

# Northeast Kingdom Vermont Pre-Feasibility Study

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**TILSON**

Prepared for the Northeastern Vermont Development Association



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## Executive Summary

Communications Union Districts (CUDs) are a specialized form of municipality in Vermont that allow multiple towns and cities to join together to deliver communications services and operate a communications plant. Many towns in Vermont have joined or are now considering joining a CUD to provide better broadband services. The Northeastern Vermont Development Association (NVDA) engaged Tilson in a “pre-feasibility study” to assess the potential boundaries for one or more CUDs in the Northeast Kingdom region, including all of Caledonia, Essex and Orleans counties and parts of Lamoille county. This study also considers potential funding sources for further full feasibility studies and implementation.

This study concludes that the Northeast Kingdom should pursue a single CUD, starting with the towns in the region ready to vote on the CUD formation at Town Meeting 2020, and expanding it to other interested towns in the region subsequently. The study considered a range of factors and opportunities, but three considerations especially drove this recommendation:

- Achieving a critical mass of users, funding, leadership, managerial, and technical talent is important for the CUD’s success and ability to serve the region more rapidly. It will be easier to achieve that critical mass one time, across a larger region, than more than once in the region.
- There are major opportunities to move soon, leveraging region-wide grant opportunities for planning and implementation, especially the Federal Communications Commission’s upcoming Rural Digital Opportunity Fund (RDOF).
- There are opportunities to leverage and extend existing fiber projects in the region to benefit the whole region, not merely one part of it.

# 1. Introduction and Background

The Vermont Communications Union District (CUD) legislation<sup>1</sup> allows two or more towns to form a district for the purpose of delivering communications services and operations of a communications plant. The Northeastern Vermont Development Association (NVDA) is assessing the optimal boundaries for one or more CUDs in the Northeast Kingdom region, including all of Caledonia, Essex and Orleans counties and parts of Lamoille county.

Here we assess whether one or more CUDs would most effectively represent the broadband needs and funding opportunities of the NEK region. Given the region's goal of facilitating symmetrical 100Mbps service ubiquitously, the construction of middle mile fiber and last mile fiber will be required at a substantial cost, and maximizing utilization of any and all available grant, loan and subsidy funding will be required. Sources of funding for feasibility studies and planning are outlined, as well as sources of funding for middle mile and last mile construction for fixed broadband and voice networks, as well as a potential funding opportunity for cellular expansion.

This analysis takes into consideration the legal requirements of the Vermont CUD legislation, demographic information from the 2010 US census, current broadband coverage, existing regional fiber assets, and public private partnership opportunities. The addition of five towns in neighboring Lamoille county is taken into consideration for inclusion in one or more CUD.

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<sup>1</sup> 30 VSA §3051- 3083

## 2. Key Requirements for a Communications Union District

The Vermont Communications Union District (CUD) statute allows two or more towns to form a CUD by public vote at an annual or special town meeting.<sup>2</sup> Additional towns (or cities) may be permitted to join the CUD after the district's initial formation, and member towns are permitted to withdraw from the district after their admittance.<sup>3</sup> Under the statute the CUD has the power to adopt a name under which it shall be known and establish an effective date of its creation.<sup>4</sup> Each town is a unique member of the district.

The legislative power and authority of the CUD will reside with a body known as the "governing board", which will be comprised of one delegate from each district member.<sup>5</sup> The governing board has the power to establish one or more committees, granting and delegating them as much power as deemed necessary. The governing board may establish an executive committee, but members of an executive committee must serve staggered terms and be members of the governing board. Other committee members do not have to be governing board members.<sup>6</sup>

Annually, on or before the last Monday in April beginning the year following the effective date of the district's creation, the legislative body of each district member shall appoint a representative and one or more alternates to serve on the district's governing board for one-year terms. The legislative body of a member, by majority vote, may replace its appointed representative or alternate(s) at any time and shall promptly notify the district clerk of such replacement.<sup>7</sup>

Annually, on the second Tuesday in May following appointments to the governing board by district members, the board shall hold its organizational meeting. At this meeting, the board shall elect from its members a chair and a vice chair, each of whom shall serve a one-year term and until his or her successor is duly elected. Each district member has one vote.<sup>8</sup>

After the initial formation of the CUD by two or more towns, additional towns may become members of the district. The legislative body of any non-member municipality can apply to the CUD governing board for membership. The governing board has the authority to grant membership and can specify terms and conditions of membership.<sup>9</sup> While the statute does not require CUD member towns to be contiguous to one another, it does require a non-member town to be contiguous to the CUD to receive communications services from the CUD.<sup>10</sup>

After admission as a member of the CUD, a member town may choose to withdraw their membership. The member town would hold a public vote at a duly warned annual or special public meeting, and if a majority votes to withdraw their membership from the district, that vote will be certified by the clerk of that town and presented to the district's governing board.<sup>11</sup>

The CUD cannot accept funds generated by members' power of taxation or assessment, but the CUD can receive revenue for communications services and facilities it provides to towns. The CUD will not have the power to levy or collect tax on property within the district without specific authority of the General Assembly.<sup>12</sup> The obvious ramifications of this is that the CUD has a

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<sup>2</sup> 30 VSA § 3051

<sup>3</sup> 30 VSA § 3081

<sup>4</sup> 30 VSA §3054

<sup>5</sup> 30 VSA §3057

<sup>6</sup> 30 VSA §3071

<sup>7</sup> 30 VSA §3059

<sup>8</sup> 30 VSA §3060

<sup>9</sup> 30 VSA §3082

<sup>10</sup> 30 VSA §3054

<sup>11</sup> 30 VSA §3081

<sup>12</sup> 30 VSA §3056

limited ability to self-fund upon formation. Initial funding for the CUD to be operationally self-sustaining may need to come from grant funding or private investment.<sup>13</sup>

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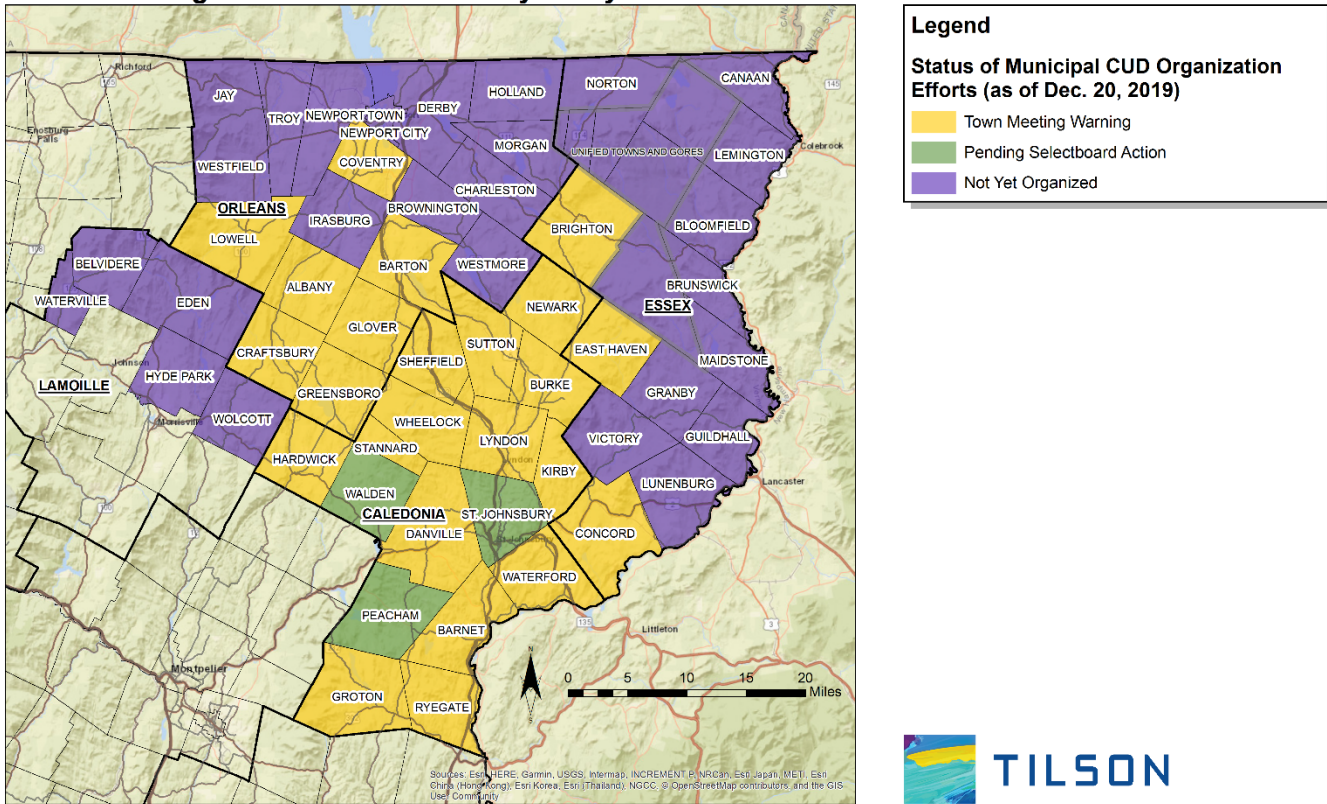
<sup>13</sup> 30 VSA §3076. For short-term funding needs, “[t]he board may borrow money through the issuance of notes of the district for the purpose of paying current expenses of the district. Such notes shall mature within one year, and may be refunded in the manner provided by law, and shall be payable solely from the district’s operating revenues. The governing board may borrow money in anticipation of the receipt of grants-in-aid from any source and any revenues. Such notes shall mature within one year, but may be renewed as provided by general law.”

### 3. Status of Efforts to Organize CUDs

As part of this study, NVDA convened a planning group on November 26, 2019 with representatives of many of the towns and organizations most active at the present time in organizing one or more CUDs in the region. This group inventoried the status of efforts to form a CUD or CUDs in this region. Many towns in the region have already decided to place the question of whether to form a CUD to voters at the March 2020 Town Meeting. Additional towns have ongoing consideration regarding whether to do so before the town selectboard. Other towns in the region may or may not have interest in joining a CUD, but in either event do not appear likely to consider the question within the same timeframe as the first two categories. The status of the towns' organization efforts is summarized in Figure 1. As will be discussed later in this report, Tilson considers the timing of towns' readiness to join a CUD to be an important factor to consider when addressing the question of how many CUDs to organize and what the boundaries of the CUDs should be.

Figure 1: CUD Organization Efforts in the Region

#### Northeast Kingdom CUD Pre-Feasibility Study



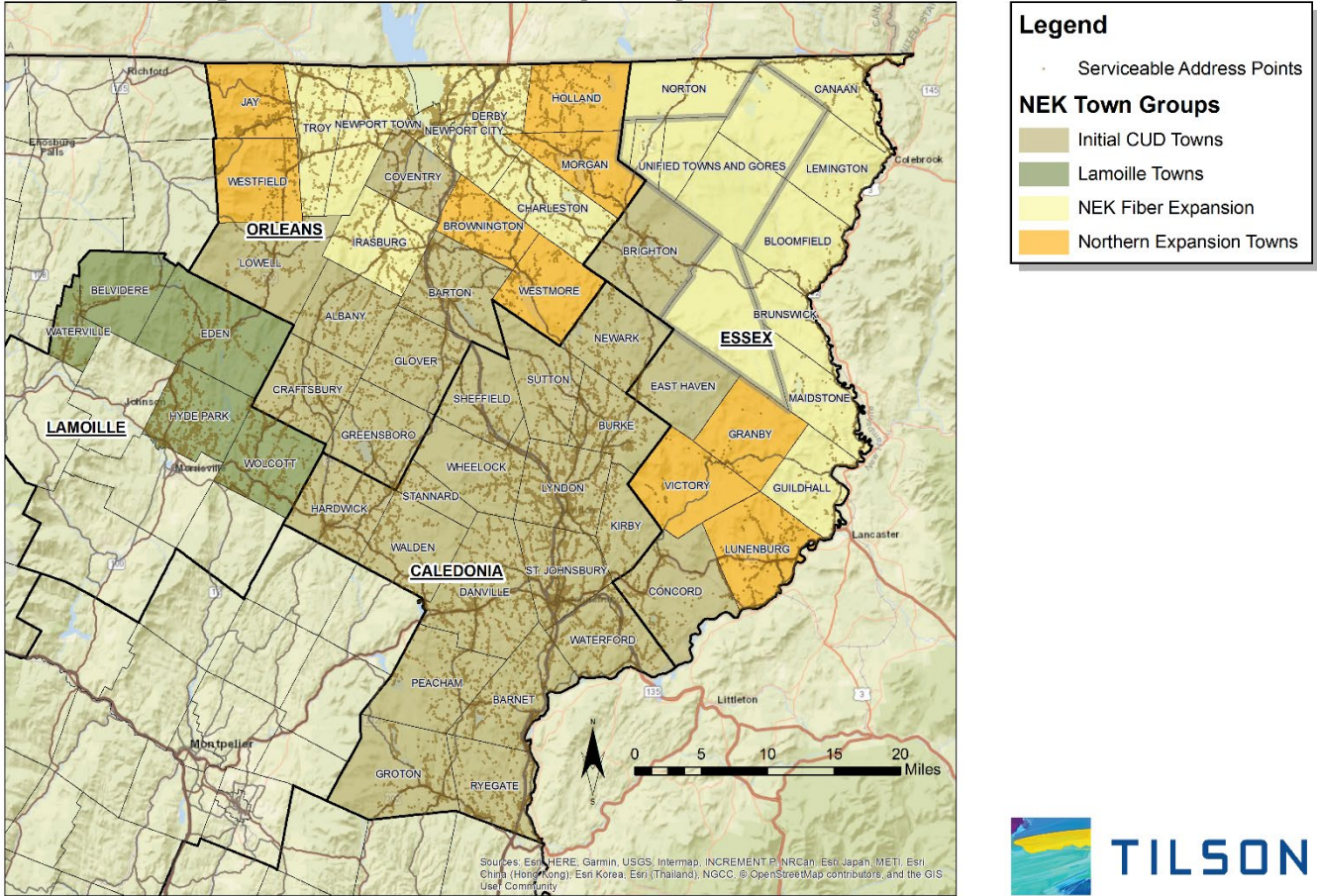


## 4. Regional Groups

Tilson has identified four groups of towns for the purposes of further discussion and analysis in this report. Also, the report’s recommendations will discuss a roadmap for CUD formation and growth using these town groupings.

