South Shore Opportunities
BUSINESS ... From the Idea Forward

CBDC
A Community Business Development Corporation

BROADBAND SSREN

Network Design and Implementation

Full Report

February 15, 2018

i-ALLEY

BROADBAND SSREN:

Network Design and Implementation

Full Report

January 22, 2018

Internet for the South Shore Region

Network Design and Implementation Full Report

January 22, 2018

INDEX

1. Executive Summary

Network Design and Implementation Study for Municipality-driven Provision of Internet Infrastructure and Services

This Report describes a 'big bang' approach to provide a global solution for broadband for the South Shore region, plus a detailed look at selected communities.

It describes what it would take to provide a complete global solution for Internet coverage of the South Shore, using a fibre network to provide the backbone and fixed wireless for last mile. It finds that this approach is technically and financially feasible and will provide coverage of 80% of the region. The report includes a complete overlay of what is needed and the associated costs.

It also does a 'deep dive' into selected communities, to provide detailed information confirming the coverage. These communities can be served both as part of the integrated big bang approach, or as a separate project. Both considerations are described; the report favours a total regional approach.

In scale and comparison, the findings match closely the work done independently in Annapolis County. The South Shore regional coverage plan has an estimated cost of $30-million; the figures in Annapolis put their project at $18.3-million. A difference between the two is that Annapolis plans to cover 65% of its rural area, and this plan for the South Shore aims to cover 80% of its area.

Recommendations

Item	Description
Phase 1: Fibre Backbone	Choose the route from the Halifax Internet Exchange to Chester, which then goes to MODL and Queens.
Phase2: Priority Connections	Next, spread wireless and fibre coverage to selected priority communities.
Phase 3: Service Spread	Lastly, achieve the 'big bang' with service spread throughout region.
Financing	Commit to Detailed Engineering work, as preparation for obtaining loans for total project.
	Fund the full regional 'big bang' project if possible, in preference to the Selected Communities project.
Management	Look for a Municipally-controlled Managed Service Provider to help with all the above steps.
Partners	Obtain provincial and federal partnerships as indicated, and investigate banks and PPPs for long-term loans against anticipated income (see Funding Sources section).

About This Study

The BROADBAND SSREN Report sets out a high-level business and technical analysis to allow the development of a locally-initiated model of broadband delivery. It incorporates options for future technologies that will become available in the coming months. BROADBAND SSREN's major sections include:

Network Design:

The Report lays out the scope of the network design for coverage of specified communities in the South Shore. Overall fibre optic backbone routes are noted, plus wireless deployment designs that include estimates of the numbers of people who will receive coverage.

Costing Estimates:

A high-level view of the scale of funding required to provide the service is provided, plus a path forward to obtain funding should the South Shore partners decide to move to an implementation stage. It also includes ongoing costs of network upkeep and expansion. I-Valley has experience and can help with this step, if desired.

Future-Proofing:

Nova Scotia is at a "tipping point" for communications services; the landscape will look very different a few months from now. Today's fast-changes are occurring in both technology and government policy. This Report is coming at a time when new technology options are presenting themselves - such as TV White Space (described later) - that will positively impact a deployment plan in terms of providing better coverage for lower cost. Moving Public Sector plans will also impact the South Shore's future deployment. There are new Provincial announcements, for example, such as the new RFQ for communications towers[1] that might provide help with infrastructure; these need to be followed for further clarification on the impact on South Shore networks. The Federal Government's Connect To Innovate" program- at the time of the writing of this Report – has yet to make an announcement that could lower South Shore network pricing by lowing a routing option through the VCFN. Also, a report is expected by the provincial consultant Brightstar, on the direction of "middle mile" network deployment. i-Valley will keep the South Shore apprised of these developments and their impact on deployment options.

A topic that should be explored is the receptiveness of The Municipality of the District of Shelburne to joining in to this project. If that were likely to happen in the short to medium term, there might be considerations made to allow that to happen more seamlessly.

A futures option that was not requested in this Report but that may be helpful in providing coverage, would be the establishment of "Gigaports" in selected communities - dedicated centres where ultra-highspeed connectivity could be made available to community businesses, students and residents. A description in provided in the Appendix.

[1] REQUEST FOR SUPPLIER QUALIFICATIONS FOR Telecommunications Towers and Equipment Shelters For the Department of Internal Services, (Pre-Qualification), RFSQ Number: WS82825557

2. Context: Broadband and Rural Communities

Broadband is the next essential infrastructure, as vital to economic growth as clean water and good roads.[2] It is transforming how we work, play, live, educate and entertain ourselves, govern our citizens and relate to the world. In the "broadband economy" created by this technology:

- The world's largest taxi company, Uber, owns no vehicles.
- The world's most popular media company, Facebook, creates no content.
- The world's largest accommodation provider, Airbnb, owns no real estate.
- The world's most valuable retailer, Alibaba, has no inventory.

Broadband may be one of the fastest growing technologies in history, but its availability, speed and reliability consistently lag behind user demand, *particularly in low-density and low-income markets that do not offer the private sector attractive investment opportunities*. That gives local government a strong incentive to involve itself in promoting access to high-quality broadband. Rural communities find that broadband provides:

- Increased business investment with higher employment rates;
- Improved healthcare with remote diagnosis and treatment;
- More efficient Government through digital information gathering and analytics;

The CRTC recently declared broadband to be a "vital" service and essential to life and success.[3] It is so convinced of the need for rural broadband that the agency has set aside $750-million to help rural communities bring themselves up to the new standard of 50 Mbps.

Rural regions that are robustly connected can be global competitors, whether they are Stratford ON, home to driverless vehicle technology, or Redlands, California (home to ESRI, the world leader in GIS). They are places where people want to live for the sake of the place, not just a paycheque. And they have one enormous advantage over tech hubs like Silicon Valley, Austin, Boston or New York. Land is affordable.

Lack of rural broadband, on the other hand, is seen to be responsible for between 25- and 50% of rural job loss. This is connected with the fact that broadband is today's prosperity driver: well over half of all economic growth in America since WWII has come about dues to innovation - a networking activity.[4]

[2] Dan Mathieson, Mayor, Stratford, ON, speaking to i-Valley in August, 2016
[3] Jean-Jacque Balis, CRTC Chair, Dec 21, 2016: http://www.cbc.ca/news/politics/crtc-internet-essential-service-1.3906664

[4] National Institute of Science and Technology: https://www.nist.gov/speech-testimony/innovation-key-driver-economic-growth-competitiveness

Why a Community-Provided Broadband Network?

There is a growing movement that believes that citizens and locally-elected officials should be able to control their citizen's broadband destinies. Today in the United States, for example, more than 500 communities are extending broadband to their residents and businesses.[5]

There are many reasons for this:

1. **Lower costs, higher quality**: Community networks perform an important function: They introduce competition where there was none before. This results in lower broadband costs and better broadband service. In many documented instances, community broadband strengthens local economies and enables more efficient government service delivery. According to MuniNetworks Magazine:

   > *"Internet-based applications are essential for producing and packaging crops; creating video, 3-D renderings, and other media; and communicating with employees around the world. Businesses increasingly consider Internet access as they once did proximity to major thoroughfares and storefront size, and many cities tout high-speed Internet access as a major incentive for business development."*

2. **Education**: A community that provides broadband throughout the region is best able to train its youth for the future; Internet access can close the 'homework gap'. Other public services such as **health care** and **workforce development** also benefit from broadband capacity.
3. **Success**: All of the winners of the prestigious award for best community broadband awarded by te Intelligent Community Forum for the past 18 years, have been networks provided by a municipality, not a commercial company. Put simply: community networks are the most advanced in the world.
4. **Community 'Return on *Involvement*'**: In many of these cases, a normal commercial Return on *Investment* does not allow a telecom operator to install a network in a rural or small centre; as the Mayor of the award-winning city of Chattanooga said: "No one was going to do this for us; we had to do it ourselves."
5. **Lower costs, higher quality**: Community-owned networks serve their citizens well: they are able to increase network speed year-after-year, with little or modest increase in subscriber rates.[6] This rate level is maintained by the competition inherent in providing ***an open-access network*** where many service providers compete.

A community-provided network can take many forms, and could be one that is owned by the community and operated and maintained by a private company or infrastructure service provider.

It is important to note that i-Valley works to bridge the needs of the municipal governments to the private sector companies that provide solutions. I-Valley is vendor-neutral in all cases. I-Valley provides a choice of vendor options and if requested will make a recommendation for Council's consideration.

[5] Municipal Networks, May, 2017: https://muninetworks.org/communitymap

[6] https://muninetworks.org/sites/www.muninetworks.org/files/2017-05-31-TN-Muni-Prices-Speeds-FINAL.pdf

3. The Regional 'Big Bang' Network

As demonstrated by the efficiencies inherent in the SWIFT approach, in which a single plan for coverage will improve the lives of 3.5 million people in Southwest Ontario, there are advantages to dealing with an entire region.

This section covers this regional approach for the South Shore, in terms of:

- Service Provider
- Service offering
- Subscribers
- Revenues and Costs
- Implementation Plan
- Financing Considerations
- Network routes and Engineering costs

Service Provider

Ownership: The Municipal Model

i-Valley has confidence in the applicability of a managed service model in creating a sustainable network infrastructure. We have gained this confidence as a result of extensive work with Kings and Hants, and CTI program personnel, who support the model. As far as the greater market is concerned,

we can look to examples of municipal ownership including Ontario's SWIFT program, and the Valley Community Fibre Network (VCFN). The VVCFN for example has an entity, the VCFN Authority, which manages the network on behalf of the stakeholders. The Authority is organized as a non-profit with board membership comprised of participating municipal, educational and operational staff members.

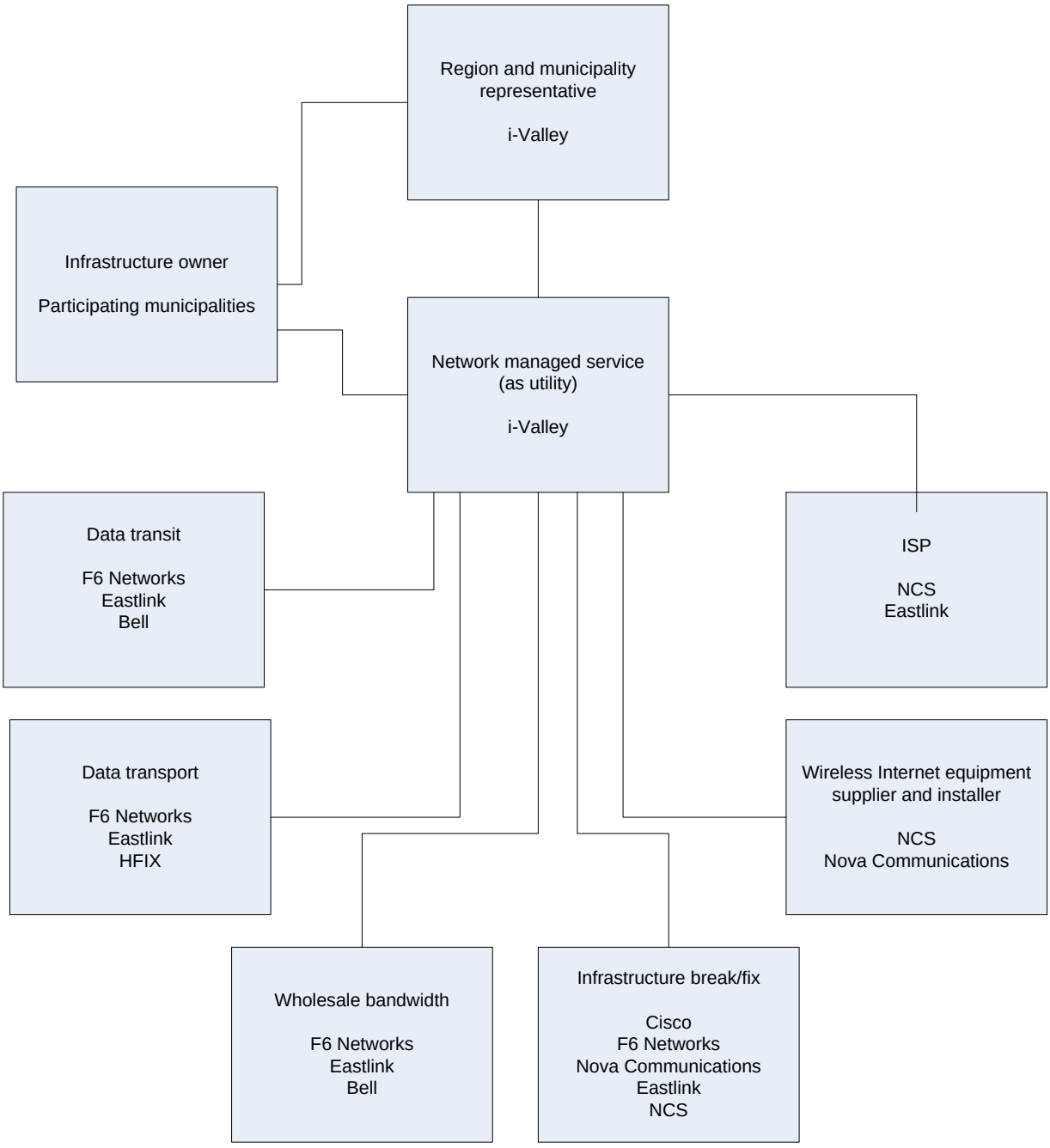
Due to i-Valley staff involvement in the VCFN, this can be further improved on for the South Shore municipalities, moving to a truly managed service.

Ownership of the network infrastructure asset does *not* mean the South Shore municipalities must operate the network, nor should they. It is recommended to set up a managed service that can efficiently operate the service on behalf of the stakeholders. The operation of this service entails business plan development for operational costs and revenues, policies, service and partnering agreements, as examples. The managed service is akin to running a specialized infrastructure, like road building and maintenance, or electrical. It is the ideal buffer between the municipalities and constituents, and the complexities of managing relationships between the long term support eco-system partners. It can set prices, negotiate favourable supply agreements and operate the network, with long term stability and support for the citizens and businesses in the region. It is a non-profit entity, that weights its priorities toward supporting the community, vs. shareholder profits.

i-Valley has had informal discussions with a funding entity related to the establishment of such a managed service. They have opened the door a little to participation as a funding partner and are open

to a presentation/meeting with the interested municipalities and i-Valley to propose such a venture. I-Valley can coordinate the preparation and logistics of such a meeting if this initiative moves forward.

Example Operational Eco-system



Example managed components of a municipal infrastructure model

Element	**Type**	**Examples**
Marketing	Ongoing	Marketing of services offerings to subscribers Marketing of Open Access infrastructure to ISPs and ASPs (Application Service Providers)
Cost reduction strategies	Ongoing	Data transit aggregation
Supply and support partner and vendor sub-contractors	Ongoing	Fibre co-sharing partners, supply and break/fix vendors
Technological roadmap and research	Ongoing	Network managed services best practices. Community ownership evolution, new fibre and wireless technologies Network expansion and performance roadmap
Stakeholder engagement and involvement	Ongoing	Periodic meetings and surveys, improvement requests Alignment of technical direction with municipality service strategies
Administration	Ongoing	Day to day business management, insurance, rent, legal, etc.

Example revenue components of a municipal infrastructure model

Element	Type	Examples	Industry norms $
Wholesale transport	Periodic	ISP fibre access, carrier access, other dedicated access	100's to 1,000's per instance
Wholesale transit	Recurring	ISP and carrier data bandwidth purchase	100's to 1,000's per month per access point/volume
Subscriber/ISP fee	Recurring	ISP wireless and fibre, and subscriber direct	10's-100's per month per subscriber/business
Municipality operating contribution	Annual recurring - declining		
Fibre IRU fees	One-time	Carrier fibre access	$200,000+ per instance
Direct institution gigabit access	Recurring	Library, municipal offices, utilities, Gigaports	1,000's per month per connection
Direct business gigabit access	Recurring	Business clusters, high volume businesses	1,000's per month per connection
High value applications	Recurring	Home healthcare access, videoconferencing, agriculture and aquaculture, tourism	Variable either on a subscriber or ASP (Application Service Provider) basis

Financial projections for Municipal Ownership

The overall goal for the municipality, over a 10-20 year horizon, is to provide Smart Community leadership and to manage the service to the benefit of the community, while building sufficient capital reserves for on-going network growth and enhancement. Financial projections are provided below on overall anticipated revenues to the municipality, taking the projections to the year in which a positive cash flow begins. While not in scope for this report, detailed operational cash flows and P&L can be developed in a further step. Some of the dependencies include the decision on the size and coverage of the network, the network implementation timeline, the structure of the managed service, and the agreements with partners and subscribers. Based on CTI experience, and the potential scope of implementation, i-Valley would expect break-even in six or seven years, with substantial capital reserves building forward from there. This is based only on subscriber fees; this report does not count potential additional revenues from (e.g.) special business services.

Service Offering

While final end-user costs will be defined more definitively, at a later date, for the purposes of forecasting for this report an accessible fee of $85.90/month has been put forward here as a starting point. For most of the areas being considered, this means a jump from near-zero connectivity. An open access network will encourage ISPs to offer competing services and content. It is our experience that once an infrastructure is available, ISPs will immediately begin to use it and will provide service immediately to residents and businesses.

The service will have these features:

Name of Service Plan	Type of Subscriber	Advertised Download Speed (Mbps)	Advertised Upload Speed (Mbps)	Standalone Monthly Price of Service ($) - Not including CPE lease price.	One Time Installation/Activation Fees ($)	One-time CPE Purchase Price	Monthly Usage Cap (Unlimited/Limited)	Minimum Contract Length (Years)
Municipal Open Access	*Residential*	*15.00 Mbps*	*5.00 Mbps*	*$85.90*	*$100.00*	*$0.00*	*Unlimited*	*0*
Municipal Open Access	*Business*	*15.00 Mbps*	*5.00 Mbps*	*$85.90*	*$100.00*	*$0.00*	*Unlimited*	*0*

The service speed is capable of being expanded to meet the new CRTC objectives, as noted in the section on Future Considerations.

Subscribers

The “Big Bang” or all-up network coverage will allow 80% of the South Shore’s households in that region to access the Internet. According to studies like the Pew Research Centre report in September 7, 2016, 87% of those will become subscribers. The Broadband SSREN report takes a low estimate of 20% for those who will become initial subscribers within the first six months as the network is turned on and becomes available. Growth thereafter is estimated at 5% per year. Subscriber number calculations are based on dwelling counts or households. An additional 10% is added to account for businesses. The results are further refined by making an allowance for ongoing operating expenses.

Further refinement is needed for the next stage of planning, but this gives an order-of-magnitude scope for high-level purposes.

The results are:

CHESTER (6,161 Dwellings)							
No. of Subscribers (80% of regional dwellings)		**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
20% sign-up (grows 5% per annum)	Dwellings	1232	1294	1359	1426	1498	1573
	Business	100	200	300	400	425	425
Total Dwelling Subscribers		1332	1494	1659	1826	1923	1998
MODL (13,392 Dwellings)							
No. of Subscribers (80% of regional dwellings)		**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
20% sign-up (grows 5% per annum)	Dwellings	2678	2812	2953	3100	3256	3418
	Business	200	250	350	450	475	500
Total Subscribers		2878	3062	3303	3550	3731	3918
QUEENS (6,150 Dwellings)							
No. of Subscribers (80% of regional dwellings)		**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
20% sign-up (grows 5% per annum)	Dwellings	1230	1291	1356	1424	1495	1570
	Business	100	200	300	400	425	425
Total Subscribers		1330	1491	1656	1824	1920	1995
TOTAL REGION		**5540**	**6047**	**6618**	**7200**	**7574**	**7912**

Subscriber Revenues

To provide Internet service to these dwellings, two working partners need to be involved:

- Municipality (or Proxy) – providing the infrastructure and infrastructure upkeep; and
- Internet Service Provider (ISP) – providing service delivery, including IRU, transport and associated transit fees.

At this high-level stage of planning, these two partners are assumed to be splitting the Internet revenue equally.

Based on current pricing models in the region, service is being offered at $85.90 per month. Each partner would therefore get $42.95 per subscriber per month.

A "***Phase-In***" period of six months has been allowed before the start of network revenues to allow phased construction to service subscribers. After the first 6 months of construction, service will be available to increasing numbers of users. In the first full year after the six-month start-up, it is anticipated that 20% of potential customers will be subscribers. Thereafter, revenues are expected to expand by 5% a year.

MONTHLY REVENUES	*Phase-in*						
		Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Municipality per month (50% of $85.90)		237,943	259,719	284,243	309,240	325,303	448,056
ISP per month (50% of 85.90)		237,943	259,719	284,243	309,240	325,303	448,056
Total Monthly Revenues for Both		475,886	519,438	568,486	618,480	650,606	813,816
Total Annual Revenues for Both		5,719,632	6,233,256	6,821,834	7,421,760	7,807,272	9,765,792
Total Annual Revenues Each (50%)		2,859,816	3,116,628	3,410,917	3,710,880	3,903,636	4,882,896

Based on access to an opportunity such as this, and from experience in other areas such as SWIFT in Ontario, i-Valley is confident that partners will readily agree to become involved in the South Shore project. Other Districts such as Kings and Hants are already aligned with this approach.

Impact of Ongoing Costs on "Available" Revenue

Revenue that is available to the municipality for directed spending on budget items like loan payback and network expansion, is impacted by the need to pay for ongoing network and operational costs.

The following table breaks down the budget items needed for these ongoing costs:

Costs	% of Budget
Hardware Maintenance	
Tower and line upkeep	5%
Professional Services	
Project Management incl. billing, customer care	5%
Marketing	2%
Implementation Life-cycle Engineering Design	1%
Managed Services	5%
Travel	
Vehicle mileage	1%
Other	
Site Preparation	0.50%
Hydro Connection	0.50%
Make-ready	0.50%
Testing - Network elements	0.50%
Testing - Power Systems	0.50%
Testing - Monitoring Systems	0.50%
Total % of budget for above ongoing costs	**22.00%**
Total % of budget for loan payments, expansion	**78.00%**
Total all	**100%**

Because the following calculations of subscriber revenues were done with a view to seeing how fast a debt could be repaid, only 78% of the total subscriber amount is used. Ongoing costs have been

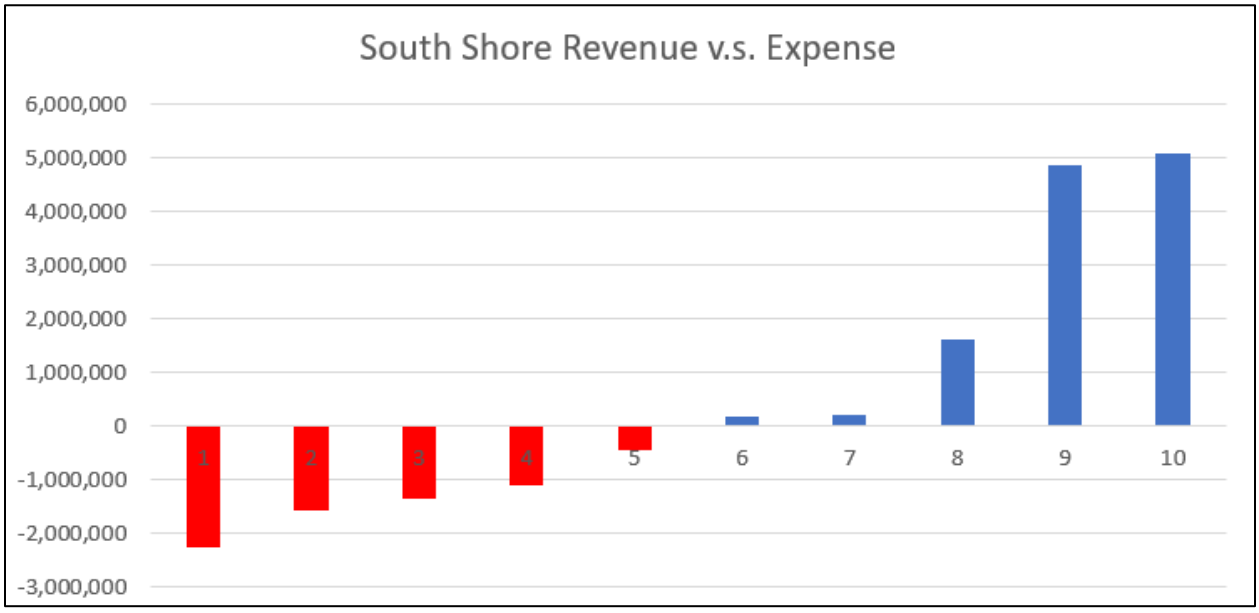
deducted. A "***Phase-In***" period of six months has been allowed before the start of network revenues. As per the table above in Year 1, revenues start with a 20% sign-up rate, expanding thereafter by 5% a year.

