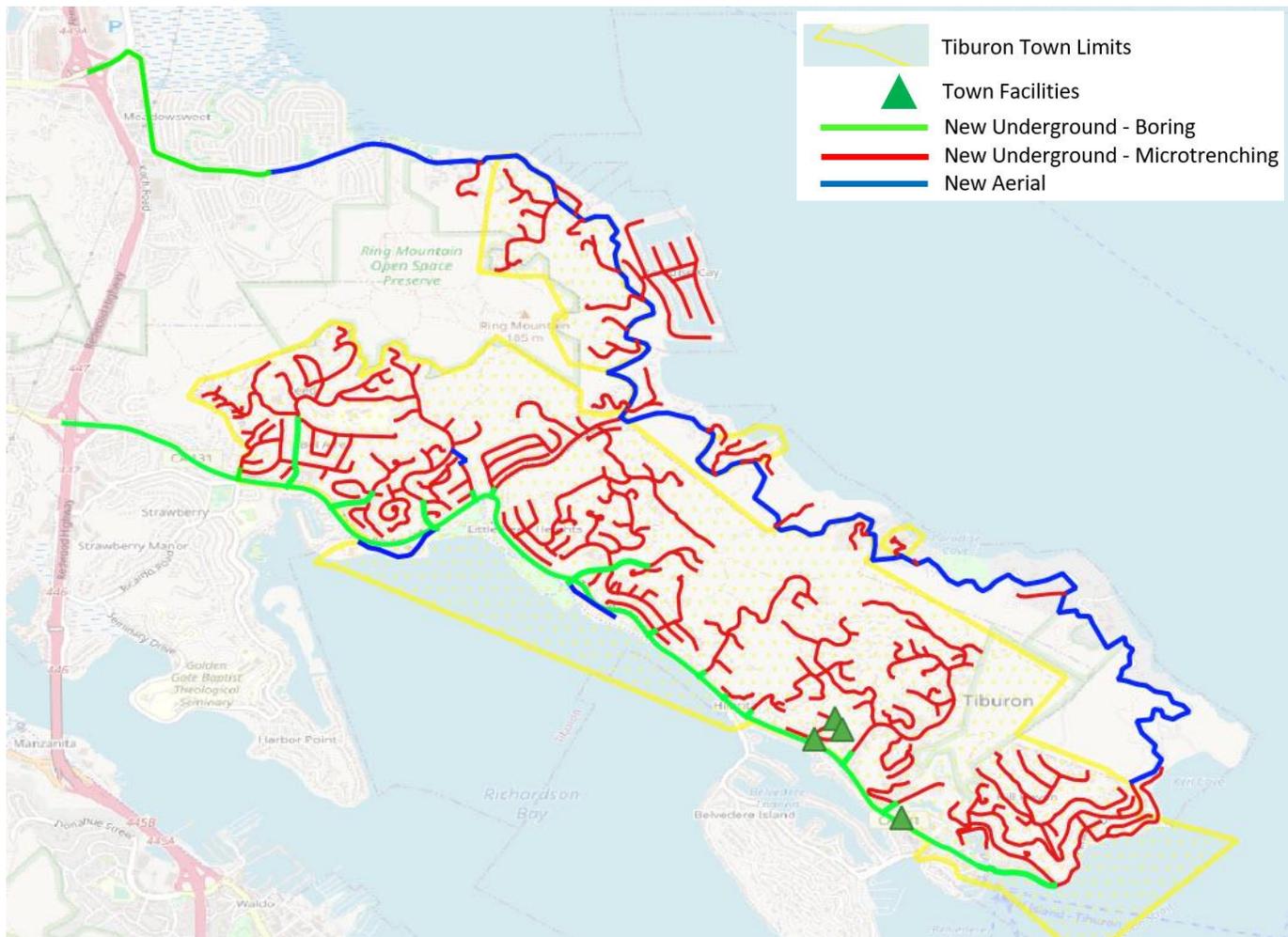
Aerial construction is the process of attaching infrastructure, cable, conduits, terminals, splice cases, etc. to poles. Aerial infrastructure can be one of the most cost-effective and time saving construction methods; however, aerial infrastructure is vulnerable to damage through many means, such as pole failure, squirrels, weather, vandalism, etc. Aerial also requires extra engineering by doing pole loading, a process where each pole's strength is assessed to validate whether the pole can handle the new infrastructure being attached to it. Pole loading also includes wind and ice loading – ice is not an issue in Tiburon, but wind is. The pole information is loaded into a simulation program that virtually stresses the pole in the event of high winds. The pole must pass this simulation before the placement of the new infrastructure will be approved. Another drawback to aerial construction is if a pole fails pole loading, the pole must be fixed, supported, replaced, or the cable placed with new underground bypassing the failed pole.

## **5.3 CONCEPTUAL DESIGN**

The full conceptual network design uses all three of these construction methods. The Town of Tiburon prefers to have an all-underground infrastructure, using aerial construction only in areas where it is necessary and can be undergrounded in the future with other utilities. On the longer routes in Phase 3, millions of dollars can be saved using aerial, or even microtrenching, rather than boring.

We recommend that Phase 1 be built by the Town of Tiburon and Phases 2-4 to be built by a partnering ISP through a negotiated agreement after a competitive procurement process. Phases 2-4 are shown and evaluated to demonstrate what the partner would be expected to handle as part of the agreement.

Figure 5-1. Conceptual Design by Construction Type



### Phase 1

Phase 1, shown in the figure below, will bring a new fiber cable into Tiburon that will allow an ISP partner to easily access the remainder of the peninsula. The build on Tiburon Boulevard (Hwy 131) starts at Hwy 101 and terminates near the Ferry Boat Landing in downtown Tiburon. It is entirely new underground and is budgeted as new underground boring, the most expensive method. We estimate the total cost of this build to be approximately \$2.17 million.

