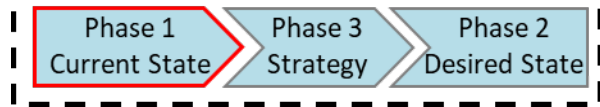


## 7 Northern Alberta Development Council (NADC)

### 7.1 Current State

#### 7.1.1 Introduction

The Current State is the first phase of the three strategy development phases outlined to the right (for communities interested in executing broadband strategies, a fourth phase, business case development, will be undertaken).



The current state establishes the present situation ('what is') – an inventory, as it relates to broadband – current service providers; assets that could potentially be leveraged to support enhancing broadband infrastructure; and current and planned civil infrastructure and works that can significantly reduce the cost of laying fibre conduit. Essentially, the starting point and premise of the *Northern Alberta Broadband Preparedness Project* is to build on what's already or soon to be in place.

Specifically, the current state data collection and analysis focuses on the following:

- Determining the population size and number of dwellings (and growth/decline rates) of each community and business counts by REDA and municipality. Estimating the percentages of aerial and buried utility (power) infrastructure by community. Identifying relevant economic, industrial, political, and social developments. Communities include all types of municipalities (urban, rural, and specialized) as well as First Nations and Métis Settlements.
- Identifying the current state of community plans and strategies – i.e., is broadband included in current municipal, First Nations, and Métis Settlements plans; what factors impact each community's capability to pursue broadband/fibre initiatives; what role could broadband play in addressing individual community's challenges; and where would each community like to be with respect to broadband in the near- and long-term? Where possible, local issues, barriers, and constraints relevant to potentially deploying fibre infrastructure are documented, and the level of broadband policy and planning support established by the entities are identified.
- Developing a clear picture of the broadband service providers and the service options that are available to communities on a community-by-community basis. Service providers can be classified as Wireless Internet Service Providers (WISPs)/fixed wireless, mobility/cellular, wireline ISPs and serve residential, business, and wholesale customers. Services can be provided using radio frequency, optical fibre, copper twisted pair, and coaxial cable.
- Creating an inventory of local and regional assets – community- or privately-owned. Communications towers, fibre networks, and utilities transmission/distribution lines can potentially be leveraged to support enhanced broadband and extend broadband infrastructure deeper into a community.
- Identifying planned public and private sector major projects within northern Alberta as well as planned community/local capital projects and civil works, which can provide an opportunity to incorporate fibre conduit during construction to save network deployment costs.

#### 7.1.2 Methodology

Developing the current state comprised data collection, mapping, and analysis on a community-by-community basis. Figure 37 shows the information and data being sought from each of the communities. The information and data was attained using primary and secondary research methods.

Various community statistics are needed for broadband business case inputs. Statistics Canada (StatsCan) population and dwelling data from the Census 2011 and 2016 (updated data when 2016 Census was issued in February 2017) was used to calculate five-year growth rates and compounded annual growth rates (CAGRs). The underlying data for the business counts was also from StatsCan. Since buried fibre deployments are significantly more expensive than aerial builds, it was necessary to assess how the

community’s utilities (e.g., power) are currently delivered. For this task, community Land Use maps were used to identify residential, commercial, and industrial areas. As well Google Maps and Earth was used – looking at street detail for the presence of poles and condition of road surfaces (gravel vs. paved). Various methods were used to count dwellings. Site visits were made to five communities in the Alberta HUB region (Bruderheim, Lamont, Chipman, Hilliard, Mundare), where residential and commercial areas were observed, houses and multi-unit dwellings counted, and tall structures noted.

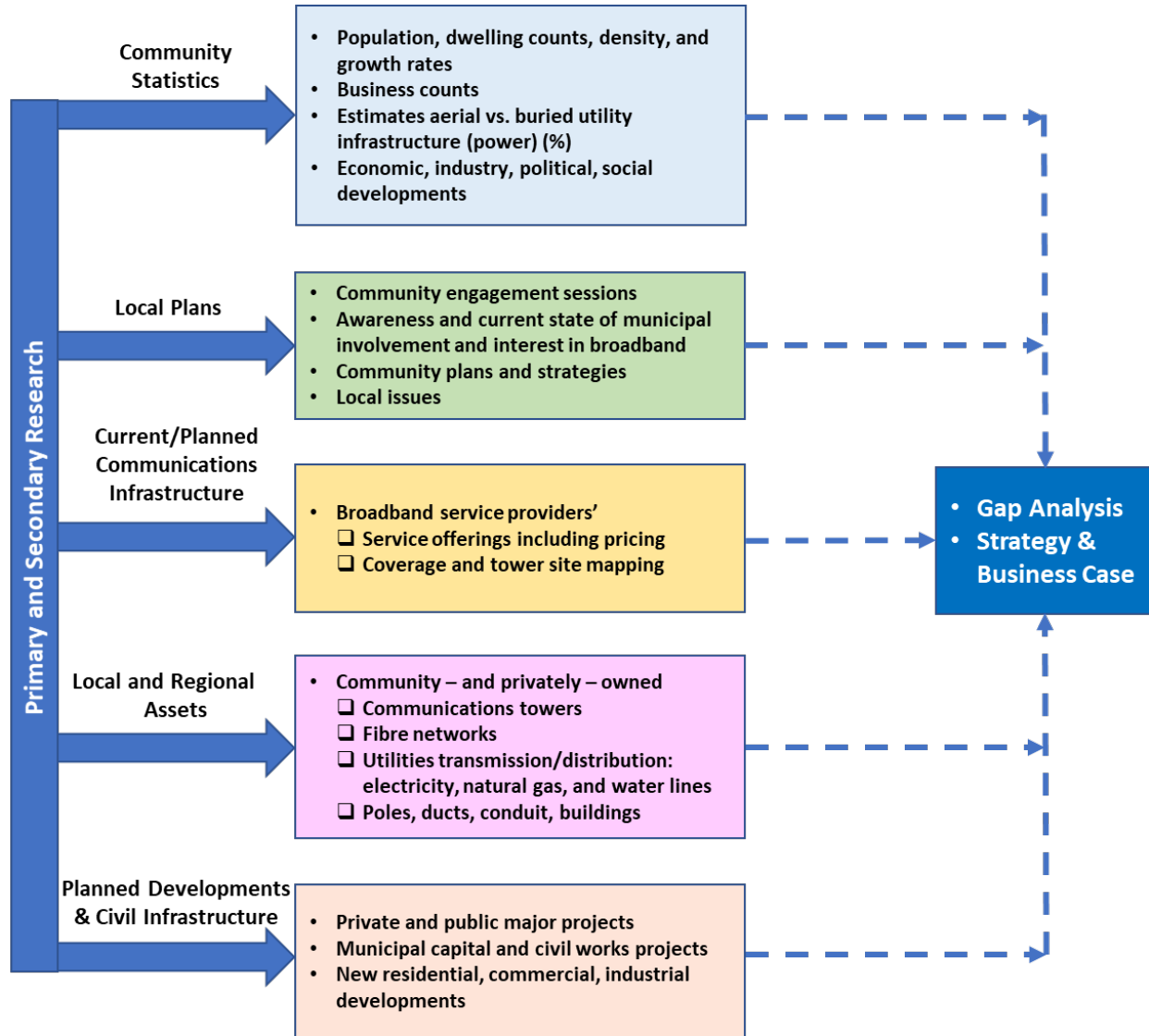


Figure 37 – Developing the current state.

To discover ‘local plans’, the project team interacted directly with the communities through community engagement sessions; information and data requests; and telephone conversations (with communities, utility companies, ISPs and other community stakeholders). Extensive follow-up telephone calls were made by the report’s author, the NADC, and the REDAs. The NADC created a video and Information bulletins to support the project. Alberta HUB and GROWTH Alberta conducted surveys with businesses located in their respective areas. The information attained was supplemented by document, website, and social media searches. Local and regional assets, both community- and privately-owned were inventoried and detailed insight about planned developments and civil infrastructure projects was attained.

Community contacts included Chief Administrative Officers and their staff as well as First Nation and Métis Settlement administrators and managers. Other groups or entities contacted during the study included ISPs, First Nations Technical Services Advisory Group (TSAG); electric and water utilities (e.g., Aquatera Utilities, NEW Water, Smoky River Regional Water Management Commission, ATCO Electric and Fortis Alberta).

Local ISPs were identified on a community-by-community basis and through conversations and website searches, their current and planned communications infrastructure, service offerings, and coverage were documented and tower sites mapped.

## 7.2 Regional Profile

Since the geographic footprints of the northern Alberta study area and the Northern Alberta Development Council (NADC) region are very similar, it follows that the community compositions are also very similar. The NADC region, shown in Figure 38, covers approximately 60% of the Alberta's total landmass, which is slightly less than the study area covers.<sup>81</sup> There are 24 municipal districts and counties, 2 cities, 23 towns, 9 villages, 11 summer villages, 137 hamlets, 33 First Nations and 8 Métis settlements with a total of 377,000 people in the NADC area. Approximately 41% are urban dwellers while 59% live in rural communities. Of the 59%, approximately 8% live on First Nations reserves or Métis Settlements. In addition to the permanent population there are mobile workers (known as shadow population), estimated to be about 43,000 in the Regional Municipality of Wood Buffalo. Please visit the NADC's website for more information <http://www.nadc.ca/>.

The NADC region is home to approximately 17,198 businesses (with employees).<sup>82</sup> Approximately 56% of these businesses are engaged in one of five industry sectors: construction; other services (except public administration); professional, scientific, and technical services; transportation and warehousing; and retail trade. The 'other services' sector comprises establishments that have not been classified in any of the other 19 North American Industry Classification System (NAICS) industry sectors. For example, businesses that repair and maintain motor vehicles and other machinery or provide personal care services fall into this category. About 60% of businesses in the region are defined as micro businesses with less than five employees.<sup>83</sup>

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<sup>81</sup> NADC; *NADC Area Profile: An Economic Description of the Region*; 2016-05.

<sup>82</sup> Calculations based on data provided by Michael Parkatti, Senior Director. Economic Information & Analytics, Alberta Economic Development and Trade; *Request - Alberta Businesses Counts by Industry*; Message to Doris Regula; 2017-02-13.

<sup>83</sup> NADC; *NADC Area Profile: An Economic Description of the Region*; 2016-05.