MONTHLY REVENUES	***Phase-in***						
		Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Municipality, by month (50% of $85.90)		237,943	259,719	284,243	309,240	325,303	448,056
78% of municipal portion, by month		185,596	202,581	221,710	241,207	253,736	349,484
78% of Revenues by year		**2,227,146**	**2,430,970**	**2,660,514**	**2,894,486**	**3,044,836**	**4,193,804**

After deductions for ongoing costs, the cash-flow balance crosses over to positive numbers after five years of operations. (Borrowing costs have not been calculated).

A "***Phase-In***" period of six months has been allowed before the start of network revenues.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total at Year 10
Total Regional Plan Cost	4,500,000	4,000,000	4,000,000	4,000,000	3,500,000	4,000,000	3,800,000	3,000,000	0	0	30,800,000
Subscriber Fees, Selected Communities	2,227,146	2,430,970	2,660,514	2,894,486	3,044,836	4,193,804	4,403,492	4,623,666	4,854,849	5,097,591	36,431,354
Cash flow by year	-2,272,854	-1,569,030	-1,339,486	-1,105,514	-455,164	193,804	200,000	1,623,666	4,854,849	5,097,591	6,431,354



Funding Sources for Municipalities

Community infrastructure requires long-term funding and other support that does not fall within the ROI formulas used by commercial carriers. While funding may also come from provincial and federal sources, such as those developed by SWIFT, this Report takes the "hardest-road" approach, and assumes that there are no extraordinary grants made available.

As noted in a previous study[7] of Nova Scotia's rural broadband delivery environment, market forces alone will not ensure that rural communities have access to the educational and economic benefits that broadband internet services can provide.[8] This study uses as its base-point the assumption that external funding will be required to deliver the network; once in place, this study proposes ways to ensure that the network continues to be maintained and even expanded.

Improving broadband services for rural and remote residents is a costly endeavour. However, building out telephone lines or electrical power lines to rural and remote residents was also a costly undertaking in the 20th century, requiring significant government and regulator intervention. High quality internet access is as essential today to social and economic development as the electrical or telephone connections of the 1900s.

For the purposes of this study, it is assumed that the **take-up rate** for service will be 20%. This is a conservative number; a study of the more expensive Fibre to the Home option for rural delivery stated that in most cases, a take-up rate of more than 50% is the norm.[9] Twelve years ago, a StatsCan survey noted that 58% of people in rural and small towns accessed the Internet.[10]

Rural internet demand is consistently high all across Canada. Manitoba Farmer Dan Mazier thinks it's high time that rural digital infrastructure be treated as an essential service, much like landline telephone service:

> *"It's a mandatory infrastructure and it's no different than water, it's no different than electricity. It's one of those utilities that we now need to function as a Canadian," said the president of Keystone Agricultural Producers in Manitoba. "Let's provide that to rural Canadians and let's get on with the plan."* [11]

Costing prices for this Report are calculated from an average derived from the various suppliers consulted, and are in line with industry norms.

In any scenario, i-Valley is capable of working with the client to help obtain public sector funding, and a list of potential funding sources known to i-Valley is included. For the potential Public-Private Partnership source, for example, the President of the Canadian Council on Public Private Partnerships sits on the Governors Council of i-Valley's sister organization, i-Canada.

---

[7] Province of Nova Scotia- Department of Business Options for Rural Broadband Connectivity, EY, 2016: https://novascotia.ca/business/docs/Broadband-Deliverable-Report.pdf

[9] Strategies for Rural Broadband, 2010, https://books.google.ca/books?id=gQGiaoSAaLAC&pg=PA95&lpg=PA95&dq=typical+rural+subscriber+take-up+rate&source=bl&ots=V9FpW992ey&sig=cuN_cg35kztjg5doff9_H1IYvn0&hl=en&sa=X&ved=0ahUKEwi8-tDqwcXXAhXC1CYKHWxNCScQ6AEINDAC#v=onepage&q=typical%20rural%20subscriber%20take-up%20rate&f=false

[10] Rural and Small Town Canada Analysis Bulletin Catalogue no. 21-006-XIE, Vol. 7, No. 3 (September 2007) Factors Associated with Internet Use: Does Rurality Matter?, Larry McKeown,

[11] The Western Producer, November 20, 2017: http://www.producer.com/2017/01/out-of-touch-fixing-rural-internet/

These organizations and programs are known at the present time; more will be added as they are revealed in federal and provincial announcements, and i-Valley will keep the South Shore up to date.

Financing Sources

	Scope	Jurisdiction	Affinity				
Program			**Citizen**	**Business**	**Infrastructure**	**Rural**	**Urban**
Build Canada Fund				**Yes**		**Yes**	
CRTC	$750 M	Federal	50+ Mbps service	Yes	Yes	Yes	Yes
CIRA			Yes	Yes	Net new Internet access technologies and reliability	Yes	Yes
Cisco Community Program[12]	$1-billion	P3	Yes	Yes	Yes		Yes
Provincial Government	$14.5M	Provincial	Yes	Yes	Yes	Yes	No
Community Infrastructure	$1 B	Federal			Yes - Municipal strategic infrastructure	Yes	Yes
Gas tax		Municipal	Yes		Yes	Yes	
Tax assessment		Municipal	Yes	Yes	Yes	Yes	
ACOA	$25 K	Atlantic Canada	Not primarily	Yes - Business competitiveness at regional level	Yes	Yes	
Public Private Partnership	$10-100 M	Public and Private combination	Yes	Canadian Council on Public Private Partnerships	Yes	Yes	Yes
Smart City Challenge	$300 M	Federal	Yes	Yes	Deployment of applications based on connectivity, IoT	Yes	Yes
Eco-System Partners		Commercial	Yes	Yes	Yes	Yes	Yes

In addition to these programs, i-Valley could explore the interest of outside partners to fund the project as a Public Private Partnership (PPP). The challenge is twofold: PPPs covering networks are rare, and the

[12] i-Valley is currently and actively exploring the interest of Cisco Capital in investing in community infrastructure.

amount involved in this project is small in the world of PPPs. Nevertheless, it is an option needing to be explored.

Implementation Plan

At a high level, there are three steps to take to move the project forward:

1. Perform the Detailed Engineering Plan of the network, to get the exact numbers that a loaning agency will need to approve financing. The first question in any lender's mind, is "how much will it cost?" Doing this Detailed Design will require some level of Municipal funding, and options can be explored to offset some of that with provincial and federal public-sector funds.
2. Decide how much the region itself is willing to put up for the total project. This will be the second question a lender will ask: "how much are you investing yourself?"
3. Work with the province, the federal government and the banks to obtain any long-term loans needed to finance the project.

By way of scale, the County of Annapolis is moving along a similar path; here is their funding framework:

Target coverage:	65% of rural area
Project Type:	Fibre backbone
Total Investment:	$18-million
Provincial Loan:	$13-million
Federal CTI:	$4-million

The big bang project is seen as having three construction elements:

1. Fibre Backbone Construction from Halifax to Chester, then from Chester to Lunenburg and Queens;
2. Connection of Identified Priority Communities, using fibre backbone and fixed wireless; and
3. Service Spread from priority communities to the rest of the region.

Element 1: Fibre Backbone Construction

This phase is described in detail in the Network section.

The complete backbone construction is seen as taking two years. Work can be done concurrently with work on Element 2. Immediate wireless connections can be opened from points along the network that are already served with infrastructure, with significant progress to service-provision within six months.

Element 2: Connection of Identified Priority Communities

This phase is also described in detail in the later section on Selected Communities.

Construction would be done serially with Phase 1. Completion of all construction for the entire network is seen as taking two years. Again, service can start for many communities within six months.

Element 3: Service Spread

The accompanying Tables describe this phase in detail.

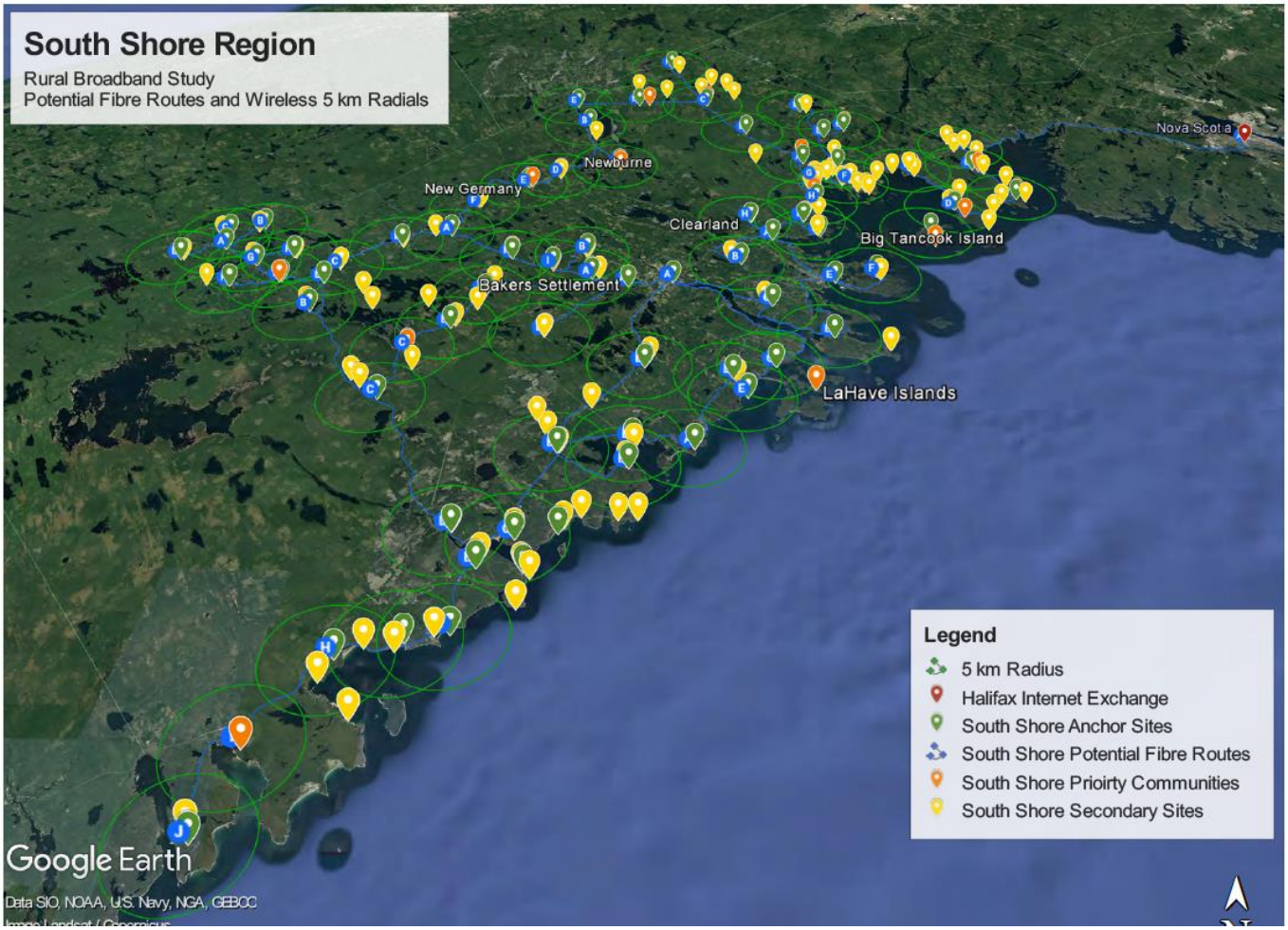
Construction targets depend on regional priorities as defined in district Development Plans, and could include factors such as:

- Social need within communities;
- Sector development (e.g. Tourism) requirements; and
- Provincial targets affecting needs like Healthcare, where additional focus and resources might be available to accelerate development of particular areas.

Construction is seen as taking two years beyond the completion of the original project.

Network Routes and Costs

"Big Bang" Total Coverage



South Shore Potential New Fibre Construction (Proposal Estimates)

(NOTE: Projections are based on a successful HFXIX fibre build to Municipality of the District of Chester)

Based on Fibre Route Construction Costs of $20,000 per Kilometer	Total	$27,061,660
Full Fibre Engineering Design Estimate Based on $4,500 per Kilometer	Total	$3,100,050

Total Route construction (fibre, wireless, detailed engineering)	$30,161,110
Consulting	$600,000
Total all	**$30,761,110**
Pro Rated cost to each region	
Chester 22%	$6,767,443
MODL 54%	$16,610,999
Queens 24%	$7,382,668
Optional contingency for TV White Space 10%	$3,076,111

Municipality of the District of Chester

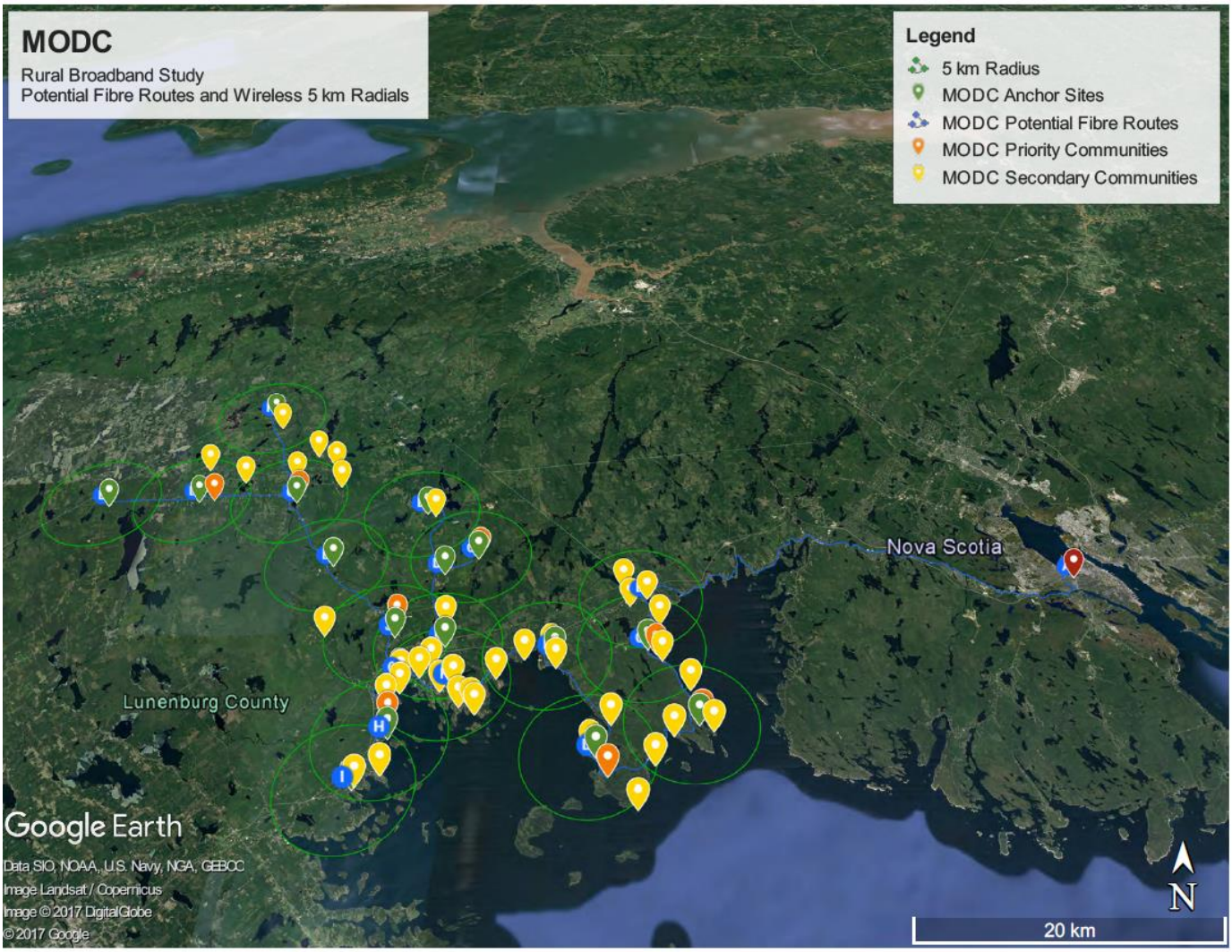
South Shore Potential Fibre and Wireless Mapping Estimates

Municipality of the District of Chester Potential New Fibre Construction (Proposal Estimates)
(**NOTE**: Projections are based on a successful HFXIX fibre build to Municipality of the District of Chester)

Backbone Community	Anchor Institution	Fibre (km)	Fibre Estimate	Equip Est	Site Prep Est	Wireless Est
HFXIX	HFXIX	0.0	$0	$55,674	$0	$0
Hubbards	Hubbards Fire Station	49.7	$994,000	$55,674	$30,000	$106,196
Mill Cove	Aspotogan Consolidated Elementary School	6.0	$120,000	$55,674	$30,000	$106,196
Northwest Cove	Ocean Swells Community Association	9.2	$184,000	$55,674	$30,000	$106,196
Blandford	Blandford and Area Fire Rescue	13.0	$260,000	$55,674	$30,000	$106,196
East River	Louisiana-Pacific Canada Ltd	14.0	$280,000	$55,674	$30,000	$106,196
Robinsons Corner	Oceanview Home and Garden	12.2	$244,000	$55,674	$30,000	$106,196
Chester Basin	Royal Canadian Legion Branch 88	5.1	$102,000	$55,674	$30,000	$0
Western Shore	Royal Canadian Legion Branch 144	6.2	$124,000	$55,674	$30,000	$106,196
Martin's River	Martin's River Fire Station	4.7	$94,000	$55,674	$30,000	$106,196
Chester Grant	Forest Heights Community School	4.1	$82,000	$55,674	$30,000	$106,196
Seffernville	2921 NS-12	10.2	$204,000	$55,674	$30,000	$106,196
New Ross	New Ross Consolidated School	7.9	$158,000	$55,674	$30,000	$106,196
Forties	Forties Community Centre	9.6	$192,000	$55,674	$30,000	$106,196
Franey Corner	3570 Forties Rd, New Ross, NS B0J 2M0	8.1	$162,000	$55,674	$30,000	$106,196
Aldersville	Muwin Estate Wines Ltd.	13.4	$268,000	$55,674	$30,000	$106,196
Windsor Road	Bonny Lea Farm	3.8	$76,000	$55,674	$30,000	$106,196
Canaan	Canaan And District Hall Association	11.2	$224,000	$55,674	$30,000	$106,196
Sherwood	Sherwood Golf & Country Club	9.2	$184,000	$55,674	$30,000	$106,196
		197.6	**$3,952,000**	**$1,057,806**	**$540,000**	**$1,805,332**
Based on Fibre Route Construction Costs of $20,000 per km		**Subtotal**				**$7,355,138**
Full Fibre Engineering Design Estimate Based on $4,500 per km		**Subtotal**				**$889,200**

Chester Regional Coverage Map

(5 km radius)

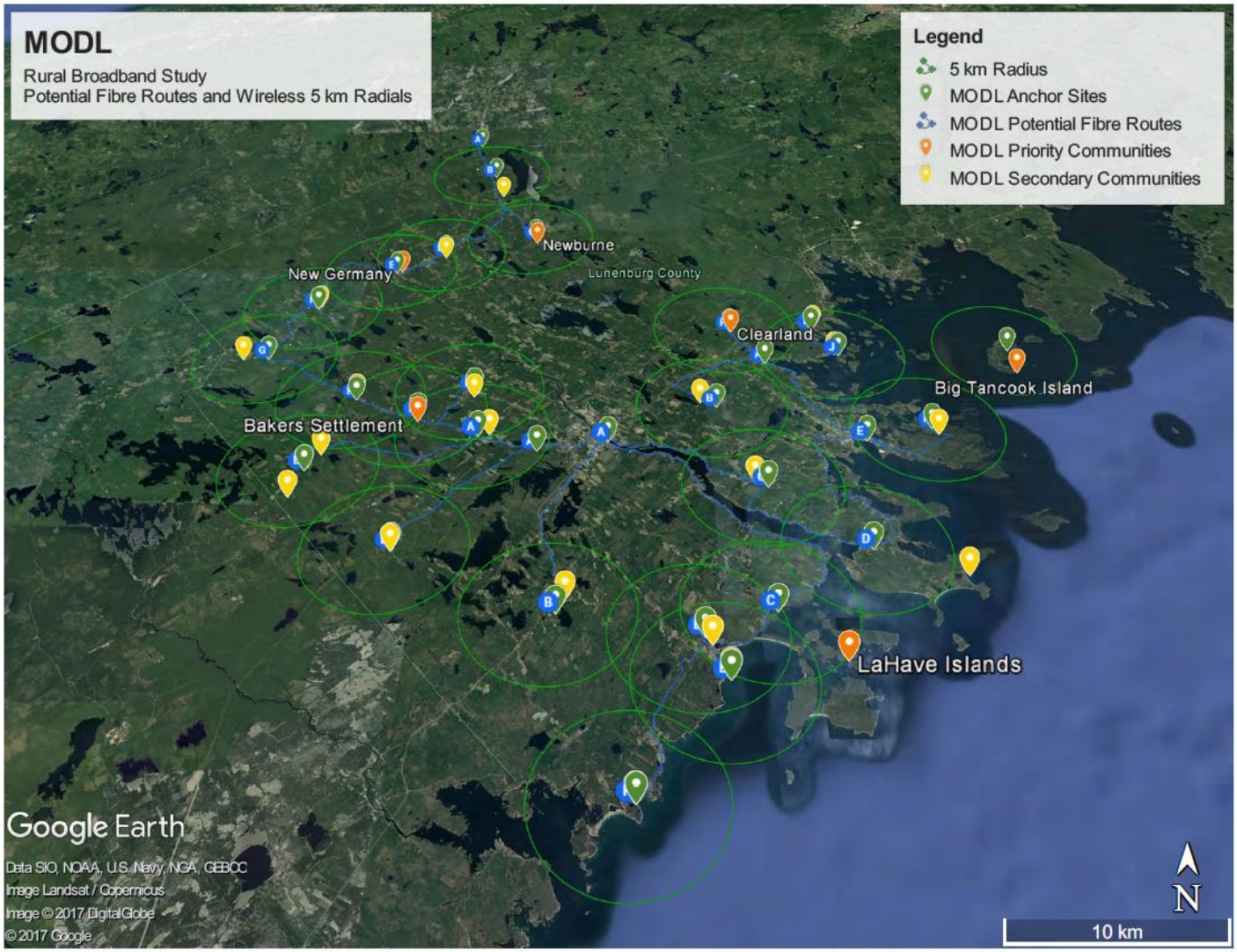


Municipality of the District of Lunenburg Potential New Fibre Construction (Proposal Estimates)
(NOTE: Projections are based on a successful HFXIX fibre build to Municipality of the District of Chester)