A section of Phase 1 overlaps with a planned Caltrans project along Tiburon Boulevard. As of the writing of this Plan, Caltrans is in the design and environmental review process, making this the perfect time to work with them to explore the possibility of joint building for more cost-effective construction or conducting the projects in tandem to minimize traffic disruptions. The Caltrans project could provide savings by eliminating some of the costs incurred during construction such as traffic control, full restoration efforts, and using faster more cost-effective construction methods such as plowing, trenching, or trenching. Any of these methods would have to be approved and permitted through Caltrans.

Figure 5-2. Phase 1

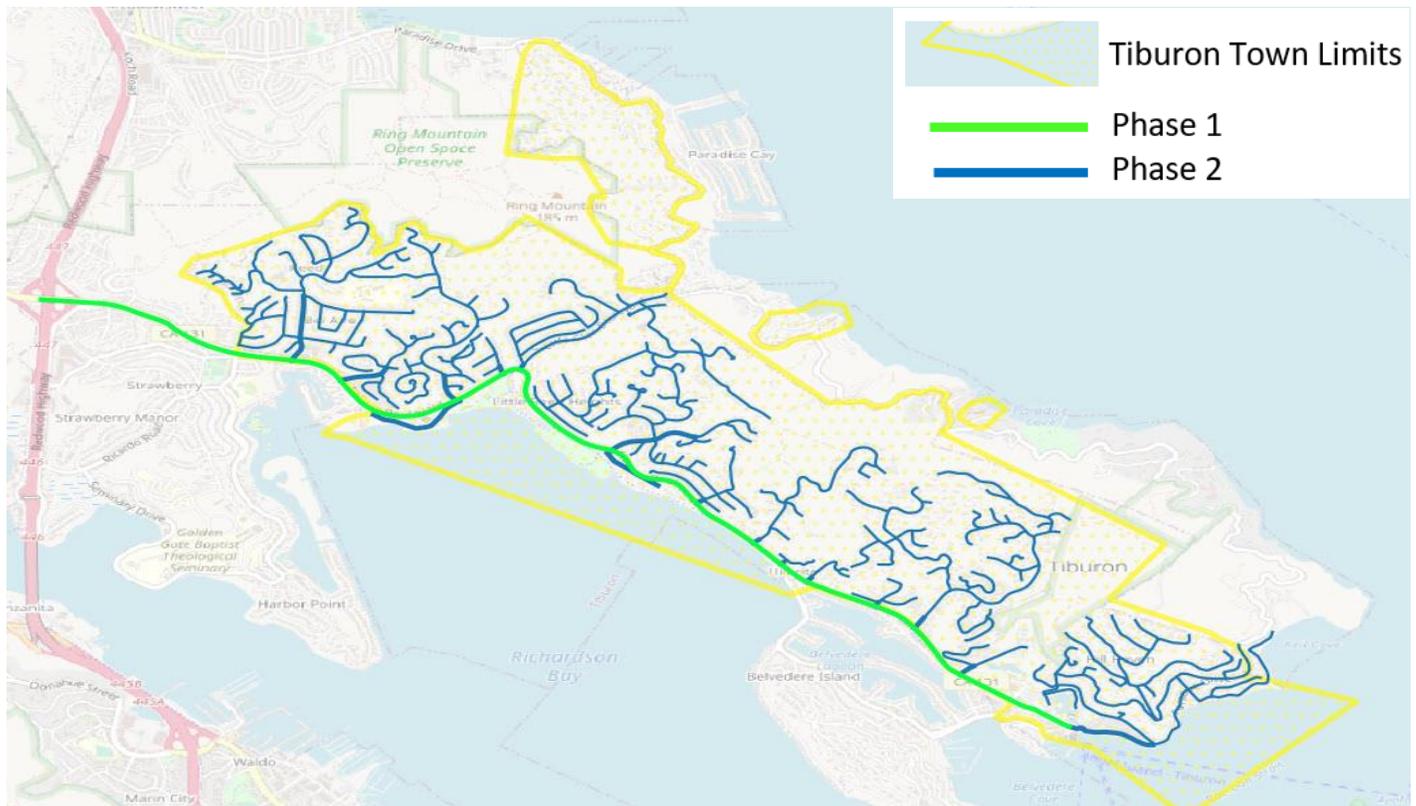


## Phase 2

The second phase builds on the infrastructure built in Phase 1 and deploys fiber to the neighborhoods that are accessed from Tiburon Blvd. These neighborhoods represent the vast majority of the residences in Tiburon and will allow the partnering ISP to start providing services quicker and start earning revenues for the partnership. The partner would need to lease fiber strands to bring services to these neighborhoods.

We estimate the cost for Phase 2 to be approximately \$10.08 million. Capital costs for this portion of the network will likely be covered by the partnering ISP. Willingness to contribute capital should be reviewed as a part of the partnership selection process.

Figure 5-3. Phase 2



As shown in Table 5-1, most of this phase of construction is expected to be deployed via microtrenching. A limited amount of boring and aerial construction is also required.

Table 5-1. Phase 2 Construction Methods by Length

Phase 2 Construction Methods		
	FEET	MILES
New Underground - Boring	10,178	1.93
New Underground - Microtrenching	232,104	43.96
New Aerial	3,566	0.68

### Phase 3

The third phase creates a ring and provides the redundancy, creating an alternate path for data to be sent and received up and down the peninsula makes the network reliable and minimize outages. Like Phase 2, we expect that this phase will be constructed by the partner ISP.

We estimate the cost for Phase 3 to be approximately \$1.85 million. Because much of this infrastructure is outside of the Town limits, Tiburon should work with regional partners such as Marin County and surrounding communities, as well as partner ISPs, to coordinate this build.