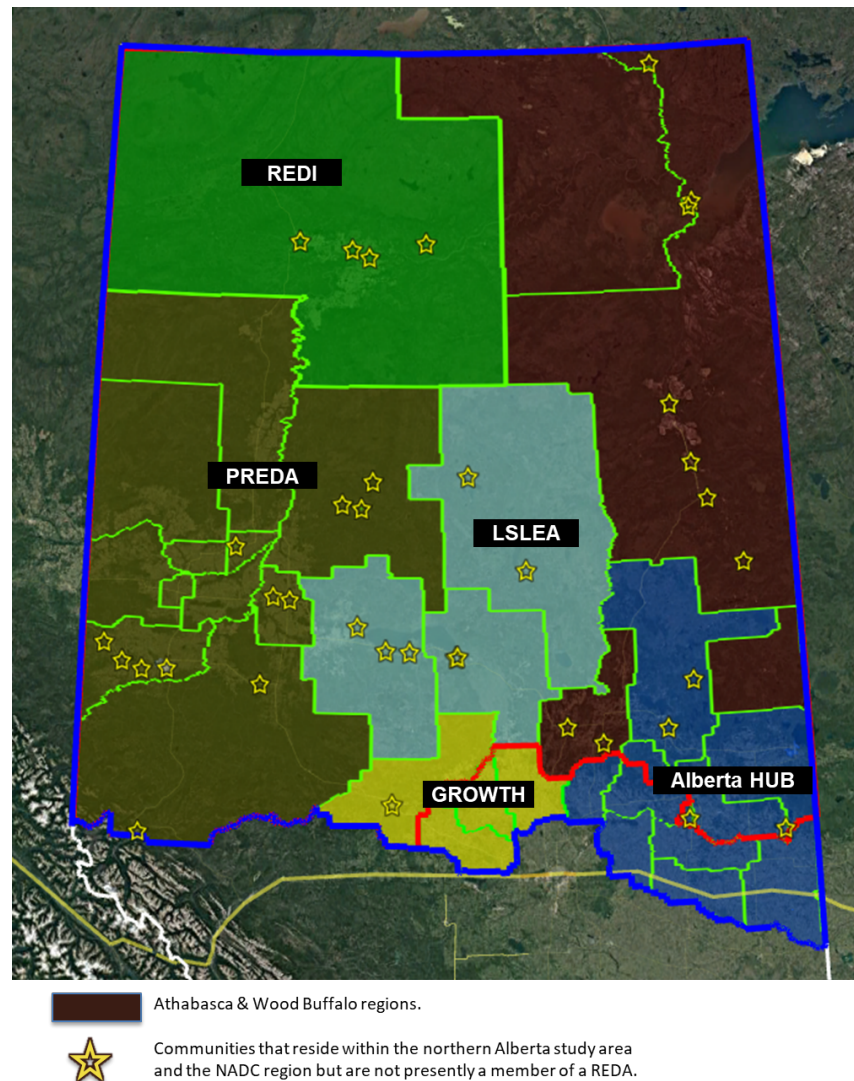


Figure 38 – Northern Alberta Development Council region.

## 7.3 Current Service Providers, Services, and Infrastructure

### 7.3.1 Fixed Wireless-based

Current Internet Service Providers using fixed wireless technology in the NADC region include the following. Appendix 16.4.1 provides the details of their service offerings (Internet only – no bundling unless otherwise stated) and geographic coverage. The coverage maps of the individual service providers are those that were available on their websites at the time of the writing of this report.

- AB North,
- Arrow Technology Group,
- Boreal Wireless,
- CCL Networks,
- Clearwave Broadband Networks (Clearwave),
- Corridor Communications (CCI) (fixed wireless and wired Digital Subscriber Line (DSL)-based),
- Crossover Networks,
- DeneTech (Cold Lake First Nations),
- First Broadband,

- GPNetworks (fixed wireless) and GPOptiX (fibre),
- I Want Wireless,
- Infinity Internet Solutions,
- Infinity Internet Solutions Alberta,
- Lakeshore Internet Services,
- Little Red River First Nations,
- MCSNet,
- Mighty Peace Wireless,
- NexxCom Technologies,
- Peace River Internet Service Society (PRiS),
- Slave Lake Communications,
- Sniper Communications,
- Whitecourt Communications,
- Wispernet.ca,
- XplorNet (fixed wireless and satellite-based), and
- Xtremewave Services.

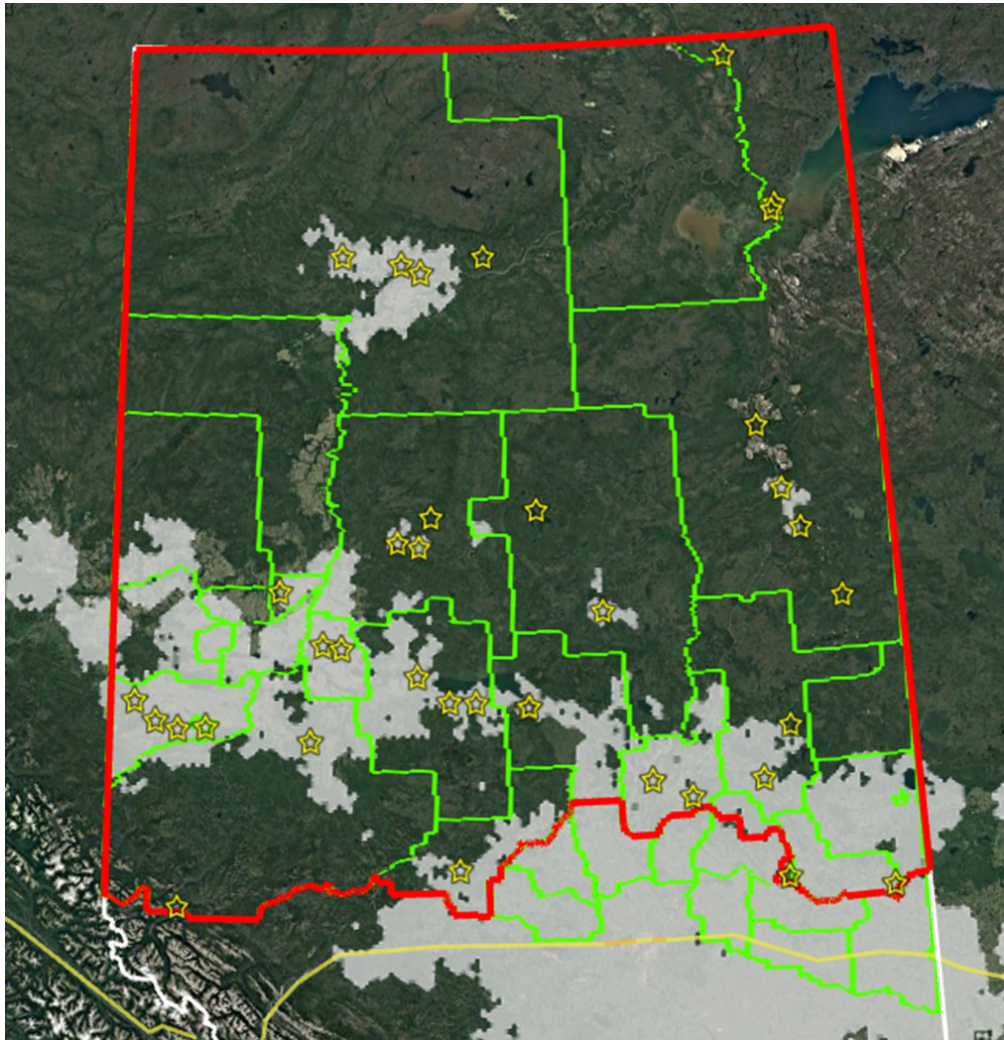
Through its DSL partnership with TELUS, CCI offers wired service in the villages of Glendon, Mannville, Marwayne, and Nampa. Clearwave is planning a province-wide expansion. XplorNet Communications' (XplorNet's) new satellites will allow them to offer download speeds of 25 Mb/s across their customer base by July 2017. GPNetworks' sister company, GPOptiX, has begun rolling out an fibre-to-the-premise (FTTP) network in the City of Grande Prairie and surrounding area.

The PRiS, a not-for-profit organization, was formed in 1994 to '*bridge the wireless divide*' that then existed in the Dawson Creek, British Columbia area. PRiS has placed wireless Internet equipment on three towers in the Saddle Hills Utility Communications Network (UTN) and plans to co-locate on the remaining six towers in the future. In June 2016, PRiS received funding from the Canadian Internet Registration Authority (CIRA) to equip three towers in Saddle Hills County.

A combined view of the fixed wireless coverage is shown in Figure 39 (light gray areas). The map is based on minimal 5 Mb/s down (toward the end-client) by 1 Mb/s up (from the end-client to the network).<sup>84</sup> Coverage is generally available in the southeastern portion of the NADC and the Wood Buffalo region as well as in the Grande Prairie and Peace River areas. There is no fixed wireless service in the Grande Cache area and coverage is very limited along Highway 40 – the highway that runs north of Grande Cache to Grande Prairie and south of Grande Cache to Highway 16.

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<sup>84</sup> <http://crtc.gc.ca/eng/internet/internetcanada.htm>



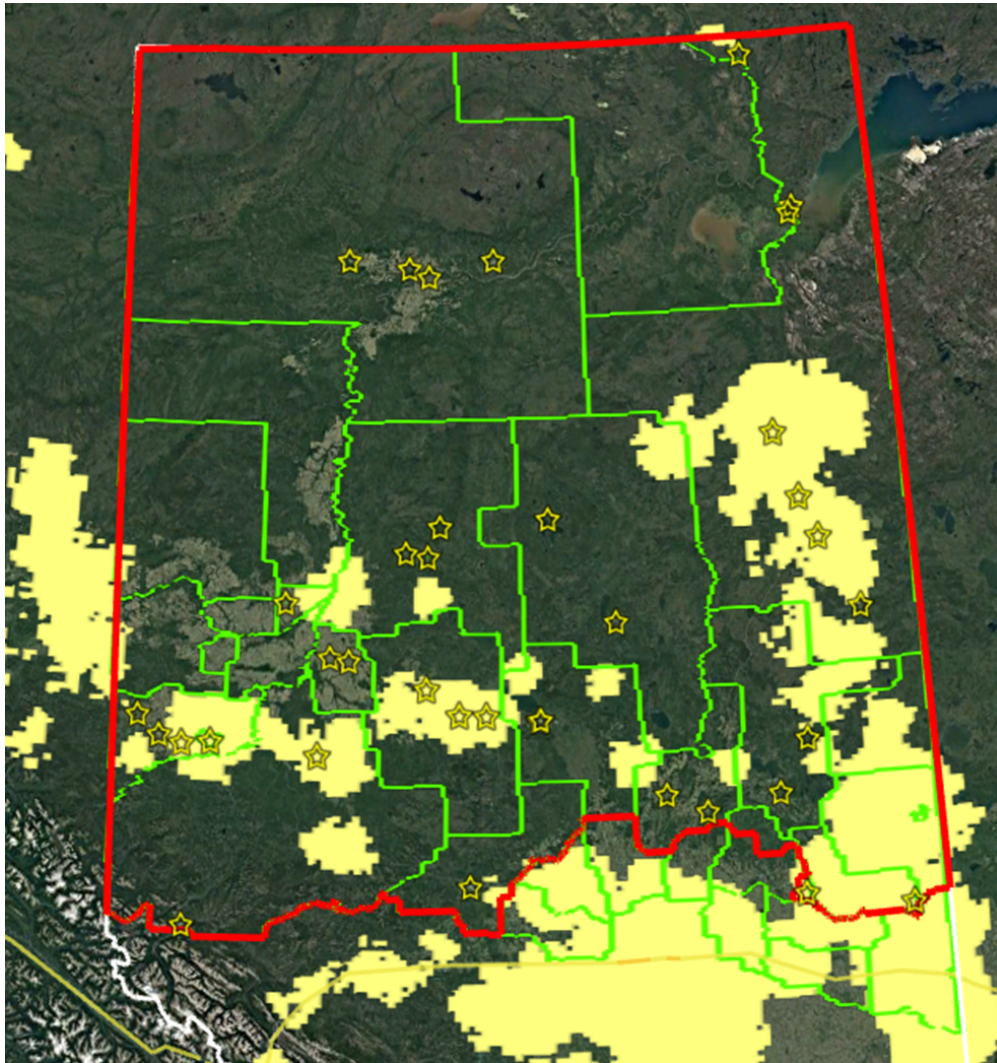
Source: <http://www.crtc.gc.ca/eng/internet/internetcanada.htm>

The gold stars represent communities that reside within the northern Alberta study area and the NADC region but are not presently a member of a REDA.