Figure 2: Northeast Kingdom Town Groups

### Northeast Kingdom CUD Pre-Feasibility Study



#### Initial CUD Group

The Initial CUD group contains twenty seven towns at the center and south of the region from Caledonia, Essex and Orleans Counties. These include: all of Caledonia County; the Essex county towns of Brighton, concord and East Haven; and the Orleans county towns of Albany, Barton, Coventry, Craftsbury, Glover, Greensboro and Lowell. Most of these towns have either approved placing a CUD question before the March 2020 Town Meeting or are considering it at the selectboard level.

#### NEK Fiber Expansion Group

The NEK Fiber Expansion group contains nineteen towns and gores from Essex and Orleans counties. These include: the Orleans county towns of Charlestown, Derby, Irasburg, Newport, Troy and Newport City; the Essex county towns of Bloomfield, Brunswick, Canaan, Guildhall, Lemington, Maidstone, Norton; and the Unified Towns and gores of Essex County (Averill, Averys Gore, Ferdinand, Lewis, Warners Grant and Warren Gore). None of these towns currently appear likely to vote on joining a CUD at the March 2020 Town Meeting. As will be discussed later in the report, all of these towns lie abreast the existing Northeast Kingdom Fiber Network.

#### Northern Expansion Group

The Northern Expansion group could be comprised of nine towns from Essex and Orleans counties. Members would include the Essex county towns of Granby, Lunenburg and Victory; and the Orleans county towns of Brownington, Holland, Jay, Morgan, Westfield and Westmore. None of these towns currently appear likely to vote on joining a CUD at the March 2020 Town Meeting.

#### Lamoille Group

The Lamoille group could be comprised of the Lamoille county towns of Belvidere, Eden, Hyde Park Waterville and Wolcott. None of these towns currently appear likely to vote on joining a CUD at the March 2020 Town Meeting.

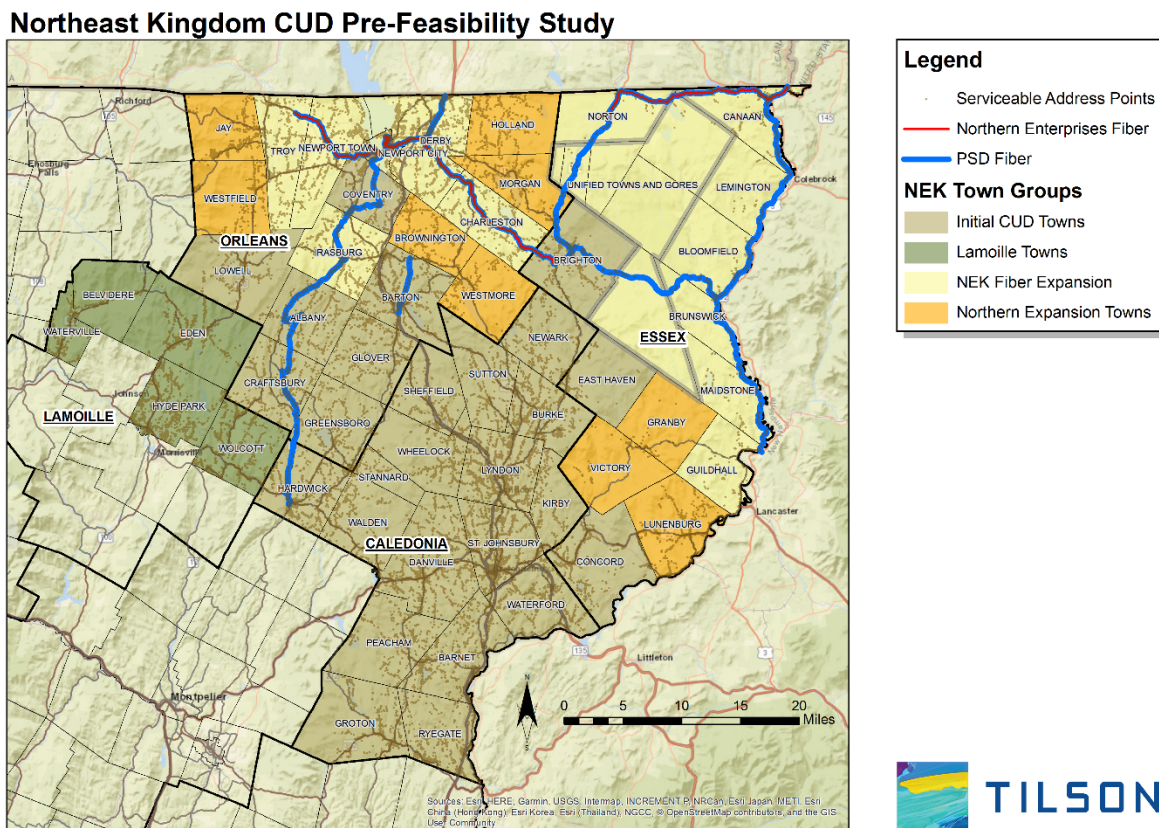
## 5. Existing and Critical Fiber Assets

The Northeast Kingdom has the advantage of several critical fiber assets already in place. These assets are useful to help jump-start a CUD effort in the region and help it obtain critical mass.

### 5.1. The Northeast Kingdom Fiber Network and Craftsbury Fiber

This section refers to a collection of fiber assets as the “Northeast Kingdom Fiber Network.” The primary components of the Northeast Kingdom Fiber Network were assembled through construction projects and a series of swaps and trades with underlying owners performed by the Vermont Telecommunications Authority (which was merged into the Vermont Public Service Department (PSD) in 2015).<sup>14</sup> The network is a 144-count dark fiber network along the routes shown in Figure 3. Dark fiber strands may be leased at standard rates from the Vermont Public Service Department.<sup>15</sup> This network would provide the

Figure 3: Northeast Kingdom Fiber Network



ability of last mile networks to be constructed off of the route at any point without the need to construct extensive middle-mile or feeder fiber simply to get from one point on the network to another. This has several benefits. First, it allows a CUD to more rapidly address some existing users and generate revenue. This revenue can pay for capacity in the organization that, in turn, can be leveraged to develop and fund projects in parts of the CUD that are not immediately adjacent to the Northeast

<sup>14</sup> Underlying owners included Northern Enterprises, Vermont Electric Cooperative, Northern Communities Investment Corporation, and 186 Communications (now FirstLight).

<sup>15</sup> Rate schedule available at <https://publicservice.vermont.gov/content/fiber-optic-cable>.

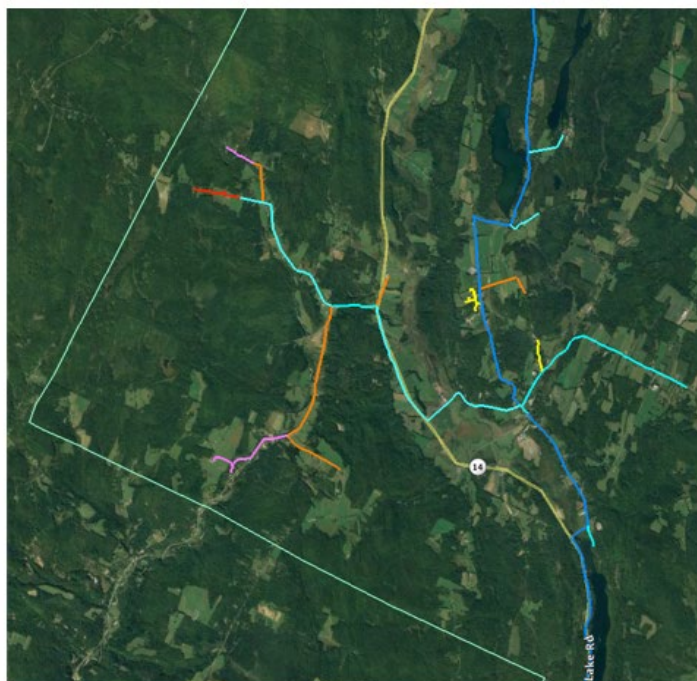
Kingdom Fiber network. It also provides the CUD with a more diverse set of opportunities for funding. Some funding opportunities, whether driven by grants or “bankable” business cases, will be available for parts of the CUD territory but not others. A large regional network makes it likely that the CUD will be able to exploit more of these opportunities, accelerating the pace at which communities within the CUD can be served.

Dark fiber strands in the Northeast Kingdom Fiber Network may also be leased along portions of the fiber route from one of the underlying fiber owners, Northern Enterprises, an economic development non-profit which developed fiber segments from Troy through Newport to Brighton and from Norton to Canaan under a grant from the U.S. Economic Development Administration (EDA). Northern Enterprises, through its mutual dark fiber lease agreements with the PSD, also acquired rights to a limited number of strands elsewhere on the Northeast Kingdom Fiber Network. Northern Enterprises has been in a mode of limited activity for more than 10 years, is governed by a volunteer board, and has no professional staff. The board is seeking opportunities to wind up the organization but, due to the terms of its EDA grant, its fiber assets may only be transferred to another not-for-profit organization. The board’s chair, a member of the planning committee for this project, has stated that Northern Enterprises would consider transferring its assets to a CUD if one is formed in the region. In addition to its dark fiber assets, Northern Enterprises has cash assets of approximately \$235,000 and monthly income of \$1,700 from a dark fiber lease with VTel Wireless.<sup>16</sup>

Figure 4: Craftsbury Fiber

Colors correlate fiber counts in table with routes on map.

- Cyan: 48-count fiber
- Orange: 24-count fiber
- Yellow: 12-count fiber
- Blue: 144-count fiber—owned by State of Vermont
- Red: 48-count fiber—owned by Pear Networks LLC
- Fuschia: 24-count fiber—owned by Pear Networks LLC



One example of the use of the Northeast Kingdom Fiber Network to deploy last mile services is the Craftsbury Fiber Project, a partnership between the Town of Craftsbury and Pear Networks LLC d/b/a Kingdom Fiber, a small, Northeast Kingdom ISP. Kingdom Fiber acquired dark fiber leases on the Northeast Kingdom Fiber Network at initial lease rates that are more favorable than those currently available. Under its existing dark fiber license agreements, Kingdom Fiber has an option to license up to 48 strands on the entire Northeast Kingdom Fiber Network.<sup>17</sup> The Town of Craftsbury acquired grant funding to build last-mile lateral fiber extensions and leased these to Kingdom Fiber, which deployed last-mile service in the town using town and Northeast Kingdom Fiber Network strands. Kingdom Fiber further extended this network with two small Connectivity Grants from the PSD totaling approximately \$50,000.<sup>18</sup> Advertised residential speed tiers go up to 50 Mbps downloads, while available business tiers range from 100 Mbps to 10 Gbps.<sup>19</sup> Some subscribers have contracted for symmetrical 100Mbps and symmetrical 500Mbps service.<sup>20</sup> This network is at present quite small, serving only a portion of the Town of Craftsbury, although Kingdom Fiber does have plans to exercise its options the Northeast Kingdom Fiber Network and expand service in

<sup>16</sup> E-mail from Dave Stoner, Northern Enterprises board chair to Christopher Campbell, Tilson Principal Consultant, November 30, 2019.

<sup>17</sup> E-mail from David Stoner to David Snedeker, December 17, 2019.