Figure 5-4. Phase 3

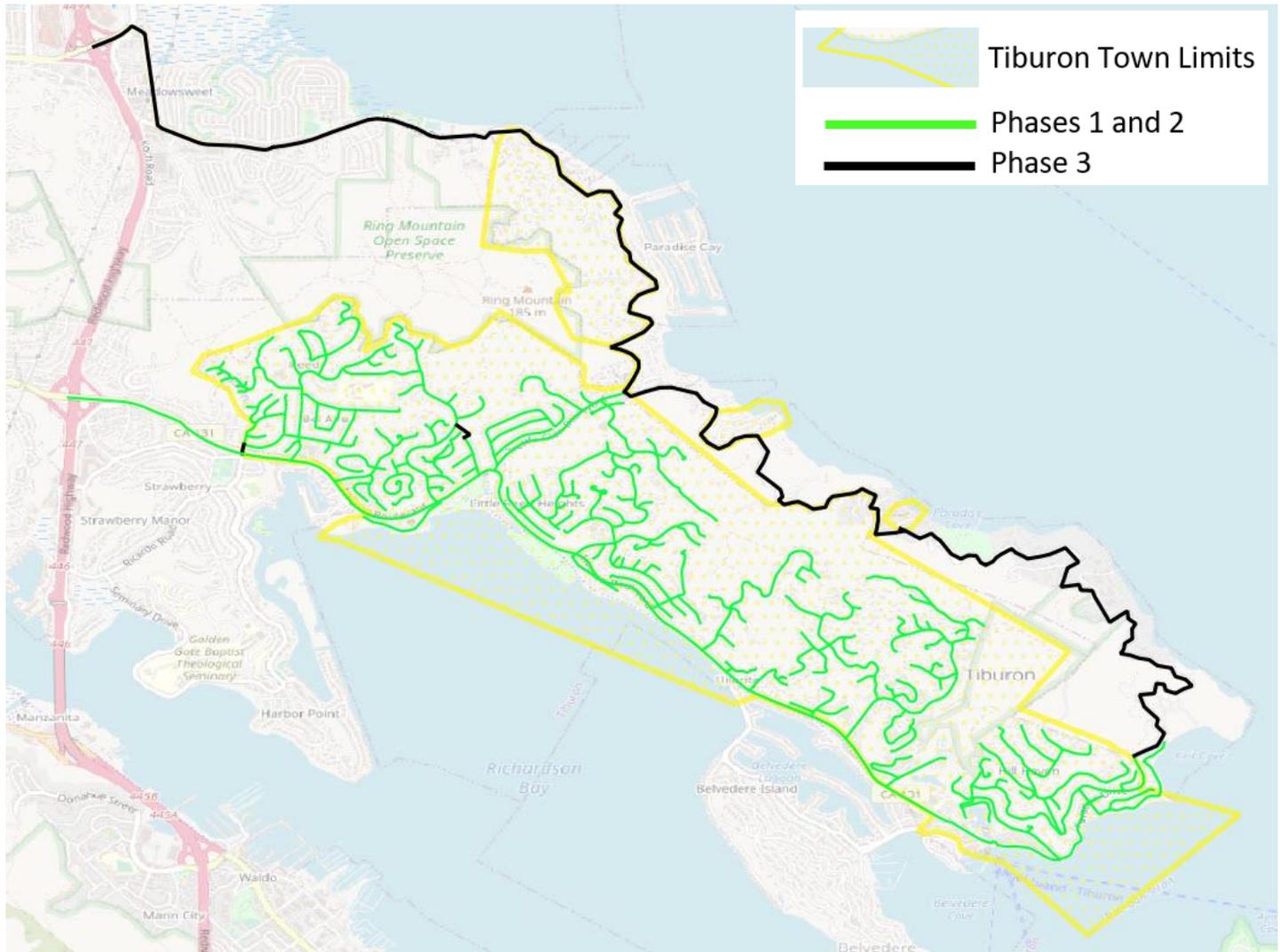


Table 5-2. Phase 2 Construction Methods by Length

**Phase 3 Construction Methods**

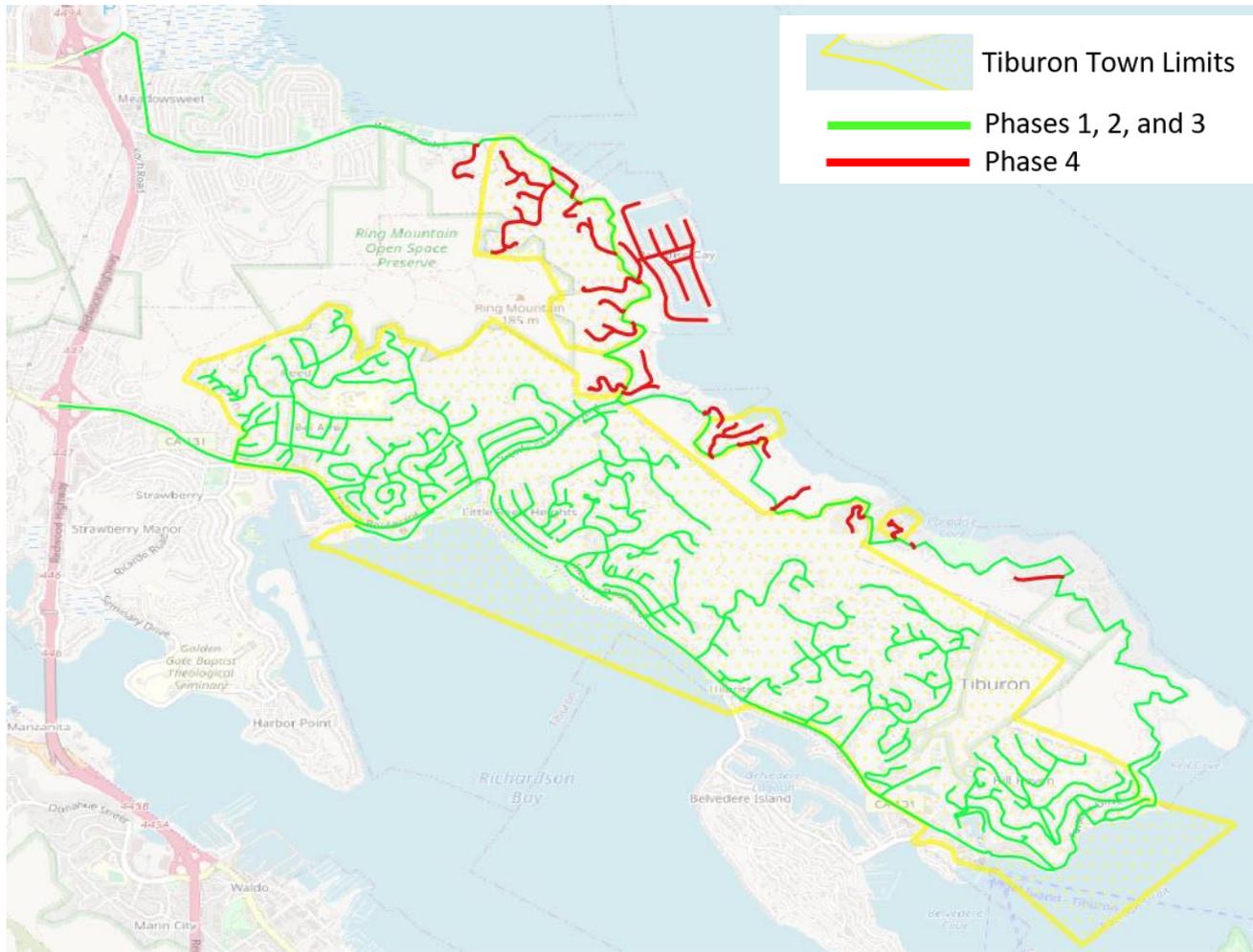
	FEET	MILES
New Underground - Boring	7,105	1.35
New Aerial	43,757	8.29