Figure 39 – NADC region fixed wireless coverage.

### 7.3.2 Mobility

Shown as yellow areas in Figure 40, mobility data services are available from TELUS/Bell and Rogers. Appendix 16.4.2 provides the coverage maps for each of the providers of mobility services. As discussed earlier Bell, TELUS, and Rogers are now using cellular towers and SmartHubs to provide at-home Internet services. Grande Cache and the most northern communities are without mobility data services.



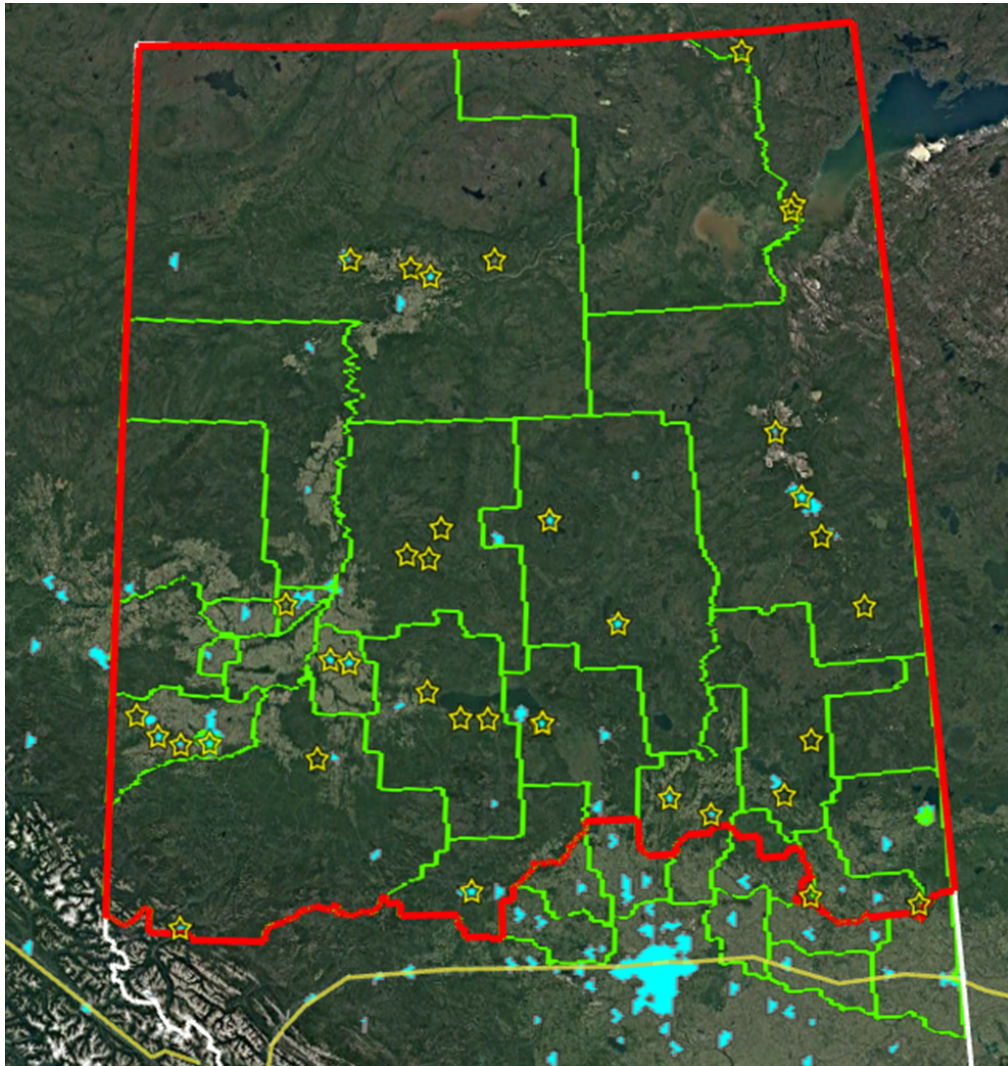
Source: <http://www.crtc.gc.ca/eng/internet/internetcanada.htm>

The gold stars represent communities that reside within the northern Alberta study area and the NADC region but are not presently a member of a REDA.

Figure 40 – NADC region mobility data services coverage.

### 7.3.3 Wireline-based – DSL

Digital Subscriber Line (DSL) refers to a group of last mile technologies that are used by wireline-based service providers such as TELUS in Alberta to provide broadband services over twisted-pair copper wiring. The local copper wire loop is a remnant from the days when (and how) the telephone company connected residential and business premises to the telephone company's network for the purposes of providing local and long distance telephone services (and dial-up Internet services). Since DSL's performance degrades with distance, the technology is only deployed in urban areas where access distances are less than about two miles. As shown in Figure 41, communities served by DSL technologies (shown in blue) are scattered throughout the NADC region.



Source: <http://www.crtc.gc.ca/eng/internet/internetcanada.htm>

The gold stars represent communities that reside within the northern Alberta study area and the NADC region but are not presently a member of a REDA.

Figure 41 – NADC Region DSL coverage.

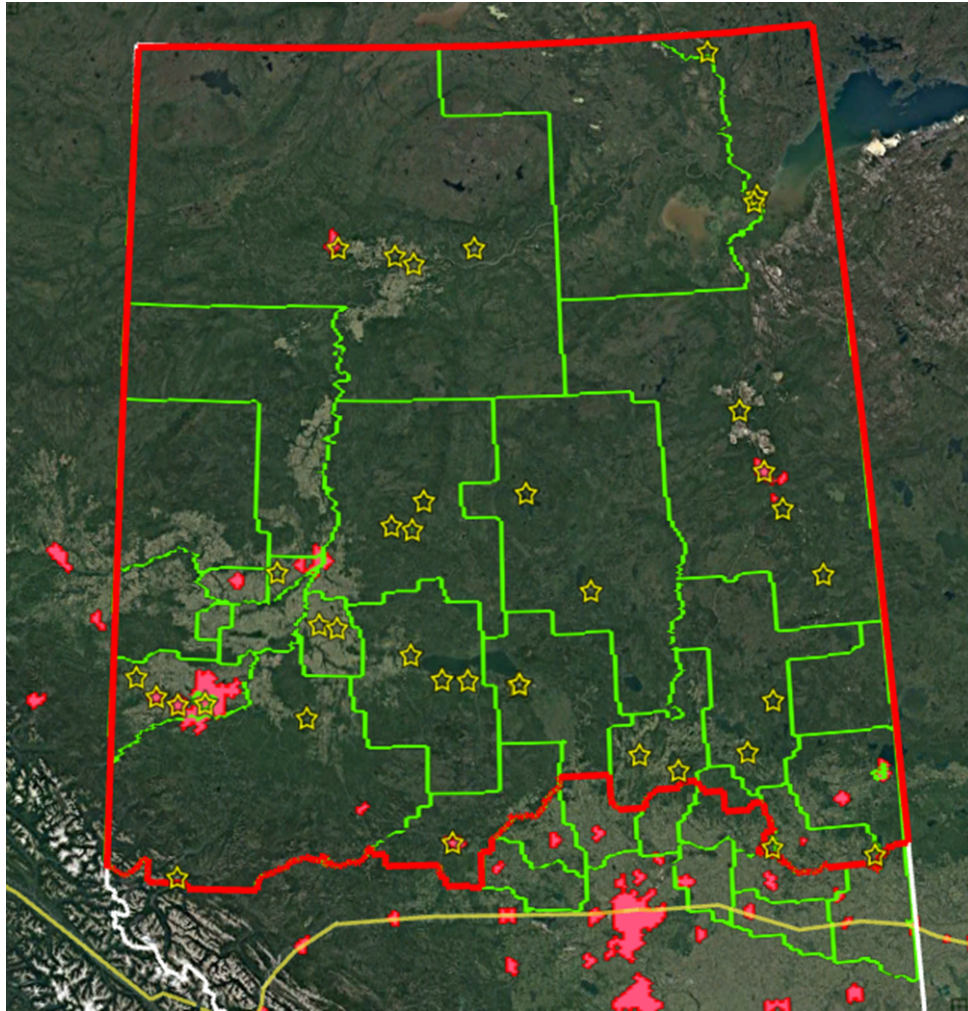
### 7.3.4 Wireline-based – Coaxial Cable

Eastlink, NorthwTel Inc. (NorthwTel), and Shaw Communications (Shaw), originally television broadcast companies, use coaxial cable and modern cable modem technology to provide broadband services in the NADC region (red areas in Figure 42). The predominate coverage area within the NADC region is the Grande Prairie area. The cable companies currently use the Data Over Cable Service Interface Specification (DOCSIS) 3.0 standard to achieve broadband speeds of 100 Mb/s or more over coaxial cable. Shaw expects to complete its DOCSIS 3.1 upgrade by the end of August 2017.<sup>85</sup> According to the Cybera, *State of Alberta Infrastructure Report*, “The next-generation DOCSIS 3.1 standard is expected to

<sup>85</sup> Shaw Announces Third Quarter and Year-to-Date Result; Shaw Communications; 28 June 2017. 8.



revolutionize hybrid fibre-coaxial cable connections by providing up to 10 Gb/s download and 1 Gb/s upload network throughput and significant improvements in latency.”<sup>86</sup>



Source: <http://www.crtc.gc.ca/eng/internet/internetcanada.htm>

The gold stars represent communities that reside within the northern Alberta study area and the NADC region but are not presently a member of a REDA.