<sup>18</sup> See “List of Connectivity Grants” at <https://publicservice.vermont.gov/connectivity>.

<sup>19</sup> <https://kingdomfiber.net/home-broadband> and <https://kingdomfiber.net/biz-broadband>, accessed Dec. 24, 2019.

<sup>20</sup> Email from Michael Birnbaum to Dave Stoner, December 20, 2019.

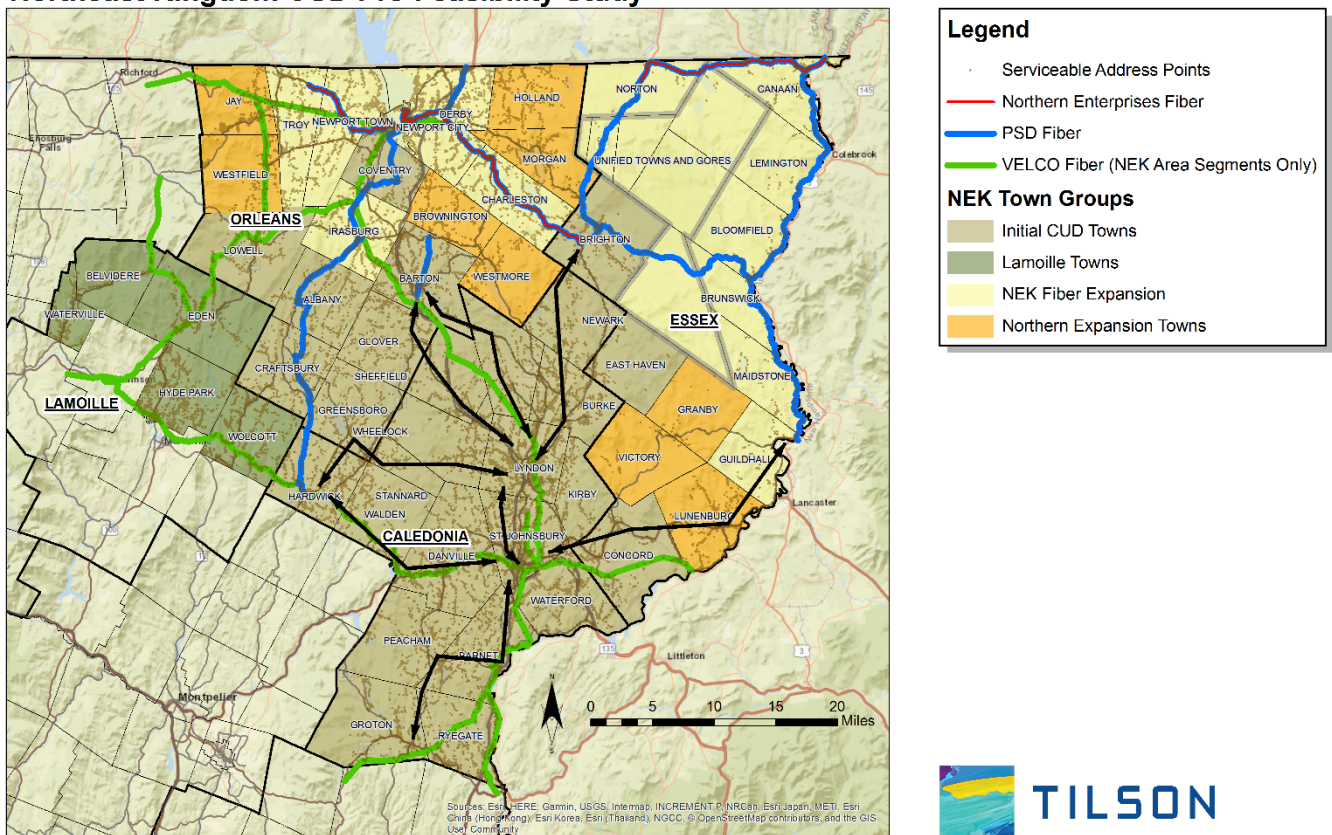
2020, pending installation of additional access points on the network by the PSD.<sup>21</sup>

## 5.2. VELCO Fiber and Extending the Northeast Kingdom Fiber Network

A future effort to connect the Northeast Kingdom Fiber Network through Caledonia County (beyond its current southwestern terminus in Hardwick) could bring important benefits. This would provide the opportunity to create redundant-route rings including both the northern and southern parts of the region. This could provide important reliability benefits allowing multiple local last-mile extension projects to be aggregated together, providing greater economies of scale in operations and facilitating a more rapid last-mile build-out across the region. Figure 5 shows hypothetical examples of routes that might connect and extend the NEK Fiber Network in additional regions. These examples are neither intended to identify routes with precision, nor all possible routes.

Figure 5: Examples of Extending the NEK Fiber Network

### Northeast Kingdom CUD Pre-Feasibility Study



Given the benefits of access to a regional fiber network outlined above and to extend its ability to serve all member towns, a regional CUD should seek opportunities to extend this type of asset throughout the region, and a region-wide CUD would be best positioned to bring it to those parts of the region that do not currently have it. There are several strategies by which this might be achieved.

<sup>21</sup> E-mail from Michael Birnbaum to Christopher Campbell, December 23, 2019.

1. Grant funding for key regional routes. The Northeast Kingdom Fiber Network was developed in segments with the assistance of federal grants and state appropriations. A CUD with access to the existing fiber assets will be positioned to seek out similar funding opportunities for parts of the region that lack these facilities currently.
2. Co-development of last mile service and key routes extending the Northeast Kingdom Fiber Network. The possible key regional fiber routes also pass by homes and businesses that a CUD would seek to serve as part of a mission to bring broadband service to users within its footprint. Fiber that serves a regional transport function can be done incrementally on such a project.
3. Co-development of key routes with an electric utility. The next section discusses this further.
4. Leasing, swapping and trading access to existing fiber. This strategy may be of most use in early stages of a CUD's development, when its owned fiber is limited. This may allow a region-wide CUD to access parts of the region not connected by the Northeast Kingdom Fiber Network, but where there is an opportunity due to a business case from a sufficient mass of ready users, or a grant funding opportunity. A CUD with operating capacity and network facilities will be better positioned to capitalize on these opportunities.

VELCO, Vermont's electric transmission utility, has substantial fiber assets, and is a company that could provide access to a CUD. Figure 5 depicts Vermont Electric Power Company (VELCO) fiber in the region. In many cases, VELCO's routes complement those of the Northeast Kingdom Fiber Network, especially in the southern and western parts of the region.

A CUD should not expect that VELCO fiber will be available to it without some cost. VELCO has a history of fiber co-development, dark fiber leases, and dark fiber swaps. Finding agreements that are similar in structure to prior agreements, and allowing VELCO to demonstrate value to its electric utility owner-members and their customers will likely facilitate an agreement with a CUD. Most of these existing agreements are with companies using VELCO fiber for middle mile and long-haul, such as VTel and Level (3) (now owned by CenturyLink). On some routes, VELCO fiber is installed alongside high voltage power lines and on cross-country routes instead of along the road; this makes the fiber more difficult to access locally. Other VELCO fiber routes may provide greater access to homes and businesses along its route. If the CUD were to pursue potential fiber swap opportunities with VELCO it will need to be determined where access to the VELCO fiber will be useful and appropriate for the CUD's needs.

Based on a November 2015 Presentation by the VELCO Operating Committee, the risks and benefits of "partnerships with long haul and/or last-mile providers" has been previously suggested by the power company, asking: "do any strategic and/or niche market opportunities exist with state government and/or with municipalities, hospitals and educational facilities to provide middle-mile back haul services?"<sup>22</sup>

### 5.3. Transport and Bulk Bandwidth Services

A regional CUD may require high-capacity services in the form of bulk internet or transport to a partner ISP's network or tier 1 Internet access points of presence in Boston or New York. The Northeast Kingdom has multiple competitive options for this kind of service today. Candidates to provide bulk Internet bandwidth or transport to regional Internet hubs include FirstLight, VTel Internet, CenturyLink, Comcast, Spectrum, and Consolidated Communications. All of these carriers' fiber networks touch or overlap the Northeast Kingdom fiber network. In fact, FirstLight utilizes the Northeast Kingdom fiber north of Hardwick, and VTel utilizes the NEK Fiber network for its wireless affiliate, VTel Wireless. When additional middle mile and last mile fiber is deployed in the NEK there will be other points of commonality with FirstLight and VTel to allow diverse and redundant connections. This fiber backhaul would likely take the form of a managed lit service rather than dark fiber.

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<sup>22</sup> VELCO Operating Committee presentation, 2015: <https://opcom.velco.com/library/document/download/5206/Fiber%20Market%20Analysis%20Preso.pdf>

Figure 6: FirstLight Fiber Network Map: <https://www.firstlight.net/network/network-map/>

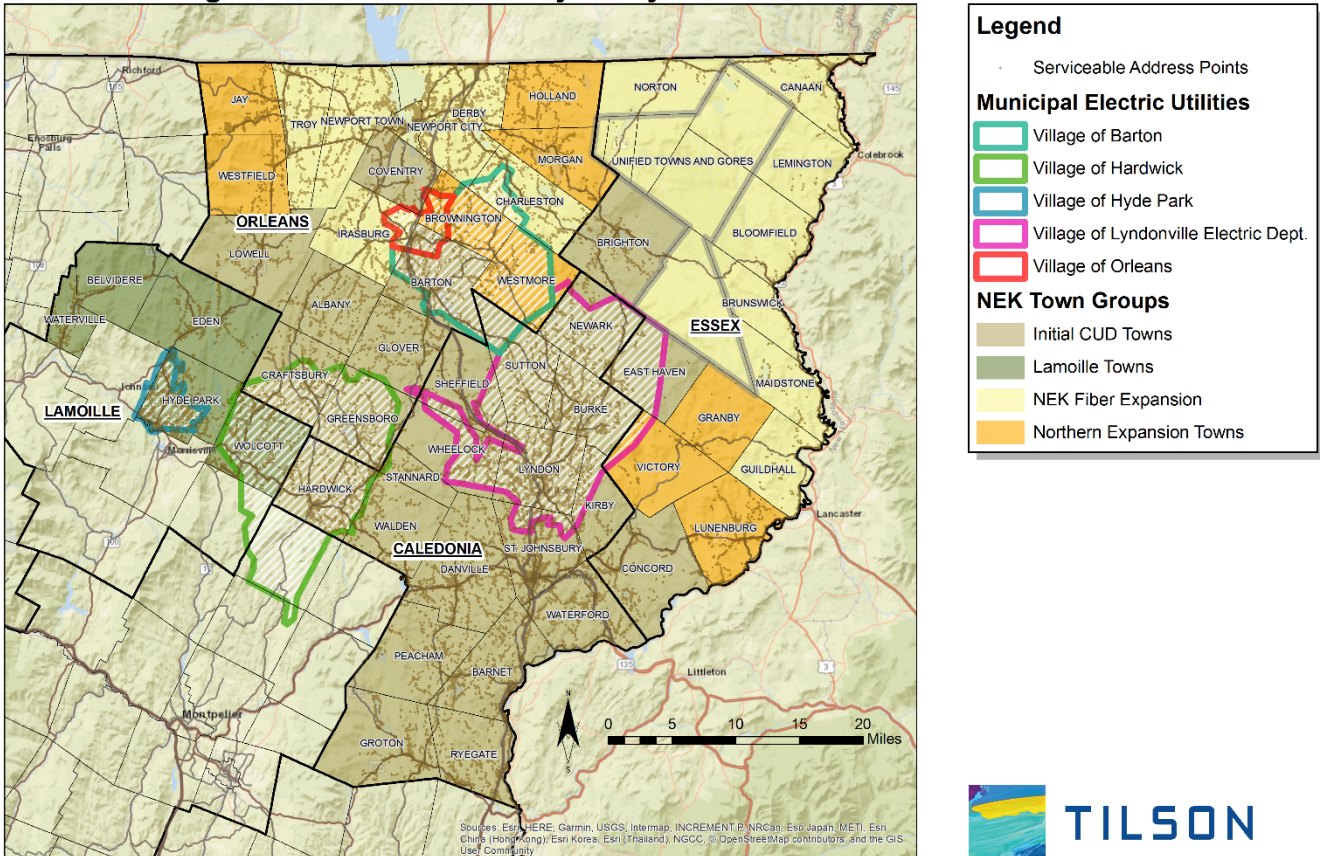


## 6. Electric Utilities

The Northeast Kingdom and the five Lamoille County towns that are the subject of this study contain five municipal electric utilities, most covering a multi-town region. These utilities are especially concentrated in the Initial CUD group of towns. One of these utilities, Lyndonville Electric, was represented on the stakeholder committee for this project.