Backbone Community	Anchor Institution	Fibre (km)	Fibre Estimate	Equip Est	Site Prep Est	Wireless Est
Franey Corner	3570 Forties Rd, New Ross, NS B0J 2M0	0.0	$0	$0	$0	$0
Parkdale	Parkdale-Maplewood Community Museum	10.1	$202,000	$55,674	$30,000	$106,196
Newburne	Newburne Community Hall	6.6	$132,000	$55,674	$30,000	$106,196
Barss Corner	Barss Corner Community Hall	14.0	$280,000	$55,674	$30,000	$106,196
New Germany	New Germany Fire Hall	5.1	$102,000	$55,674	$30,000	$106,196
Hemford	Hemford and District Fire Department	11.2	$224,000	$55,674	$30,000	$106,196
Colpton	Colpton Fibre Splice	7.2	$144,000	$55,674	$30,000	$106,196
West Clifford	Norwood K Auto Repair	8.6	$172,000	$55,674	$30,000	$106,196
Bakers Settlement	Baker Settlement Fire Hall	5.0	$100,000	$55,674	$30,000	$106,196
Newcombville	Newcombville Elementary School	4.7	$94,000	$55,674	$30,000	$106,196
Bridgewater	Town of Bridgewater	9.6	$192,000	$55,674	$30,000	$0
LaHave Island	West Dublin Hall	24.3	$486,000	$55,674	$30,000	$106,196
Petite Rivière Bridge	Petite Rivière Elementary School	5.9	$118,000	$55,674	$30,000	$106,196
Green Bay	MacLeod Cottages	3.5	$70,000	$55,674	$30,000	$106,196
Upper Chelsea	Tri District Fire Rescue Station 3	13.7	$274,000	$55,674	$30,000	$106,196
Lapland	Lapland & District Fire Department	12.2	$244,000	$55,674	$30,000	$106,196
Italy Cross	Italy Cross Fire Hall	15.6	$312,000	$55,674	$30,000	$106,196
Cheery Hill	United Communities Fire Hall	12.4	$248,000	$55,674	$30,000	$106,196
Crouses Settlement	584 Crouses Settlement Rd	13.2	$264,000	$55,674	$30,000	$106,196
Kingsburg	Riverport District Fire Department	11.7	$234,000	$55,674	$30,000	$106,196
Lunenburg	Lunenburg Town Hall	16.3	$326,000	$55,674	$30,000	$0
Heckmand's Island	Terra Beata Farms	8.8	$176,000	$55,674	$30,000	$106,196
Mahone Bay	Mahone Bay Town Office	11.6	$232,000	$55,674	$30,000	$0
Clearland	856 Woodstock Road	5.0	$100,000	$55,674	$30,000	$106,196
Martin's River	Martin's River Fire Station	6.2	$124,000	$0	$0	$0
Indian Point	Indian Point Fire Dept	4.0	$80,000	$55,674	$30,000	$106,196
Big Tancook Island	Big Tancook Island Reef Rd.	0.0	$0		$30,000	$106,196
Covey Lake	Sweetwood Farm	10.2	$204,000	$55,674	$30,000	$106,196
Midville Branch	Midville & District Fire Department	7.0	$140,000	$55,674	$30,000	$106,196
		263.7	**$5,274,000**	##########	**$810,000**	**$2,548,704**
Based on Fibre Route Construction Costs of $20,000 per km		**Subtotal**				**$10,080,228**
Full Fibre Engineering Design Estimate Based on $4,500 per km		**Suntotal**				**$1,186,650**

MODL Regional Coverage Map

(5 km radius)



Region of Queens Municipality

Municipality of Queens Potential New Fibre Construction (Proposal Estimates)

(NOTE: Projections are based on a successful HFXIX fibre build to Municipality of the District of Chester)

Backbone Community	Anchor Institution	Fibre (km)	Fibre Estimate	Equip Est	Site Prep Est	Wireless Est
Colpton	Colpton Fibre Splice	0.0	$0	$0	$0	$0
Pleasant River	Farm	6.2	$124,000	$55,674	$30,000	$106,196
North Brookfield	Farm	8.4	$168,000	$55,674	$30,000	$106,196
South Brookfield	South Brookfield Canada Post	2.8	$56,000	$55,674	$30,000	$106,196
Caledonia	North Queens Volunteer Fire Department	4.7	$94,000	$55,674	$30,000	$106,196
Harmony Mills	Farm	4.9	$98,000	$55,674	$30,000	$106,196
Westfield	Westfield Community Center	5.7	$114,000	$55,674	$30,000	$106,196
Kempt	Kempt Community Hall	5.3	$106,000	$55,674	$30,000	$106,196
Albany New	Farm	6.2	$124,000	$55,674	$30,000	$106,196
Northfield	Farm	3.2	$64,000	$55,674	$30,000	$106,196
New Grafton	New Grafton Hall	5.6	$112,000	$55,674	$30,000	$106,196
West Caledonia	Farm	5.8	$116,000	$55,674	$30,000	$106,196
Hibernia	Nova Scotia Guides Association	8.1	$162,000	$55,674	$30,000	$106,196
Greenfield	Hillsview Acres	17.5	$350,000	$55,674	$30,000	$106,196
Milton	Baptist Church Milton	20.3	$406,000	$55,674	$30,000	$106,196
Liverpool	Region of Queens Municipality	5.9	$118,000	$55,674	$30,000	$0
White Point	White Point Beach Resort	9.0	$180,000	$55,674	$30,000	$106,196
Hunts Point	Hunts Point Community Hall	4.4	$88,000	$55,674	$30,000	$106,196
Port Mouton	Port Mouton International Hostel	6.4	$128,000	$55,674	$30,000	$106,196
Port Joli	Port Joli Community Hall	10.4	$208,000	$55,674	$30,000	$106,196
East Port L'Hebert	East Port L'Hebert Community Association	9.4	$188,000	$55,674	$30,000	$106,196
Buckfield	Buckfield Community Centre	6.4	$128,000	$55,674	$30,000	$106,196
Greenfield	Alean Freeman Library	5.6	$112,000	$55,674	$30,000	$106,196
Greenfield	Hillsview Acres	7.0	$140,000	$55,674	$30,000	$106,196
Mill Village	Mill Village & District Fire Department	16.5	$330,000	$55,674	$30,000	$106,196
Brooklyn	WA-Su-Wek Ltd	11.7	$234,000	$55,674	$30,000	$106,196
Liverpool	Region of Queens Municipality	6.4	$128,000	$0	$0	$0
East Port Medway	East Port Medway Community Hall	7.3	$146,000	$55,674	$30,000	$106,196
Mill Village	Mill Village & District Fire Department	7.9	$158,000	$0	$0	$0
Port Medway	Port Medway Fire Department	8.6	$172,000	$55,674	$30,000	$106,196
		227.6	**$4,552,000**	##########	**$810,000**	**$2,761,096**
Based on Fibre Route Construction Costs of $20,000 per km		**Subtotal**				**$9,626,294**
Full Fibre Engineering Design Estimate Based on $4,500 per km		**Subtotal**				**$1,024,200**

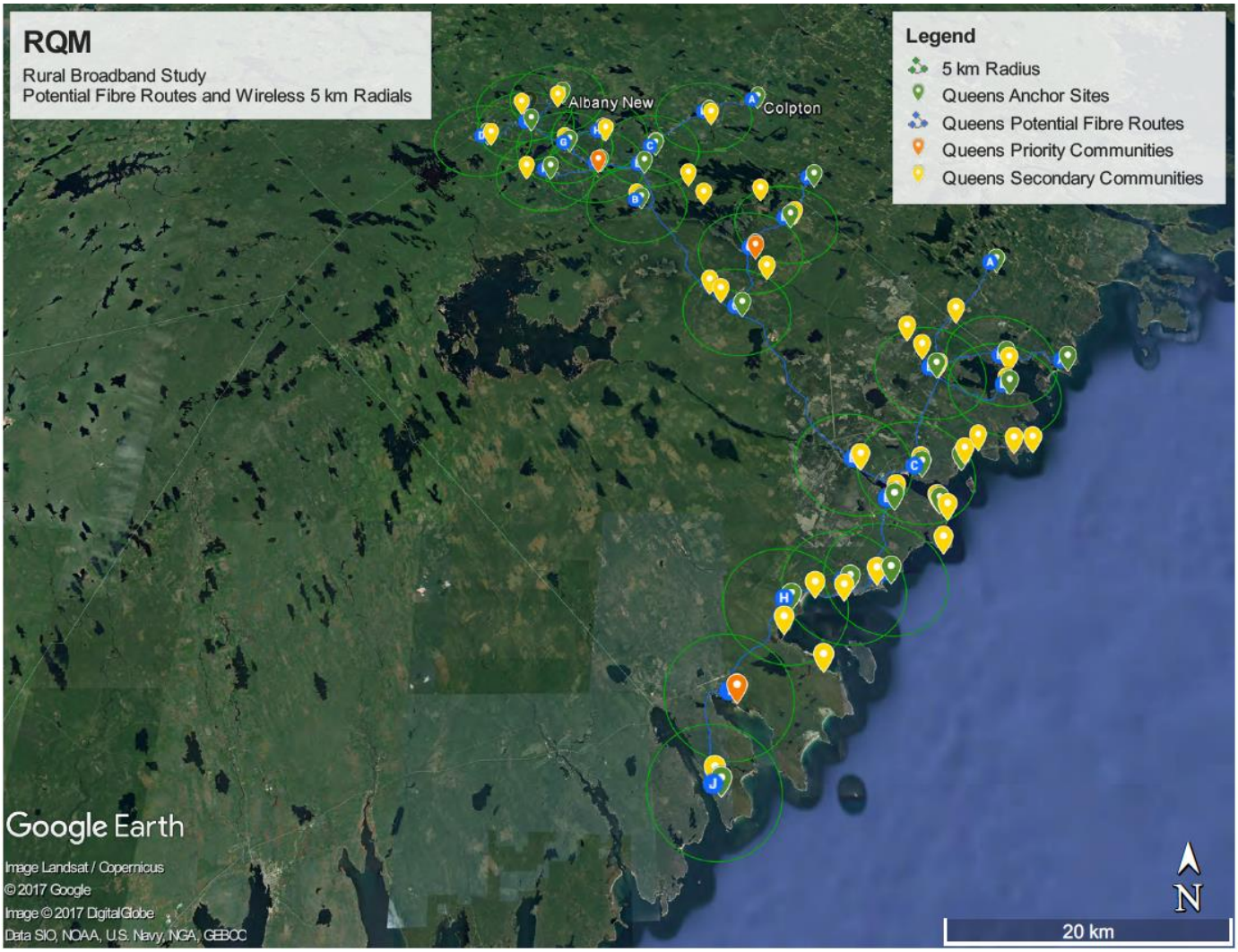
South Shore Potential New Fibre Construction (Proposal Estimates)

(NOTE: Projections are based on a successful HFXIX fibre build to Municipality of the District of Chester)

Based on Fibre Route Construction Costs of $20,000 per km	**Total**	**$27,061,660**
Full Fibre Engineering Design Estimate Based on $4,500 per km	**Total**	**$3,100,050**

Queens Regional Coverage

(5 km radius)



4. Selected Communities Network

A group of communities were selected for in-depth consideration, in view of their priority need for Internet service. Study was given to a determination of how these communities could be served, if for some reason the 'big bang' regional approach was not attractive.

Role of the Selected Communities in the Overall Network Implementation

The selected communities are in fact on the backbone route that would have to be followed by the regional plan. They are the priority communities to connect, in creating a regional network.

For this reason, a financial case can be made for considering two choices for implementation of the regional plan:

1. Financing the network to connecting the Selected Communities; then
2. Financing the build-out of the rest of the region.

An advantage to this approach is that the financing model for doing the Selected Communities is more attractive than the overall regional big build:

- The financing amounts are smaller and thus easier to borrow and manage;
- Cash flow could be positive from the fifth year onwards; and
- It would provide a base for financing and connecting the rest of the region.

Weighing against this option are these considerations:

- The build-out for the rest of the region would be delayed for some six years - a heavy human cost to pay;
- Financing, though greater than for the Selected Communities, is not much different from other regions and well within the range of similar projects; and
- It may be better in terms of obtaining financing, to go after a total package rather than a portion of the desired outcome.

Overall, i-Valley recommends the 'big bang' approach, noting that there is a viable option in going after Selected Communities instead.

Selected Communities: Total Dwellings

South Shore Communities		
	5 kms	10 kms
CHESTER		
Blandford	420	1484
Canaan	160	468
Chester Grant	1020	3745
Forties	189	665
Mill Cove	875	1833
New Ross	464	1001
Northwest Cove	308	1191
Western Shore	1431	3570
Totals	**4867**	**13957**
MODL		
Baker Settlement	406	1809
Big Tancook Island	164	225
Clearland	855	2427
LaHave	354	1571
Newburne	557	1479
New Germany	613	1759
Totals	**2949**	**9270**
QUEENS		
Greenfield	361	1222
Port Joli	112	585
Totals	**473**	**1807**
Totals All Regions	**8289**	**25,034**

Subscriber Counts In 10-km Radius for Selected Communities

A "***Phase-In***" period of six months has been allowed before Year 1 network revenue begins.

CHESTER: 8 communities							
No. of Premises: 13,957		**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
20% sign-up (grows 5% per annum)	Dwellings	2,791	2,930	3,076	3,231	3,393	3,563
	Business	80	200	300	400	425	575
Total		2871	3130	3376	3631	3818	4138
MODL: 6 communities							
No. of Premises: 9,270		**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
20% sign-up (grows 5% per annum)	Dwellings	1,854	1,947	2,044	2,146	2,254	2,366
	Business	30	50	100	300	400	450
Total		1884	1997	2144	2446	2654	2816
QUEENS: 2 communities							
No. of Premises: 1,807		**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
20% sign-up (grows 5% per annum)	Dwellings	361	379	398	418	439	461
	Business	20	40	80	200	300	400
Total		381	419	478	618	739	861
TOTAL REGION		**5136**	**5546**	**5998**	**6695**	**7211**	**7815**

Revenues in Selected Communities from Subscribers

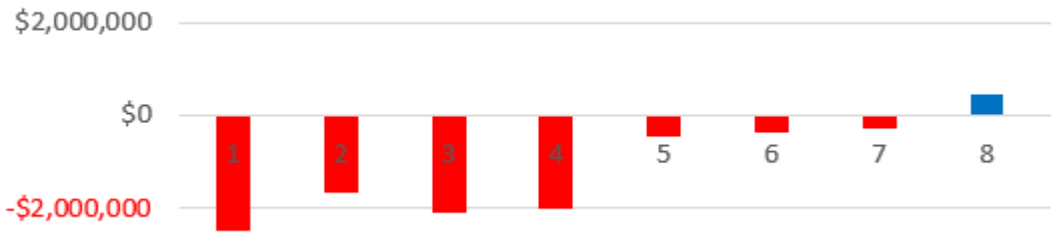
A "Phase-In" period of six months has been allowed before Year 1 network revenue begins.

REVENUES		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Municipality	(50% of $85.90)	141,133	151,614	159,001	167,033	175,708	184,341
ISP	(50% of $85.90)	141,133	151,614	159,001	167,033	175,708	184,341
Total Monthly Revenues for Both		282,267	303,227	318,002	334,066	352,416	368,682
Total Annual Revenues for Both		3,387,209	3,638,724	3,816,022	4,008,781	4,217,003	4,424,184
Total Annual Revenues Each (50%)		1,693,604	1,819,362	1,908,010	2,004,390	2,108,501	2,221,092

Revenues In Selected Communities Minus Ongoing Operating Expenses

REVENUES		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Municipality	(50% of $85.90)	141,133	151,614	159,001	167,033	175,708	184,341	193,559
78% of portion by month		110,083	118,259	124,020	130,285	137,052	143,786	150,974
78% of portion by year		1,320,996	1,419,108	1,488,249	1,563,423	1,644,626	1,725,431	1,811,703

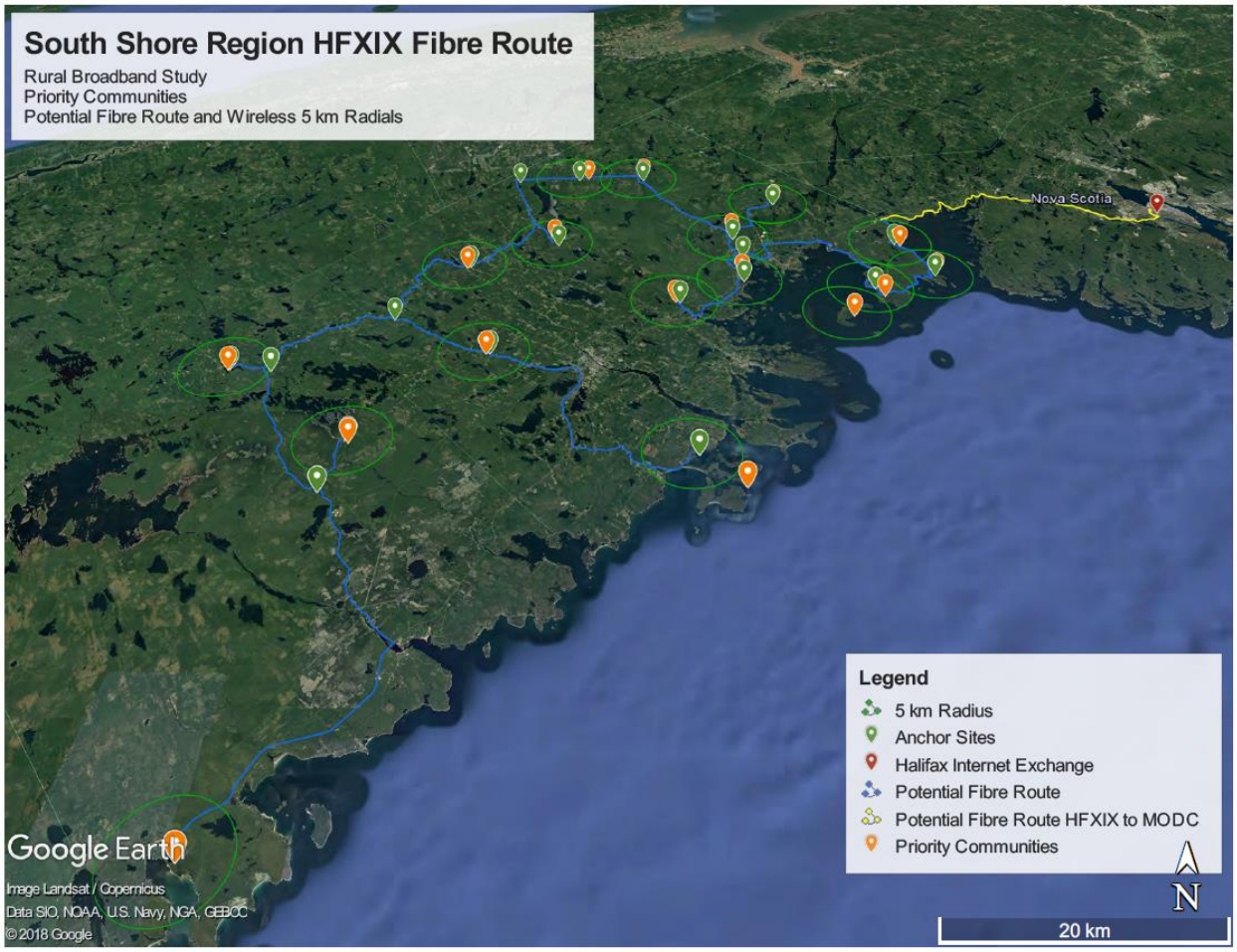
After deductions for ongoing costs, the cash-flow balance crosses over to positive numbers after seven years of operations:



In this chart, the first column represents the front-end cost of the Detailed Engineering Design.

16 Selected Communities: Network Options

16 Selected Communities: Route Direct From Halifax Exchange



This route involves new construction but is the most flexible and the preferred choice. This route forms the basis of the Financial Indicator view in the following pages. The costs in the following Table include:

- Backbone from Halifax
- Backbone to each Selected Community
- Wireless coverage for each Community
- Detailed Engineering Study

In summary:

Network	13,087,060
Consulting	460,000
Total:	**13,547,060**

Pro-Rated:	
Chester (22%)	2,980,353
MODL (54%)	7,315,412
QUEENS (24%)	3,251,295

Municipality of the District of Chester Potential New Fibre Construction (Proposal Estimates)

(Based on a successful HFXIX fibre build to Mill Cove, Mun. of the Dist. of Chester)

Backbone Community	Fibre (km)	Fibre Estimate	Equip Est	Site Prep Est	Wireless Est
Forties	0.0	$0	$55,674	$30,000	$106,196
New Ross	9.6	$192,000	$55,674	$30,000	$106,196
Chester Grant	19.0	$380,000	$55,674	$30,000	$106,196
Canaan	12.7	$254,000	$55,674	$30,000	$106,196
Chester Basin	4.1	$82,000	$55,674	$30,000	$106,196
Western Shore	6.2	$124,000	$55,674	$30,000	$106,196
Blandford	29.9	$598,000	$55,674	$30,000	$106,196
Northwest Cove	13.0	$260,000	$55,674	$30,000	$106,196
Mill Cove	9.2	$184,000	$55,674	$30,000	$106,196
HFXIX	55.3	$1,106,000	$55,674		
	159.0	**$3,180,000**	**$556,740**	**$270,000**	**$955,764**
Based on Fibre Route Construction Costs of $20,000 per Kilometer				**Subtotal**	**$4,962,504**
Full Fibre Engineering Design Estimate Based on $4,500 per Kilometer				**Subtotal**	**$715,500**

Municipality of the District of Lunenburg Potential New Fibre Construction (Proposal Estimates)

(Based on a successful HFXIX fibre build to Mill Cove, Mun. of the Dist. of Chester)

Backbone Community	Fibre (km)	Fibre Estimate	Equip Est	Site Prep Est	Wireless Est
Newburne	24.8	$496,000	$55,674	$30,000	$106,196
New Germany	19.3	$386,000	$55,674	$30,000	$106,196
Bakers Settlement	32.9	$658,000	$55,674	$30,000	$106,196
LaHave Island	38.4	$768,000	$55,674	$30,000	$106,196
Clearland	14.3	$286,000	$55,674	$30,000	$106,196
Big Tancook Island				$30,000	$106,196
	129.7	**$2,594,000**	**$278,370**	**$180,000**	**$637,176**
Based on Fibre Route Construction Costs of $20,000 per Kilometer				Subtotal	**$3,689,546**
Full Fibre Engineering Design Estimate Based on $4,500 per Kilometer				Subtotal	**$583,650**

Municipality of Queens Potential New Fibre Construction (Proposal Estimates)

Backbone Community	Fibre (km)	Fibre Estimate	Equip Est	Site Prep Est	Wireless Est
Colpton	0.0	$0	$0	$0	$0
South Brookfield	17.4	$348,000	$0	$0	$0
Caledonia	4.8	$96,000	$55,674	$30,000	$106,196
Greenfield	21.5	$430,000	$0	$0	$0
Greenfield	7.7	$154,000	$55,674	$30,000	$106,196
Port Joli	53.1	$1,062,000	$55,674	$30,000	$106,196
	104.5	**$2,090,000**	**$167,022**	**$90,000**	**$318,588**
Based on Fibre Route Construction Costs of $20,000 per Kilometer				**Subtotal**	**$2,665,610**
Full Fibre Engineering Design Estimate Based on $4,500 per Kilometer				**Subtotal**	**$470,250**

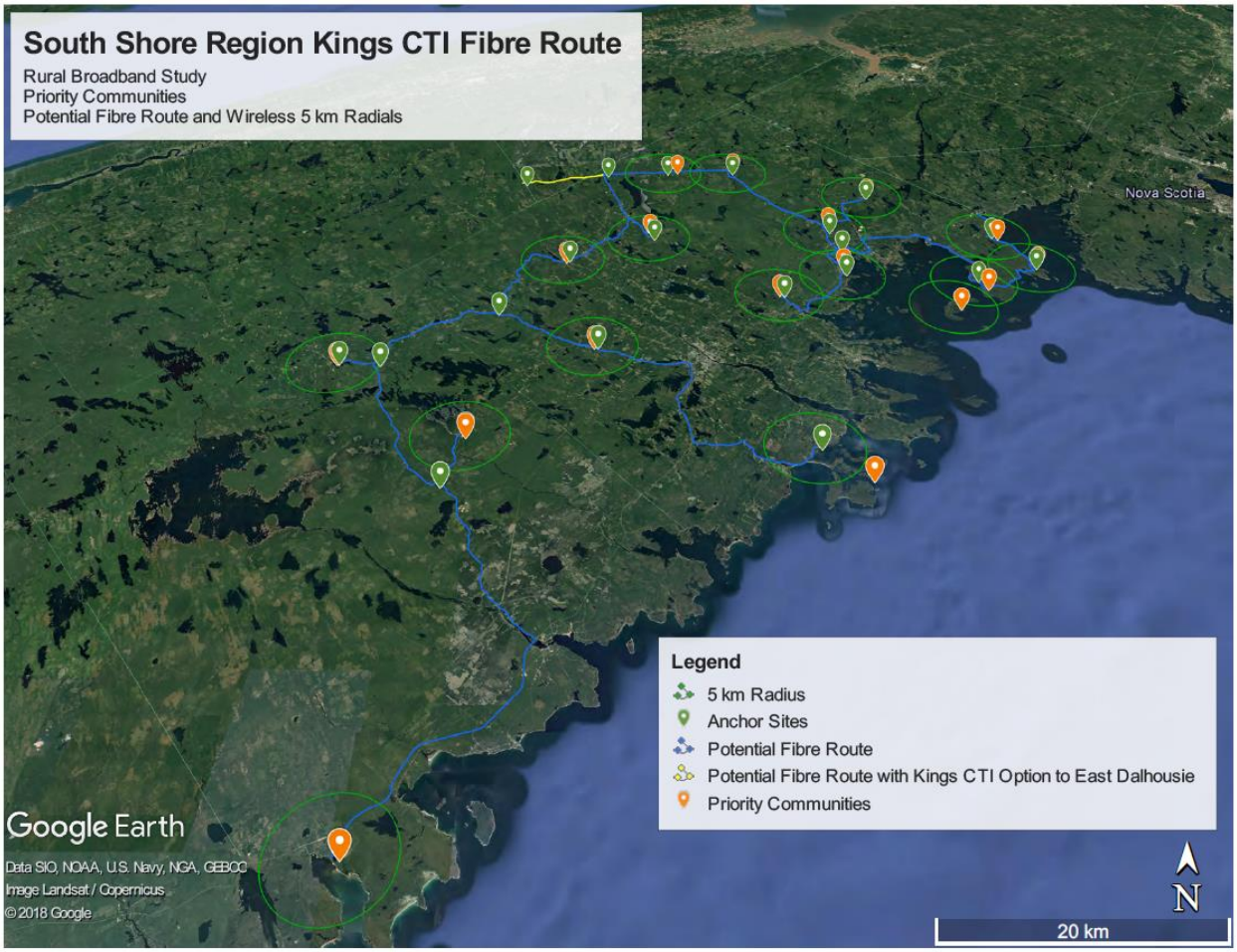
South Shore Potential New Fibre Construction (Proposal Estimates)

(**NOTE:** Based on a successful HFXIX fibre build to Mill Cove, Mun. of the Dist. of Chester)

Based on Fibre Route Construction Costs of $20,000 per Kilometer				**Total**	**$11,317,660**
Full Fibre Engineering Design Estimate Based on $4,500 per Kilometer				**Total**	**$1,769,400**

16 Selected Communities: Route Supported by VCFN "Connect To Innovate" Competition

This route is the least expensive, but is predicated on the possibility that submissions by either Kings or Hants Municipalities will be awarded funds under the Connect to Innovate federal program.