**Phase 4**

The final stage addresses the residents that live on the north side of the peninsula and is built off the cable placed in Phase 3. Like Phase 2, this phase largely includes fiber that extends into neighborhoods, including in unincorporated areas of Marin County. As with Phases 2 and 3, we assume that a partner ISP, as well as other government agencies in the region will partner to build this segment.

We estimate the cost for Phase 4 to be approximately \$2.78 million, based on the assumption that Phase 4 is microtrenched across all 9.43 miles of the design.

Figure 5-5. Phase 4



### Cost of Deployment

Based on current estimates for labor and materials in areas like Tiburon we estimate the total cost of the network deployment to be approximately \$16.86 million, shown by phase in the table below. As previously stated, only Phase 1 should be fully built and funded by the Town of Tiburon; the remaining phases will be funded and built through partnerships with public and private entities.

Table 5-1. Construction Numbers by Phase

Phase	Feet	Miles	Labor	Material	Design/Eng.	Sum of Total
Phase 1 Backbone	\$ 24,076.50	4.56	\$ 1,852,335.51	\$ 286,868.55	\$ 37,099.00	\$ 2,176,303.06
Phase 2 Distribution	\$ 245,848.05	46.57	\$ 8,017,131.40	\$ 1,657,566.20	\$ 374,683.00	\$ 10,049,380.60
Phase 3 Ring	\$ 50,862.35	9.64	\$ 1,424,178.99	\$ 356,147.27	\$ 78,081.00	\$ 1,858,407.26
Phase 4 Distribution	\$ 69,671.00	13.20	\$ 2,212,272.62	\$ 461,754.57	\$ 106,272.00	\$ 2,780,299.19
<b>Grand Total</b>	<b>\$ 390,457.90</b>	<b>73.97</b>	<b>\$ 13,505,918.52</b>	<b>\$ 2,762,336.59</b>	<b>\$ 596,135.00</b>	<b>\$ 16,864,390.11</b>

## 6. Financial & Funding Analysis

After preliminary discussion with possible ISP partners, the best way for the Town to accomplish the goals of creating competitive high-speed broadband for use on the Tiburon Peninsula is to invest in and construct Phase 1 of the high-level design as presented in this Plan. The Town should begin planning for this deployment by conducting design engineering and pursuing funding opportunities, while simultaneously engaging with internet service providers who are interested in the use of the asset. Construction should begin only after a partnership can be arranged and entered in order to ensure that the asset will be used and provide the Town with a return on investment. The Town may also decide to allow the partner to construct Phase 1 as part of the partnership if funding is not available.

Design and construction for Phase 1 will occur over two (2) years in conjunction with the Caltrans rehabilitation project. The network placed in Phase 1 will be used to support a partnership using the new fiber cable as the backbone for a fiber-to-the-home (FTTH) network, with the partner constructing and delivering the FTTH services in Phase 2.

The deployment of the FTTH portion of the network, Phases 2-4, would take place after the engineering for the full network is complete, about 4-6 months. The Town should, with the aid of the partner, apply for a LATA grant through the state, which would pay for the design and engineering of the network.

The financial impact to the Town would be for the construction of Phase 1 only. The remaining construction, drops, installation, and maintenance should be handled by the partner via the partnership agreement. The typical agreement considers the financial contributions by both parties with revenue share and/or dark fiber lease agreements to cover the costs to the Town.

### 6.1 TOWN OF TIBURON CAPITAL EXPENDITURES

If Tiburon can successfully engage and find a partnership with a local ISP, the following expenses should be considered:

- **Network Design, Permitting, and Professional Engineering Stamping** – Includes low-level design / construction ready prints of all phases of the network. Each design sheet will obtain an official professional engineering (PE) stamp from a qualified engineer necessary to obtain necessary construction permits.
- **Construction** - Expenses include the estimated underground construction labor and material costs needed to build the backbone for the network and allow access to local ISPs, government, and other entities.
- **Project and Construction Management and Inspections** - Management includes oversight of all facets of the broadband project from buildout to customer rollout. A few of the key duties include:

- Daily management of construction vendor assuring the buildout is done as designed and meets all standards for underground installation.
- Daily inspection of buildout construction, documenting needed corrections, and assuring that corrections are made in a timely manner.
- Verification of construction invoices to ensure invoices match actual work completed.
- Inspection of materials and assist with ordering, if needed.
- Documenting and updating design for agreed upon changes (“as-builts”).

Based upon these elements, we estimate the capital costs to build Phase 1 to be approximately \$2.176 million, as shown in the table below.