Figure 7: Municipal Electric Utilities in the Region

### Northeast Kingdom CUD Pre-Feasibility Study



Tilson’s analysis does not assume any of these utilities will be directly involved in providing broadband service. However, even without such involvement there are good reasons to believe collaboration between a CUD and these fellow municipal entities could be mutually beneficial.<sup>23</sup>

For electric utilities, a smarter, more resilient electric grid can bring efficiencies in operations and reliability benefits. Increasingly, this requires utilities to have greater internal communications capabilities, connecting points such as substations,

<sup>23</sup> The focus here on collaboration with municipal utilities is not meant to exclude collaboration with cooperative utilities (Vermont Electric Cooperative and Washington Electric Cooperative), investor-owned utilities (Green Mountain Power) or VELCO, with which there may be similar opportunities. However, the footprint of the municipal utilities in most cases lies entirely within the footprint of the region, which may mean that these utilities could engage in planning with a CUD across their entire footprint, which may be especially appealing.



DACR (Distribution Automation/Circuit Reconfiguration) points, and facilities for AMI (Automated Metering Infrastructure). It is now quite common for electric utilities to build fiber optic lines connecting key points on their electric grid. It is also quite common for these facilities to have some spare capacity, which could be leased to a CUD at lower cost than constructing a parallel facility. Alternatively, an electric utility can lease fiber strands constructed by a CUD.

Where fiber optic lines do not yet exist for future utility needs, this opens up the possibility of joint planning and cost-sharing between a CUD and an electric utility or utilities. Fiber construction costs do not increase linearly when installing a cable with larger numbers of fiber strands. A single shared fiber optic cable, with fiber strands dedicated to electric utility use and other dedicated to broadband, can be more cost-effective than two parallel cables. Indeed, this is already occurring on the Northeast Kingdom Fiber Network, where Vermont Electric Cooperative has dedicated fiber strands within a cable also used for broadband service. These cost-sharing opportunities may make certain projects which would not have been feasible for either the electric utility or the CUD feasible for both. Furthermore, when developing a fiber facility cooperatively with an electric utility for which there is an electric utility use, there may be opportunities for the CUD to mitigate some costs associated with pole make-ready and pole attachment.<sup>24</sup>

Recent Vermont legislation signals a willingness on the part of Vermont policy makers to consider or encourage such collaboration. Act 79 of the 2019 legislative session directed the Public Service Department to study “the feasibility of Vermont electric companies providing broadband service using electric distribution and transmission infrastructure,” and also, to evaluate whether it is in the public interest and the interest of electric utilities to “permit a communications union district or other unit of government, nonprofit organization, cooperative, or for-profit business to lease excess utility capacity to provide broadband service to unserved and underserved areas of the State.”<sup>25</sup>

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<sup>24</sup> As pole attachment rates and make-ready costs are governed by Vermont Public Utility Commission Rule 3.700 and utility tariffs approved by the Public Utility Commission, reduction or elimination of fees would require a project-specific analysis to determine when it would or would not be allowed under these regulations.

<sup>25</sup> Act 79, 2019-2020 session of the General Assembly, Sec. 11.

## 7. NEK Towns Demographic Overview and Existing Service

Looking at the tables in this section, it is interesting to note some of the similarities between regional groups.<sup>26</sup> One of the important metrics used in estimating fiber network construction, per home or home passed, is the number of premises per mile, and the difference between groups here is minimal. While there are notable difference in the number of premises per mile between individual towns within groups, it interestingly averages out when grouped together, even though this was not one of the factors used to determine group membership. Most last mile fiber networks inevitably have sections of varying density.

Table 1: Initial CUD group demographic information summary

Town	Group Population	% of Group Population	Total Group Buildings	% of Group Buildings	Served 25/3 or Better	Percent Served 25/3 or Better	Premises / Road Mile	Median Household Income	Median Age
Kirby	493	1%	274	1%	30	10%	10.89	\$37,917	37.0
Sutton	1029	2%	487	2%	110	22%	8.47	\$36,750	37.0
Stannard	216	1%	141	1%	0	0%	8.85	\$36,250	38.0
Wheelock	811	2%	500	2%	59	11%	15.35	\$35,750	40.0
Burke	1753	4%	1004	4%	549	54%	15.42	\$35,268	39.0
Greensboro	762	2%	824	4%	82	9%	12.91	\$34,583	44.0
Coventry	1086	3%	531	2%	242	45%	10.07	\$33,487	36.0
Craftsbury	1206	3%	720	3%	58	8%	10.50	\$34,453	41.0
East Haven	290	1%	214	1%	0	0%	16.20	\$34,375	37.0
Hardwick	3010	7%	1426	6%	962	67%	15.20	\$33,636	36.0
Newark	581	1%	597	3%	0	0%	13.75	\$33,611	39.0
Glover	1122	3%	806	3%	119	14%	13.77	\$33,403	44.0
Lyndon	5981	14%	2277	10%	1874	82%	20.74	\$32,946	35.0
Albany	941	2%	615	3%	20	3%	11.53	\$30,625	38.0
Barton	2810	7%	1478	6%	932	63%	15.56	\$28,797	41.0
Sheffield	703	2%	468	2%	108	23%	10.47	\$28,125	36.0
Lowell	879	3%	556	2%	0	0%	12.06	\$27,969	35.0
Brighton	1222	3%	930	4%	589	63%	18.75	\$26,932	41.0
Peacham	732	2%	568	2%	292	51%	8.80	\$62,344	48.5
Waterford	1280	3%	650	3%	106	16%	9.13	\$50,197	42.0
Danville	2196	5%	1421	6%	770	54%	12.74	\$42,440	41.0
Concord	1235	3%	889	4%	265	29%	13.52	\$38,264	37.0
Walden	935	2%	657	3%	84	12%	13.20	\$37,500	36.0
Ryegate	1174	3%	674	3%	245	36%	8.54	\$36,761	41.0
Barnet	1708	4%	1015	4%	201	19%	9.84	\$36,089	40.0
Groton	1022	2%	705	3%	188	26%	13.56	\$33,333	39.0
St. Johnsbury	7604	18%	2890	12%	2,484	85%	18.28	\$20,269	39.5
	<b>42,781</b>	<b>100%</b>	<b>23,317</b>	<b>100%</b>	<b>10,369</b>	<b>30%</b>	<b>12.89</b>		

<sup>26</sup> The broadband availability and building counts in this section are from the Vermont Department of Public Service, "Broadband Statistics Summary by Town as of December 31, 2018," [https://publicservice.vermont.gov/sites/dps/files/documents/Connectivity/BroadbandReports/2019/BroadbandStatistics\\_2018\\_123118.pdf](https://publicservice.vermont.gov/sites/dps/files/documents/Connectivity/BroadbandReports/2019/BroadbandStatistics_2018_123118.pdf). The demographic information is from the 2010 U.S. Census.

The range in median age and income between groups also does not vary widely, with a few minor exceptions. With a median age of 39.42 among all groups, the region is only slightly older than the U.S. median age of 38.1. However, median household income does fall well below the national median household income of \$63,179.

The percent of premises served at 25/3 or better is the statistic that varies most widely between towns and between groups. However, it is important to note that reported broadband service statistics are often inaccurate and inflated. In the Lyndon, Vermont Broadband Feasibility Report from February, 2019 it was reported that “current providers are not meeting the needs and/or expectations of many residents, especially those residing outside of the developed portions of Lyndon. Information obtained through the Survey and Stakeholder Outreach anecdotally contradicts the availability of speeds and service offerings as reported by the Providers.”<sup>27</sup> It’s also worth noting that with very few exceptions (Craftsbury, Canaan, Lemington, Albany and Hardwick), there is virtually no residential Internet access available in the NEK at speeds of at least 100/100 Mbps. And while 25/3 is currently the lower threshold definition for broadband according to the Federal Communications Commission, in reality it represents the upper threshold of capability of an aging copper network.

Table 2: NEK Fiber Expansion group demographic information summary

Town	Group Population	% of Group Population	Total Group Buildings	% of Group Buildings	Served 25/3 or Better	Percent Served 25/3 or Better	Premises / Road Mile	Median Household Income	Median Age
Newport City	4589	26%	1879	18%	1859	98%	49.84	\$34,000	40.0
Troy	1622	9%	879	9%	684	77%	15.81	\$31,705	37.0
Derby	4621	26%	2473	24%	1908	77%	21.30	\$35,313	39.0
Charleston	1023	6%	768	7%	460	59%	14.11	\$28,083	41.0
Newport Town	1594	9%	865	8%	408	47%	15.61	\$34,758	39.0
Canaan	972	5%	621	6%	279	44%	17.61	\$32,574	39.0
Lemington	104	1%	91	1%	30	32%	6.70	\$35,417	52.0
Irasburg	1163	7%	628	6%	179	28%	10.90	\$40,962	42.0
Averys Gore	0	0%	8	0%	0	0%	0.00		
Lewis	0	0%	47	0%	0	0%	0.00		
Warners Grant	0	0%	2	0%	0	0%	0.00		
Guildhall	261	1%	183	2%	0	0%	7.43	\$31,750	43.0
Brunswick	112	1%	76	1%	0	0%	8.21	\$21,250	40.0
Bloomfield	221	1%	236	2%	0	0%	11.94	\$33,500	39.0
Warren Gore	4	0%	59	1%	0	0%	12.31		46.0
Ferdinand	32	0%	77	1%	0	0%	15.93	\$14,688	54.0
Norton	169	1%	221	2%	0	0%	18.87	\$20,000	43.0
Averill	24	0%	245	2%	0	0%	32.57	\$27,500	42.0
Maidstone	208	1%	360	4%	0	0%	38.89	\$19,167	46.0
	<b>16,719</b>	<b>100%</b>	<b>9,718</b>	<b>100%</b>	<b>5,807</b>	<b>60%</b>	<b>15.69</b>		

<sup>27</sup> Lyndon, Vermont Broadband Feasibility Report, February, 2019:

[https://tilson.sharepoint.com/sites/NortheastKingdomCUD/Shared%20Documents/Pre%20Feasibility%20Study/LyndonFeasibilityReportFinal\\_1302717050.pdf](https://tilson.sharepoint.com/sites/NortheastKingdomCUD/Shared%20Documents/Pre%20Feasibility%20Study/LyndonFeasibilityReportFinal_1302717050.pdf)

Table 3: Northern Expansion group demographic information summary

Town	Group Population	% of Group Population	Total Group Buildings	% of Group Buildings	Served 25/3 or Better	Percent Served 25/3 or Better	Premises / Road Mile	Median Household Income	Median Age
Morgan	749	14%	809	15%	533	65%	20.53	\$37,292	38.0
Jay	521	10%	538	10%	341	63%	14.14	\$43,958	41.3
Brownington	988	19%	558	11%	324	58%	11.70	\$29,667	38.0
Westfield	536	10%	375	7%	122	32%	11.97	\$38,021	44.0
Lunenburg	1302	25%	886	17%	0	0%	17.68	\$28,802	37.0
Holland	629	12%	458	9%	5	1%	10.15	\$28,359	35.0
Victory	62	1%	102	2%	0	0%	5.33	\$28,750	46.0
Granby	88	2%	101	2%	0	0%	9.39	\$39,375	42.0
Westmore	350	7%	590	11%	0	0%	17.60	\$27,375	46.0
	<b>5,225</b>	<b>100%</b>	<b>4,417</b>	<b>100%</b>	<b>1,325</b>	<b>30%</b>	<b>13.17</b>		

Table 4: Lamoille group demographic information summary

Town	Group Population	% of Group Population	Total Group Buildings	% of Group Buildings	Served 25/3 or Better	Percent Served 25/3 or Better	Premises / Road Mile	Median Household Income	Median Age
Hyde Park	2954	43%	1382	50%	1002	72%	17.04	\$38,650	38.0
Belvidere	194	3%	226	8%	0	0%	10.52	\$44,583	35.0
Waterville	673	10%	336	12%	0	0%	16.99	\$39,453	36.0
Eden	1323	19%	821	30%	0	0%	18.78	\$35,417	34.0
Wolcott	1676	25%	838	16%	0	0%	15.00	\$34,760	33.0
	<b>6,820</b>	<b>100%</b>	<b>3,603</b>	<b>100%</b>	<b>1,002</b>	<b>28%</b>	<b>15.67</b>		

## 8. Potential Funding Sources

This section contains a summary of potential funding opportunities for a NEK CUD. In a rural area with low premises density, pursuing grant and subsidy opportunities may prove a mandatory complement to project financing. All potentially applicable grant and subsidy programs should be pursued, as well as loan and loan guarantee programs. Overlapping and complimentary funding opportunities should be pursued as permitted. Pursuing, applying for and managing funding opportunities can be a time consuming and cumbersome process, but funding opportunities aimed specifically at developing broadband networks for rural and low income areas should be given the highest priority of the CUD(s), including pursuing funding for planning and feasibility studies. A unified CUD in the region will have the best opportunity to develop the capacity, experience, track record, and partners that will help it become successful in pursuing these opportunities.