Figure 42 – NADC region coaxial cable coverage.

Maximum advertised wireline offerings are shown in Appendix 16.3. Since these are ‘up to’ bit rates, during high usage periods, actual bit rates will be less – Eastlink and Shaw more so than TELUS due to the way the aggregation is implemented. In both cases, the offerings are highly asymmetric – upload and download bit rates differ significantly.

### 7.3.5 Internet Service Provider Wi-Fi

Bell, Shaw, and TELUS WiFi services are available in the NADC region.

<sup>86</sup> State of Alberta Digital Infrastructure Report; Cybera; 2016-09-13.

### 7.3.6 Axia Fibre

Axia NetMedia provides retail services to corporate clients and, through AxiaConnect (Axia), provides retail Internet services in smaller communities (e.g., Town of Fairview – fall 2017). In exchange for access to a community's rights-of-way, Axia will invest in FTTP if a community can demonstrate that at least 30% of its residences and businesses have an interest in purchasing Internet services from Axia once the 'closed-access' network is built.

## 7.4 Backhaul Availability

### 7.4.1 Alberta SuperNet

The extent of the SuperNet within the NADC region is shown in Figure 43. The green lines represent the Bell-operated Base Area Network (BAN) portion while the blue lines represent the Axia-operated Extended Area Network (EAN) segments. A more general discussion about the SuperNet is presented in Appendix 16.5.

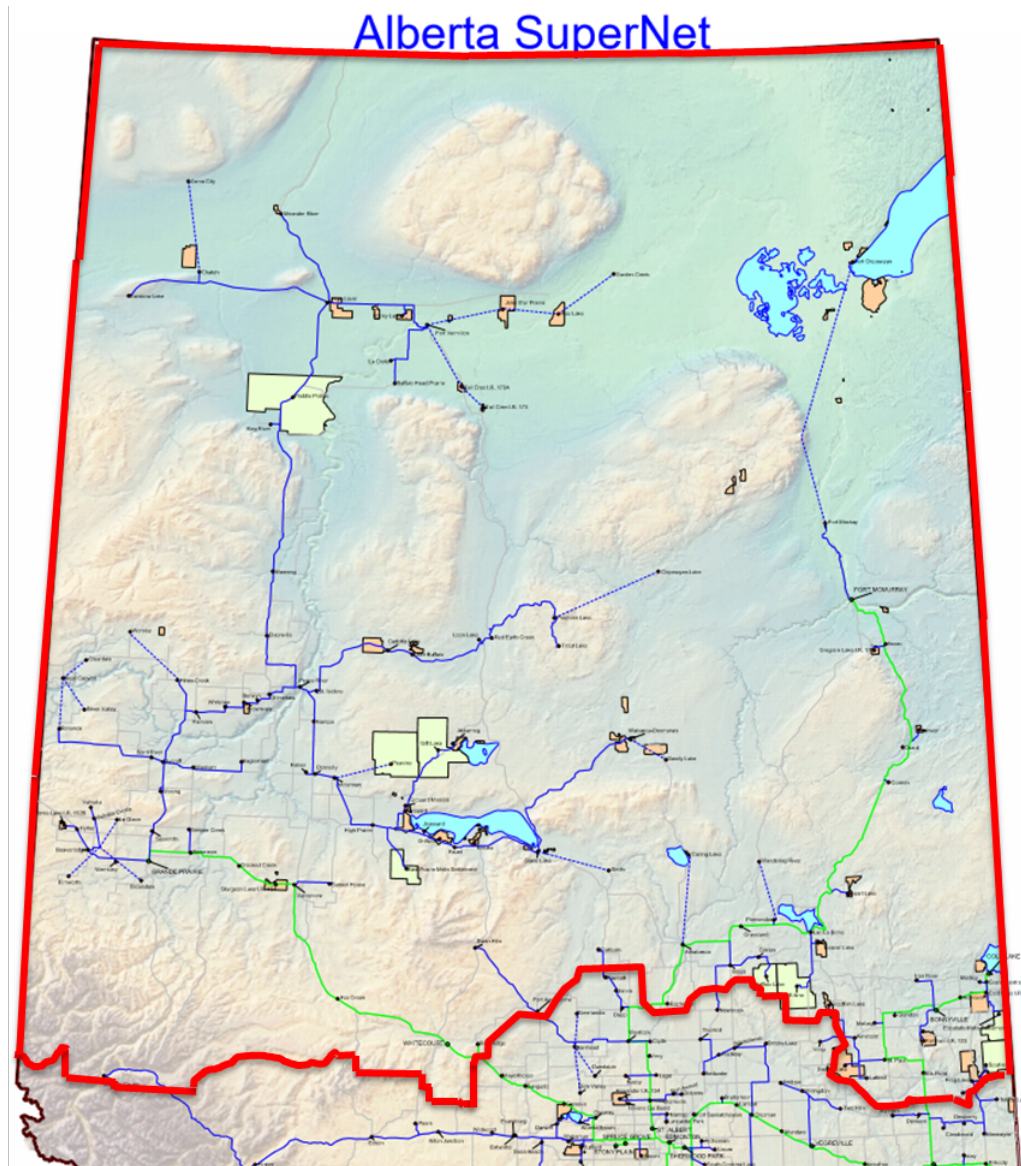


Figure 43 – NADC region SuperNet infrastructure.

## 7.4.2 Shaw Wholesale

Given the uncertainty associated with the next iteration of the SuperNet contract by June 30, 2018, municipalities, First Nations, and Métis Settlements requiring access to fibre transport for backhaul to Edmonton may want to consider Shaw, Bell, or TELUS.

## 7.5 Desired State

The Desired State, Phase 2 as outlined in the diagram to the right, establishes each communities' broadband vision, specifically within the next decade with each community breaking down their progress (within 3-, 5-, and 10-years) to realizing their vision.



Specifically, the desired state data collection and analysis focuses on the following:

- The most significant issues and challenges facing each community over the next five years and whether broadband can play a role in addressing these issues and challenges.
- Whether broadband is on each community Council's agenda.
- The factors that directly impact each community's capability to pursue a broadband/fibre initiative.
- Communities' short- and long-term broadband visions.
- Identifying communities, cluster of communities, or regions wishing to move forward with their broadband plans in the near-term (within three years).

The desired state informs the gap analysis and provides direction to the strategic options phase of the project, Phase 3. There are several options to close the gap between a community's current state and desired state. Although not exhaustive, the following is a list of options:

- Incorporating fibre network requirements during local and regional planning.
- Seek additional investment from the incumbent services providers in the urban centres.
- Support WISPs in rural areas.
- Subsidize private providers.
- Establish a community or regional broadband network (various models of ownership, governance, operation, and service provision, including laying fibre as basic infrastructure but leases the network to a private party to provide the electronics, marketing, and retail services).

The views expressed by those that participated in the community sessions and contributed during the research phase may not be inclusive of the entire community; however, this report is based on the knowledge gained and the information received as well as the author's ability to synthesize and summarise the same at the time of writing.

### 7.5.1 Methodology

Developing the desired state comprised data collection and analysis on a community-by- community basis. The information and data was attained using primary and secondary research methods.

To discover the *'future broadband visions and aspirations'* from the perspectives of the communities, the project team interacted directly with the communities through community engagement sessions, information and data requests, and telephone conversations. The information and data was evaluated and analysed to identify those communities, community partnerships, or regions that were most likely to develop and begin executing a broadband strategy in the near-term.

Community contacts included Chief Administrative Officers and their staff (information technology, planning and development, and economic development officers); elected officials; and First Nation and Métis Settlement administrators and managers.

The research for this phase of the project was conducted between January 2017 and May 2017. The reader is advised that the information and data found in this report is a 'snapshot' in time. In other words, a variety of changes may have occurred since its collection (e.g., communities may have changed or evolved their broadband aspirations and visions, changes may have occurred in key staff who contributed to this report).

For the purposes of this phase of the project, broadband is defined a wide bandwidth data transmission with an ability to simultaneously transport multiple signals and traffic types. The medium can be twisted-pair copper wiring, optical fibre, coaxial cable, or radio. Broadband service is characterized as offering symmetric bandwidth between 50 Mb/s and 1 gigabit (Gb/s)/1,000 Mb/s and higher (really unlimited bit rates) (symmetric meaning the upload bit rate is as fast as the download bit rate).

### **7.5.2 Key Observations and Conclusions**

This project has promoted conversations, questions, and general thinking about community broadband networks and their roles in urban and rural communities' futures. Broadband is recognized as a topic for today's conversations and discussions. Communities are asking questions such as the following:

- Do residents and businesses in my community want or need enhanced broadband?
- What will the network cost? Who will pay for it and who will own it?
- Will the network build be done in collaboration with the incumbents/ISPs?
- What happens to current ISPs?
- Will a current memorandum of understanding (MOU) with an incumbent provider or similar agreement with a prospective provider restrict a community's options in the future?
- How will the changes coming to the Alberta SuperNet operations contract affect us?
- Why isn't the provincial government providing incentives for communities to work together?
- How do you predict where technology is going to take us in the future?

### **7.5.3 Segmentation**

During this project, it became increasingly evident that northern Alberta communities' interest in community-based broadband network concepts and models can be segmented based on population size. Larger urban centres (with populations greater than 5,000) comprise the first segment, largely 'selected' already by the larger incumbent wireline-based ISPs. These communities generally do not see the benefits of a community-fibre initiative for themselves and prefer to leave the evolution of enhanced broadband services to the local incumbents.

Urban centres, with populations between approximately 1,000 and 5,000 people, represent the second segment. This segment is typically looking for solutions and expresses interest in working on regional solutions. The thought of doing their own community network build is too challenging and they have the perception that it would be too expensive. Furthermore, they do not believe they have the funding power, skills, or capacity needed for a community fibre initiative. AxiaConnect offers a compelling solution - seen as presenting a solution that requires the least cost and community involvement (learning, skills, capacity) in the short-term – often the longer-term implications (e.g., monopoly control of critical civic infrastructure) have not necessarily been envisioned at the time of the community's decision.

The third segment, and the segment with the most to gain from a community-led broadband effort, are towns and villages with populations less than approximately 1,000 people, counties, municipal districts (MDs), First Nations, and Métis Settlements. Today, they receive the poorest quality Internet services (if they receive service at all) and pay the most for these services. Their options are limited. Larger incumbent service providers do not have the financial incentive to serve this segment because its potential subscriber base is too small and too spreadout geographically (i.e., low population density). The concerns of this

segment are attaining coverage for all residents and businesses; improved bandwidth/capacity; and securing access to affordable and reliable service.