Table 6-1. Phase 1 Construction Costs

Phase 1 - Backbone	
Footage	\$ 24,076.50
Mileage	\$ 4.56
<b>Design Engineering</b>	\$ 37,099.00
<b>Labor</b>	
UNDERGROUND - BURIED LABOR TOTAL	\$ 1,580,788.91
SPLICING LABOR TOTAL	\$ 270,246.60
PATCH PANELS AND CABINETS LABOR TOTAL	\$ 1,300.00
<b>LABOR TOTAL</b>	<b>\$ 1,852,335.51</b>
<b>Material</b>	
FIBER MATERIAL TOTAL	\$ 110,708.20
UNDERGROUND MATERIAL TOTAL	\$ 149,060.35
CLOSURES MATERIAL TOTAL	\$ 5,900.00
PATCH PANELS AND CABINETS MATERIAL TOTAL	\$ 21,200.00
<b>MATERIAL TOTAL</b>	<b>\$ 286,868.55</b>
<b>TOTAL BID</b>	<b>\$ 2,176,303.06</b>
<b>WITH 20% CONTINGENCY</b>	<b>\$ 2,604,143.87</b>

## 6.2 PARTNER CAPITAL EXPENDITURES

Although Magellan recommends the Town be financially invested in the Phase 1 build, we expect that a partner will contribute the capital costs for the remaining phases. However, knowing what the estimated costs for the partner is important for the overall partnership agreement. These are very high-level conservative estimates based on averages that have been seen in the area and quotes from San Francisco Bay Area construction companies on similar projects. In addition to the design, engineering, construction, and management for the build out, the partner will have an additional capital expenditure for premise drops, described below.

- **Premise Drops** - Premise drop costs encompass the labor and materials to connect residential and commercial customers to the network. Drops will be done through aerial and underground methods. It is anticipated that 25% of drops will be aerial at an estimated cost of \$1000/drop, 75% will be underground at \$2000/drop. It is assumed

that 35% of the residences and businesses will switch to the new provider with-in the first 4 years.

Based upon current costs, we estimate the total network buildout for Phases 2-4 to be approximately \$14.68 million, as shown in the table below.

Table 6-2. Phases 2-4 Construction Costs

Phase	Feet	Miles	Labor	Material	Design/Eng.	Sum of Total
Phase 2 Distribution	\$ 245,848.05	46.57	\$ 8,017,131.40	\$ 1,657,566.20	\$ 374,683.00	\$ 10,049,380.60
Phase 3 Ring	\$ 50,862.35	9.64	\$ 1,424,178.99	\$ 356,147.27	\$ 78,081.00	\$ 1,858,407.26
Phase 4 Distribution	\$ 69,671.00	13.20	\$ 2,212,272.62	\$ 461,754.57	\$ 106,272.00	\$ 2,780,299.19
<b>Grand Total</b>	<b>\$ 366,381.40</b>	<b>69.41</b>	<b>\$ 11,653,583.01</b>	<b>\$ 2,475,468.04</b>	<b>\$ 559,036.00</b>	<b>\$ 14,688,087.05</b>

### 6.3 ESTIMATED OPERATING EXPENSES

The operating expenses required for the Phase 1 backhaul cable will be for the physical maintenance of the cable, future splicing needs, and documentation of usage. These are minimal costs and are estimated at \$2,000 per year per mile or \$9,000 annually.

Equipment should be included in the partnership agreement and the Town should not have financial responsibility for it.

### 6.4 FUNDING SOURCES

Phase 1 will require approximately \$2.8 million dollars and can be paid for through various funding sources. Magellan Advisors analyzed the current funding environment for state and federal grant programs to determine which opportunities Tiburon should pursue to assist with covering the cost of the build.

Broadband grant dollars are being allocated at unprecedented rates, particularly in the wake of the COVID-19 pandemic and the subsequent shift to online work, learning, and healthcare. Various programs through the COVID-19 Economic Relief (CARES) Act, American Rescue Plan Act (ARPA), and Infrastructure Investment and Jobs Act (IIJA) directly or indirectly fund broadband infrastructure and programs through a slew of federal agencies including the National Telecommunications and Information Administration (NTIA), Federal Communications Commission (FCC), United States Department of Agriculture (USDA), Economic Development Administration (EDA), and Department of Energy (DOE). However, these programs are primarily directed at communities in rural locations, those will low-income populations, and those that have no existing options for internet services. Because Tiburon has an affluent constituency and, according to some mapping resources, is served by at least two providers, the Town is unlikely to be eligible for any federal funding. This is largely also the case for state funding as most state programs follow the same requirements as federal programs.

However, broadband funding is evolving in California. The state recently announced rules for a Local Agency Technical Assistance (LATA) grant program to help fund the design and engineering of municipal broadband networks such as the one included in this Plan. The grants are limited to \$500k for each awarded agency and the application process will open within the next couple of months, likely in late June to early July 2022. We strongly recommend that the Town of Tiburon pursue a LATA grant to perform detailed design engineering for Phase 1 of this Plan, which will cost approximately \$38,000. The Town could also consider pursuing LATA funding to bring on a resource dedicated to broadband to oversee the implementation of this Plan and future broadband initiatives. We also encourage the Town of Tiburon to track other upcoming grant opportunities through the State of California, which may update eligibility requirements as more funds become available.

In addition to grant funding, the Town of Tiburon should engage with elected officials at the state and federal levels to track other funding sources such as earmarks. Because this Plan makes Tiburon’s project shovel-ready, it is a prime project to be sponsored by such resources.

Lastly, in the absence of grant funding or earmarked dollars, the Town could consider taking a loan for the cost of Phase 1. As described in further detail below, we estimate that with a 3.0% loan, the Town could achieve a return on investment in about fifteen (15) years and would maintain ownership of a valuable, revenue-positive piece of broadband infrastructure well into the future.

*Table 6-3. Loan Summary - Phase 1 Only*

Funding Source - Loan		
Loan Amount	\$	2,176,000.00
Interest Rate		3%
Terms (Months)		60
Compounded periods per year		12
Monthly Payment	\$	39,099.87
<b>Total Loan payback</b>	<b>\$</b>	<b>2,345,992.25</b>

## 6.5 REVENUES

The revenues from the Phase 1 build will come from leasing the fiber strands to the partner with a long term, assumed 20-year IRU. The rates are based on averages found in the San Francisco Bay Area and around the country. The number fiber strands leased is estimated on expected use of the cable by the partner for the backhaul, internet connection, connection to their services, and for use a part of the distribution network. This does not include any possible use by mobile carriers wanting to deploy additional 4G and 5G towers, potentially creating a far greater revenue to the town.