Several of the programs listed here are potential sources of grant funding for feasibility studies and planning:

- The Vermont Department of Public Service (PSD) Broadband Innovation Grant. This program provides up to \$60,000 for feasibility and planning. A Request-for-Proposals (RFP) for utilities is expected in Feb. 2020, for others in April 2020.
- The Vermont Agency of Commerce and Community Development ThinkVermont Innovation Grant Program. This state program is funded at \$45,000 for FY2020 for planning municipal broadband projects. It may be administered in conjunction with the PSD program.<sup>28</sup>
- The U.S. Department of Agriculture (USDA) Rural Business Development Grant. This program provides up to \$100,000 for projects in the Northeast Kingdom, with smaller requests prioritized. Applications for the next funding round are due March 31, 2020.
- U.S. Economic Development Administration (EDA) Planning Program. This program has a rolling application window.

Several programs provide opportunities to fund projects such as key fiber routes or small unserved portions of the region:

- The Vermont Economic Development Authority (VEDA) Broadband Expansion Loan Program, which has a \$4M maximum loan amount.
- PSD Connectivity Initiative grants funded by Vermont Universal Service Fund, for which almost \$2M was allocated statewide between 2015-2017 to fund projects in unserved areas.
- The Northern Border Regional Commission (NBRC) State Economic & Infrastructure Development Investment Program, which funded up to \$3.5M in grants for projects in each of its four member states in 2019, with a \$500,000 max for eligible infrastructure projects. The recently passed \$1.4 trillion federal appropriations bill funded the NRBC with \$31 million for fiscal year 2020, a \$6 million increase over FY 2019.<sup>29</sup>
- EDA's Public Works and Economic Adjustment Assistance Programs, which provide grants with a \$100,000 floor and a \$3M ceiling.

Finally, several programs provide funding potentially appropriate for very large projects that could have a major impact on the CUD's ability to rapidly develop infrastructure in the region. These opportunities will require a CUD to form public-private partnerships requiring a substantial amount of work to identify, develop and negotiate:

- Federal Communications Commission (FCC) reverse auctions for subsidies from the Federal Universal Service Fund, including the Rural Digital Opportunity Fund (RDOF) for fixed broadband and the 5G Fund for cellular.
- New Market Tax Credits.
- Opportunity Zones.

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<sup>28</sup> Email from Nick Grimley, Vermont Agency of Commerce and Community Development.

<sup>29</sup> Saint Albans Messenger, December 18, 2019.

## 8.1. Vermont Department of Public Service

### 8.1.1. Broadband Innovation Grant Program

<https://publicservice.vermont.gov/content/broadband-innovation-grant-program>

The Broadband Innovation Grant program was launched on August 6, 2019 to help communities conduct feasibility studies and create business plans related to the deployment of broadband in rural, unserved and underserved areas of Vermont.

The program will award up to \$60,000 per grant to eligible grantees including non-profit organizations, for-profit businesses, cooperatives, distribution utilities, communications union districts and other government entities. Grantees must produce a feasibility study that proposes new broadband systems with minimum speeds of 25 Mbps download and 3 Mbps upload in unserved or underserved areas.

#### Grant Details:

- Proposals should be structured to include activities that determine the viability of different innovative strategies for enabling broadband deployment in rural unserved and underserved areas of Vermont.
- Proposals should include a feasibility study designed to collect information regarding project development, financing and deliverables.
- Proposals will need to include an actionable business plan for a potential broadband solution with speeds at a minimum of 25/3 Mbps.
- Proposals must include a detailed project description including how specific technology will be deployed and evaluated.

#### Grant Schedule:

- First Cycle: Awardees have been selected and announced.
- Second Cycle (distribution utilities only): Request for Proposals to be issued in February 2020.
- Third Cycle (up to six eligible awardees): Request for Proposal to be issued in April 2020.

In 2019 CVFiber was awarded a \$60,000 grant from this program to complete a feasibility study and business plan for providing high-speed broadband to each of its 17 member municipalities, including 755 locations in its territory that lack access to broadband with speeds of 25Mbps download and 3Mbps upload.<sup>30</sup>

### 8.1.2. Connectivity Initiative

<https://publicservice.vermont.gov/connectivity>

The Connectivity Initiative is the only state program addressing broadband deployment. Funded by proceeds from the Vermont Universal Service Fund, Connectivity Initiative grants are awarded to internet service providers that agree to extend service to designated areas least likely to be served through the private sector or through federal programs. The Division is expanding the program to fit with other community development initiatives. Towns are encouraged to work with an internet service provider to identify projects that will meet private and public needs. Priority will be given to projects that match Connectivity funding with local or private funding and that establish a nexus between broadband and other community goals.

The next Connectivity Initiative RFP will be issued December 2020.<sup>31</sup>

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<sup>30</sup> Vermont Department of Public Service: <https://publicservice.vermont.gov/announcements/department-announces-round-one-awardees-broadband-innovation-grants>

<sup>31</sup> Telecommunications and Connectivity Grants and Resources 2019-2020: <https://shaftsburyvt.gov/dev/wp-content/uploads/2019/11/4-Connectivity-Grants-Resources-Manchester-11-8-2019.pdf>

ECFiber was a recipient of funding from this program and was granted \$359,404 in 2015, \$156,500 in 2016 and \$59,200 in 2017.<sup>32</sup>

## 8.2. Vermont Economic Development Authority Broadband Expansion Loan Program

<https://www.veda.org/broadband-loan-program>

Program Purpose & Use of Loan Proceeds:

- Loans may be made for startup broadband projects and expansion of existing broadband networks. Eligible project costs include working capital, construction, and infrastructure / installation.
- Applicants may contact the Vermont Department of Public Service for grant and technical assistance opportunities for developing feasibility studies. (Refer to the Broadband Innovation Grant Program).

Eligible Borrowers:

- Borrowers eligible to participate include communications union districts and other units of government, nonprofit organizations, cooperatives, and for-profit businesses.
- Applicants must be capable of offering broadband service speeds of at least 100 Mbps symmetrical.

Loan Terms and Borrowing Limitations:

- Maximum Loan Amount: \$4.0 million.
- Maximum Financing: Up to 90% of project costs.
- Term: Loans up to five years with amortization up to 15 years.
- Interest: Variable Rates based on VEDA Base + appropriate risk-based spread.
- Collateral: First security interest in all business assets; assignment of all applicable contracts and agreements necessary to operate the system.
- Guarantees: Personal guarantees of owners of 20% or more, if available.
- Feasibility study and/or a detailed business plan is required.

## 8.3. Vermont Agency of Commerce and Community Development ThinkVermont Innovation Grant Program

<https://accd.vermont.gov/press-releases/vermont-launches-new-innovation-grant-program>

The appropriation for 2019, the Program's first year, was \$150,000. For 2020, \$45,000 was appropriated for the purpose of funding technical assistance grants to Vermont municipalities planning broadband projects.<sup>33</sup>

ACCD is working with the Public Service Department to administer these funds. PSD will be issuing the RFP and choosing grant recipients.<sup>34</sup> It is likely the 2020 ThinkVermont Innovation Grant will be folded into PSD's Broadband Innovation Grant Program, and that an RFP will be issued in April.<sup>35</sup>

The ThinkVermont Innovation Grant Program is designed to fund projects in areas crucial to the growth needs of Vermont's small businesses, including those that enable or support broadband telecommunication access and leverage federal funding.

In 2019, CVFiber received a planning and feasibility study grant from the ThinkVermont Innovation Grant Program.

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<sup>32</sup> Vermont Department of Public Service: [https://publicservice.vermont.gov/sites/dps/files/SummaryofConnectivityGrantAwards\\_20170810.xlsx](https://publicservice.vermont.gov/sites/dps/files/SummaryofConnectivityGrantAwards_20170810.xlsx)

<sup>33</sup> Act 79, 2019-2020 session of the General Assembly, Sec. 9.

<sup>34</sup> Email from Nick Grimley, Vermont Agency of Commerce and Community Development.

<sup>35</sup> Email from Clay Purvis, Director Vermont Public Service Department Telecommunications and Connectivity Division.

## 8.4. Northern Border Regional Commission State Economic & Infrastructure Development Investment Program

<http://www.nbrc.gov/content/economic-infrastructure-development-investments>

<http://www.nbrc.gov/content/vermont>

Since its founding in 2008, the Northern Border Regional Commission (NBRC) Federal - State partnership has provided Federal grants to employment generating projects that have helped reduce poverty, unemployment, and outmigration. The NBRC, which includes parts of Vermont, New Hampshire, New York and Maine, invests in economic and infrastructure projects in the following Vermont counties: Addison, Bennington, Caledonia, Chittenden, Essex, Franklin, Grand Isle, Lamoille, Orange, Orleans, Rutland, Washington, Windham, Windsor. Depending on the level of economic and demographic distress in each county, NBRC funded projects can be eligible for up to an 80% matching grant.

In the \$1.4 trillion federal appropriations bill approved by the senate on December 19, 2019, the Northern Border Regional Commission was funded at \$31 million for fiscal year 2020. This is a \$6 million increase over FY 2019.<sup>36</sup>

- 2019 appropriations allowed up to \$3.5M million for projects in each NBRC State.
- Up to a \$500,000 maximum award to eligible infrastructure projects, up to a \$250,000 maximum award for all other types of eligible projects.
- NBRC awards require up to a 50% match depending on the level of county economic and demographic distress.
- NBRC funds can be used as match for leveraging other Federal grant funds, only up to 80% of the total project. There always needs to be a 20% non-federal match.
- All funds are in the form of reimbursement for eligible expenses incurred after a Notice to Proceed has been issued.

Prioritized grant projects include those that:

- Revitalize and modernize essential infrastructure in Northern Border region communities.
- Increase access, affordability, and use of high-speed telecommunications by Northern Border residents and businesses.
- Retain, expand and diversify business enterprise capitalizing on the region's natural, cultural, and economic assets.
- Position the Northern Border region as an attractive and supportive place for creative and entrepreneurial people.
- Support and expand a highly productive workforce with skills suited to existing and future business needs.
- Foster entrepreneurial leadership and capacity for community economic development.
- Inform and align local, state, and regional economic development decision making with regional data and perspectives.

Applicants may include:

- Public bodies, IRS recognized 501(c) organizations, Native American tribes, and the four NBRC State governments.

## 8.5. Federal Communications Commission Auctions

### 8.5.1. Rural Digital Opportunity Fund

<https://docs.fcc.gov/public/attachments/DOC-358831A1.pdf>

In August 2019 the Federal Communications Commission (FCC) proposed establishing the Rural Digital Opportunity Fund, which would direct up to \$20.4 billion to expand broadband in unserved rural areas. Recent versions of this program were

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<sup>36</sup> Saint Albans Messenger, December 18, 2019.



known as the “Connect America Fund (CAF).” This is the primary program the FCC offers to support broadband service in unserved areas with a high cost to serve. RDOF funding will be available as a Universal Service Fund subsidy to the winners of a reverse auction open to Internet service providers and electric utilities.

In Vermont, funding under the Connect America Program has flowed during a six-year transitional support period to Consolidated Communications (formerly FairPoint Communications), the incumbent telephone company that historically received support under the Connect America Fund’s predecessor FCC programs. (Most of these areas were not eligible for the CAF-II reverse auction in 2019). That support is now slated to come to an end in 2021, and the FCC plans to open the opportunity for support to bidders in a “reverse auction,” where bidders compete nationally for the obligation to serve, with broadband and voice, unserved census blocks, an obligation that would come with a stream of subsidy payments paid out over a 10-year period. Bidders would bid against an expected or “model” support amount, with awards going to bidders willing to accept a lower amount of support. However, the FCC has signaled its intention to continue the practice from the CAF-II auction in which bidders offering to build higher-performance networks (such as gigabit-capable networks) received higher weights, allowing them to compete more effectively against lower-performing networks such as satellite.

Tilson currently expects rules for the Rural Digital Opportunity Fund reverse auction be released during the first quarter of 2020, the auction itself will likely be held before the end of 2020. In a Notice of Proposed Rulemaking released in August 2019 the FCC made clear they thought the process for the recently completed Connect America Fund Phase II auction was successful and would aim to emulate that process for the RDOF reverse auction.<sup>37</sup> As such, auction participation will likely be limited to Internet service providers in business for at least two years and electric utilities. Auction participants will also need to meet certain financial thresholds in order to qualify for participation, and winning bidders will need to maintain an annual letter of credit valued at the subsidy amount the bidder has received plus what they will receive the coming year, or 10% of the total award year one, 20% of the total award year two and so on until the buildout is certified complete.

The NEK CUD(s) will have to work diligently to form a public private partnership in order to fully leverage the subsidy and integrate the funding into their larger business planning and financial modeling. Such public private partnerships were encouraged by the FCC during the CAF II auction, but the auction participant and subsidized entity will be an ISP or utility. While the RDOF represents potentially the largest federal funding opportunity for a Northeast Kingdom CUD, it is an opportunity that comes around very infrequently and should be addressed with appropriate urgency.