### 7.5.4 Issues and Challenges

Typical issues and challenges identified by municipalities include the following:

- From an economic development perspective – the ability to attract and retain residents, businesses, and industry.
- From rural communities' perspective – the lack of access to reliable high-speed Internet restricts business opportunities and, in turn, negatively impacts the community's overall quality of life.
- Internet bandwidth and speeds and lack of connectivity to high-speed infrastructure (fibre) as well as limited availability and interest of broadband service providers.
- Retention of young people and entrepreneurs.
- Other critical infrastructure such as water, wastewater, and roads are aging and in need of repair, upgrading, or replacement.
- Maintaining current taxation levels.
- Addressing the requirements of the modernized *Municipal Government Act*.
- Financial.
- Learners having sufficient bandwidth to do homework at home and the ability to access distant learning.
- Social (high unemployment rate and the ability to access employment opportunities online, youth leaving, and addiction).
- Loss of industry leads to the loss of the community's assessment/tax base, which is needed to fund critical infrastructure projects. As infrastructure declines, residents move away and the subsequent population decline translates into reduced core municipal grant funding (e.g., Municipal Sustainability Initiative (MSI)). If this vicious circle, as depicted in Figure 44, gains momentum it can spell the decline of a community.

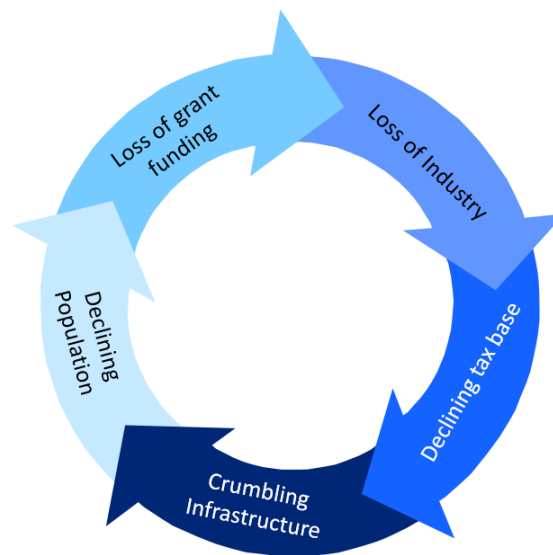


Figure 44 – Lack of high-speed broadband connectivity causes many issues.

In addition to several of the above challenges, some people living on First Nations reserves and Métis Settlements have the following challenges:

- Access to critical infrastructure and essential services such as roads, safe drinking water, and wastewater and waste disposal.

- Access to economic and business opportunities.
- Housing and living conditions.
- Financial stability.
- Bridging the socio-economic gap – lower labour market participation and employment rates.
- Lack of First Nations' capacity (i.e., people and skill sets).
- Access to educational opportunities and digital literacy (youth). *"It's a well understood cycle. A good education leads to greater financial stability, which leads to increased opportunities for the next generation."*<sup>87</sup>
- Maintenance and subject expertise and knowledge.

There is a need and the demand for improved and enhanced broadband services in northern Alberta communities; however, the key factor holding the majority of communities back from pursuing community-based broadband infrastructure is cost.

Community composition in the Northern Alberta Development Council (NADC) region is very similar to that of the northern Alberta study area. Only some communities in GROWTH Alberta and Alberta HUB fall outside of the boundaries of the NADC.

### 7.5.5 List of Communities with Near-term Broadband Plans Within the NADC

The following is a list of communities with near-term broadband plans within the NADC. The communities are either REDA members or fall geographically within a REDA. Full details about each individual community's plans can be found in the REDA-specific sections in this report.

- County of St. Paul, the Town of Elk Point, the Elizabeth Métis Settlement and Saddle Lake First Nation - Northeast Alberta Information HUB Ltd. (Alberta HUB);
- Town of Swan Hills - Grizzly Regional Economic Alliance Society (GROWTH Alberta);
- Big Lakes County, the towns of High Prairie and Slave Lake, the MD of Lesser Slave River, and the Gift Lake Métis Settlement; the Northern Alberta Broadband Society; and the Southshore Area First Nations and Lakeshore Internet Services - Lesser Slave Lake Economic Alliance (LSLEA);
- County of Grande Prairie, the Town of Valleyview, G5 Municipalities, Saddle Hills County, and the MD of Smoky River - Peace Region Economic Development Alliance (PREDA); and
- Town of High Level and the First Nations communities of Dene Tha', Beaver First, Little Red River Cree, and Tall Cree - Regional Economic Development Initiative for Northwest Alberta (REDI).

## 7.6 Athabasca and Wood Buffalo Regions

### 7.6.1 Introduction

As previously mentioned, most northern Alberta communities are both members of a REDA and the NADC. There are, however, exceptions – some are only members of one. For the purposes of this study, those communities that geographically fall within a REDA's boundaries but are not a member of the REDA are listed and grouped with the member communities of that REDA. This is done to facilitate the Phase 3 – Strategy portion of this project. The specific communities of this nature include the following:

- Beaver Lake, Frog Lake, Heart Lake, and Saddle Lake First Nations (within Alberta HUB's boundaries).
- Alberta Beach (not an NADC member), Whitecourt, and Alexis Nakota First Nation (within GROWTH Alberta's boundaries).
- Slave Lake, Big Lakes County, MD of Lesser Slave River and Bigstone Cree, Driftpile, Kapawe'no, Loon River, Peerless Trout, Sawridge, Swan River, and Woodland Cree First Nations (within LSLEA's boundaries).

<sup>87</sup> Kronyk, Rhonda; *Indigenous on Campus*; New Trails; Spring 2017.

- City of Grande Prairie, Beaverlodge, Grande Cache, Wembley, Donnelly, Girouxville, and Spirit River (within PREDA's boundaries).
- Beaver, Dene Tha', Little Red River, and Tallcree First Nations (within REDI's boundaries).

In each of the REDA-specific sections of this report, these communities are identified and discussed.

The municipal and First Nations communities in the Athabasca and Wood Buffalo regions also are not members of a REDA. They are covered in the discussion that follows.

## 7.6.2 Current State

### 7.6.2.1 Regional Profiles

The Athabasca and Wood Buffalo regions include 1 town, 1 village, 8 summer villages, the County of Athabasca, the Regional Municipality of Wood Buffalo (RMWB), and 6 First Nations as shown in Table 15. A map is shown in Figure 45.

The Wood Buffalo region also includes two improvement districts. Improvement District No. 24 (ID 24) is located along the Alberta-Northwest Territories border and encompasses the Alberta portion of Wood Buffalo National Park. It includes the unincorporated community of Peace Point 222, part of the Mikisew Cree First Nation. According to the Statistics Canada's 2016 Census of Population, ID 24's population is 648, and there are approximately 100 private dwellings within its boundaries. Improvement District 349 is located north of the City of Cold Lake and was created in 2012 by separating lands from the RMWB and Lac La Biche County. The Alberta portion of the Cold Lake Air Weapons Range is within its boundaries. The 2016 Census indicated that there are not any people living there, and there are not any private dwellings located there.

Of the communities that make up the Athabasca and Wood Buffalo regions, TELUS has made a generational fibre investment in the urban service area of the RMWB. The RMWB is comprised of an urban service area and rural communities. The RMWB urban service area's growth is correlated with the growth of the petroleum industry within the area. Its utility infrastructure is buried. In 2011, TELUS laid fibre optics in the urban service area, and is currently offering Internet speeds of 150 Mb/s download and upload. Shaw also offers 150 Mb/s download speeds. The urban service area has some municipality-owned fibre (underground) between some of the its buildings, which is for the urban service areas' purposes.

On May 1, 2016, an uncontrolled wildfire swept through parts of RMWB urban service area and some of the rural communities, forcing the largest wildfire evacuation in Alberta's history.

Table 15 – Athabasca and Wood Buffalo Regions

Towns	Villages	Summer Villages	Counties/Improvement Districts/RMs	First Nations
Athabasca	Boyle	Bondiss Island Lake Island Lake South Mewatha Beach South Baptiste Sunset Beach West Baptiste Whispering Hills	Athabasca Improvement District No. 24 Improvement District No. 349 Wood Buffalo	Athabasca Chipewyan Chipewyan Prairie Fort McKay Fort McMurray Mikisew Cree Smith's Landing

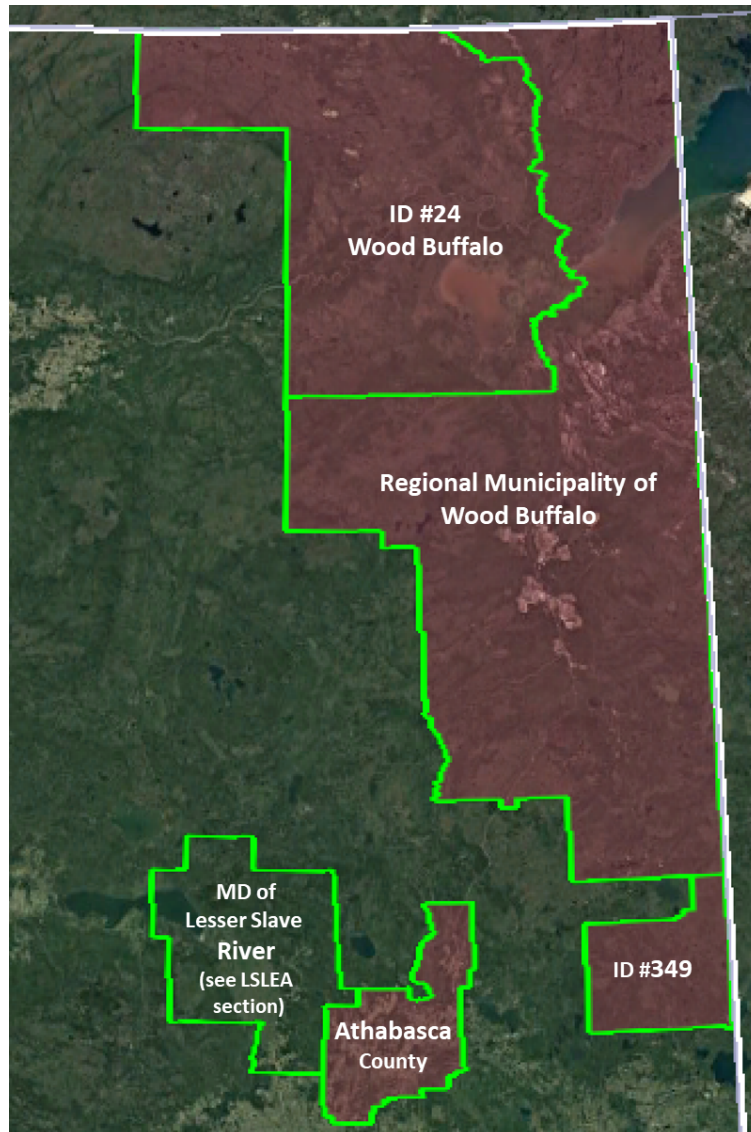


Figure 45 – Athabasca and Wood Buffalo regions.