In summary:

Network including Fibre Backbone and Engineering:	12,066,086
Consulting	460,000
Total:	12,526,086

Pro-Rated Costs of $12,526,086	
Chester (22%)	2,755,739
MODL (54%)	6,764,086
QUEENS (24%)	3,006,261

CTI-Supported VCFN Route: Selected Communities

Municipality of the District of Chester Potential New Fibre Construction (Proposal Estimates)

Network ID	Backbone Community	Fibre Routing Start Point	Fibre Routing Splice or End Point	Fibre (km)	Fibre Estimate	Equip Est	Site Prep Est	Wireless Est
Chester	Forties	Franey Corner, NS	1787 Forties Rd, New Ross, NS B0J 2M	8.1	$162,000	$55,674	$30,000	$106,196
Chester	New Ross	1787 Forties Rd, New Ross, NS B0J 2M0	4689 NS-12, New Ross, NS B0J 2M0	9.6	$192,000	$55,674	$30,000	$106,196
Chester	Chester Grant	4689 NS-12, New Ross, NS B0J 2M0	847 12 HWY, Chester Grant, NS B0J 1I	19.0	$380,000	$55,674	$30,000	$106,196
Chester	Canaan	847 12 HWY, Chester Grant, NS B0J 1K0	732 Canaan Rd, Canaan, NS B0J 1J0	12.7	$254,000	$55,674	$30,000	$106,196
Chester	Chester Basin	848 12 HWY, Chester Grant, NS B0J 1K0	25 NS-12, Chester Basin, NS B0J 1K0	4.1	$82,000	$55,674	$30,000	$106,196
Chester	Western Shore	25 NS-12, Chester Basin, NS B0J 1K0	6582 Nova Scotia Trunk 3, Western S	6.2	$124,000	$55,674	$30,000	$106,196
Chester	Blandford	25 NS-12, Chester Basin, NS B0J 1K0	30 Firehall Rd, Hubbards, NS B0J 1T0	29.9	$598,000	$55,674	$30,000	$106,196
Chester	Northwest Cove	30 Firehall Rd, Hubbards, NS B0J 1T0	NS-329, Hubbards, NS B0J 1T0	13.0	$260,000	$55,674	$30,000	$106,196
Chester	Mill Cove	NS-329, Hubbards, NS B0J 1T0	105 Parkwood Drive, Mill Cove, NS B0	9.2	$184,000	$55,674	$30,000	$106,196
Based on Fibre Route Construction C	**Subtotal**		**$3,962,830**	**111.8**	**$2,236,000**	**$501,066**	**$270,000**	**$955,764**
Full Fibre Engineering Design Estimate	**Subtotal**		**$503,100**					

NOTE: This option assumes that the Municipality of Kings is awarded a successful federal CTI project for new fibre constructed overlashing the VCFN through to East Dalhousie.
There would be an additional cost to secure a partnership with Kings and or VCFN for fibre pairs, or contract an IRU for fibre pairs for the South Shore municipalities (costs unknown to date).

Municipality of the District of Lunenburg Potential New Fibre Construction (Proposal Estimates)

Network ID	Backbone Community	Fibre Routing Start Point	Fibre Routing Splice or End Point	Fibre (km)	Fibre Estimate	Equip Est	Site Prep Est	Wireless Est
MODL	Newburne	E Dalhousie Rd, Springfield, NS B0R 1H0	1385 Newburne Road, Newburne, NS	32.6	$652,000	$55,674	$30,000	$106,196
MODL	New Germany	1385 Newburne Road, Newburne, NS B0R	Fire Hall Rd, New Germany, NS B0R 1	19.3	$386,000	$55,674	$30,000	$106,196
MODL	Bakers Settlement	Fire Hall Rd, New Germany, NS B0R 1E0	Bakers Settlement, Lunenburg Co., NS	32.9	$658,000	$55,674	$30,000	$106,196
MODL	LaHave Island	Bakers Settlement, Lunenburg Co., NS B4V	10 Huey Lake Road, La Have, Nova Sc	38.4	$768,000	$55,674	$30,000	$106,196
MODL	Clearland	6582 Nova Scotia Trunk 3, Western Shore	856 Woodstock Road, Clearland, NS,	14.3	$286,000	$55,674	$30,000	$106,196
MODL	Big Tancook Island						$30,000	$106,196
				137.5	**$2,750,000**	**$278,370**	**$180,000**	**$637,176**
Based on Fibre Route Construction C	**Subtotal**		**$3,845,546**	**137.5**	**$2,750,000**	**$278,370**	**$180,000**	**$637,176**
Full Fibre Engineering Design Estimate	**Subtotal**		**$618,750**					

NOTE: This option assumes that the Municipality of Kings is awarded a successful federal CTI project for new fibre overlashing the VCFN through to East Dalhousie.
There would be an additional cost to secure a partnership with Kings and or VCFN for fibre pairs, or contract an IRU for fibre pairs for the South Shore municipalities (costs unknow to date).

Municipality of Queens Potential New Fibre Construction (Proposal Estimates)

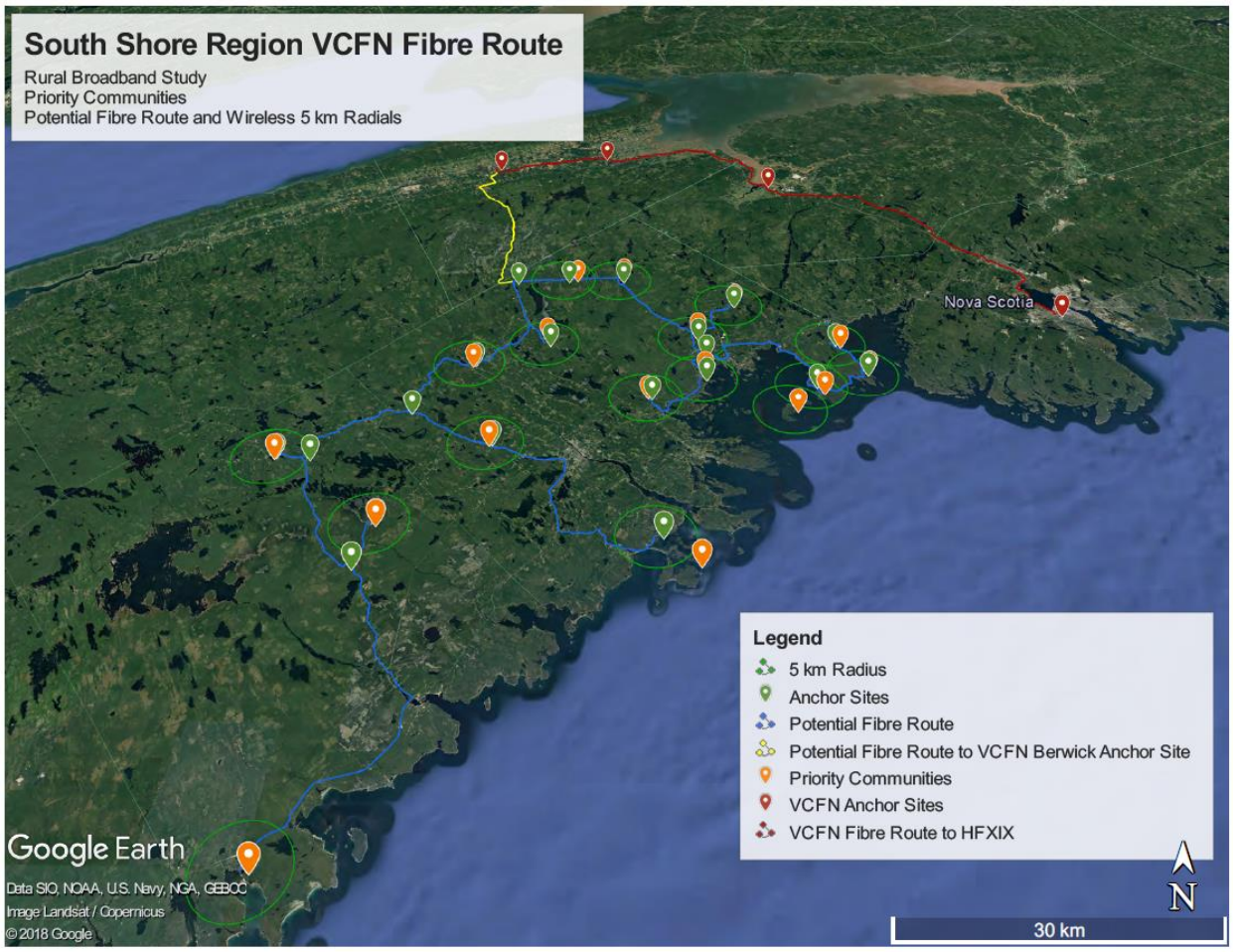
Network ID	Backbone Community	Fibre Routing Start Point	Fibre Routing Splice or End Point	Fibre (km)	Fibre Estimate	Equip Est	Site Prep Est	Wireless Est
Queens	Colpton	44.453714, -64.820240	Intersection 208 and 325	0.0	$0	$0	$0	$0
Queens	South Brookfield	44.453714, -64.820240	6995 NS-208, South Brookfield, NS B0	17.4	$348,000	$0	$0	$0
Queens	Caledonia	6995 NS-208, South Brookfield, NS B0T 1X	Nova Scotia Trunk 8, Caledonia, NS B	4.8	$96,000	$55,674	$30,000	$106,196
Queens	Greenfield	6995 NS-208, South Brookfield, NS B0T 1X	14 Middlefield Rd, Greenfield, NS B0T	21.5	$430,000	$0	$0	$0
Queens	Greenfield	14 Middlefield Rd, Greenfield, NS B0T 1E0	5060 NS-210, Greenfield, NS B0T 1E0	7.7	$154,000	$55,674	$30,000	$106,196
Queens	Port Joli	14 Middlefield Rd, Greenfield, NS B0T 1E0	10032 Highway 3, Port Joli, NS	53.1	$1,062,000	$55,674	$30,000	$106,196
				104.5	**$2,090,000**	**$167,022**	**$90,000**	**$318,588**
Based on Fibre Route Construction C	**Subtotal**		**$2,665,610**	**104.5**	**$2,090,000**	**$167,022**	**$90,000**	**$318,588**
Full Fibre Engineering Design Estimate	**Subtotal**		**$470,250**					

NOTE: This option assumes that the Municipality of the District of Lunenburg constructs new fibre from New Germany and Bakers Settlement following highways 208 and 325.

South Shore Potential New Fibre Construction (Proposal Estimates)

Based on Fibre Route Construction C	**Total**	**$10,473,986**
Full Fibre Engineering Design Estimate	**Total**	**$1,592,100**

16 Selected Communities: The Valley Community Fibre Network (VCFN) Route



This option is less expensive than the direct line from Halifax but uses an existing VCFN network that might soon reach capacity.

Network including Fibre Backbone and Engineering:	12,740,145
Consulting	460,000
Total:	13,200,145

Pro-Rated Costs of $13,200,145	
Chester (22%)	2,904,032
MODL (54%)	7,128,078
QUEENS (24%)	3,168,035

VCFN Route: Selected Communities

Municipality of the District of Lunenburg Potential New Fibre Construction (Proposal Estimates)

Network ID	Backbone Community	Fibre Routing Start Point	Fibre Routing Splice or End Point	Fibre (km)	Fibre Estimate	Equip Est	Site Prep Est	Wireless Est
MODL	Newburne	236 Commercial St, Berwick, NS B0P 1E0	1385 Newburne Road, Newburne, NS	60.4	$1,208,000	$55,674	$25,000	$104,155
MODL	New Germany	1385 Newburne Road, Newburne, NS B0R	Fire Hall Rd, New Germany, NS B0R 1	19.3	$386,000	$55,674	$30,000	$106,196
MODL	Bakers Settlement	Fire Hall Rd, New Germany, NS B0R 1E0	Bakers Settlement, Lunenburg Co., NS	32.9	$658,000	$55,674	$30,000	$106,196
MODL	LaHave Island	Bakers Settlement, Lunenburg Co., NS B4\	10 Huey Lake Road, La Have, Nova Sc	38.4	$768,000	$55,674	$30,000	$106,196
MODL	Clearland	6582 Nova Scotia Trunk 3, Western Shore	856 Woodstock Road, Clearland, NS,	14.3	$286,000	$55,674	$30,000	$106,196
MODL	Big Tancook Island						$30,000	$106,196
				165.3	**$3,306,000**	**$278,370**	**$175,000**	**$635,135**
Based on Fibre Route Construction C		**Subtotal**	**$4,394,505**	**165.3**	**$3,306,000**	**$278,370**	**$175,000**	**$635,135**
Full Fibre Engineering Design Estimate		**Subtotal**	**$743,850**					

NOTE: This option assumes that the Valley Community Fibre Network at the time of contract has available fibre remaining and available to contract to the South Shore municipalities. There would be an additional cost to secure a partnership with VCFN for fibre pairs, or contract an IRU for fibre pairs (approx $220,000 for a 20-year IRU per pair plus annual maintenance).

Municipality of the District of Chester Potential New Fibre Construction (Proposal Estimates)

Network ID	Backbone Community	Fibre Routing Start Point	Fibre Routing Splice or End Point	Fibre (km)	Fibre Estimate	Equip Est	Site Prep Est	Wireless Est
Chester	Forties	Franey Corner, NS	1787 Forties Rd, New Ross, NS B0J 2M	8.1	$162,000	$55,674	$30,000	$106,196
Chester	New Ross	1787 Forties Rd, New Ross, NS B0J 2M0	4689 NS-12, New Ross, NS B0J 2M0	9.6	$192,000	$55,674	$30,000	$106,196
Chester	Chester Grant	4689 NS-12, New Ross, NS B0J 2M0	847 12 HWY, Chester Grant, NS B0J 1	19.0	$380,000	$55,674	$30,000	$106,196
Chester	Canaan	847 12 HWY, Chester Grant, NS B0J 1K0	732 Canaan Rd, Canaan, NS B0J 1J0	12.7	$254,000	$55,674	$30,000	$106,196
Chester	Chester Basin	848 12 HWY, Chester Grant, NS B0J 1K0	25 NS-12, Chester Basin, NS B0J 1K0	4.1	$82,000	$55,674	$30,000	$106,196
Chester	Western Shore	25 NS-12, Chester Basin, NS B0J 1K0	6582 Nova Scotia Trunk 3, Western S	6.2	$124,000	$55,674	$30,000	$106,196
Chester	Blandford	25 NS-12, Chester Basin, NS B0J 1K0	30 Firehall Rd, Hubbards, NS B0J 1T0	29.9	$598,000	$55,674	$30,000	$106,196
Chester	Northwest Cove	30 Firehall Rd, Hubbards, NS B0J 1T0	NS-329, Hubbards, NS B0J 1T0	13.0	$260,000	$55,674	$30,000	$106,196
Chester	Mill Cove	NS-329, Hubbards, NS B0J 1T0	105 Parkwood Drive, Mill Cove, NS B0	9.2	$184,000	$55,674	$30,000	$106,196
Based on Fibre Route Construction C		**Subtotal**	**$3,962,830**	**111.8**	**$2,236,000**	**$501,066**	**$270,000**	**$955,764**
Full Fibre Engineering Design Estimate		**Subtotal**	**$503,100**					

NOTE: This option assumes that the Valley Community Fibre Network at the time of contract has available fibre remaining and available to contract to the South Shore municipalities. There would be an additional cost to secure a partnership with VCFN for fibre pairs, or contract an IRU for fibre pairs (approx $220,000 for a 20-year IRU per pair plus annual maintenance).

Municipality of Queens Potential New Fibre Construction (Proposal Estimates)

Network ID	Backbone Community	Fibre Routing Start Point	Fibre Routing Splice or End Point	Fibre (km)	Fibre Estimate	Equip Est	Site Prep Est	Wireless Est
Queens	Colpton	44.453714, -64.820240	Intersection 208 and 325	0.0	$0	$0	$0	$0
Queens	South Brookfield	44.453714, -64.820240	6995 NS-208, South Brookfield, NS B0	17.4	$348,000	$0	$0	$0
Queens	Caledonia	6995 NS-208, South Brookfield, NS B0T 1\	Nova Scotia Trunk 8, Caledonia, NS B	4.8	$96,000	$55,674	$30,000	$106,196
Queens	Greenfield	6995 NS-208, South Brookfield, NS B0T 1\	14 Middlefield Rd, Greenfield, NS B0T	21.5	$430,000	$0	$0	$0
Queens	Greenfield	14 Middlefield Rd, Greenfield, NS B0T 1E0	5060 NS-210, Greenfield, NS B0T 1E0	7.7	$154,000	$55,674	$30,000	$106,196
Queens	Port Joli	14 Middlefield Rd, Greenfield, NS B0T 1E0	10032 Highway 3, Port Joli, NS	53.1	$1,062,000	$55,674	$30,000	$106,196
				104.5	**$2,090,000**	**$167,022**	**$90,000**	**$318,588**
Based on Fibre Route Construction C		**Subtotal**	**$2,665,610**	**104.5**	**$2,090,000**	**$167,022**	**$90,000**	**$318,588**
Full Fibre Engineering Design Estimate		**Subtotal**	**$470,250**					

NOTE: This option assumes that the Municipality of the District of Lunenburg constructs new fibre from New Germany and Bakers Settlement following highways 208 and 325.

South Shore Potential New Fibre Construction (Proposal Estimates)

Based on Fibre Route Construction C	**Total**	**$11,022,945**
Full Fibre Engineering Design Estimate	**Total**	**$1,717,200**

Priority Communities by District

Chester

Chester Grant

Priority Community: Chester Grant, Municipality of the District of Chester, Nova Scotia

Anchor Site: Forest Heights Community School, 847 12 HWY, Chester Grant, NS B0J 1K0

PIN: 44.600413, -64.320912

The following offers an interim approach to extend an Internet access service to Chester Grant in the event that an initiative is not undertaken to fund a full municipally owned infrastructure open access network for rural broadband deployment throughout the municipal districts of Chester, Luneburg and Queens.

In this interim approach, a tower build in Chester Grant at Forest Heights Community School could tie into an EastLink gigabit Internet point of service. The tower build would incorporate a wireless Internet broadband-to-the-home delivery model to residence and business who wish to subscribe to the service. The broadband-to-the-home delivery model consists of a mix of fixed LTE technology and point-to-multipoint technology, both of which may service a 5 km radial area from the tower, however these delivery technologies will require a full engineering site by site study to determine which method can deliver the best solution to each civic site within the Chester Grant area. The engineering study will also finalize the tower location, which could be different from the preliminary selection. The high level approach and cost estimates are outlined here.

Gigabit Service Access: Closest gigabit access service point may be at or near Forest Heights Community School.

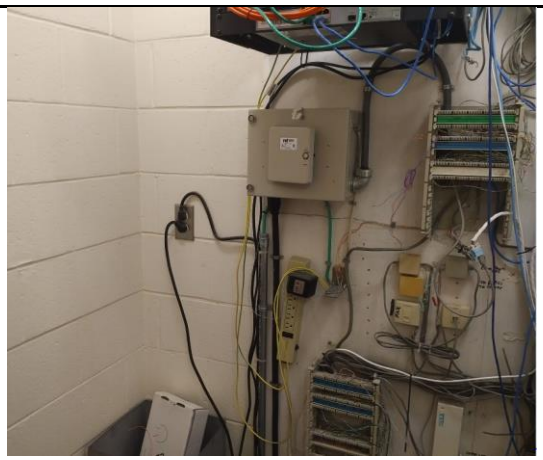
Fixed Wireless Access Option:

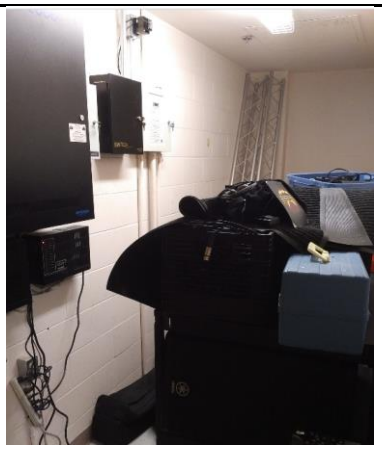
Site Prep	$30,000
Tower Configuration	$106,196
Infrastructure Estimate	**$136,196**

Next Step: Conduct a full site survey, which would include verification of EastLink access point, ISP agreements and costs, lease and use agreements, final tower site selection, coverage area mapping, end user subscription rates, service agreements, and final costs.