The Public Notice seeks comment on FCC proposals to:

- Make eligible for support any subsidized area currently receiving CAF Phase II model-based support but lacking broadband at speeds of 25 Megabits per second (Mbps) downstream, 3 Mbps upstream, as well as the areas unawarded in the CAF Phase II auction.
- Raise the standard for broadband deployment from the CAF’s 10 Mbps/1 Mbps minimum to at least 25 Mbps/3 Mbps, with incentives for faster speeds.
- Allocate support through a multi-round reverse auction such as that used in last year’s CAF Phase II auction.
- Implement a two-phase approach:
  - In Phase I, target wholly unserved census blocks, using existing FCC data collection.
  - In Phase II, target unserved locations in partially unserved census blocks, using new, more granular data being developed through the Digital Opportunity Data Collection, along with areas not won in Phase I.
- Set a budget of \$20.4 billion in high-cost universal service support, making available at least \$16 billion for Phase I and the remainder available for Phase II. Both phases would have 10-year support terms.
- Adopt technology-neutral standards, opening the auction to all types of providers that can meet program standards.

### 8.5.2. 5G Fund

<https://docs.fcc.gov/public/attachments/DOC-361168A1.pdf>

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<sup>37</sup> [FCC-19-77A1 Rcd.pdf: https://docs.fcc.gov/public/attachments/FCC-19-77A1.pdf](https://docs.fcc.gov/public/attachments/FCC-19-77A1.pdf)

In December 2019 the Federal Communications Commission Chairman, Ajit Pai, announced intentions to establish the 5G Fund, which would make up to \$9 billion in Universal Service Fund support available to carriers to deploy advanced 5G mobile wireless services in rural America. This funding would be allocated through a reverse auction and would target hard-to-serve areas with sparse populations and/or rugged terrain. The \$9 billion Fund also would set aside at least \$1 billion specifically for deployments facilitating precision agriculture needs.

It is important to note that, similar to the RDOF reverse auction, qualified participants in this reverse auction will be limited to service providers. Unlike the RDOF, where electric utilities will likely be allowed to participate as they were in the Connect America Phase II auction, electric utilities will likely not be allowed to participate in the 5G Fund auction. As auction participation will likely be limited to mobile wireless providers and Internet service providers, the NEK CUD(s) will have to work diligently to form a public private partnership to leverage the region's available subsidy in such a way as to not only deploy 5G wireless mobile networks, but to ensure the necessary fiber backhaul assets are considered in conjunction with the needs of fixed broadband deployments such as middle mile and last mile fiber.

The 5G Fund would replace the planned Mobility Fund Phase II, which would have provided federal support for 4G LTE service in unserved areas. Pursuant to the Mobility Fund Phase II rules, wireless providers were required to submit 4G LTE coverage data in order to help the Commission target federal subsidies to unserved parts of the country. The Mobility Fund Phase II challenge process gave stakeholders an opportunity to dispute these coverage maps by submitting speed tests to the Commission. But in a report released in December 2019, Commission staff found the 4G LTE coverage data submitted by providers not sufficiently reliable for the purpose of moving forward with Mobility Fund Phase II.

The staff report recommended the Commission terminate the challenge process, audit the coverage filings of carriers in other proceedings before the Commission, and take additional steps to make sure coverage data the Commission and the public rely on is accurate.

There is currently no specific timeline for the 5G Fund reverse auction.

## 8.6. United States Department of Agriculture Programs

### 8.6.1. ReConnect Loan and Grant Program

<https://www.usda.gov/reconnect/program-overview>

Because Vtel has been a previous recipient of United States Department of Agriculture (USDA) ReConnect funding, having received a loan through the Broadband Initiatives Program, much of the region is considered a Protected Broadband Borrower Service Area and has limited availability to additional funding. The USDA's ReConnect program rules include a waiver process allowing program applicants to challenge the availability of broadband from the protected borrower.<sup>38</sup> The Vermont Department of Public Service has requested more information from the USDA on the waiver process.<sup>39</sup>

This program helps fund broadband service expansion to rural areas without sufficient broadband access, defined as 10 Mbps downstream and 1 Mbps upstream.

To be eligible for a 100% grant, 100% loan or 50% loan / 50% grant, the proposed funded service area in an application must be in a rural area where 90% of the households do not have sufficient broadband access. The proposed network must be capable of providing service to every premise in the proposed funded service area at a speed of at minimum, 25 Mbps downstream and 3 Mbps upstream.

Applicants may include:

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<sup>38</sup> [https://www.rd.usda.gov/files/ReConnect\\_Program\\_Application\\_Guide.pdf](https://www.rd.usda.gov/files/ReConnect_Program_Application_Guide.pdf) Page 12.

<sup>39</sup> Email from Clay Purvis, Director, Telecommunications and Connectivity Department of Public Service

- Non-profit entities
- For-profit corporations
- Limited liability companies
- Cooperative or mutual organizations
- States, local governments, or any agency, subdivision, instrumentality, or political subdivision thereof

Eligible Funding Purposes:

- To fund the construction or improvement of buildings, land, and other facilities that are required to provide broadband service.
- To fund reasonable pre-application expenses. Funding for pre-application expenses may not exceed five percent of the award amount. If the funding category applied for has a grant component, then grant funds will be used for this purpose; otherwise, loan funds may be applied. All pre-application expenses must be included in the first request for award funds.
- To fund the acquisition and improvement of an existing system that is currently providing insufficient broadband service (eligible for 100 percent loan requests only). Funding for the acquisition of an existing system may not exceed 40 percent of the award amount.
- To fund terrestrial based facilities that support the provision of satellite broadband service.

Funding Limits:

- 100 Percent Grant. Up to \$200,000,000 is available for grants. The maximum amount that can be requested in an application is \$25,000,000.
- 50 Percent Loan / 50 Percent Grant. Up to \$200,000,000 is available for loan/grant combinations. The maximum amount that can be requested in an application is \$25,000,000 for the loan and \$25,000,000 for the grant. Loan and grant amounts will always be equal.
- 100 Percent Loan. Up to \$200,000,000 is available for loans. The maximum amount that can be requested in an application is \$50,000,000. Financial Feasibility and Sustainability Requirements apply.

## 8.6.2. Rural Business Development Grant

<https://www.rd.usda.gov/programs-services/rural-business-development-grants>

This program is designed to provide technical assistance and training for small rural businesses. The definition of a ‘small business’ for purposes of this program is a business that has fewer than 50 new workers and less than \$1 million in gross revenue. Grant funding for feasibility studies and planning are permissible under this program.

Applicants may include rural public entities including but not limited to:

- Towns
- Communities
- State agencies
- Authorities
- Nonprofit corporations
- Institutions of higher education
- Rural cooperatives (if organized as a private nonprofit corporation)

There is no maximum grant amount for the program; however, due to the limited amount of Vermont's allocation, applications within the Northeast Kingdom (NEK) of Vermont (Caledonia, Essex, and Orleans) a designated Rural Economic Area Partnership zone, will be limited to no more than \$100,000. Applications outside the NEK (all other counties in the state of Vermont) will be limited to no more than \$30,000; smaller requests are given higher priority. There is no cost-sharing

requirement. Two grant types are available, Enterprise grants and Opportunity grants. Opportunity grants are limited to up to 10 percent of the total Rural Business Development Grant annual funding.

Enterprise grants must be used on projects to benefit small and emerging businesses in rural areas as specified in the grant application including:

- Feasibility studies and business plans.
- Training and technical assistance, such as project planning, business counseling and training, market research, feasibility studies, professional or/technical reports.
- Acquisition or development of land, easements, or rights of way; construction, conversion, renovation of buildings; plants, machinery, equipment, access for streets and roads; parking areas and utilities.
- The capitalization of revolving loan funds, including funds that will make loans for start-ups and working capital.
- Rural transportation improvement.
- Community economic development.
- Technology-based economic development.
- Long-term business strategic planning.

Opportunity grants can be used for:

- Feasibility studies and business plans.
- Community economic development.
- Technology-based economic development.
- Leadership and entrepreneur training.
- Rural business incubators.
- Long-term business strategic planning.

All applications are evaluated based on:

- Evidence showing job creation at local businesses.
- Percent of non-federal funding committed to the project.
- Economic need in the area to be served.
- Consistency with local economic development priorities.
- Experience of the grantee with similar efforts.

## 8.7. United States Economic Development Administration Programs

### 8.7.1. Planning Program

<https://www.eda.gov/pdf/about/Planning-Program-1-Page.pdf>

The Economic Development Administration (EDA) Planning Assistance program provides essential investment support to district organizations, states, sub-state planning regions, urban counties, cities and other eligible recipients to assist in planning.

Eligible activities under this program include:

- Developing, maintaining, and implementing a Comprehensive Economic Development Strategy (CEDS) and related short-term planning activities.

EDA supports Partnership Planning investments to facilitate the development, implementation, revision, or replacement of Comprehensive Economic Development Strategies (CEDS), which articulate and prioritize the strategic economic goals of recipients' respective regions.

As the NVDA well knows, the region has a CEDS approved by the EDA, and is part of a larger region, the Northern Vermont Economic Development District, that has EDA designation as an Economic Development District (EDD).

### Northern Vermont Economic Development District

<http://nvedd.org/index.html>

The Northern Vermont Economic Development District (NVEDD) was designated by the Economic Development Administration of the US Department of Commerce. NVEDD is comprised of the six northern counties in Vermont: Caledonia, Essex, Franklin, Grand Isle, Lamoille and Orleans.

## 8.7.2. Public Works and Economic Adjustment Assistance Programs

<https://www.eda.gov/funding-opportunities/index.htm>

EDA's Public Works and Economic Adjustment Assistance (EAA) programs provide economically distressed communities and regions with comprehensive and flexible resources to address a wide variety of economic needs. Projects funded by these programs will support work in Opportunity Zones and will support the mission of the Department by, among other things, leading to the creation and retention of jobs and increased private investment, advancing innovation, enhancing the manufacturing capacities of regions, providing workforce development opportunities, and growing ecosystems that attract foreign direct investment.

EDA solicits applications in order to provide investments that support construction, non-construction, planning, technical assistance, and revolving loan fund projects under EDA's Public Works program and EAA. Grants and cooperative agreements made under these programs are designed to leverage existing regional assets and support the implementation of economic development strategies that advance new ideas and creative approaches to advance economic prosperity in distressed communities.

For fiscal year 2020, grants for this program have a floor of \$100,000 and a ceiling of \$3,000,000.

## 8.8. Opportunity Zones

<https://www.irs.gov/newsroom/opportunity-zones-frequently-asked-questions>

The Opportunity Zone designation encourages investment in communities by granting investors federal tax advantages for using their capital gains to finance new projects and enterprises.

Qualified Opportunity Zones were created by the 2017 Tax Cuts and Jobs Act. These zones are designed to spur economic development and job creation in distressed communities throughout the country by providing tax benefits to investors who invest eligible capital into these communities. Taxpayers may defer tax on eligible capital gains by making an appropriate investment in a Qualified Opportunity Fund and meeting other requirements.

For investments made for two years after January 1 2020, investors won't pay tax on 10% of their deferred capital gains, and their remaining federal tax obligation is deferred for seven years. For example, if an investor realizes a \$1M capital gain on the sale of an asset, the investor has 180 days to put that amount in a qualified Opportunity Zone investment. In that scenario, at the end of seven years, the investor would pay tax on \$900K.

## 8.9. New Market Tax Credits

<https://www.cdfifund.gov/programs-training/Programs/new-markets-tax-credit/Pages/default.aspx>

<https://www.cdfifund.gov/programs-training/certification/cde/Pages/default.aspx>

The New Markets Tax Credit (NMTC) Program incentivizes business and real estate investment in low-income communities via a federal tax credit. The program is administered by the US Treasury Department's Community Development Financial Institutions (CDFI) Fund and allocated by local Community Development Entities (CDEs) across the United States.

The NMTC Program attracts private capital into low-income communities by permitting individual and corporate investors to receive a tax credit against their federal income tax in exchange for making equity investments in specialized financial intermediaries called Community Development Entities (CDEs).

A CDE is a domestic corporation or partnership that is an intermediary vehicle for the provision of loans, investments, or financial counseling in Low-Income Communities (LICs). Benefits of being certified as a CDE include being able to apply to the CDFI Fund to receive a New Markets Tax Credit (NMTC) allocation to offer its investors in exchange for equity investments in the CDE and/or its subsidiaries; or to receive loans or investments from other CDEs that have received NMTC allocations.

To become certified as a CDE, an organization must submit a CDE Certification Application to the Fund for review. The application must demonstrate the applicant meets each of the following requirements to become certified:

- Be a legal entity at the time of application.
- Have a primary mission of serving LICs.
- Maintain accountability to the residents of its targeted LICs.