Based on these assumptions, we estimate a total of \$3.1 million cumulative revenue after 20 years, with annual revenues of nearly \$187,488, as shown in the table below.

Table 6-4. Potential Revenues for Phase 1

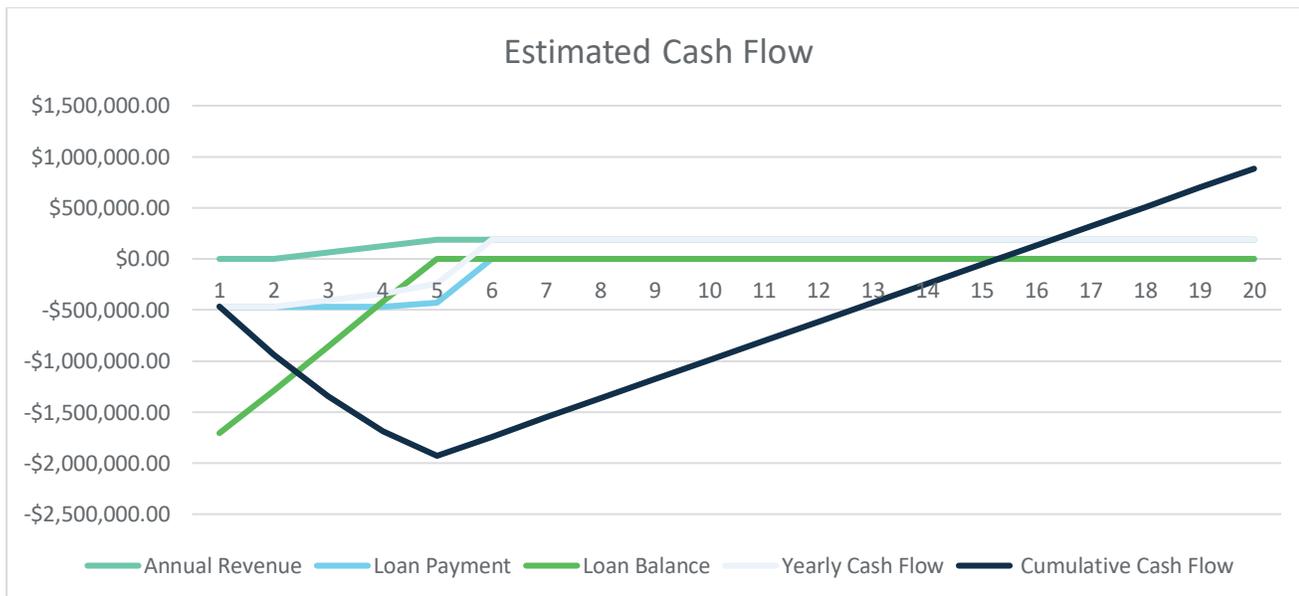
Potential Service Revenues				
	2025	2030	2035	2040
Year #	5	10	15	20
Est Dark Fiber Leased Strands	36	36	36	36
Lease Rate \$/Mile/Strand	\$100.00	\$100.00	\$100.00	\$100.00
Miles Leased	4.34	4.34	4.34	4.34
<b>Total Yearly Lease Revenue</b>	<b>\$187,488.00</b>	<b>\$187,488.00</b>	<b>\$187,488.00</b>	<b>\$187,488.00</b>
<b>Cumulative</b>	<b>\$374,976.00</b>	<b>\$1,312,416.00</b>	<b>\$2,249,856.00</b>	<b>\$3,187,296.00</b>

### 6.6 FINANCIAL SUMMARY

If the Town of Tiburon invests in the full cost of Phase 1 of and finds a partner to use as an anchor tenant for leasing fibers, the Town’s investment via a loan with a 3.0% rate. Monthly payments, total loan payback, and estimated cash flow are displayed below.

This model shows that Tiburon can build a new fiber path on Tiburon Blvd from Highway 101 to Ferry Landing with a initial investment of approximately \$2.1 million and a breakeven point around year 15. The pay back could be accelerated with partnerships with more than one ISP, other government agencies, and supporting the Caltrans traffic signal upgrade project.

Figure 6-1. Estimated Cash Flow – Phase 1 Only



### 6.7 PROFORMA – PUBLIC OWNED OPEN ACCESS

Public Owned Open Access Wholesale Model requires the Town to incur the costs and construct the network in its entirety. The Town will then lease out the network to various ISPs allowing the ISP to provide the services to the customers on the network. This model can be very successful in towns and cities that have substantial infrastructure lowering the construction costs. The Town of Tiburon does not have enough infrastructure to make this a cost-effective partnership.

Below is the proforma showing this model to not be a viable option for the Town to consider, even with a 55% take rate the 20-year cash flow is an astonishing negative \$13.78 million. The maximum take rate is realistically that ISPs use for performance is 30%-35%.

Households/MDU Units				
Projected Uptake	40%	45%	50%	55%
Estimated Subs	4,200	4,728	5,254	5,776
Anchors (481)	449	449	449	449
Projected Uptake	30%	35%	40%	45%
Estimated Subs	132	156	178	202
20-Year Projected Revenue	\$111,993,868.62	\$126,756,024.48	\$141,575,328.72	\$156,410,618.76
20-Year Projected Cap-Ex	\$75,266,427.30	\$76,801,931.30	\$78,304,280.30	\$79,810,399.30
20-Year Projected Op-EX	\$49,665,135.80	\$49,933,602.06	\$50,200,030.41	\$50,466,070.09
Funding / Debt Service	\$59,494,035.30	\$60,316,049.30	\$61,135,616.30	\$61,952,713.30
Working Capital Needed	\$91,000,000.00	\$72,800,000.00	\$54,800,000.00	\$36,600,000.00
20-Year End-of-Year Cash	\$ (47,294,671.88)	\$ (36,133,494.90)	\$ (25,010,444.37)	\$ (13,776,793.02)

## 7. Recommendations & Next Steps

This Plan should be considered a blueprint for the Town of Tiburon to follow as it takes steps to ensure that robust broadband is available not only within Town limits, but across the peninsula. Based on market research and outreach to the community, Tiburon is currently served with at least one option for high-speed internet; however, competition is limited and there is concern among the community about the need for more choices. Other options, such as satellite, also exist, but cannot be relied upon as a primary connection due to their high latency. It is unlikely that incumbents Comcast and AT&T will upgrade their aging infrastructure soon, leaving most residents without an option for fiber-optic infrastructure. New entrants could be encouraged to enter the Tiburon market by building fiber to homes, and Tiburon can take steps to lower their barriers to entry.