Next Step Cost: $15,000

Tower	
Location	Forest Heights Community School
Images	 





Tower Site Analysis

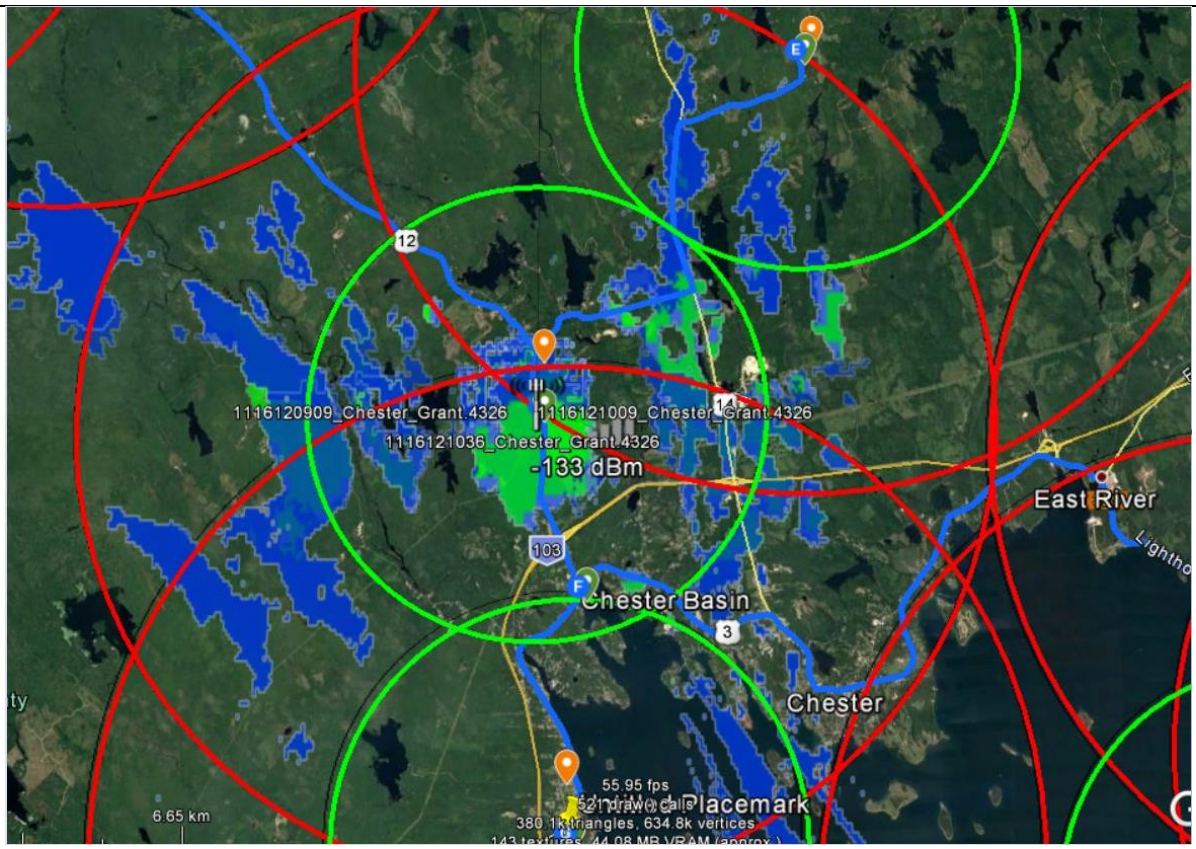
Site survey checklist

PoP site: Forest Heights Community School

Item	Yes/No	Comments
Secure equipment room with enough physical equipment space	Y	Electrical room or Server room
Secure cabinet with sufficient physical equipment space	Y	
Y	N	
120 v power with sufficient capacity	Y	
Available battery backup with sufficient capacity	N	
Power on 24x7x365?	Yes	
Any physical impediments to planned fibre run to building?	N	Building adjacent to highway
Suitable as tower site?	Y	Needs to be outside of school play area
Alternative tower site. Provide description incl. suitability for incremental fibre run or PtP wireless	Potential adjacent public land	
Pictures of building and surroundings, proposed IT room or closet location	Y	
Alternative PoP sites observed	N	

Base Station Type

Configuration 1

Coverage Radius	
5-Km Radius Dwellings	**1020**
10-km Radius Dwellings	**3745**

New Ross

Priority Community: New Ross, Municipality of the District of Chester, Nova Scotia

Anchor Site: New Ross Consolidated School, 4689 NS-12, New Ross, NS B0J 2M0

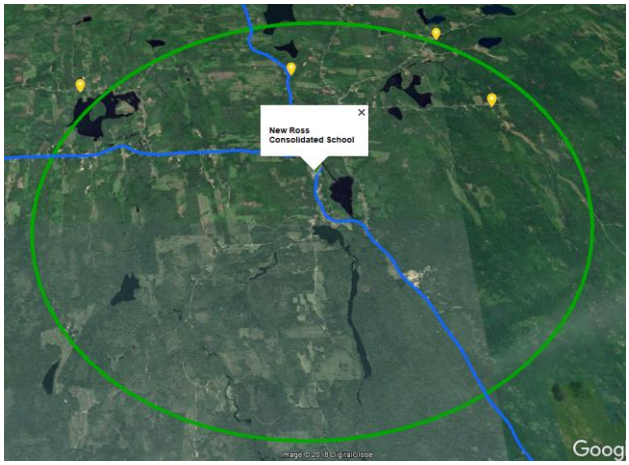
PIN: 44.730796, -64.457778

The following offers an interim approach to extend an Internet access service to New Ross in the event that an initiative is not undertaken to fund a full municipally owned infrastructure open access network for rural broadband deployment throughout the municipal districts of Chester, Luneburg and Queens.

In this interim approach, a tower build in New Ross at the New Ross Consolidated School (or alternatively, New Ross Volunteer Fire Department) could tie into an EastLink gigabit Internet point of service. The tower build would incorporate a wireless Internet broadband-to-the-home delivery model to residence and business who wish to subscribe to the service. The broadband-to-the-home delivery model consists of a mix of fixed LTE technology and point-to-multipoint technology, both of which may service a 5 km radial area from the tower. However these delivery technologies will require a full engineering site by site study to determine which method can deliver the best solution to each civic site within the New Ross area. The engineering study will also finalize the tower location, which could be different from the preliminary selection. The high level approach and cost estimates are outlined here.

Gigabit Service Access: Closest gigabit access service point may be at or near New Ross Consolidated School.

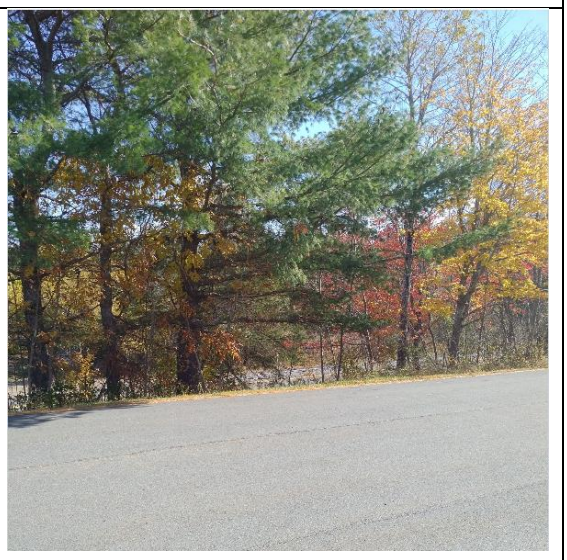
Fixed Wireless Access Option:



Site Prep	$30,000
Tower Configuration	$106,196
Infrastructure Estimate	**$136,196**

Next Step: Conduct a full site survey, which would include verification of EastLink access point, ISP agreements and costs, lease and use agreements, final tower site selection, coverage area mapping, end user subscription rates, service agreements, and final costs.

Next Step Cost: $15,000

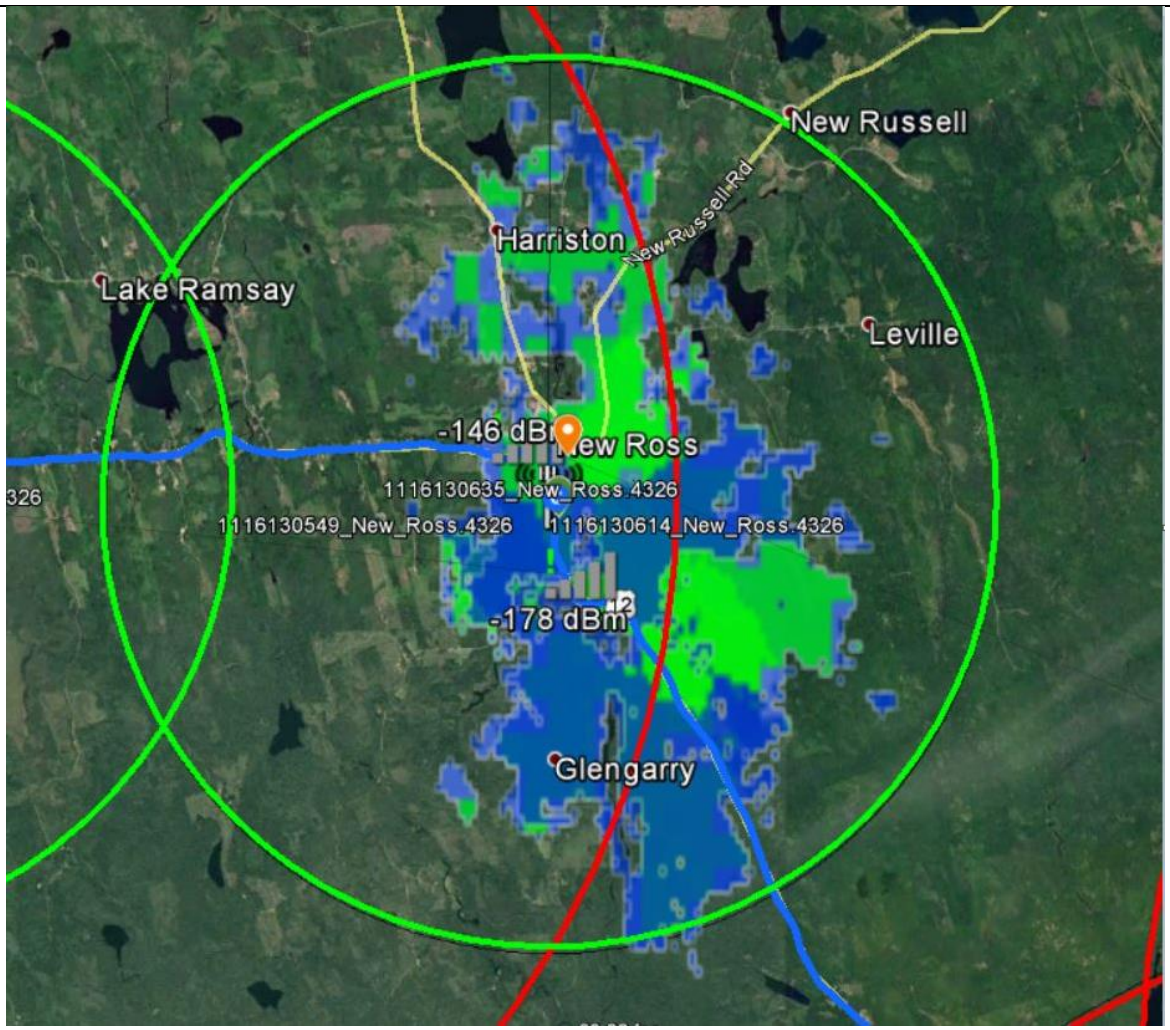
Tower	
Location	
Images New Ross Consolidated School	   

Option 2: New Ross Fire Hall			

<table>
<tr><td>Tower Site Analysis</td><td>
Site survey checklist

PoP site: New Ross Consolidated School

<table>
<tr><th>Item</th><th>Yes/No</th><th>Comments</th></tr>
<tr><td>Secure equipment room with enough physical equipment space</td><td>Y</td><td>1. Unused storage room 2nd floor available which can be fitted with lock.
2. NS Public Internet Access building also potential site – unavailable to enter</td></tr>
<tr><td>Secure cabinet with sufficient physical equipment space</td><td></td><td></td></tr>
<tr><td>240 v power with sufficient capacity</td><td>Y</td><td></td></tr>
<tr><td>120 v power with sufficient capacity</td><td>Y</td><td></td></tr>
<tr><td>Available battery backup with sufficient capacity</td><td>N</td><td></td></tr>
<tr><td>Power on 24x7x365?</td><td>Y</td><td></td></tr>
<tr><td>Any physical impediments to planned fibre run to building?</td><td>No</td><td>Directly on highway</td></tr>
<tr><td>Suitable as tower site?</td><td>Y</td><td>Slightly raised plateau should be suitable</td></tr>
<tr><td>Alternative tower site. Provide description incl. suitability for incremental fibre run or PtP wireless</td><td></td><td></td></tr>
<tr><td>Pictures of building and surroundings, proposed IT room or closet location</td><td>Y</td><td></td></tr>
<tr><td>Alternative PoP sites observed</td><td></td><td>New Ross Fire Hall on north highway side of New Ross</td></tr>
</table>
</td></tr>
<tr><td>Base Station Type</td><td>Configuration 1</td></tr>
</table>

Coverage Radius	
5-Km Radius Dwellings	**464**
10-km Radius Dwellings	**1001**

Priority Communities by District

Municipality of the District Of Lunenburg

LaHave Islands

Priority Community: LaHave Islands, Municipality of the District of Lunenburg, Nova Scotia

Anchor Site: West Dublin Hall, 10 Huey Lake Road, La Have, Nova Scotia B0R 1C0

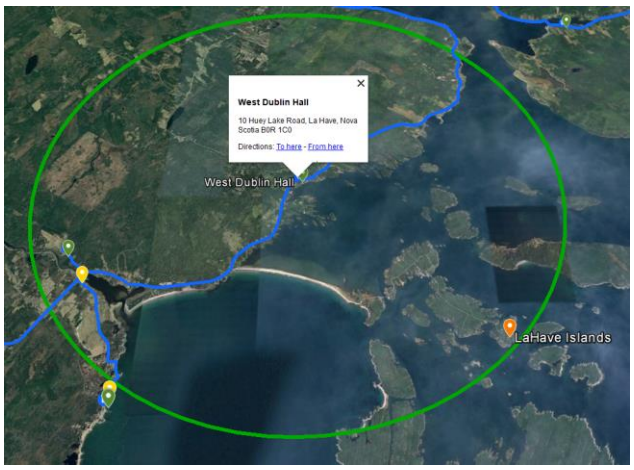
PIN: 44.2535041, -64.4000122

The following offers an interim approach to extend an Internet access service to LaHave Islands in the event that an initiative is not undertaken to fund a full municipally owned infrastructure open access network for rural broadband deployment throughout the municipal districts of Chester, Lunenburg and Queens.

In this interim approach, a tower build in West Dublin at the West Dublin Hall would tie into an EastLink gigabit Internet point of service. The tower build would incorporate a wireless Internet broadband-to-the-home delivery model to residence and business who wish to subscribe to the service. The broadband-to-the-home delivery model consists of a mix of fixed LTE technology and point-to-multipoint technology, both of which may service a 5 km radial area from the tower. However, these delivery technologies will require a full engineering site by site study to determine which method can deliver the best solution to each civic site on the LaHave Islands. The engineering study will also finalize the tower location, which could be different from the preliminary selection. The high level approach and cost estimates are outlined here.

Gigabit Service Access: Closest gigabit access service point would be at or near West Dublin.

Fixed Wireless Access Option:

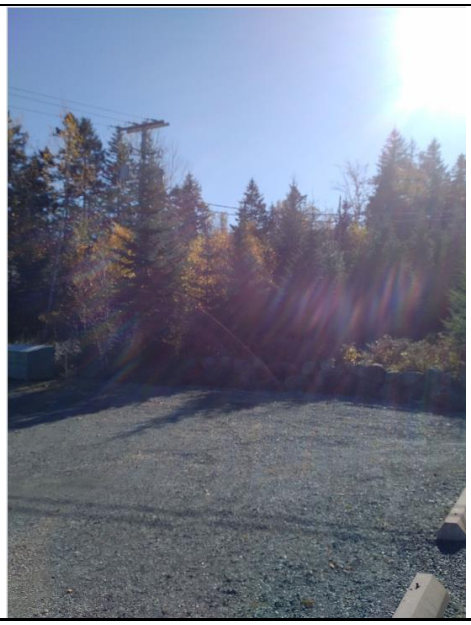


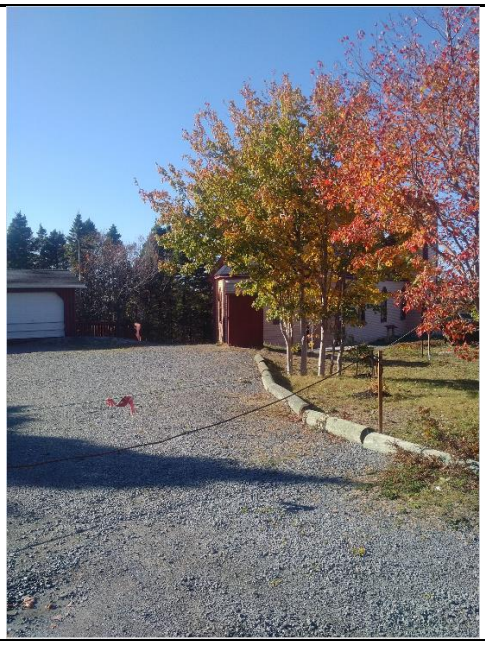
West Dublin Hall Site Prep	$30,000
West Dublin Hall Tower Configuration	$106,196
Infrastructure Estimate	**$136,196**

Next Step: Conduct a full site survey, which would include verification of EastLink access point, ISP agreements and costs, lease and use agreements, final tower site selection, coverage area mapping, end user subscription rates, service agreements, and final cost.

Next Step Cost: $15,000

Note: A full site survey and coverage area mapping may prove that an additional tower may be required on LaHave Island to ensure service availability. This will add infrastructure and survey costs for the project.

Tower	
Location 1	Dublin: preferred location; fine-tuning to come if the project moves forward.
Location 2 (not optimal)	LaHave Island Fire Dept., 50 School House Rd, LaHave, NS B0R 1C0 44.28515,-64.3892564
Images	 



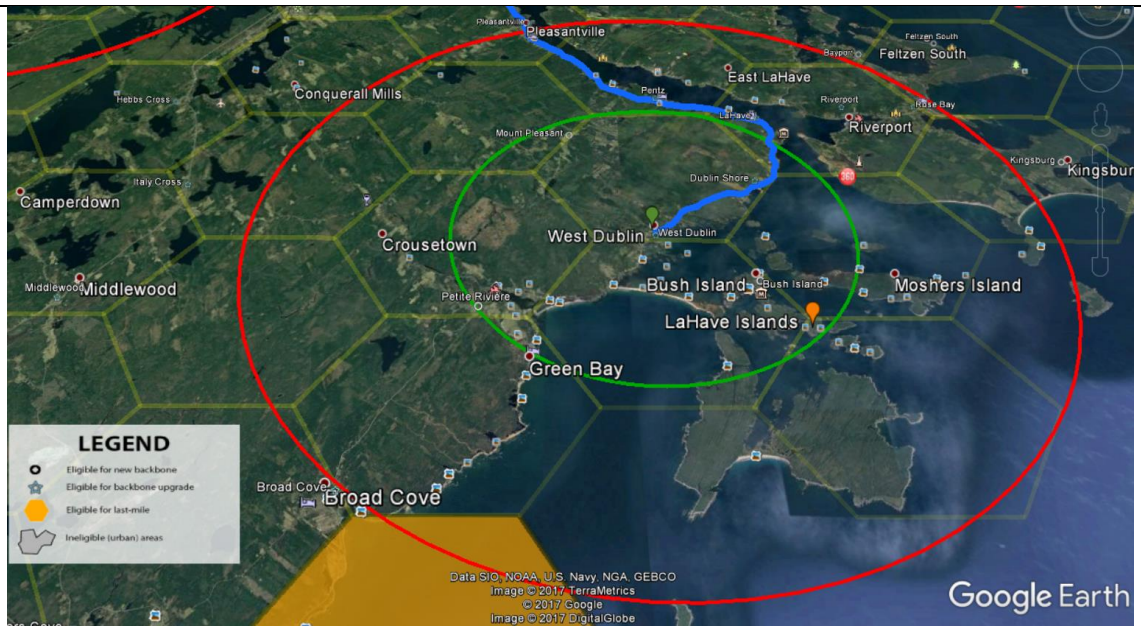
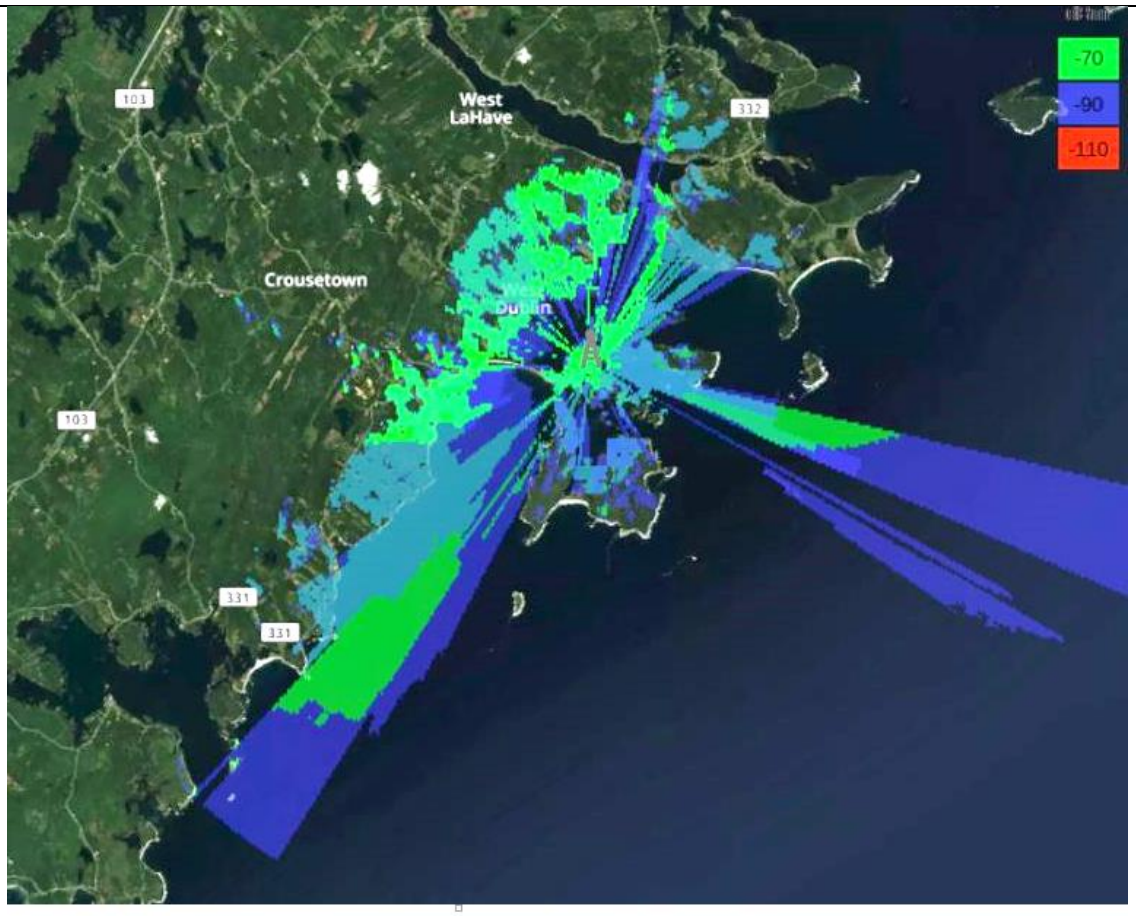
Tower Site Analysis