The Athabasca and Wood Buffalo regions are home to almost 92,000 residents.<sup>88</sup> Table 16 provides a breakdown by municipality (rural and urban) and First Nation as well as five-year population growth trends and compound annual growth rates (CAGRs). Statistics Canada's 2016 Census of Population data indicate significant growth among all First Nations communities over the five-year period.

There are 2,811 businesses (with employees) in the two areas that comprise the Athabasca and Wood Buffalo regions. As shown in Table 17 and Figure 46, 28% of the businesses in the region participate in the top two industries – construction and other services.<sup>89</sup> Industries were classified according to the NAICS.

<sup>88</sup> Calculations based on Statistics Canada's 2016 Census of Population.

<sup>89</sup> Other Services is comprised of businesses primarily engaged in repairing and maintenance on motor vehicles, machinery, and other products; providing personal care, funeral, and laundry services; organizing and promoting religious activities; and supporting causes such as grant making and advocacy.



The 'Other Industries' segment (12.9%) shown in the Figure 46 chart includes industries that individually contribute between 3.2% and 0.2% to the category.<sup>90</sup>

Table 16 – Athabasca and Wood Buffalo Regions Population &amp; Population Growth Trends

Municipality	Rural				Urban				First Nations (FN)					
	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend		City/Town/Village	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend		Reserve / Settlement	Population (2016)	CAGR (%) (2011-2016)	5-Year Trend	
			(%) &	Direction				(%) &	Direction				(%) &	Direction
Athabasca, County	7,869	0.5	2.7	▲	Athabasca	2,965	-0.2	-0.8	▼					
					Boyle	845	-1.6	-7.8	▼					
					SV <sup>1</sup> (8)	904	-0.6	-3.1	▼					
					<b>Sub-total</b>	<b>4,714</b>								
Wood Buffalo, RM (includes Urban Service Area = 74,000)	77,600 (shadow population removed)	na	na							Athabasca Chipewyan	na	na	na	
										Chipewyan Prairie	414	7.0	40.3	▲
										Ft McKay	742	5.7	32.0	▲
										Ft McMurray	321	3.2	17.2	▲
										Mikisew Cree	226	3.0	15.9	▲
										Smith's Landing	48	9.9	60.0	▲
<b>Total</b>	<b>85,469</b>					<b>4,714</b>				<b>Total - FN</b>	<b>1,751</b>			

CAGR – Compound Annual Growth Rate

Note 1: SV - Summer Village: Bondiss, Island Lake, Island Lake South, Mewatha Beach, South Baptiste, Sunset Point, West Baptiste, Whispering Hills

Total Population = **91,934**

Source: Statistics Canada Census 2011 and 2016.

Table 17 – Athabasca and Wood Buffalo Regions Number of Businesses (with employees) by Industry

Industry	Businesses	Percent (%)
Construction	456	16.2
Other services (except public administration)	339	12.1
Retail trade	332	11.8
Professional, scientific and technical services	279	9.9
Transportation and warehousing	230	8.2
Real estate and rental and leasing	197	7.0
Accommodation and food services	191	6.8
Healthcare and social assistance	157	5.6
Administrative and support, waste management and remediation	145	5.2
Wholesale Trade	123	4.4

Source: Calculations based on dataset provided by Alberta Economic Development & Trade, Economic Information & Analytics, Feb. 13, 2017.

<sup>90</sup> Mining, quarrying, and oil and gas extraction; agriculture, forestry, fishing, and hunting; manufacturing; finance and insurance; arts, entertainment and recreation; educational services; information and cultural industries; management of companies and enterprises; public administration; and utilities.

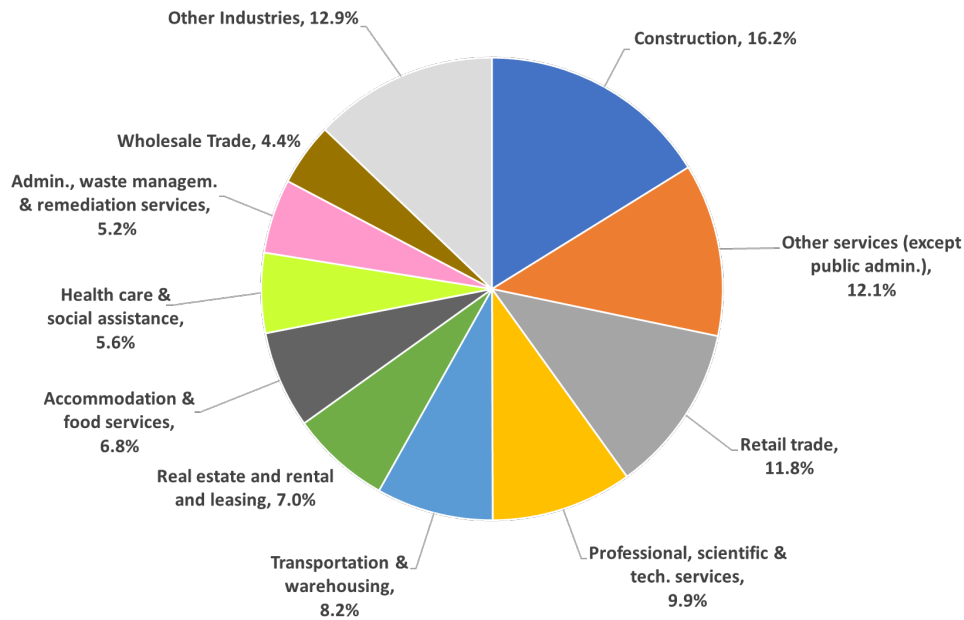


Figure 46 – Athabasca and Wood Buffalo regions industry mix (based on business counts).

Athabasca University's main campus is in the Town of Athabasca. Keyano College has two campuses: one in urban service area of the RMWB and one in Fort Chipewyan as well as four learning centres (Fort McKay, Conklin, Janvier, and Gregoire Lake). Portage College has a learning location Boyle.

#### 7.6.2.2 Municipal, First Nations and Métis Settlement Broadband Interests

Communities within the Athabasca and Wood Buffalo regions are at different stages in recognizing the importance of broadband services and connectivity to economic diversification, municipal sustainability, regional competitiveness, public service delivery, and quality of life.<sup>91</sup> Table 18 identifies the awareness and current state of municipal involvement and interest in broadband.

The Town of Athabasca is working with Axia to lay fibre in select areas of their town. Challenging terrain (valleys) present issues for the fixed wireless-based provider, MCSNet. Further complicating these issues, MCSNet is experiencing over-capacity on their towers. Density is also an issue. Athabasca County is also not satisfied with their current level of service and are seeking alternatives to improve broadband services to their residents.

<sup>91</sup> The five elements of broadband's importance were identified by the Calgary Regional Partnership, Economic Prosperity Steering Committee, *Request for Decision*; 2016-09-08.

Table 18 – Athabasca and Wood Buffalo Regions Involvement & Interest in Broadband<sup>92</sup>

Community	Enthusiastic	Interested 'Maybe'	Need Help Too Small	Too Expensive	Status Quo	Don't Know <sup>93</sup>	No Response <sup>94</sup>
Towns							
Athabasca	X						
Villages							
Boyle							X
Counties/RMs							
Athabasca		X					
Wood Buffalo <sup>95</sup>	'The RMWB is actively involved and interested in broadband initiatives'						
First Nations							
Athabasca Chipewyan							X
Chipewyan Prairie							X
Fort McKay							X
Fort McMurray							X
Mikisew Cree							X
Smith's Landing							X

### 7.6.2.3 Current Service Providers, Services, and Infrastructure

#### Fixed Wireless-based and Mobility

Current ISPs using fixed wireless technology in the Athabasca and Wood Buffalo Regions include the following Appendix. 14.3 provides the details of their service offerings (Internet only – no bundling unless otherwise stated) and geographic coverage. The coverage maps of the individual service providers are those that were available on their websites at the time of the writing of this report.

- CCL Networks,
- MCSNet, and
- XplorNet (fixed wireless and satellite-based).

XplorNet's new satellites will allow them to offer download speeds of 25 Mb/s across their customer base by July 2017.

<sup>92</sup> Communities were asked to rate their involvement and interest in broadband. Broadband was defined as follows: In telecommunications, broadband is a wide bandwidth data transmission with an ability to simultaneously transport multiple signals and traffic types - the medium can be twisted-pair copper wiring, optical fibre, coaxial cable, or radio. Broadband service is characterized as offering symmetric bandwidth between 50 Mb/s and 1 gigabit (Gb/s)/1,000 Mb/s and higher (really unlimited bit rates) (symmetric meaning the upload bit rate is as fast as the download bit rate).

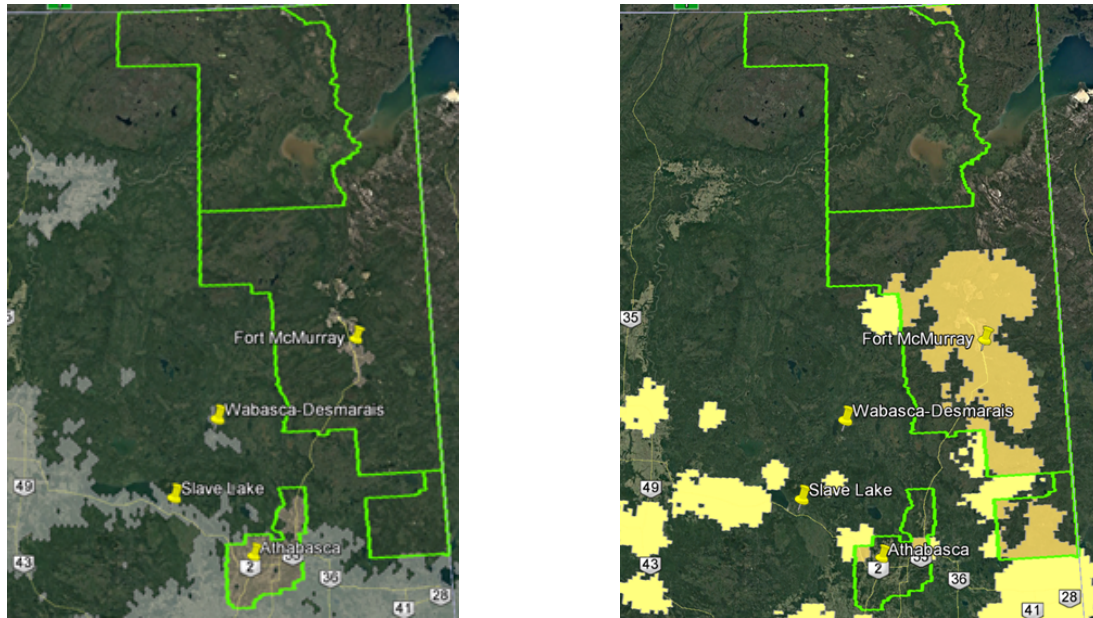
<sup>93</sup> Don't Know – the respondent was unable to rate their community's interest and involvement in broadband.