Due to the geographic challenges presented by Tiburon's location, the most effective course of action that the Town can take is to seek funding to build a fiber-optic route along Tiburon Boulevard that can be used by internet service providers to access neighborhoods. Tiburon should work with potential new entrants to the market to ensure that this asset will be used prior to beginning construction and should explore options for public-private partnerships that will enable new providers to build fiber to homes within Tiburon. This is best accomplished through a competitive RFP process, which should reference the design contained within this Plan.

In the meantime, Tiburon can begin design engineering Phase 1 of the build, with funding assistance through the LATA grant program. Tiburon should also track other coming funding opportunities that may offset the \$2.8m price of Phase 1, including potential funds earmarked by elected officials, CASF funds, and, most immediately and critically, coordination with Caltrans on its project along the same route to ensure cost savings and minimal disruption to the public right-of-way. Generally, Tiburon should ensure that Dig Once and utility coordination practices are used consistently to continue to identify and act upon such opportunities.

Once a partner who will use the fiber along the Phase 1 route has been identified, construction can begin, and Tiburon should continue to engage with partners for the deployment of fiber-to-the-home into neighborhoods in Phase 2, a redundant route to Highway 101 in Phase 3, and additional fiber-to-the-home buildouts in Phase 4. Phases 2-4 should be fully funded by the private partner, with no financial impact to the Town of Tiburon. Other public agencies throughout the region, including Marin County, should also be included in this process to ensure alignment and regional partnership.

## 7.1 RECOMMENDATIONS

1. Investigate and track notices of funding opportunities for LATA and CASF grants through the State of California and other grant and loan programs that may arise. LATA grants can help cover the costs of design engineering Phase 1 of the network build, which will cost approximately \$38,000, as well as detailed design on subsequent phases, which will cost significantly more. CASF grants will also contribute to funding of future infrastructure and network expansion.
2. Apply for LATA funding for design engineering for building the Highway 131 route, connecting the Town facilities along the way, during the Phase 1 network deployment. This untapped potential fiber path has the highest impact on private companies' return on investment and will continue to prevent private investment in Tiburon. To offset these concerns, the Town should invest in this path into Tiburon to attract future ISP investment in the region.
3. Develop a partnership with local ISPs for the engineering, construction, management, and maintenance of the new fiber-optic network. To start the partnership process, the Town will need to issue an RFP and engage with local ISPs and negotiate a beneficial partnership including considerations for capital that the ISP may contribute to

construction, ownership of assets, revenue sharing, and other terms for the maintenance and operations of the network. Two entities, Astound and Open 5G, have already expressed interest in partnering with the Town.

4. Engage with Caltrans to leverage their Hwy 131 project as much as possible to realize cost savings for joint build. This project, which is entering design phase, is a key piece of implementing Phase 1 of this Plan and is a prime opportunity to save on construction and restoration costs, as well as to minimize disruptions to the public right-of-way and traffic patterns.
5. Continue to leverage Dig Once policies and utility coordination practices to explore opportunities for joint building new conduit and fiber across the peninsula among public and private agencies. Any undergrounding projects, including initiatives being undertaken by assessment districts or other entities, should also be required to add conduit and/or fiber infrastructure while excavations are being done.
6. Investigate and set Town standards for microtrenching construction methodology that aligns with the Town's current Public Works standards for work done the public right-of-way. Because microtrenching has been developed recently, this is an evolving subject that Tiburon should consider when choosing a partner to build. Depth of the fiber, location of placement, and restoration methods should all be considered and researched to ensure that they are acceptable to Tiburon prior to allowing for this kind of construction.
7. Follow up with elected officials to propose possible ear marks and other funding options that may cover the costs of the network. Leverage these relationships to promote a sense of partnership throughout the region including ensuring alignment with other state agencies such as Caltrans.
8. Once Phase 1 is completed, work with partner ISPs to continue the construction into the neighborhoods in the southern peninsula during Phase 2. During Phase 3, work with providers to build the additional backbone route in the northern half of the peninsula, creating a redundant ring. Finally, during Phase 4, work with providers to connect homes in the northern half of the peninsula, completing the network's construction.