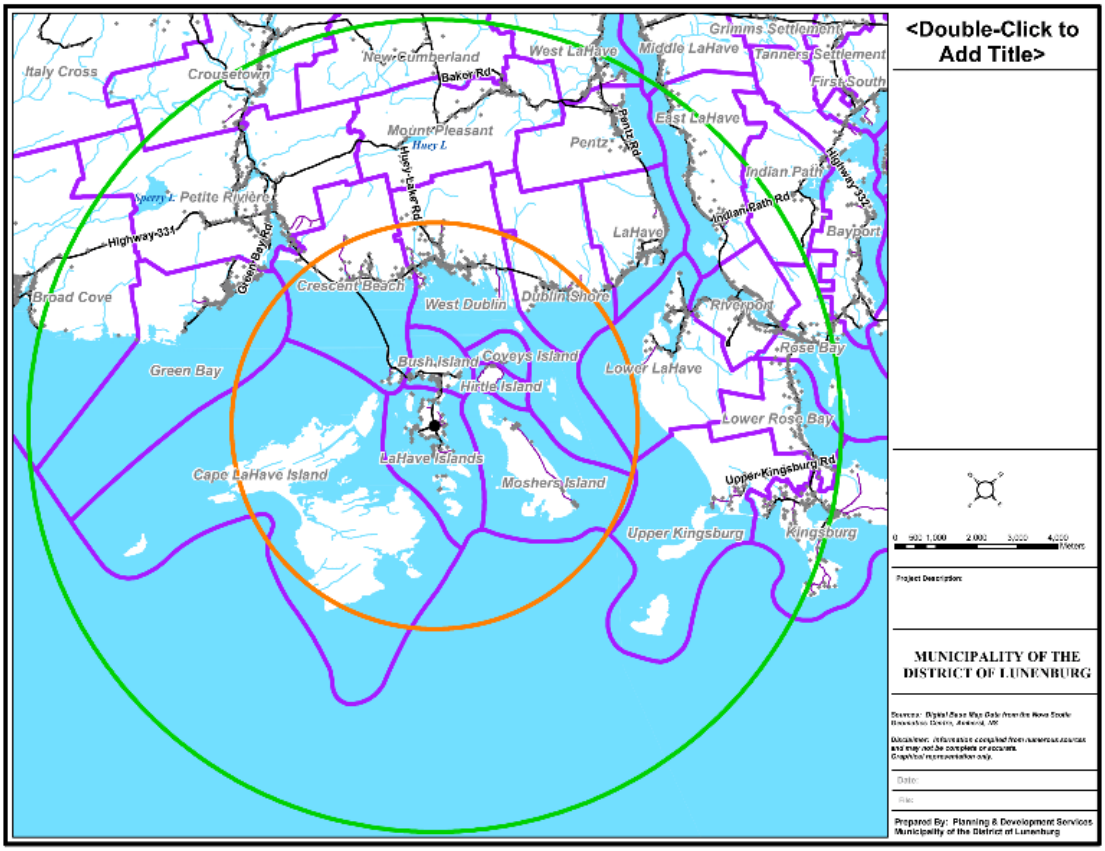
PoP site: LaHave Island Museum

Item	Yes/No	Comments
Secure equipment room with enough physical equipment space	No building access provided	
Secure cabinet with sufficient physical equipment space		
240 v power with sufficient capacity		
120 v power with sufficient capacity		
Available battery backup with sufficient capacity		
Power on 24x7x365?		
Any physical impediments to planned fibre run to building?	Fibre could be run across causeway at significant cost.	Preferred approach is PtP wireless from LaHave
Suitable as tower site?	y	
Alternative tower site. Provide description incl. suitability for incremental fibre run or PtP wireless		
Pictures of building and surroundings, proposed IT room or closet location	Y	
Alternative PoP sites observed		

Base Station Type

Configuration 1

Coverage Radius	
Coverage Projected	

5- and 10-km radius	
5-Km Radius Dwellings	**354**
10-km Radius Dwellings	**1571**

Newburne

Priority Community: Newburne, Municipality of the District of Lunenburg, Nova Scotia

Anchor Site: Newburne Community Hall, 1385 Newburne Road, Newburne, NS B0R 1A0

PIN: 44.588872, -64.5934994

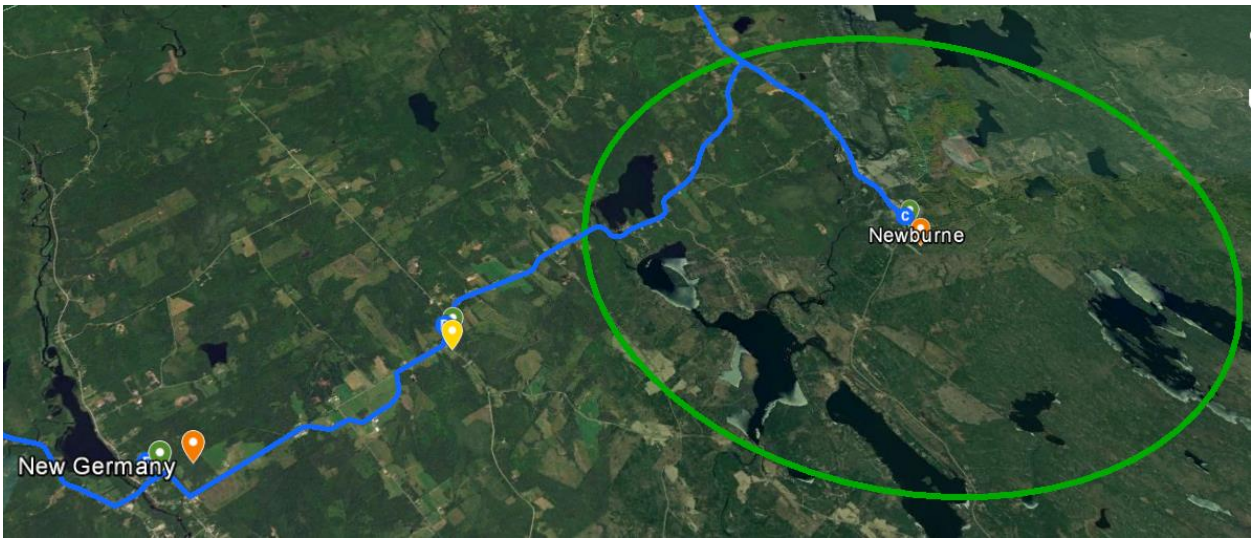
The following offers an interim approach to extend an Internet access service to Newburne in the event that an initiative is not undertaken to fund a full municipally owned infrastructure open access network for rural broadband deployment throughout the municipal districts of Chester, Luneburg and Queens.

Two methods of service extension are possible: extend fibre from EastLink's fibre or gigabit service presence in New Germany to Newburne (a new fibre build); or, build a point-to-point fixed wireless access link between New Germany and Newburne.

Of the two service extension options, a new fibre build will offer many more years of service, higher bandwidth availability, and further expansion capability above and beyond a point-to-point wireless solution, and can continue to be extended to other communities as funding becomes available.

A tower build in Newburne would incorporate a wireless Internet broadband-to-the-home market delivery model to residence and business who wish to subscribe to the service. The broadband-to-the-home delivery model consists of a mix of fixed LTE technology and point-to-multipoint technology, both of which may service a 5 km radial area from the tower. However, these delivery technologies will require a full engineering site by site study to determine which method can deliver the best solution to each civic site in Newburne. The engineering study will also finalize the tower locations, which could be different from the preliminary selections. The high level approach and cost estimates for both solutions are outlined here.

Gigabit Service Access: Closest gigabit access service point would be New Germany. New Fibre build to Newburne Community Hall from New Germany (for example, New Germany Rural High School)



1. **Fibre Route Option:**

Fibre Length (km)	19.9
Fibre Estimate ($20,000 per km)	$398,000
Newburne Community Hall Site Prep	$30,000
Newburne Wireless Tower	$106,196
Infrastructure Estimate	**$534,196**

2. **Point-to-Point Fixed Wireless Access Link Option:**

New Germany Fire Hall Site Prep	$30,000
New Germany Fire Hall Tower	$106,196
Newburne Community Hall Site Prep	$30,000
Newburne Community Hall Tower	$106,196
Infrastructure Estimate	**$272,392**

Both options assume that EastLink would provide a gigabit service to the new fibre or tower infrastructure point in New Germany. The point-to-point fixed wireless access link would operate at one gigabit to serve the Newburne tower site. It also assumes that full line of site is available between the two tower locations. A tower installation in New Germany (for example, at the New Germany Fire Hall) could also serve a broadband-to-the-home delivery model within a 5 km radial area from the tower for New Germany area residence and business.

Next Step: Conduct full site surveys, which would include verification of EastLink access point, ISP agreements and costs, lease and use agreements, final tower site selections, coverage area mapping, end user subscription rates, service agreements, and final cost.

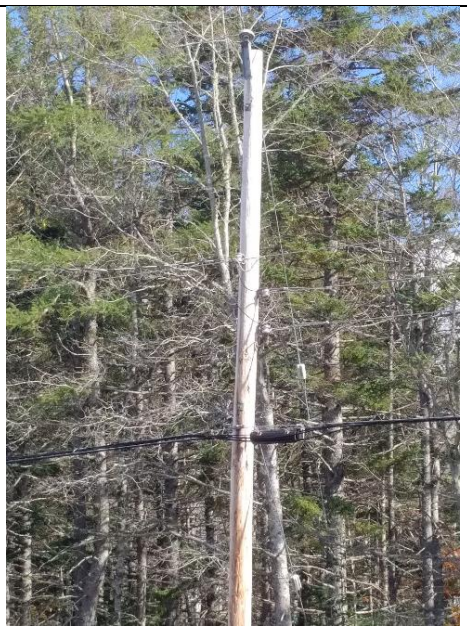
Next Step Cost: $25,000

Note: The fibre route option would also require an engineering site design at $4500 per km

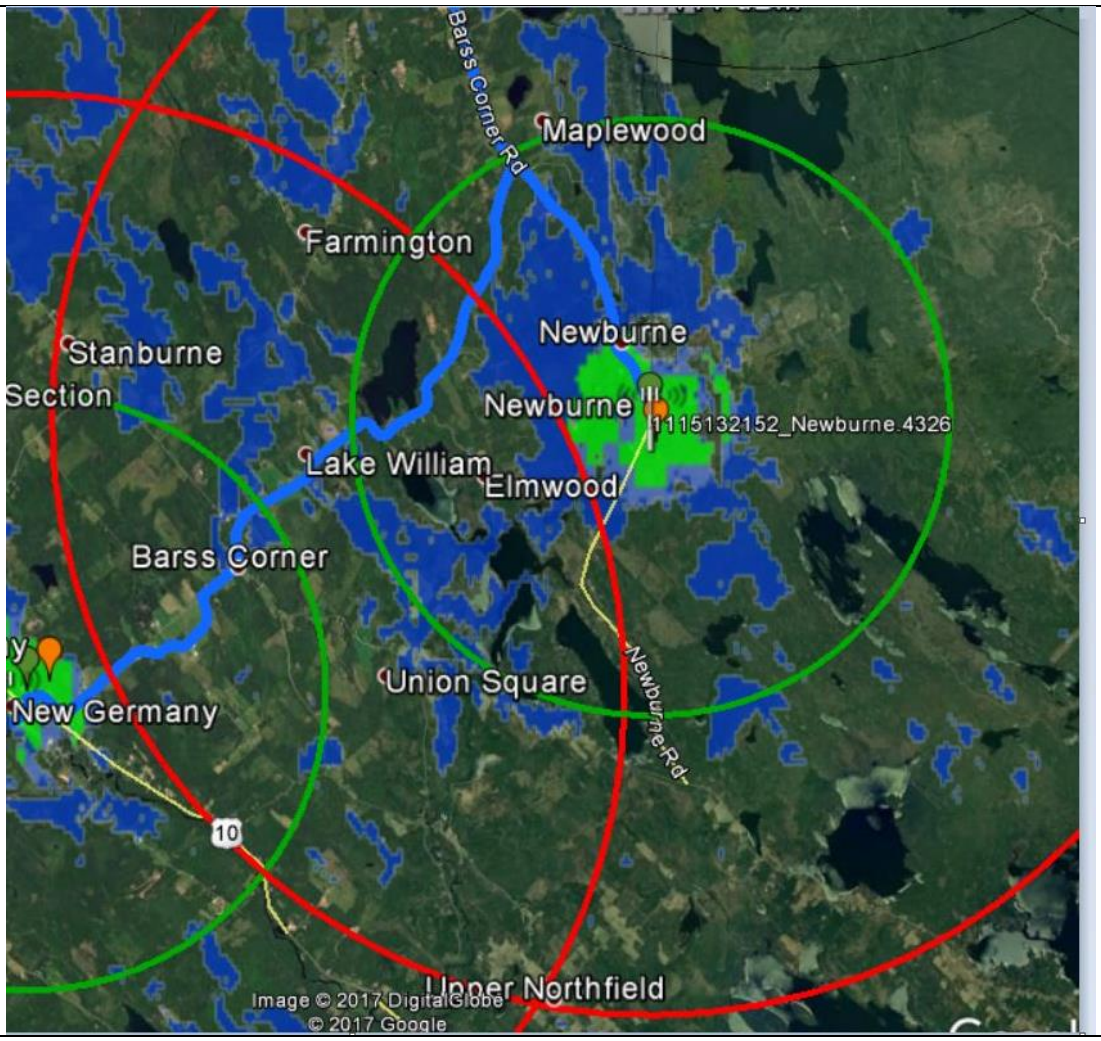
Cost: $89,550

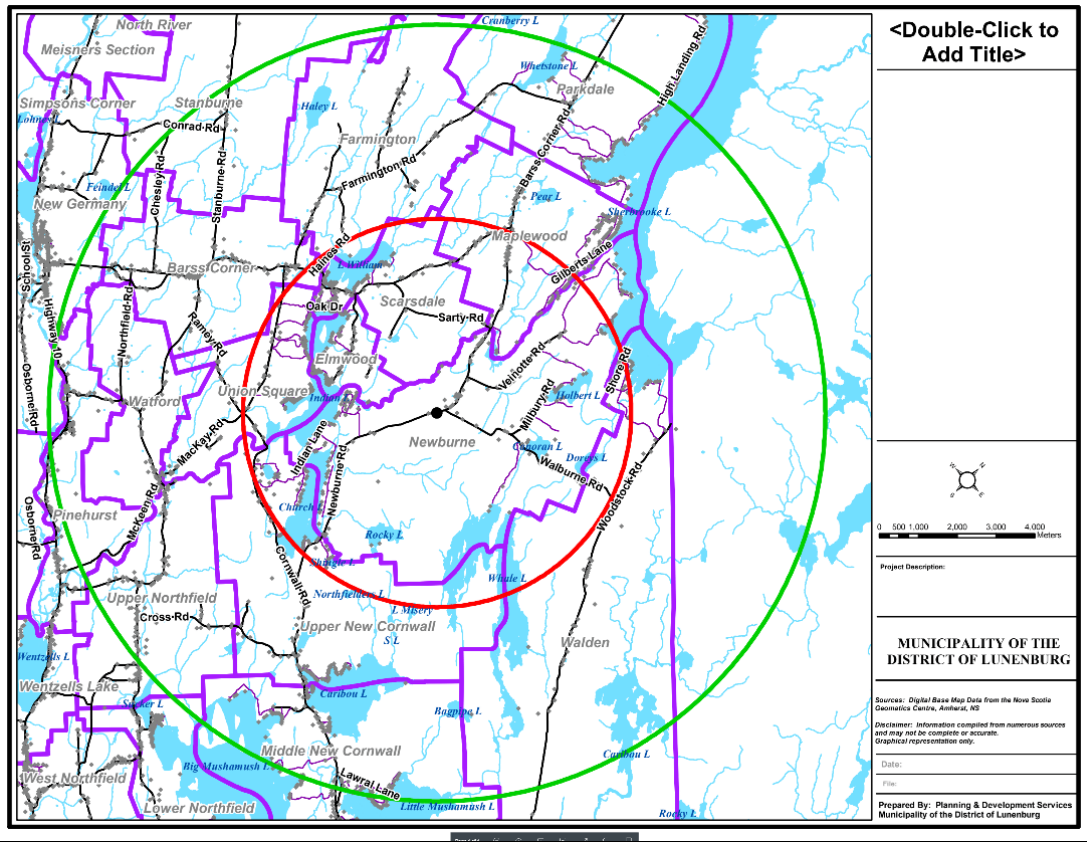
Tower	
Location	Newburne Community Hall
Images	


COMMUNITY HALL



<table>
<tr><td>Tower Site Analysis</td><td>PoP site: Newburne Community Hall
<table>
<tr><th>Item</th><th>Yes/No</th><th>Comments</th></tr>
<tr><td>Secure equipment room with enough physical equipment space</td><td>No access inside building provided</td><td></td></tr>
<tr><td>Secure cabinet with sufficient physical equipment space</td><td></td><td></td></tr>
<tr><td>240 v power with sufficient capacity</td><td></td><td></td></tr>
<tr><td>120 v power with sufficient capacity</td><td></td><td></td></tr>
<tr><td>Available battery backup with sufficient capacity</td><td></td><td></td></tr>
<tr><td>Power on 24x7x365?</td><td></td><td></td></tr>
<tr><td>Any physical impediments to planned fibre run to building?</td><td>No</td><td>Directly on Hwy 10</td></tr>
<tr><td>Suitable as tower site?</td><td>Possible</td><td>Hilly terrain</td></tr>
<tr><td>Alternative tower site. Provide description incl. suitability for incremental fibre run or PtP wireless</td><td>y</td><td>2 churches next door</td></tr>
<tr><td>Pictures of building and surroundings, proposed IT room or closet location</td><td>Y</td><td></td></tr>
<tr><td>Alternative PoP sites observed</td><td>Y</td><td>2 churches next door</td></tr>
</table></td></tr>
<tr><td>Base Station Type</td><td>Configuration 1</td></tr>
</table>

Heat Map 1 LTE antenna, omnidirectional	

Ref: 5- and 10-km radius	
5-Km Radius Dwellings	**557**
10-km Radius Dwellings	**1479**

Priority Communities by District

Region of Queens Municipality

Greenfield

Priority Community: Greenfield, Municipality of Queens, Nova Scotia

Anchor Site: Alean Freeman Library, 5060 NS-210, Greenfield, NS B0T 1E0

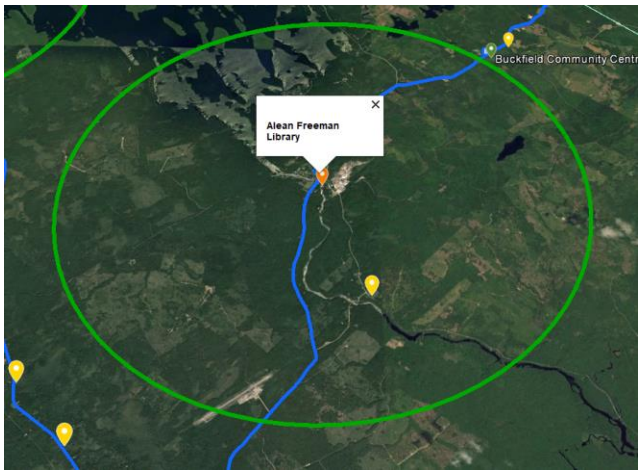
PIN: 44.2713131, -64.8442

The following offers an interim approach to extend an Internet access service to Greenfield in the event that an initiative is not undertaken to fund a full municipally owned infrastructure open access network for rural broadband deployment throughout the municipal districts of Chester, Luneburg and Queens.

In this interim approach, a tower build in Greenfield at the Alean Freeman Library could tie into an EastLink gigabit Internet point of service. The tower build would incorporate a wireless Internet broadband-to-the-home delivery model to residence and business who wish to subscribe to the service. The broadband-to-the-home delivery model consists of a mix of fixed LTE technology and point-to-multipoint technology, both of which may service a 5 km radial area from the tower. However, these delivery technologies will require a full engineering site by site study to determine which method can deliver the best solution to each civic site within the Greenfield area. The engineering study will also finalize the tower locations, which could be different from the preliminary selections. The high level approach and cost estimates are outlined here.

Gigabit Service Access: Closest gigabit access service point may be at or near the Alean Freeman Library.

Fixed Wireless Access Option:

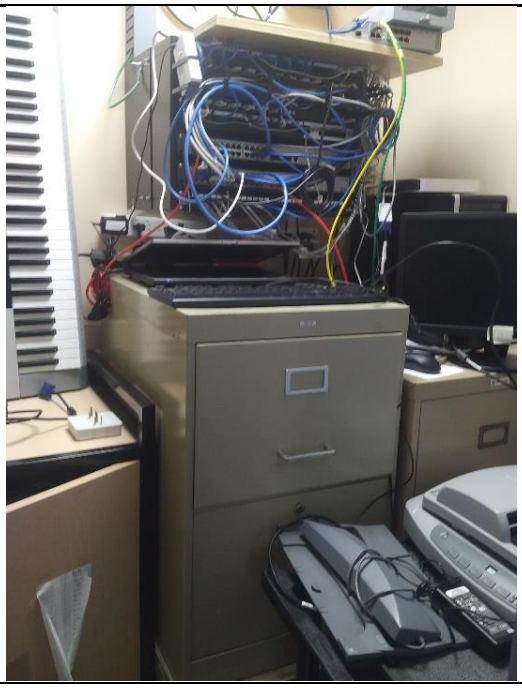


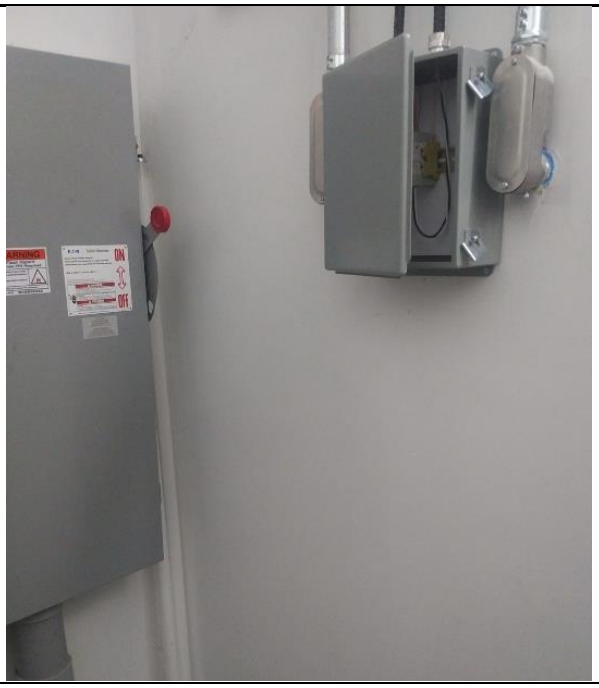
Site Prep	$30,000
Tower Configuration	$106,196
Infrastructure Estimate	**$136,196**

Next Step: Conduct a full site survey, which would include verification of EastLink access point, ISP agreements and costs, lease and use agreements, final tower site selection, coverage area mapping, end user subscription rates, service agreements, and final cost.