<sup>94</sup> No Response – the community did not respond to the inquiries regarding their community's interest and involvement in broadband.

<sup>95</sup> Regional Municipality of Wood Buffalo - email; 2017-06-13.

According to the CRTC website<sup>96</sup>, minimal 5 Mb/s down (toward the end-client) by 1 Mb/s up (from the end-client to the network) service is available in Athabasca and sparse in the RMWB. A combined view of the fixed wireless coverage is shown in Figure 47 (left side, light gray areas).

Shown as yellow areas on the right side in Figure 47, mobility data services are available from TELUS/Bell and Rogers. Appendix 16.4.2 provides the coverage maps for each of the providers of mobility services. As discussed earlier Bell, TELUS, and Rogers are now using cellular towers and SmartHubs to provide at-home Internet services.



Source: <http://www.crtc.gc.ca/eng/internet/internetcanada.htm>

Figure 47 – Athabasca and Wood Buffalo regions fixed wireless & mobility data services coverage.

### Wireline-based – DSL & Coaxial Cable

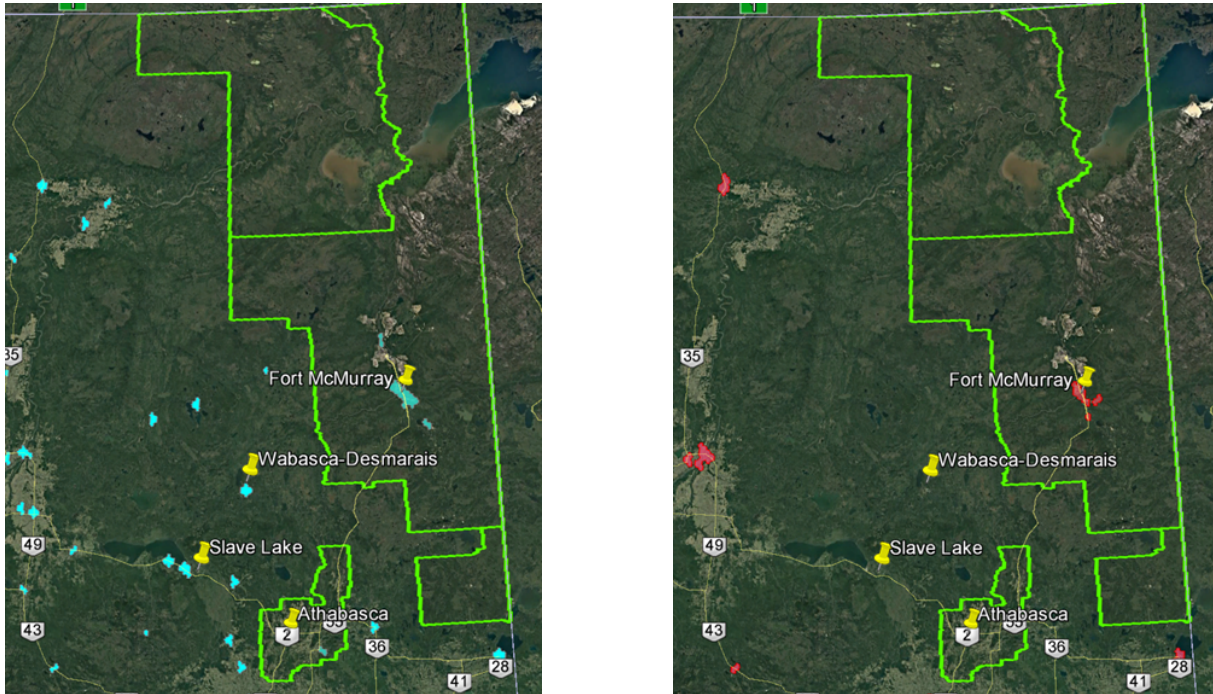
Digital Subscriber Line (DSL) refers to a group of last mile technologies that are used by wireline-based service providers such as TELUS in Alberta to provide broadband services over twisted-pair copper wiring. The local copper wire loop is a remnant from the days when (and how) the telephone company connected residential and business premises to the telephone company's network for the purposes of providing local and long distance telephone services (and dial-up Internet services). Since DSL's performance degrades with distance, the technology is only deployed in urban areas where access distances are less than about two miles. In Figure 48, areas served via DSL technologies are shown in blue.

Shaw, originally a television broadcast company, uses coaxial cable and modern cable modem technology to provide broadband services in the region (red areas in Figure 48). The cable companies currently use the DOCSIS 3.0 standard to achieve broadband speeds of 100 Mb/s or more over coaxial cable. Shaw expects to complete its DOCSIS 3.1 upgrade by the end of August 2017.<sup>97</sup> According to the Cybera, *State of Alberta Infrastructure Report*, "The next-generation DOCSIS 3.1 standard is expected to revolutionize

<sup>96</sup> <http://crtc.gc.ca/eng/internet/internetcanada.htm>

<sup>97</sup> *Shaw Announces Third Quarter and Year-to-Date Results*; Shaw Communications.

hybrid fibre-coaxial cable connections by providing up to 10 Gb/s download and 1 Gb/s upload network throughput and significant improvements in latency.”<sup>98</sup>



Source: <http://www.crtc.gc.ca/eng/internet/internetcanada.htm>

Figure 48 – Athabasca and Wood Buffalo regions DSL & coaxial cable coverage.

Maximum advertised wireline offerings are shown in Appendix 16.3. Since these are ‘up to’ bit rates, during high usage periods, actual bit rates will be less, Shaw more so than TELUS, due to the way the aggregation is implemented. In both cases, the offerings are highly asymmetric – upload and download bit rates differ significantly.

#### Internet Service Provider Wi-Fi

Wi-fi is available in the RMWB urban service area but not in the Town of Athabasca. TELUS offers WiFi at 32 locations in RMWB urban service area while Bell offers six locations. Shaw offers Go WiFi at multiple locations as shown in the coverage map below (Figure 49).

#### Axia Fibre

Axia NetMedia provides retail services to corporate clients and, through AxiaConnect (Axia), provides retail Internet services in smaller communities (e.g., Town of Fairview – fall 2017). In exchange for access to a community’s rights-of-way, Axia will invest in FTTP if a community can demonstrate that at least 30% of its residences and businesses have an interest in purchasing Internet services from Axia once the ‘closed-access’ network is built.

<sup>98</sup> State of Alberta Digital Infrastructure Report; Cybera; 2016-09-13.

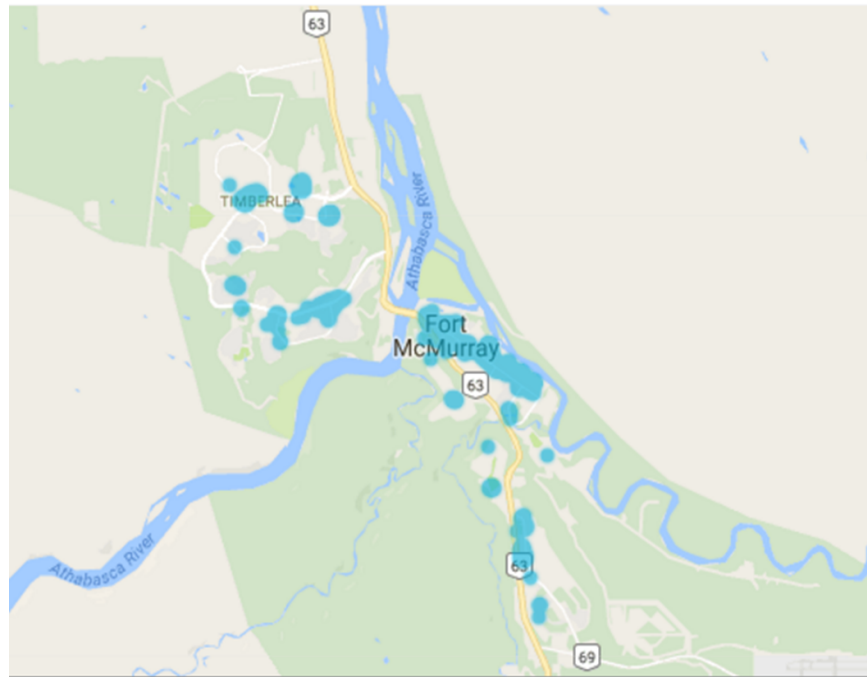


Figure 49 – Athabasca and Wood Buffalo regions Shaw Go WiFi coverage.

#### 7.6.2.4 Backhaul Availability

##### Alberta SuperNet

The extent of the SuperNet within the Athabasca and Wood Buffalo Regions is shown in Figure 50. The green lines represent the Bell-operated BAN portion while the blue lines represent the Axia-operated EAN segments. A more general discussion about the SuperNet is presented in Appendix 16.5.

##### Shaw Wholesale

Given the uncertainty associated with the next iteration of the SuperNet contract by June 30, 2018, municipalities, First Nations, and Métis Settlements requiring access to fibre transport for backhaul to Edmonton may want to consider Shaw, Bell, or TELUS. Shaw fibre in the region is limited to a run parallel to Highway 63 from Edmonton to the RMWB urban service area and on to several oilsands camps beyond. Capacity is limited and upgrades to enable Dense Wavelength Division Multiplexing (DWDM) to increase bandwidth would be expensive.

##### TELUS Wholesale

Except under a non-disclosure agreement, TELUS does not provide maps of fibre assets.

#### 7.6.2.5 Existing Infrastructure

##### Towers and Other Tall Structure

When planning a broadband build-out it is important to build on what is already in place. The key inquiry for the current state analysis is what assets does the community have that can be provided at little or no incremental cost that improve the economics of the broadband deployment and operations? Assets include existing towers, fibre and community networks, which the community might be using for communications or asset management. Existing and possible access to tall structures or buildings are also important to inventory for potential placement of wireless equipment.