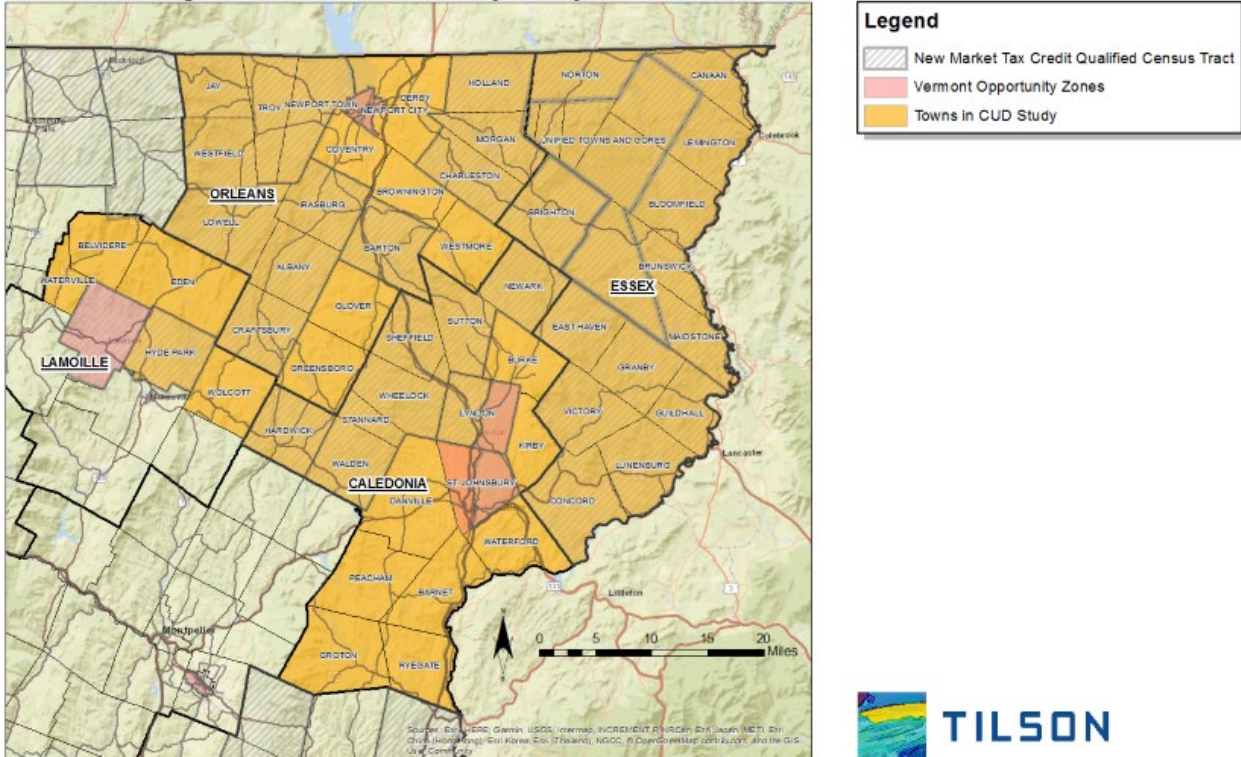
Examples of regional CDEs include Vermont Rural Ventures and Coastal Enterprises, Inc.

<http://vermontruralventures.com/>

<https://www.ceimaine.org/>

Figure 8: Opportunity Zones and New Market Tax Credits

### Northeast Kingdom CUD Pre-Feasibility Study



## 9. CUD Roadmap Recommendations

NVDA has sought Tilson's recommendation regarding the number of CUD districts that may be formed, and the potential boundaries of those districts. Several factors weigh heavily in our recommendation:

1. A CUD should have the best opportunity to reach a critical mass of users, and achieve financial sustainability.
2. A CUD will benefit from a high level of organizational capacity so as to plan, fund, and execute projects across its member towns.
3. A CUD should have the best opportunity to organize quickly to respond to funding opportunities, especially the Rural Digital Opportunity Fund Reverse Auction.

It is helpful to think not only of the possible ultimate boundaries of a CUD, but how it will get to them over time, growing and maturing as an organization. We present here a roadmap for how the region can grow a CUD organization that meets its needs.

### 9.1. Early CUD Opportunities and Reasons for Towns to Join Together

Early in the roadmap, two events in 2020 are critical factors to consider when thinking about the early development of a CUD:

1. It is likely that the formation of a Communications Union District will be on the ballot of a subset of towns in the region at Town Meeting 2020. A formal initial organizing meeting will only take place in May 2020.
2. It is likely the RDOF Reverse Auction will occur sometime in 2020, leaving only a limited amount of time in which to organize a response.

The RDOF reverse auction is of critical importance for three reasons. First, it provides an opportunity to attract a substantial amount of funding and thereby accelerate the rate at which a CUD can build out into unserved areas. Second, RDOF will not be a funding opportunity that will come up every year. Census blocks offered and won in the reverse auction will not be available for another ten years. Third, if a partnership involving a CUD does not compete in and win available census blocks in its territory, funding could very well be won by someone with a network that could be less capable than a primarily fiber-based CUD could offer, but superior to what is currently available. The presence of an alternative subsidized network could weaken the potential feasibility of the CUD effort. Even satellite Internet providers such as ViaSat and HughesNet can participate in the RDOF auction and obtain the subsidy.

Tilson therefore recommends early formation of a CUD focus on towns that may be ready to join in March 2020. The Initial CUD group contains these towns. First consider the advantages of including all Initial CUD group towns in a single CUD. In addition to their organizational efforts already underway, the following factors recommend including the Initial CUD group of towns in a single CUD:

1. The towns represent a substantial aggregation of both population and serviceable addresses.
2. This group contains territory served by four municipal electric utilities, which can be cultivated as potential partners for joint fiber use, development, and cost-sharing.
3. This group contains towns through which the Northeast Kingdom Fiber Network passes, from Hardwick to Brighton.

The last point merits elaboration, as there are several aspects to the advantages it may bring. The Northeast Kingdom Fiber Network would provide intra-CUD connectivity opportunities on day one that the CUD itself would not need to build. Furthermore, such a CUD would have the opportunity to negotiate with Northern Enterprises to take over ownership of its assets. This would provide the CUD physical assets that it could directly use to serve the CUD, potentially some cash assets,



and a modest initial income stream. A similar opportunity may exist with the Town of Craftsbury, should that town elect to join. These advantages would put the CUD ahead of where most CUDs might otherwise start when first formed.

The Caledonia County towns in this group, plus Glover, Lowell<sup>40</sup> and East Haven, are not on the Northeast Kingdom Fiber Network. However, the entire regional network would be enhanced and strengthened by efforts to connect existing fiber in Hardwick, Brighton, and Barton back to a central point in Caledonia County, such as Lyndon, which contains 25% of this group's population. This would provide the opportunity to form a route-redundant fiber ring through the region along a key trunk route passing through most towns in the group, as well as directly providing access to premises along the route. This would increase the resiliency of the regional network against interruptions in service due to fiber cuts and lower the initial financial hurdle that additional build-outs in each of the towns would face. The key routes to complete this region may be good targets for grant funds from federal programs focused on infrastructure for economic development, such as those from the USDA-Rural Development, EDA, and NBRC. They may also be prime targets for cooperative efforts with the region's electric utilities.

Tilson believes there are compelling reasons a NEK CUD should include additional towns beyond the Initial CUD group in a combined CUD, should they be willing to join. While these towns could form a second independent CUD, or even more, there are advantages to forming a single CUD in the Northeast Kingdom. These advantages include:

1. **Organizational capacity.**

A key hurdle for any CUD at its formation will be the acquisition of technical and managerial capacity either through staff or contractors. This capacity allows the CUD to plan and pursue projects, operate a network and serve users. The CUD will be limited in what it can accomplish until it clears this hurdle. It is easier to acquire this capacity once and share it among a somewhat larger group of towns than to acquire it more than once.

2. **Economies of scale.**

A single CUD can be a single procurement and contractual entity for planning, construction, facilities management, operations and network support services, allowing cost efficiencies.

3. **Attracting public funding.**

Grants and subsidies are often available without regard to town or county boundaries. A single CUD can submit a single application for funding, and the organizations issuing the funding can receive and review a single application, rather than reviewing two or more applications with possible overlapping fiber backhaul and other interests.

4. **Attracting private capital and operating partners.**

The Northeast Kingdom is a relatively low-density region. Aggregating relatively smaller opportunities into larger regional one is more likely to allow the region to attract funding and implementation partners with greater resources, an important factor for capitalizing on large opportunities.

Public-private partnerships are an important path for a CUD to consider. The CUD itself does not start with the organizational experience to operate a broadband network and faces financial hurdles in the initial stage of its existence. Forming partnerships with private entities that can assist with operational expertise and financing is a common way municipalities overcome these challenges to enter the broadband market. Institutional investors and ISP partners may prefer working with a single entity rather than the possibility of working with two or more entities from the same general region at the same time. Based on Tilson's experience assisting municipalities and counties find, evaluate, and select private partners, a larger CUD is likely to attract more competitive partnership opportunities. To achieve a positive outcome in the RDOF, attracting the right partner quickly will be essential. A CUD will not be able to compete directly for RDOF funding because it will likely not qualify as a bidder due to a lack of history as an ISP and a lack of financial resources at the time the auction takes place. It will require forming partnerships with entities that would qualify.

While towns in the southern part of the Northeast Kingdom, from St. Johnsbury and Danville south, could form their own CUD, for the reasons stated above, we believe it's most advantageous for all towns involved to be part of a single CUD. It is true that

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<sup>40</sup> As Lowell is separated by a mountain ridge from its neighbor in the group, Albany, it is perhaps the least logical member of this set. However, there is no other logical set of towns ready to vote in 2020 for it to join.

the group containing these southern towns alone offers some scale, although not so much that both they and the towns of the Initial CUD group could not benefit from their combination. Furthermore, the population of this group is more concentrated in the towns of St. Johnsbury and Danville and should either or both of these towns not pass their vote to join, a separate CUD would have significantly less scale. Should early efforts in the Initial CUD group include routes through Caledonia County to complete the Northeast Kingdom Fiber Network, it is not a stretch to envision interconnecting these with lateral routes or even a ring route around the towns in the southern portion of the Northeast Kingdom.

## 9.2. Growing a CUD after Initial Formation

An early CUD formation would give potential member towns a targeted objective to work towards, joining an existing entity. After the initial CUD formation, remaining NEK and NEK area towns will have the ability to join the region's CUD as they complete their public vote process. The CUD statute puts no restrictive time table on additional members joining the district. Starting the CUD process as soon as practicable and allowing additional towns to join when they're prepared to do so may ultimately provide better results than waiting for a larger group of towns to move forward at once.

After the initial set of towns voting to form a CUD at Town Meeting 2020, the towns in the NEK Fiber Expansion group represent a logical set of outreach towns for the CUD. These towns all lay astride the Northeast Kingdom Fiber Network, meaning users within each town would immediately be within close reach and that lateral extensions would require much less construction. In some cases, especially in Essex County, towns have very low population but conversely many of the buildings they do have are located near existing fiber. It would not be necessary for all of these towns to join, but for those that did, there would be advantages for both the town and CUD.

The Northern Expansion group are other NEK towns neighboring the Initial CUD group and/or the NEK Fiber Expansion group. These towns are discontinuous and do not have a compelling case as a stand-alone CUD. If they wish to join a CUD, they are best served by joining a neighboring CUD, most likely the NEK CUD once it is up and running.

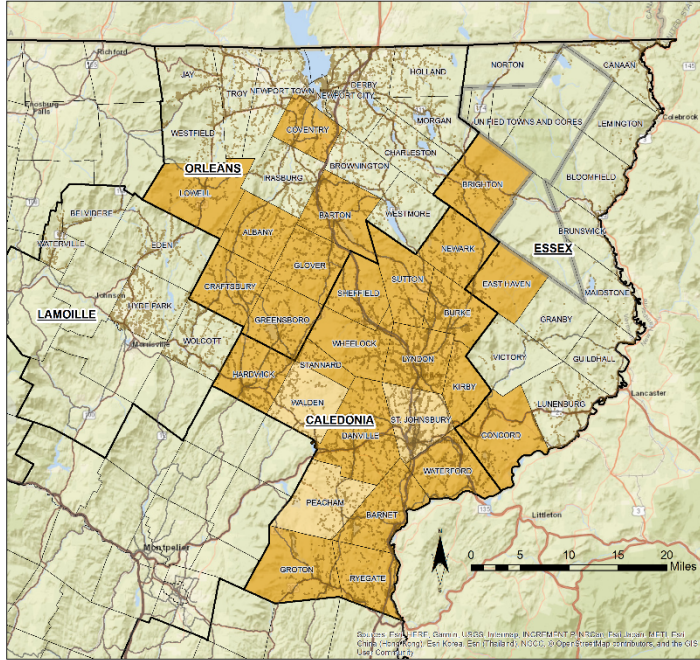
The Lamoille Towns present a similar case as expansion towns. As a group, their size as a stand-alone CUD is less than ideal. Eden may be an important town if Lowell is part of the initial CUD. Lowell is geographically isolated from the rest of the Initial CUD group and Eden stands between Craftsbury and Lowell. Town of Craftsbury fiber extends near the Craftsbury border with Eden.<sup>41</sup> However, it is also possible that these towns may best be served by a larger CUD in Franklin or Lamoille. However, Tilson has no specific information about the interest in these neighboring towns to the south or the west, given that the scope of this study does not extend beyond the Northeast Kingdom and these Lamoille County towns.