## 7.2 NEXT STEPS

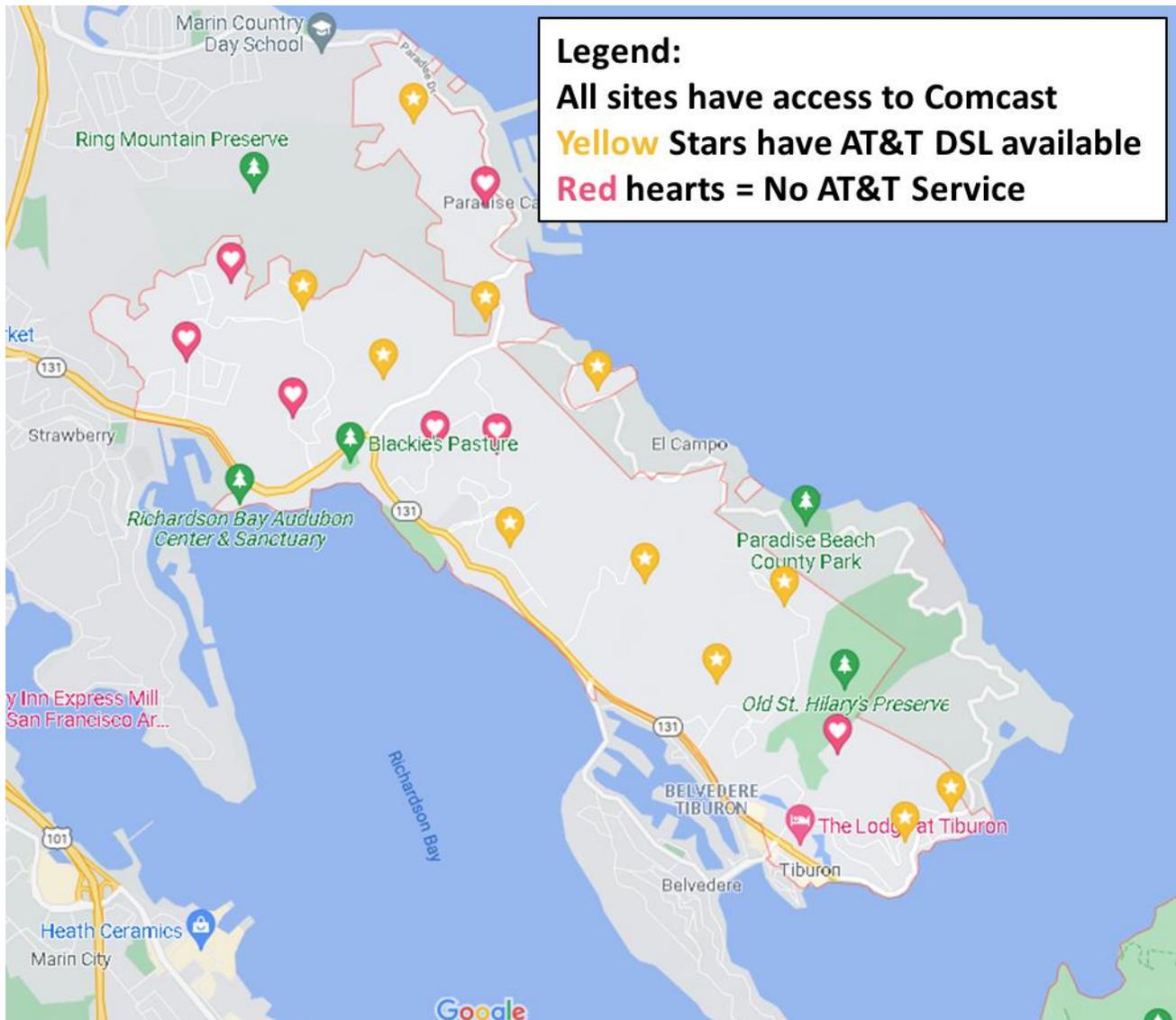
1. Continue coordination with Caltrans about joint building along Tiburon Boulevard/Highway 131.
2. Continue conversations with Caltrans for the traffic signal upgrades being done on the Hwy 131 project by supporting the upgrades by leasing fiber to Caltrans.
3. Explore and prepare for funding opportunities including a LATA grant to cover the design engineering costs of Phase 1 and CASF grants that could be used to fund future phases.
4. Engage with internet service providers interested in the use of the Phase 1 fiber route including Astound and Open 5G.
5. Review and update Dig Once, utility coordination, and development agreement requirements, as well as microtrenching standards.

6. Conduct a competitive procurement process (RFP) to develop a public-private partnership for the use of Phase 1 fiber and the buildout of Phases 2-4.
7. Conduct design engineering for Phase 1 of the build, which will cost approximately \$39,000.
8. Finalize a partnership agreement for the use of Phase 1 fiber.
9. Begin Phase 1 construction along Tiburon Boulevard/Highway 131 in coordination with Caltrans. Connect four Town facilities during this phase.
10. Work with a private partner to begin building Phase 2, which will provide fiber to Tiburon's neighborhoods.
11. Continue work with partners to build Phases 3 and 4, providing additional redundancy and reaching neighborhoods on the northern side of the peninsula.

# Appendix: Market Assessment Findings

To fully understand what offerings are available in Tiburon, Magellan Advisors randomly selected eighteen (18) addresses throughout the Town, shown in the map below.

Figure A-1. Map of Addresses Tested



Using each of these addresses, we collected actual data from Comcast and AT&T about their service offerings at each location.

All addresses surveyed were served by Comcast and were offered the full range of service tiers.

AT&T offerings are shown in the table below.

Table A-1. Address Service Offerings

<b>Tiburon Address</b>	<b>AT&amp;T Offering (All addresses have full Comcast Offers)</b>
2070 Centro E St, Belvedere Tiburon, CA 94920	Internet Basic 5
2323 Paradise Dr, Belvedere Tiburon, CA 94920	Internet Basic 5
1804 Lagoon View Dr, Belvedere Tiburon, CA 94920	None
97 Sugarloaf Dr, Belvedere Tiburon, CA 94920	Internet Basic 10
260 Round Hill Rd, Tiburon, CA 94920	Internet Basic 10
9 Mara Vista Ct, Belvedere Tiburon, CA 94920	Internet Basic 5
100 Geldert Dr, Belvedere Tiburon, CA 94920	None
75 Round Hill Rd, Belvedere Tiburon, CA 94920	Internet Basic 18
40 Seafirth Rd, Belvedere Tiburon, CA 94920	Internet Basic 1.5
40 Mercury Ave, Belvedere Tiburon, CA 94920	Internet Basic 1.5
180 Stewart Dr, Tiburon, CA 94920	None
34 Reed Ranch Rd, Tiburon, CA 94920	None
161 Blackfield Dr, Belvedere Tiburon, CA 94920	None
69 Paseo Mirasol, Tiburon, CA 94920	None
4643 Paradise Dr, Belvedere Tiburon, CA 94920	None
8 Hillcrest Rd, Tiburon, CA 94920	Internet Basic 768
120 Taylor Rd, Tiburon, CA 94920	Internet Basic 10
100 Reed Ranch Rd, Tiburon, CA 94920	Internet Basic 18