Next Step Cost: $15,000

Tower	
Location	
Images	 



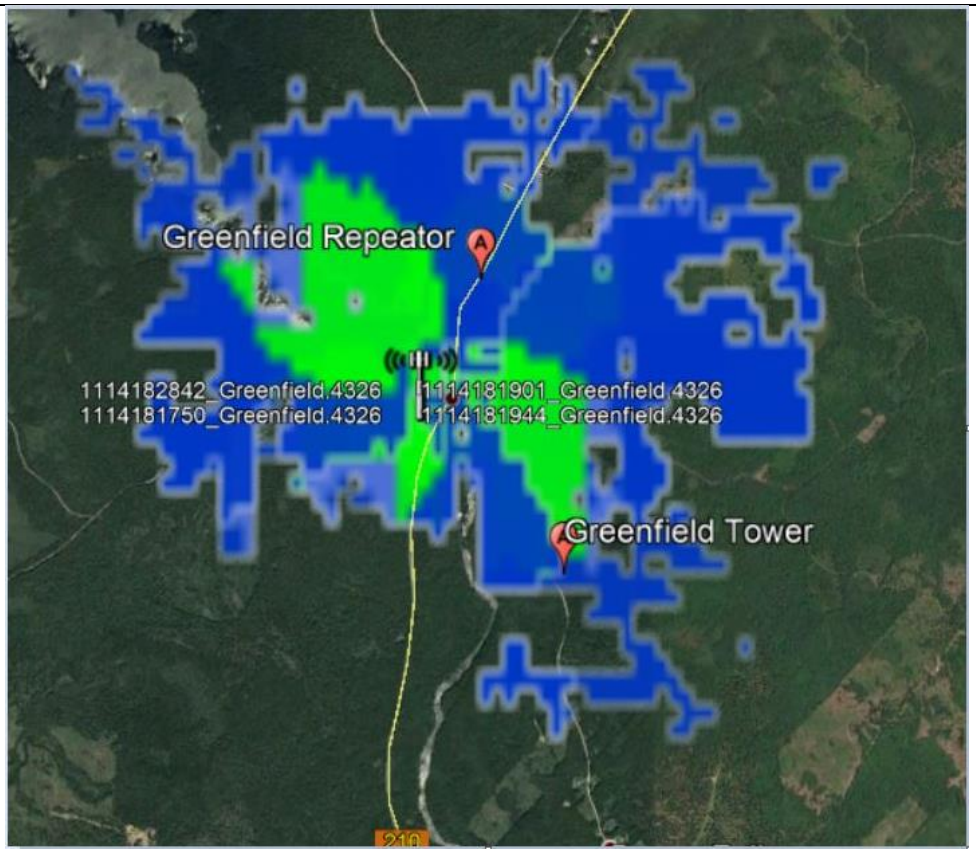


Tower Site Analysis

Site survey checklist

PoP site: Greenfield Elementary

Item	Yes/No	Comments
Secure equipment room with enough physical equipment space	Yes	Outdoor access keyed electrical room
Secure cabinet with sufficient physical equipment space		
240 v power with sufficient capacity	Y	
120 v power with sufficient capacity	Y	
Available battery backup with sufficient capacity	N	
Power on 24x7x365?	Y	
Any physical impediments to planned fibre run to building?	No	
Suitable as tower site?	Y	Flat land
Alternative tower site. Provide description incl. suitability for incremental fibre run or PtP wireless	N	
Pictures of building and surroundings, proposed IT room or closet location	Y	
Alternative PoP sites observed	N	Freeman Lumber on nearby hill

Base Station Type	Configuration 1
Coverage Heat Map	
5-Km Radius Dwellings	**361**
10-km Radius Dwellings	**1222**

Port Joli

Priority Community: Port Joli, Municipality of Queens, Nova Scotia

Anchor Site: Port Joli Community Hall, 10032 Highway 3, Port Joli, Nova Scotia

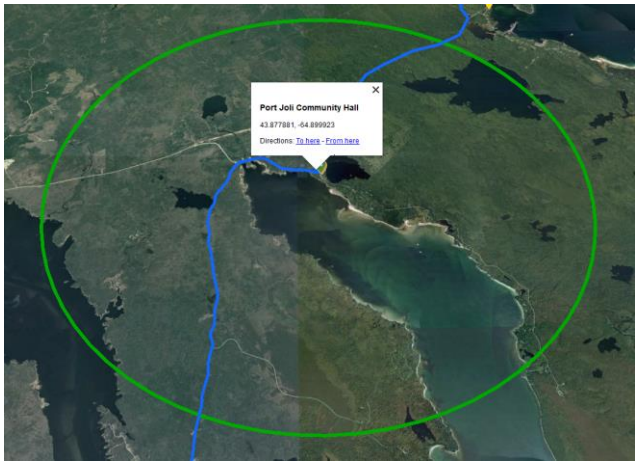
PIN: 43.877881, -64.899923

The following offers an interim approach to extend an Internet access service to Port Joli in the event that an initiative is not undertaken to fund a full municipally owned infrastructure open access network for rural broadband deployment throughout the municipal districts of Chester, Luneburg and Queens.

In this interim approach, a tower build in Port Joli at the Port Joli Community Hall could tie into an EastLink gigabit Internet point of service. The tower build would incorporate a wireless Internet broadband-to-the-home delivery model to residence and business who wish to subscribe to the service. The broadband-to-the-home delivery model consists of a mix of fixed LTE technology and point-to-multipoint technology, both of which may service a 5 km radial area from the tower. However, these delivery technologies will require a full engineering site by site study to determine which method can deliver the best solution to each civic site within the Port Joli area. The engineering study will also finalize the tower locations, which could be different from the preliminary selections. The high level approach and cost estimates are outlined here.

Gigabit Service Access: Closest gigabit access service point near the Port Joli Community Hall.

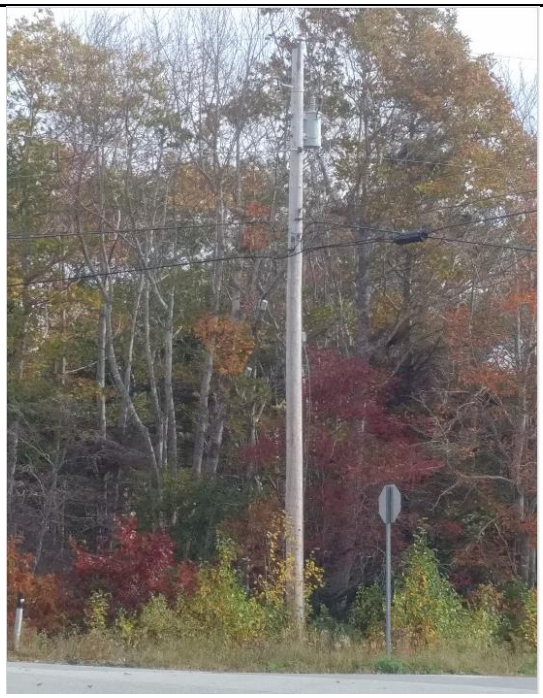
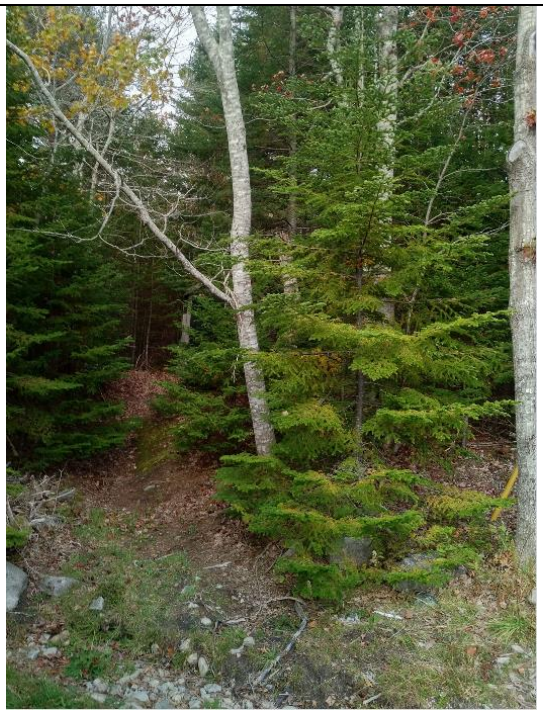
Fixed Wireless Access Option:



Site Prep	$30,000
Tower Configuration	$106,196
Infrastructure Estimate	**$136,196**

Next Step: Conduct a full site survey, which would include verification of EastLink access point, ISP agreements and costs, lease and use agreements, final tower site selection, coverage area mapping, end user subscription rates, service agreements, and final cost.

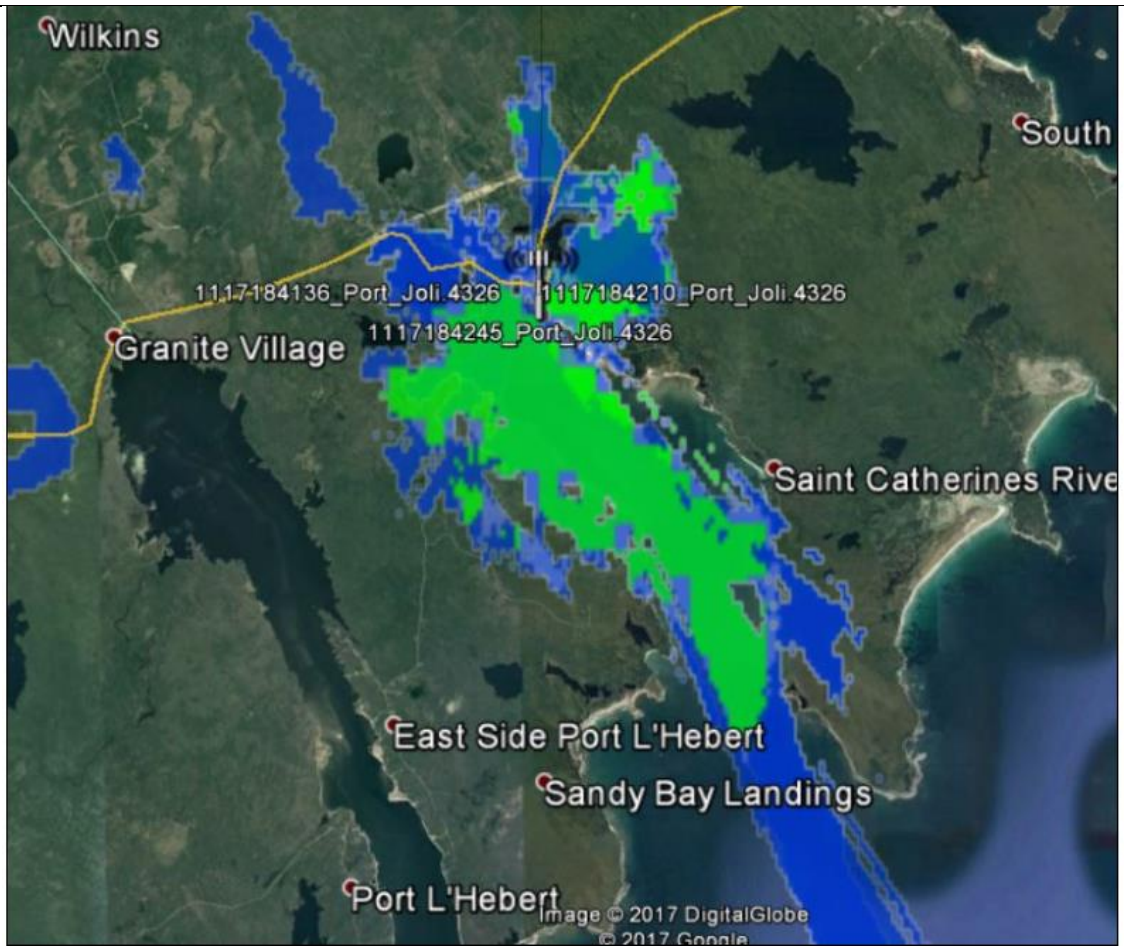
Next Step Cost: $15,000

Tower	
Location	Port Joli Community Hall
Images	   

<table>
<tr><td>Tower Site Analysis</td><td>
Site survey checklist

PoP site: Port Joli Community Centre

<table>
<tr><th>Item</th><th>Yes/No</th><th>Comments</th></tr>
<tr><td>Secure equipment room with enough physical equipment space</td><td>Yes</td><td>Electrical room needs lock added</td></tr>
<tr><td>Secure cabinet with sufficient physical equipment space</td><td></td><td></td></tr>
<tr><td>240 v power with sufficient capacity</td><td>Y</td><td></td></tr>
<tr><td>120 v power with sufficient capacity</td><td>Y</td><td></td></tr>
<tr><td>Available battery backup with sufficient capacity</td><td>N</td><td></td></tr>
<tr><td>Power on 24x7x365?</td><td>Y</td><td></td></tr>
<tr><td>Any physical impediments to planned fibre run to building?</td><td>No</td><td>lateral run from highway required</td></tr>
<tr><td>Suitable as tower site?</td><td>Y</td><td>Yes, on hill behind building</td></tr>
<tr><td>Alternative tower site. Provide description incl. suitability for incremental fibre run or PtP wireless</td><td>N</td><td></td></tr>
<tr><td>Pictures of building and surroundings, proposed IT room or closet location</td><td>Y</td><td></td></tr>
<tr><td>Alternative PoP sites observed</td><td>N</td><td></td></tr>
</table>
</td></tr>
<tr><td>Base Station Type</td><td>Configuration 1</td></tr>
</table>

Coverage Heat Map	
5-Km Radius Dwellings	**112**
10-km Radius Dwellings	**585**

5. Future Considerations

Migration to 50 Mbps

The Federal CRTC has mandated a universal service objective that Canadians – in rural and remote areas as well as in urban centres – should have access to voice services and broadband Internet access services on fixed and mobile wireless networks.

i-Valley welcomes this development, as it has for many years been pushing, through its sister organization i-Canada, for a national upgrade.

In support of this objective, the CRTC is establishing a fund that will:

- make available up to $750 million over the first five years;
- be complementary to existing and future private investment and public funding;
- focus on underserved areas; and
- be managed at arm's length by a third party.

The South Shore is an ideal candidate for this fund. I-Valley recommends an immediate application when the fund is launched, and will help alert South Shore officers to this trigger.

In the meantime, assuming the South Shore goes ahead with the regional coverage plan, it will have a foundation for building out the proposed network to the 50 Mbps standard. Once subscriber revenues allow, new branches of the fibre backbone can be laid out to communities not yet on the backbone. These can be complemented with wireless technologies like TVWS can serve communities with bandwidths of more than 15 Mbps within 12 months or so.

The design of the network is future-proofed to allow orderly expansion to a 50Mbps standard. The ability to expand the performance is dependant on 2 key factors: Backbone capacity and last mile capacity.

Backbone to feed the Internet service distribution points. The core backbone is 10Gbps/fibre pair. Using carrier level loading factors as a base, this allows connectivity for in the order of 6,000-7,000 dwellings at 15Mbps, well beyond the 6 year 4,292 overall region target. At 50Mbps, 4,292 dwellings will consume in the order of 20Mbps bandwidth, again using carrier loading factors. How do we support this? By lighting up another pair of fibres, doubling the capacity. In fact, the network is architected with 144 stands, providing 72 pairs at 10Gbps each for 720Gbps capacity. Done right up front once, and built for the future.

Last mile capacity with wireless. The 5Ghz antennas specified support 50Gbps out of the box. With our conservative loading factors, and current wireless technology as priced in the system, each 5Ghz antenna can support about 50 dwellings at 50Mbps. There are 4 antennas costed in each tower, bringing the dwellings supported to about 200 per tower, plus additional dwellings through other frequencies such as LTE or TVWS. 200 users at 50Gbps will be expected to consume 2Gbps (at 15Mbps, 200 users

will consume 300Mbps). Initially every tower will be provisioned with a 1Gbps feed and at 15Mbps services. Because we actually have 10Gbps feeding the tower, we can at any time increase the capacity to the antennas in 1Gbps increments. In addition, the subscription service can support 50Mbps performance without upgrading hardware. Done right up front, and built for the future.

Technology Options

- **TVWS**

TVWS is a new application of an old technology. Trials are currently underway. I-Valley is one of the few organizations in Canada that is working with authorities in Ottawa to test this option. Within the coming 3- 4 months, preliminary deployment could be started in the South Shore.

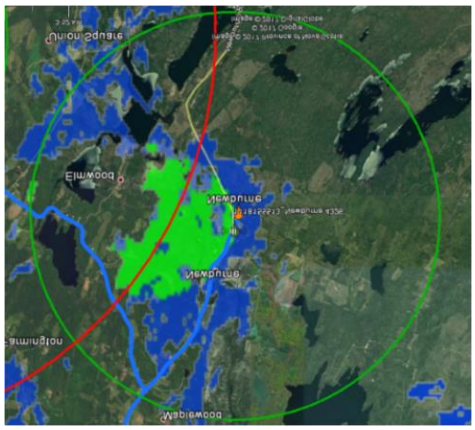
It will change the coverage picture completely.

Television White Space (TVWS) is a relative newcomer to the rural broadband issue. It is not in scope of this document to give a detailed description of the technology other that to say it operates in the 470 MHz to 790 Mhz range, in the spaces between digital TV channels. We are fortunate in Nova Scotia to have a wealth of these channels because of the few TV channels in operation here. We'll use 600Mhz as the average frequency which is a very low frequency compared to existing options described in this report. This allows far better penetration through trees and other objects, and will even follow the contours of hills and valleys better. This together significantly reduces the number of cases where a signal is blocked, increasing the available connections within a geographical area. It is claimed to be more economical to provide a TVWS service based on the number of practical connections in a given area compared to the alternatives.

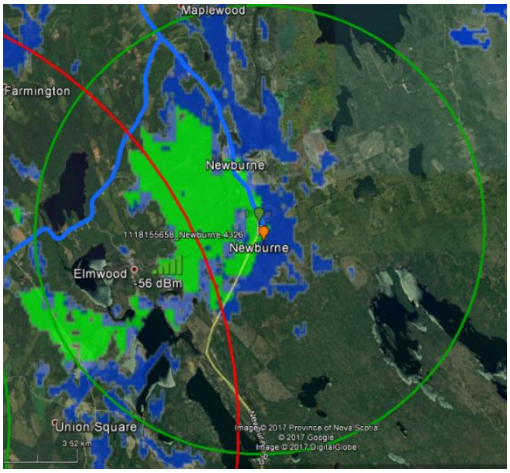
The following represents a rough comparison of 5Ghz, LTE and TVWS coverage. This is showing one 90 degree sector antenna only for clarity purposes.

The area of most interest is the green area within the 5 km radius. It indicates that as you move to lower frequencies, the coverage in valleys and other blocked areas increases. In theory, TVWS also has longer range, but i-Valley must perform further work to validate the realities of long range, given the signal strength requirements. So, for the moment, limit the topic to wireless within the 5 KM radius.

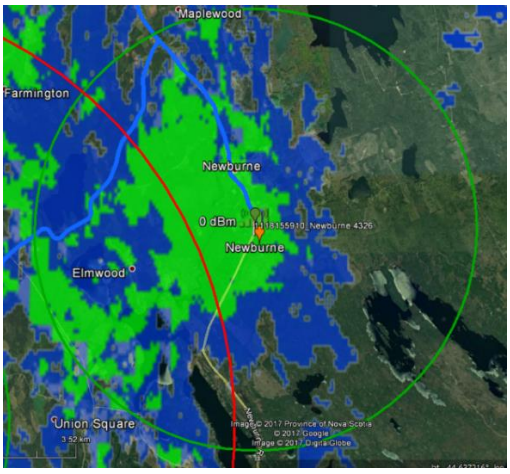
5Ghz 1 sector coverage



LTE 1 sector coverage

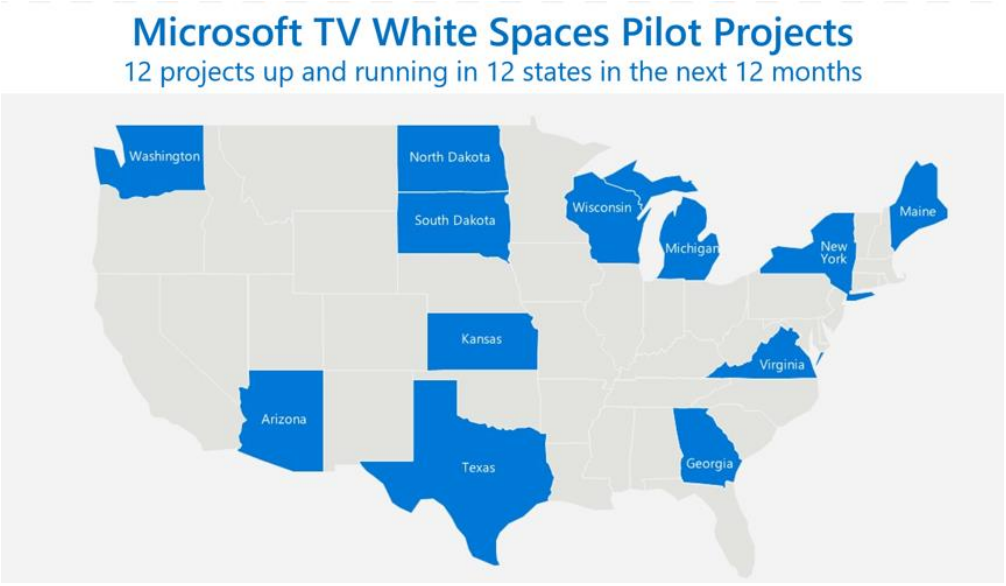


TVWS coverage



An additional area of investigation for i-Valley is the architectural model for TVWS working within a layered approach with other wireless frequencies. Microsoft is a huge promoter of TVWS and is involved in deployments in many parts of the US. They and their partners have found the benefits of using 2 different models depending on the coverage requirements. Putting TVWS on towers and broadcasting to a wide area, and alternatively connecting a local neighbourhood by high speed point to point link to a fibre-connected tower. The local neighbourhood can be one or more sub-divisions, a rural road or lane, a community. In this scenario one endeavours to use local power pole or traffic light and buildings to mount the antennas, similar to deploying outdoor Wi-Fi.

I-Valley believe there is tremendous promise for TVWS in Nova Scotia, and will be looking for initial deployment projects and to further develop the most effective solution and recommendation.



TVWS is now being taken up by leading technology providers.

Network Expansion Options

As demonstrated by the SWIFT program, it is often more efficient to plan for comprehensive region-wide coverage rather than for a selection of communities.

SWIFT has brought together the Ontario, Federal municipal and private sector funding, to create a network plan for 3.5-million resident in South West Ontario. The initial budget is $281-million, which will expand to $4-billion in the years ahead.

Clearly, this is a plateau well above the South Shore project, but the same principles of alliances and regional delivery would apply for the South Shore.

It would also optimize the potential for co-use agreements for tower use. For instance, as Eastlink rolls out mobile LTE this could add a lot of new options for them to locate cell antennas. The SSREN could open up a second 1Gbps fibre link for their traffic, thus expanding the capacity of the network.

The current plan is based on a 5-kilometre radius coverage zone, to ensure fast Internet speed. The fibre backbone will be capable of adding other communities as needed, and is able to provide a hyrid solution where needed, with a Fibre To The Home (FTTH) option.

6. Recommendations

This Report has:

- Scoped the Network Design overview of a broadband coverage plan for the South Shore, for comment and feedback;
- Provided a high-level view of Costing Estimates for the achievement of this plan;
- Suggested a municipal model of network organization; and
- Projected Future-Proofing Considerations that will affect the project in the coming months

It is our recommendation that the following "Next Steps" be considered, to move forward:

- **Deployment Support**: i-Valley work on behalf of the communities of the South Shore to determine the exact resources that private sector companies have available to put at the disposal of a new network;
- **Evidence-Based Needs Assessment**: i-Valley proposes to apply the Canadian Internet Registration Authority's (CIRA) Heat Map to determine actual Internet speeds in households and businesses in the South Shore. This has been used in applying for **funding** in Kings, East Hants and West Hants. The Heat Map measures more than speed: it measures 100 different variables including Internet quality, or consistency of service.
- **New Technology for Higher Coverage at Lower Cost**: By April 2018, have a deployment plan in place or underway in the South Shore, for TVWS;
- **Funding**: Investigate funding sources, against a general financing needs agreement, that can be presented to the South Shore communities for their consideration; and
- **Financing Plan**: Create a Prospectus to take to suitable funding agencies to obtain preliminary expressions of interest.

7. Appendix

- **Backgrounder: Technical Elements Involved in Internet Service Delivery**
- **CIRA Heat Map**
- **GigaPort**
- **WCCD Index**

Backgrounder: The Technical Elements Involved in Internet Service Delivery

Delivery of a broadband service such as the Internet service to dwellings in rural or remote areas is often challenging.

There are two elements that need to be combined:

- Getting a fibre backbone to rural region is the first hurdle, at roughly $20,000 per km. Using fibre to provide service directly to homes or businesses would be an additional hurdle, at roughly $28,000 per km.
- Thus, the use of wireless delivery from the fibre backbone is a crucial part of the overall delivery of service in Nova Scotia.