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<sup>41</sup> This is not the only possible route connecting Lowell to the Initial CUD group towns. However, successfully joining Lowell to the rest of its group will require a route through one of the neighboring towns not voting on a CUD in March 2020.

Figure 9: NEK CUD initial towns

**Northeast Kingdom CUD Pre-Feasibility Study**



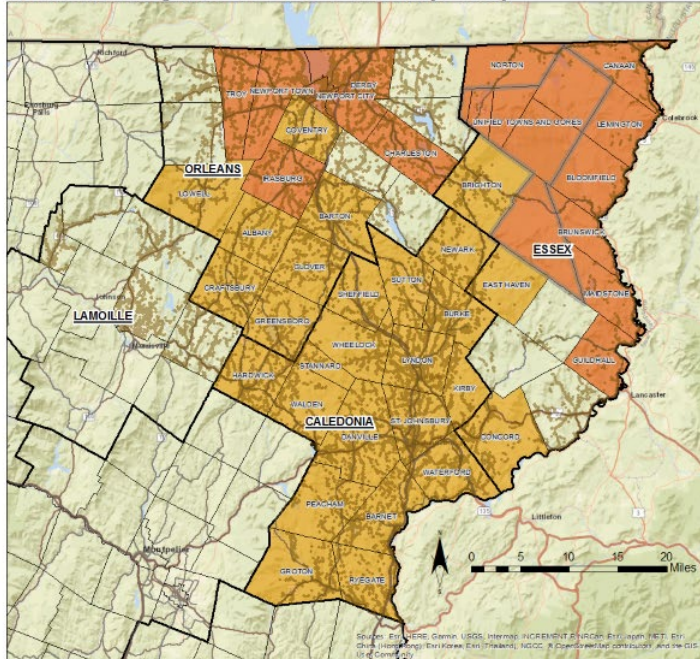
**Legend**

- Serviceable Address Points
- NEK CUD Initial Towns**
  - Warned for 2020 Town Meeting
  - Pending with Selectboard as of 12/16/2019



Figure 10: NEK Fiber Expansion Towns addition

**Northeast Kingdom CUD Pre-Feasibility Study**

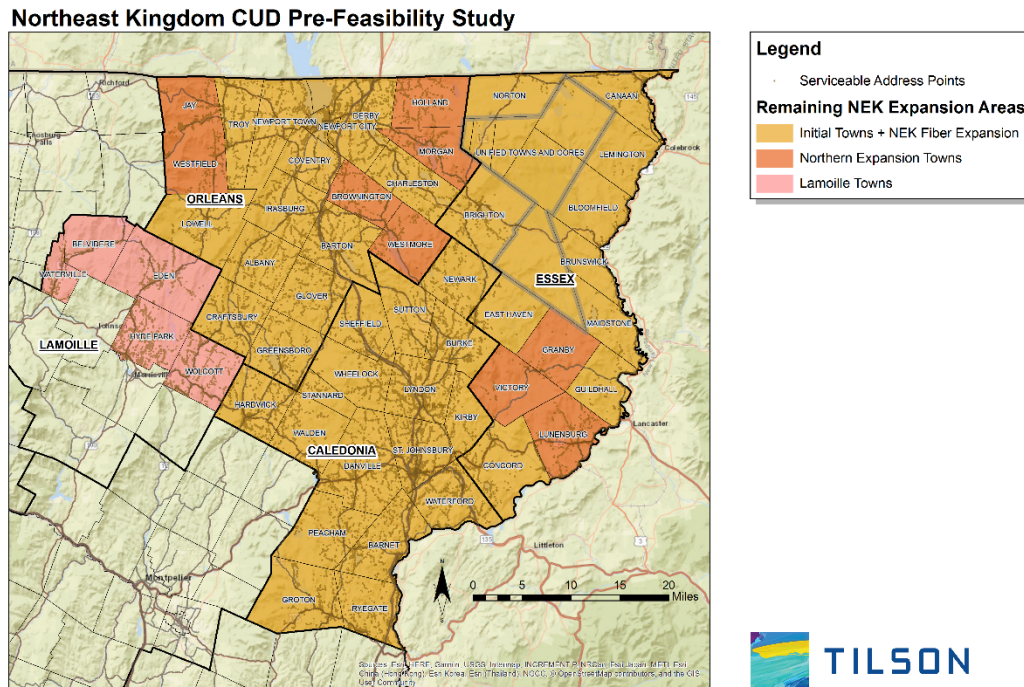


**Legend**

- Serviceable Address Points
- NEK Fiber Expansion**
  - Initial Towns
  - NEK Fiber Expansion



Figure 11: Initial CUD towns with NEK Fiber Expansion towns, Northern Expansion towns and Lamoille towns added.



### 9.3. Addressing Potential Concerns about a Larger CUD

Although a single, larger CUD has enough advantages to recommend it as the preferred alternative, there are concerns about a roadmap to a region-wide CUD. These concerns can be mitigated if recognized and addressed.

#### 9.3.1. Governance

While a single CUD with up to fifty-five member towns and a governing board of up to fifty-five people<sup>42</sup> presents an important governance issue, it is one that could be mitigated with thought and planning. A CUD need not vest all decision-making in a large board. The CUD legislation anticipated this and allows the governing board to establish more agile, smaller committees, including but not limited to an executive committee, and delegate to those committees powers it deems necessary.<sup>43</sup> As the organization matures, day-to-day decisions would be made by professional staff and contractors under the general direction of a board.

Additional towns can be admitted to the district after the initial formation. A smaller initial set of member towns would allow the CUD to make early decisions, when the role of the board will be most prominent, with a smaller set of members. If all towns in the Initial CUD group were to vote to join the CUD in March 2020, this would be only 27 member towns, a number of towns comparable to the number in EC Fiber, Vermont’s first CUD. This will also allow the Board the opportunity to establish a governance framework that can gracefully accommodate a larger membership.

<sup>42</sup> This count assumes all towns joined (not all may), and that the Unified Towns and Gores of Essex County are represented as a single municipality.

<sup>43</sup> (30 V.S.A. § 3071): <https://legislature.vermont.gov/statutes/section/30/082/03071>

It will be important for a CUD to seat on their governing board and committees people with expertise in various disciplines such as finance and technology. In a rural region such as the Northeast Kingdom it will be easier to find such key expertise for one volunteer board than it will for multiple volunteer boards. The service of this regional expertise on a single regional CUD would be in the public interest.

### 9.3.2. Towns “Left Behind”

Towns with existing fiber assets in place, towns with high premises per road mile density and towns with a high level of residents ready to pre-subscribe for service may feel that being associated with towns lacking these characteristics will slow the process of network funding and deployment. But as networks get built eventually fiber will be deployed close to towns that once had no pre-existing fiber, as networks get turned-up towns that once had residents less ready to pre-subscribe to service may have more motivated potential subscribers. Also, certain funding opportunities described above are aimed at the least populous and worst served areas within the NEK, and region-wide those funding opportunities may be available only for the towns (or parts thereof) with the least attractive network deployment characteristics, and those district members may end up carrying more than their weight if their available grant or subsidy funding can be leveraged.

Conversely, towns may fear being left out of early efforts if a large CUD were to focus initially on a subset of the larger towns. Although it is true initial opportunities may not present themselves uniformly across a large CUD, this is more than outweighed by the organizational capacity that a larger CUD could offer. An established organization with critical mass and a track record will have a much better likelihood of capitalizing on the available opportunities. It likely will be easier for such an organization to extend networks into new towns than for those towns to independently organize a smaller CUD and organize a new network from scratch. Furthermore, it is not a given that a CUD must choose between “go big” and “go fast.” Indeed, a larger, deeper organization may have funding opportunities that allow it to do both, while a collection of smaller CUDs would find more difficult to access successfully.

Furthermore, the NEK has a head start on knitting together the whole region because of the Northeast Kingdom Fiber Network. Using, completing, and extending this asset will open up opportunities to extend broadband across the region, making it less likely that a town or collection of towns will need to wait to see benefits from a CUD.

### 9.3.3. Local Stand-Alone Projects

Within the proposed CUD there is at least one existing last-mile public-private partnership, the one between the Town of Craftsbury and Kingdom Fiber. It would be logical for a CUD containing Craftsbury to take over that town’s fiber and its relationship with Kingdom Fiber. It would also be logical to consider Kingdom Fiber as an ISP partner for a larger CUD network. However, it should not and need not be the case that including Craftsbury with other towns in a single CUD automatically requires the CUD to use Kingdom Fiber as a partner in all parts or even any part of the CUD. The CUD should and would have an opportunity to consider the merits of various partners, including but not limited to Kingdom Fiber.

This could also be the case if, hypothetically, other opportunities came up to build other projects in parts of a single CUD not yet connected to each other. Nothing in the Vermont Communications Union District statute would prevent a single CUD to contain multiple networks, built in phases, funded independently or not, sharing resources and facilities or not. The CUD could act in the interest of several independent network initiatives within the district, or a single ubiquitous network. Having a single CUD would make it possible to weigh these options if they presented themselves on a case-by-case basis. This is not to say there are no economies of scale to operating a single vs. multiple networks. But even if it became necessary or desirable to have multiple networks in a single CUD, the technical expertise that a CUD would gain by managing a single network would likely better position it to manage additional networks.

## 10. Conclusion

Determining the optimal Communications Union District composition in the Northeast Kingdom must of course take into consideration the primary goal, establishing 100Mbps symmetrical last mile broadband service throughout the region. The challenges facing the region in this effort include rural demographics and geography; fiber last mile networks are costly to build due to number of homes per road-mile, and difficult terrain for fixed wireless systems propagation. These same challenges can also represent opportunity, as grant and subsidy funding is targeted specifically to regions lacking sufficient broadband service due to the high cost of deployment.

In the Lyndon, Vermont Broadband Feasibility Report it states, “If grant funding is a viable pursuit, Lyndon and the surrounding communities will need to quickly find a provider partner that would be willing to serve as the lead applicant. Federal grants usually do not allow a consortium or partnership to qualify as an applicant. The lead applicant should be the ISP provider.”<sup>44</sup> While this is true for the FCC reverse auctions for Universal Service Fund subsidies, where the auction participant and recipient of the subsidy must be a provider, grant funding from state and federal entities will generally allow a CUD to be the applicant. However, the Report is correct in emphasizing the municipality, or a CUD, should quickly work towards forming a public private partnership and try to leverage the FCC Universal Service Fund subsidies available at reverse auction, and other activities suitable for such a PPP relationship. The challenge in finding a single, appropriate private partner should not be underestimated. The partner will need to meet certain minimum financial qualifications, willing to be a regulated carrier subject to various state and federal compliance requirements, and able to obtain a sizeable letter of credit. A single CUD will best represent the interests and goals of the region in facilitating public private partnerships and pursuing other funding opportunities.

Also worth considering in the formation of a single regional CUD is Vermont Act 79, passed in August 2019 with \$700,000 in total grant funding earmarked for, among other things, communications union districts to prepare feasibility studies and business plans, with up to \$60,000 available per grant. The Vermont Public Service Department, which administers this as the Broadband Innovation Grant Program, may value the strategy of a single CUD maximizing efficiencies and economies of scale by representing the entire Northeast Kingdom region, and they may not have the budget to allocate sufficient funding for planning and feasibility studies to numerous CUDs within the same concentrated region. At the least they may look at a single application for grant funding more favorably than several applications with overlapping interests. Given this is a state grant opportunity open to CUDs preparing feasibility studies and business plans, it is possibly the first grant application the CUD will pursue.

The CUD’s primary function will be to implement a sustainable business model and financial model to provide robust, future proof broadband service throughout the region. This will no doubt involve leveraging as much grant and subsidy funding as possible. While the governance structure of a single CUD may seem large and unwieldy, with the ability to create purpose-built committees and an executive committee, governance of the CUD itself should be manageable. A single regional entity acting on behalf of one or more network efforts, whether for grant applications, the formation of public private partnerships or contracting with vendors, may prove most efficient.

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<sup>44</sup> Lyndon, Vermont Broadband Feasibility Report

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