Backgrounder on Fibre Design and Vendor Willingness to Support

The high-level design of the South Shore network is one based on open access: an arrangement in which the network is open to independent service providers to offer services. Open access separates the physical network from the services, where the services are provided by any number of ISPs. The openness of the core network itself lends fibre irrevocable right of use (IRU) potential for many ISPs and private network providers as well, such as EastLink, Rogers and Main Tel, just as the case with the Valley Community Fibre Network.

The network is positioned to operate at core with Cisco Meraki technology switching equipment, such as available through provincial municipal standing offer and supported for wireless integration at 10Gbps and 1Gbps connections. Some network providers would want access to dark fibre to run their own technology platform over the fibre for full integration with their network infrastructure; hence, the open access high-level design and nature of open access fibre networks which has been documented extensively in smart community developments, as report by Community Networks and technology providers.

Point of presence (POP) and regeneration site design is a factor of any open access network design, which are the site where providers connect and provide services from to consumers, private and business. It provisions the fibre backhaul also needed to implement wireless tower configuration for all

technology levels, such as fixed LTE, TVWS, point to point, and point to multipoint. The basis for implementation of any of these technologies, including fibre to the home, requires massive amounts of fibre interconnection to major urban points as operated by Halifax Internet Exchange, EastLink, Bell, Rogers, and the like. In dialog with such providers, there is an expressed level of interest and demand to increase the available fibre network footprint in the South Shore area for all levels of providers to better serve the area. Providers have expressed an interest to work with i-Valley and communities to find the best fit and levels of service necessary to meet current deficiencies in Internet and other services. There is interest in partnering to build out more fibre networks and or purchasing long term IRU on fibre networks when available for private partners to meet even their customer demand, both fixed wire and wireless configurations. The nature of fibre networks lends itself to be extended to new communities of interest, which is always a design factor to consider. Expansion can happen from the core POP sites in the original design, where new POP sites can be added as funding and demand occurs. Also, there is a natural splice point in the fibre network every 5 kilometers along the fibre routes where the network can be expanded to new, secondary or business sites as needed, and that are appropriately funded.

The key to keep in mind with open access networks, which globally are termed through Community Networks, is the model itself: “the open access model is often compared to road systems. Roads are built and maintained through both public funds and taxes on vehicles, but do not themselves fill the coffers of municipalities. They are then used by everyone - trucking companies, UPS, taxi cabs, pizza delivery people, etc. - to deliver services or get around. For the municipality, the net gain of building robust road systems comes in economic development successes, improvements in quality of life, and other indirect benefits rather than direct profits. Building open access broadband networks along the same principles has proven immensely successful at fostering competition and producing economic gains. Unlike more common network arrangements (where one company, owns, operates, and provides services on the network), open access separates the physical network from the services. A community owns the network and may contract with a different firm to operate it; multiple ISPs will provide services on it.”

Backgrounder on wireless coverage and modeling.

In order to initially plan wireless coverage, whether for wireless Internet, 2-way radio, or microwave links, software is utilized. These modeling packages rely on the transmitter and antenna specifications, and on a terrain database of the area in question. This satellite mapping is performed periodically and is, for example, what Google maps or Google Earth is based on. The common resolution in Canada is 90M, and is what the coverage maps are based on in this report. As explained in another section, the frequency of the transmitter determines level of penetration through objects. These objects can be trees and foliage, buildings, hills and more. The higher the frequency, the lower the penetration through an object, resulting in no coverage in the shadow of the object. There are some bending of the physics involved in certain scenarios. Conversely, the lower the frequency, the more the penetration power. Considering Wi-Fi at home as a simple example, 2.4Ghz Wi-Fi goes through 2 walls of one’s house, and 5Ghz Wi-Fi goes only through 1 wall.

The second consideration is signal strength. Sufficient signal strength gives the full capacity of the wireless link. As the signal strength degrades the speed of the link decreases until one has an unreliable connection.

Given these factors, modeling can only give an approximate indication of coverage at this initial step.

There is a recent development. LiDAR (Light Detection and Ranging) is a method to perform terrain mapping at a much higher resolution. It has come to the attention of i-Valley that LiDAR mapping of the District of Lunenburg and possibly the other two municipal partners has been completed. This data provides 1 metre resolution. The impact of this is that modeling can be far more accurate, and more field survey work can be done from desktop instead of field visits.

To recap, the lower the frequency the better it will reach through objects such as trees, with the trade-off being lower capacity in terms of number of connections supported.

The following is a survey of the elements of wireless Internet delivery that are active in the market:

1. Tower. A raised mounting point is required for wireless transmitters, so as to increase the number of dwellings that can receive the signal. In the cases of this report, a 30m wooden or composite freestanding pole is the default mounting for the transmitters.
2. Point of Presence (PoP). A fibre connectivity point to which the wireless transmitters can be attached. These use 1 Gigabit per second (Gbps) fibre connections, and can be scaled up to 10Gbps for future growth. A related construct, the microPop, is where the service can be extended the to neighbouring communities and sparse rural roads by using a high-speed Point to Point (PtP) connection onto antennae installed on existing assets such as power poles, silos, and fire station towers.
3. Line of sight (LOS). Line of sight is where the antenna at the dwelling can "see" the antenna on the tower without any obstructions. Obstructions to that LOS can include buildings, trees, hills and more. Higher frequency transmitters have much greater dependence on a clear LOS, and lower frequency antenna are more forgiving - they can "see" through some obstructions.
4. Capacity. This refers to the overall capacity of a transmitter for Internet throughput. Capacity is divided amongst the connected users to give a certain level of service, for example, but not limited to, download speed. In general, the higher the frequency the higher the number of subscribers that can obtain a certain level of service.

Due to this reality, the approach is to deploy an array of different frequency transmitters to give the best possible connection capability throughout the difference circumstances of the South Shore area.

A note on **TV White Space (TVWS):**

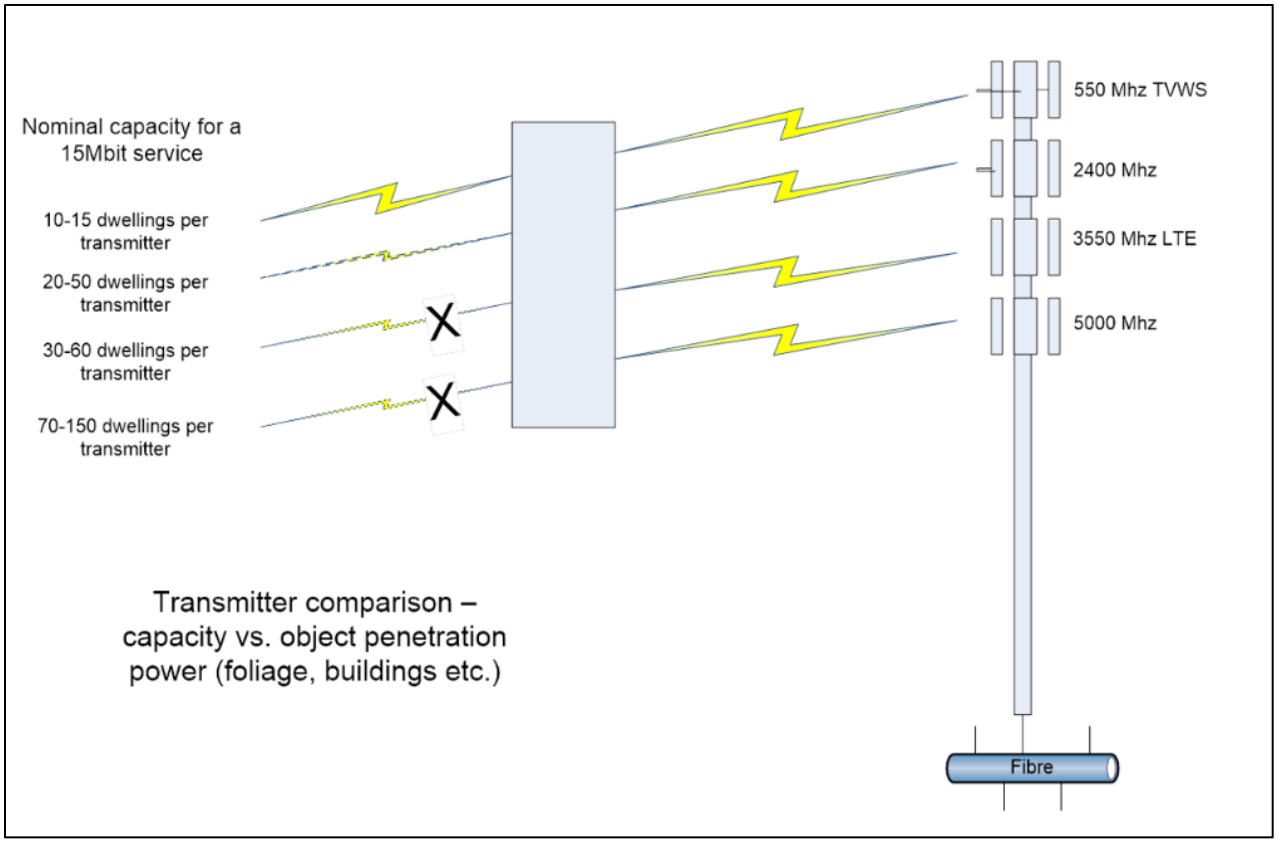
Television White Space (TVWS) is a relative newcomer to the rural broadband issue. A more complete description can be found in the "Future Options" section, but sufficient to say here that it operates in the 470 MHz to 790 Mhz range, in the spaces between digital TV channels. Its lower frequency means that it can cover more area than the higher frequency antennae. It will have a role to play in future coverage plans.

Wireless technologies comparison

Frequency	Description	Pros	Cons	Relative Pricing
5Ghz frequency point to multi-point (PtMP).	This is an established technology used for delivering Internet from a transmitter to dwellings.	It has very high capacity allowing good quantities of connections.	This is a LOS technology used when there are virtually no obstructions.	Low cost
2.4Ghz frequency PtMP.	This is similar to 5Ghz.	It is slightly more forgiving to obstructions than 5Ghz	It has lower capacity than 5hz.	Low cost
Fixed LTE 3.65Ghz	This is a subset of mobile LTE which is what one uses on one's phone for a cellular service. The main difference is that it is designed for fixed locations on dwellings, and not mobile.	More powerful antennas can be used to extend range.	It needs clear Line of Sight	Expensive
TV white space (TVWS) approximately 500-600Mhz	This technology has been in development for some time as radio frequency spectrum became available due to the switch to digital channels.	At 500Mhz or so, it proves to be NLOS technology, meaning it can penetrate through a building or a tree and even follow the contours of a hill and valley. If deployed correctly within the overall solutions TVWS can work well. Here in NS, we have a great advantage for TVWS in that there are so few TV stations taking up channels.	It exhibits a linear reduction in capacity.	Low cost

The bottom line, is that in our view, an overall solution will combine the strengths of the capacity-power of 5- and 2Ghz technologies and the LOS coverage advantage of TVWS. The Ghz technologies can serve many people, while the TVWS technology can economically reach the last 10-20% that the other wireless frequencies cannot reach.

Transmitter Stack Antenna Comparisons



In the final engineering report, each community will be "fitted" with an antenna combination that suits site-specific ground cover, lines-of-sight, and carrying capacity.

Nominal tower capacity calculations

PoP	10km	30%	Total	Loading ratio	BW LTE per antenna	# subscribers per antenna @ 15Mbps	Subscribers with LTE	# subscribers LTE with loading factor	BW 2.4Ghz per antenna	# subscribers @ 15Mbps	Total 2.4Ghz subscribers	# subscribers 2.4Ghz with loading factor	BW 5Ghz per antenna	# subscribers @ 15Mbps	total 5Ghz subscribers	# subscribers 5Ghz with loading factor	Total supported subscribers per tower	Total calculated subscribers per tower	Total fibre bandwidth required Gbps
New Germany	1759	527.7	527.7	4	224	15	60	239	330	22	88		500	33	133	533	772	528	2.0
Tancook	225	67.5	67.5	4	224	15	60	239	330	22	88		500	33	133	533	772	68	0.3
LaHave Island	1571	471.3	471.3	4	224	15	60	239	330	22	88		500	33	133	533	772	471	1.8
Newburne	1459	437.7	437.7	4	224	15	60	239	330	22	88		500	33	133	533	772	438	1.6
Baker Settlement	1809	542.7	542.7	4	224	15	60	239	330	22	88		500	33	133	533	772	543	2.0
Clearland	2427	728.1	728.1	4	224	15	60	239	330	22	88		500	33	133	533	772	728	2.7
Blandford	603	180.9	180.9	4	224	15	60	239	330	22	88		500	33	133	533	772	181	0.7
Northwest Cove	229	68.7	68.7	4	224	15	60	239	330	22	88		500	33	133	533	772	69	0.3
Mill Cove	844	253.2	253.2	4	224	15	60	239	330	22	88		500	33	133	533	772	253	0.9
Chester Grant	1026	307.8	307.8	4	224	15	60	239	330	22	88		500	33	133	533	772	308	1.2
Western Shore	1435	430.5	430.5	4	224	15	60	239	330	22	88		500	33	133	533	772	431	1.6
New Ross	350	105	105	4	224	15	60	239	330	22	88		500	33	133	533	772	105	0.4
Forties	262	78.6	78.6	4	224	15	60	239	330	22	88		500	33	133	533	772	79	0.3
Canaan	169	50.7	50.7	4	224	15	60	239	330	22	88		500	33	133	533	772	51	0.2
Greenfield	1222	366.6	366.6	4	224	15	60	239	330	22	88		500	33	133	533	772	367	1.4
Port Joli	585	175.5	175.5	4	224	15	60	239	330	22	88		500	33	133	533	772	176	0.7

In summary, the preferred strategy is to deploy multiple transmitter technologies to the pole, together adding up to ultimately support more than 2,000 subscribers per pole, and in a way that provides for LOS, high capacity, and NLOS, lower capacity for the last 10-20% of difficult buildings. The 1Gbps fibre connection can be expanded in 1Gb increments to support more subscribers and higher speeds as a design concept.

In addition, the service can be extended to microPops in neighbouring communities and rural roads using TVWS on existing pole and building assets.

The transmitter stack for the South Shore project will vary from location to location, as terrain and population dictate. For the purposes of financing estimates, an average stack has been estimated that provides for a combination of the above elements.

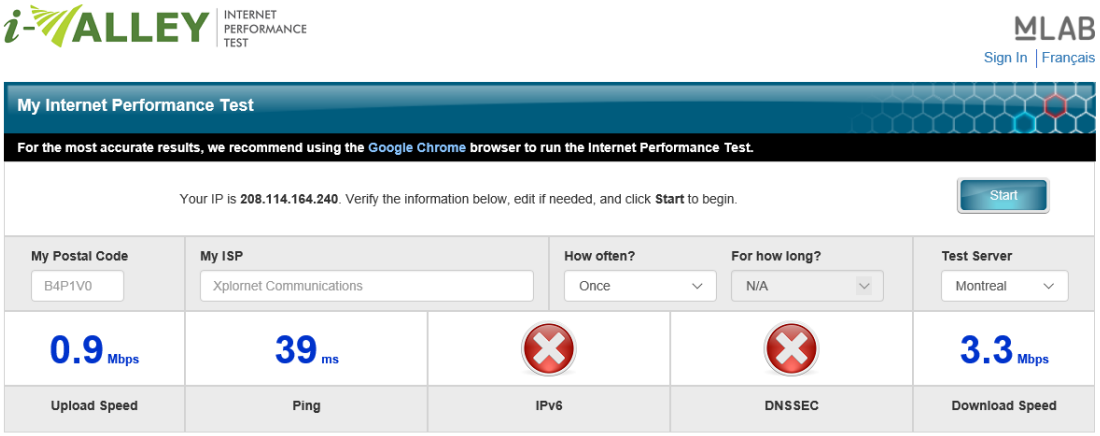
Calculations have been made community-by-community, to ensure that the proposed antenna stacks meet the service requirements:

Networking Plan: Fibre Backbone Routes

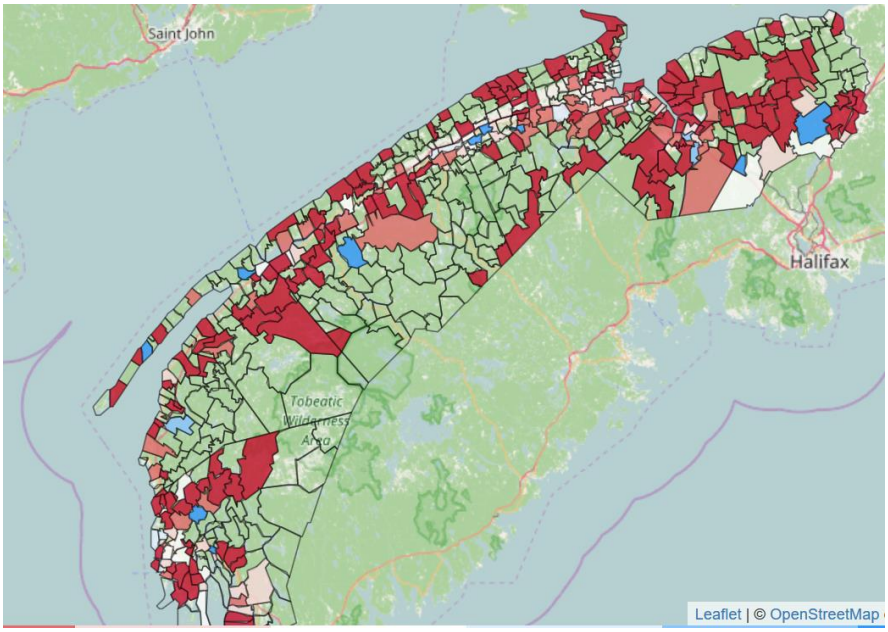
The wireless towers are to be connected by a fibre backbone network to the Halifax Internet Exchange, where data from the South Shore will be networked into the global information system.

CIRA HEAT Map

The Canadian Internet Registration Authority's "Heat Map of Internet speed provides evidence-based mapping of speed, quality, latency and 100 other measures that hep communities plan and advocated for funding and support.



Currently, some 7,000 speed tests have been conducted by residents and businesses in the Annapolis Valley, leading to a map that can demonstrate areas of need and the extent of that need:



The benefits of doing the CIRA Heat Map include:

- Precise information is gathered, fine-grained and vendor-neutral;
- It acts as a basis for evidence-based decision-making down to the individual farm or house;
- Constant measurements are delivered that are on-going year-after-year, through i-Valley's partnerships…metrics for program impacts;
- It can combine with overlay maps of income, industry, agricultural production and population, showing the connection between innovation and income; and
- It ties into the Global Index and other opportunities from agencies like the CRTC which offer funding programs.

Option for CIRA Internet Performance Test for Region

There are 2 components: a license fee and consulting.

The license fee is a 12 month renewable license. This is important because one wants to gather as much information as possible, and it's human nature that different people will be slower than others to run the test. A landing page/portal is set up where the results for the region are shown graphically.

On the consulting side, i-Valley will provide a base consulting package of 40 hours @ $150/hr to design a marketing plan to the dwelling owners/renters. Extra support can be provided upon mutual agreement.

CIRA IPT license for Region: $9,000

Consulting: 40 hours @ $150/hr: $6,000

Total for region: $15,000

GigaPort

The *Giga*Port is a community centre where access to superfast Internet speeds is available…for everyone.

The ***Giga*Port** is a multi-function:

- **Innovation Hub** where innovators can test new ideas online and connect with peers around the globe, and test-drive the digital products and services that own today's economic reality, like intelligent machines and big data;
- **Entrepreneurial Incubator** for companies that need high-speed links to develop solutions that require high data transfers, like 3-D printing or virtual healthcare;
- **Academic Accelerator** for students and faculty who need to practice coding, immerse themselves in digital worlds, process experiments, develop social media or experience entertainment with friends;
- **Public Sector Service Pilot** where connected Town Halls along the Annapolis Valley can share expertise with world experts in high-definition conference rooms and test-launch new public services such as healthcare or environmental or municipal modeling; and
- **Residents' "Experience Lab"** to see what the benefits of ultra-fast Internet service actually looks like, for exploring their own digital futures.

Regardless of age, education, or job, access to high-speed broadband is the 'new normal' in today's world. Gigabit speeds are needed to handle the increasingly heavy flow of information – especially visual information from social media and mobile devices. This year, there will be more internet traffic than all prior internet years combined - and the Internet will continue to grow at 40% per year. Two-thirds of all retail sales – to the tune of $2.2-trillion – were influenced by the internet; faster speeds mean more sales.

At the ***Giga*Port**, people will see new emerging technologies combine with applications that increase business-level innovation, lower costs, attract investment and accelerate business, environmental, and social development.

The first ***Giga*Port** in Nova Scotia is under construction in Berwick. Other hubs are being discussed with Councils in almost every region of the Annapolis Valley. The ***Giga*Port** is a concept developed by *i*-Valley, a not-for-profit association engaging social and political leaders, business executives, academic institutions and broadband industry designers and experts. *i*-Valley is dedicated to the goal of creating a "Smart Annapolis Valley" through ultra-fast open access internet connections.


TECH INDUSTRY
DEFENCE
GAMING (VIDEO COMPUTERS MOVIES)
ENTREPRENUERS
DIGITAL START-UPS
PROMOTION INTO INTERNATIONAL MARKETS
OPENING UP GLOBAL OPPORTUNITIES FOR BUSINESS GROWTH
ATTRACTING HIGH TECH INDUSTRY
CREATING LOCAL 21ST CENTURY JOBS
S.M.E/ S.O.H.O/ MICRO BOOSTER
ASSITING GROWTH OF SMALL-MEDIUM ENTERPRISES AND HOME BASED BUSINESS
i-VALLEY
GigaPort
FUTURE INITIATIVES & INNOVATION
TRANSFORMING HOW WE LEARN
SMART TECH
UNIVERSITIES
MEDICAL PRECINCTS
RESEARCH FACILITIES
SCHOOLS & LIBRARIES
ONLINE LEARNING
COMMUNITY
FOR THOSE WITH A DISABILITY
HEALTH PRESERVATION
ADVANCED MANUFACTURING
ROBOTICS
3D PRINTING
MEDICAL
AEROSPACE
LOCAL BUSINESS
TRANSITIONING TO THE DIGITAL ECONOMY
DEVELOPING 21ST CENTURY SKILLS
EFFICIENCY & EFFECTIVENESS
SMART CITY
CREATING A BUSINESS HUB ECO-SYSTEM
CITY LABORATORY


A Gig lets you download:
25 songs in 1 second
A TV show in 3 seconds
1000 Mbps
A video game in 3 seconds
An HD movie in 36 seconds
Faster. Better. Different. Local.

WCCD: Data, Investment and Smart Communities

i-Valley has just received funding to execute the World Council on City Data (WCCD)'s only ISO Standard for certifying the performance of services and quality of life, to create smart, sustainable, resilient, and prosperous places. This could be useful in he South Shore.

The Annapolis Valley will be the ***only rural region in the world*** to obtain this ranking! There are 100 indicators that will be measured, among 17 themes that are vital to Smart Community development.

Benefits

- Investment readiness for global and national players;
- Manage and make informed decisions through data analysis;
- Benchmark and target areas for improvement; and
- Leverage funding with senior levels of government, with evidence-based information.

A Tribute to ISO 37120:

"As city leaders, our daily work is all related to driving change for a more sustainable global future... ***The better we become at collecting and analyzing this data, the more we can improve the way the city works.*** *This* ***access to high quality, globally recognized indicators is a valuable asset*** *that can be used to drive evidence-based planning and decision making -* ***an incredible opportunity.***"

- Gary Dyke, CAO, Winchester, ON (pop. 127,000)

Backed by Valley REN Leaders

"This would be a great win for the Valley REN."

- Don Clarke, Mayor, Berwick

"I heartily endorse this project."

- Jeff Cantwell, Mayor, Wolfville

"We are looking forward to using the WCCD data."

- Peter Muttart, Mayor, County of Kings

"The town would be pleased to be part of this exercise."

- Anna Allen, Mayor, Windsor

"We encourage the Valley REN to assume this program."

- Lori Cox, Manager, VBLI