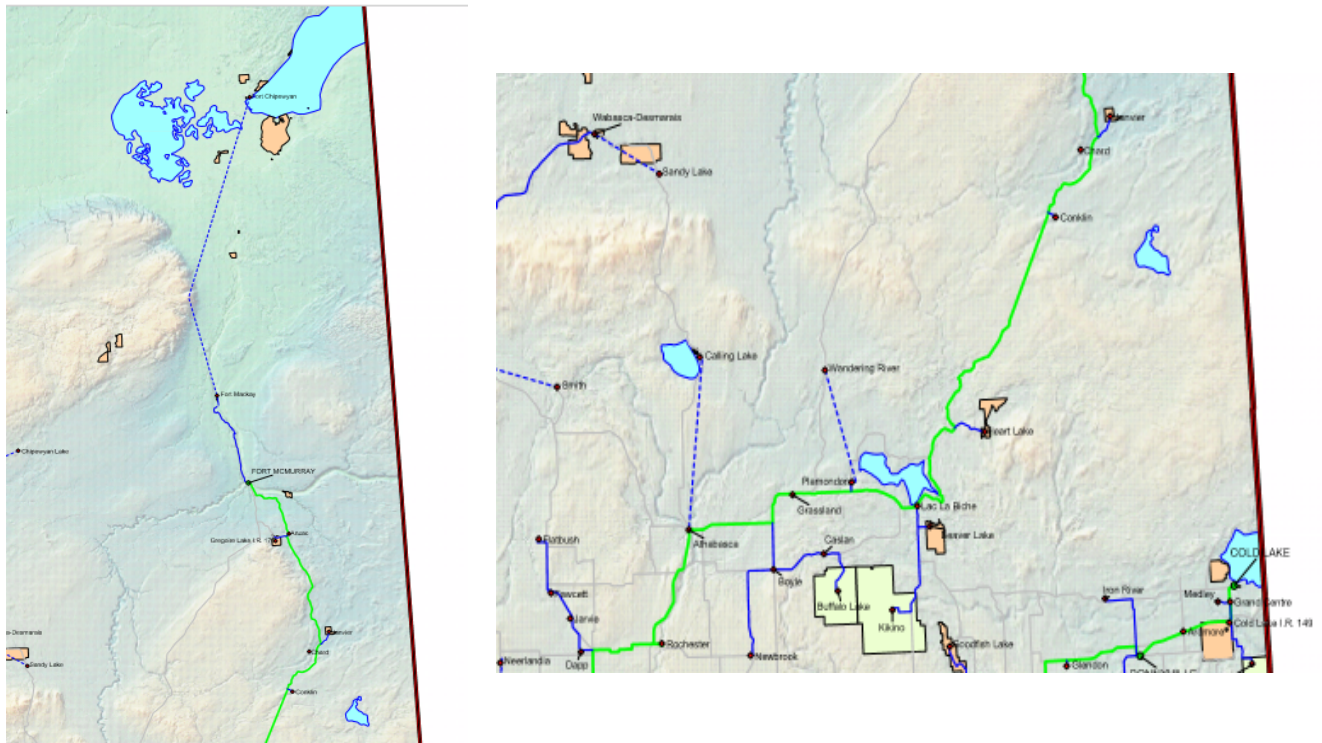


Figure 50 – Athabasca and Wood Buffalo regions SuperNet infrastructure.

Before 2006, Athabasca County partnered with Boyle and MCSNet to construct broadband infrastructure.<sup>99</sup> In the 2012 to 2013 timeframe, Athabasca County received grant funding from the *Final Mile Rural Community Program* for Internet infrastructure expenses such as towers, fibre optic cable, wireless equipment, installation costs, and radio license fees. Athabasca County has eight municipality-owned towers.

### Utility Infrastructure

The existing overhead and underground transmission and distribution lines of electric utility companies (ATCO Electric, Fortis Alberta) and natural gas co-operatives (co-ops) present deployment options for community broadband builds - access to and installing fibre cables to travel along utility poles, in ducts and conduit, and along rights-of-way can significantly improve the economics of broadband service expansion projects and network deployments. Inquiries about the availability of communications spaces on utility providers' poles and where multi-party trench agreements exist will be made during the preliminary infrastructure design phase of a broadband network. Appendix 16.6 shows ATCO Electric's and Fortis Alberta's respective service areas in northern Alberta.

### First Nations Fibre Infrastructure

First Nations Technical Services Advisory Group (TSAG) is a non-profit organization established by the Chiefs of Alberta to provide technical support and training to First Nations in the Treaty 6, 7, and 8 regions. In 2008, TSAG partnered with Health Canada to develop the network components (fibre connections) at First Nations health centres to support First Nations' telemedicine. With Health Canada funding and TSAG project management, community fibre networks connections were made to the Alberta SuperNet points-of-presence on each or close to each First Nations in 2011. Upon completion, each First Nations became

<sup>99</sup> Alberta SuperNet Final Mile Rural Task Force: Recommendation Report; 2008-03-14.

the owner of its local fibre network. As shown in Figure 51, First Nations' schools, health centres, band administration offices, and water treatment plants are now connected.

TSAG operates a state-of-the-art Network Operations Centre (NOC). The NOC's real time network monitoring ensures availability, network security/SPAM filtering, telehealth bridge management, and support, and applications (high-speed connectivity and remote water monitoring system for water treatment plants, OneHealth.ca, and FirstNationsTH.ca). Onehealth.ca is a national health portal that provides information and services to health care professionals working in First Nations communities. FirstNationsTH.ca – Telehealth provides education and travel-free patient and health care assessments via video-conferencing.

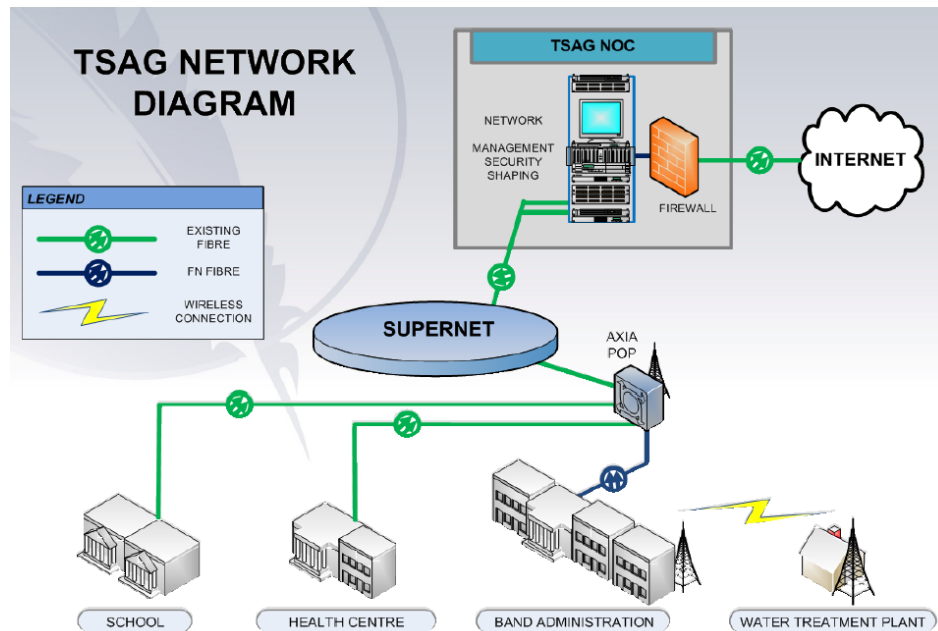


Figure 51 – TSAG network diagram.

### Gas Co-op

In the 1960s, non-profit gas co-ops were formed to supply natural gas to rural Alberta - franchise areas were designated. The Village of Boyle operates the only gas co-op in the area.

### 7.6.2.6 Planned Infrastructure

#### Major Projects

There are several private and public sector capital projects planned in the Athabasca and Wood Buffalo Regions. Where possible these projects may be leveraged to reduce the costs associated with the deployment of broadband infrastructure. Figures 52 and 53 show the capital projects in the Athabasca and Wood Buffalo Regions.<sup>100</sup> Besides the projects shown in these figures, other major projects in the region include those in the RMWB urban service area (Appendix 16.7).

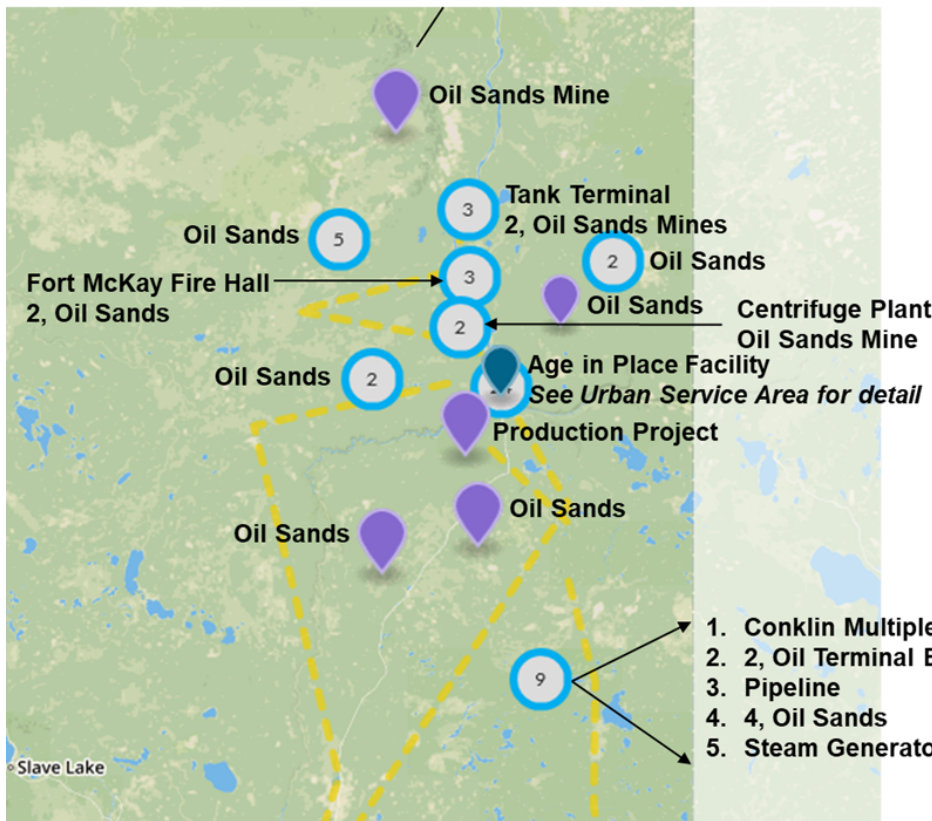
<sup>100</sup> Alberta Major Projects, Economic Development and Trade; 2016-12. <http://majorprojects.alberta.ca/>.



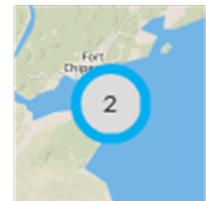


**Regional Infrastructure Projects over \$5 M.**

Figure 52 – Major projects – Athabasca.



**Regional Infrastructure Projects over \$5 M.**



**Fort Chipewyan:**  
Water Treatment Plant Expansion;  
Sports Facility

Figure 53 – Major projects – Regional Municipality of Wood Buffalo, excluding Urban Service area.

### Electricity Transmission Development Plans

Industrial load in the Athabasca and Wood Buffalo Regions (within the Alberta Electric System Operator's (AESO's) Northeast Planning region) comes from the large industrial operations in Fort McMurray.<sup>101</sup> As can be seen in Figure 54, local 138/144 kV networks also serve load across the planning region. In the Fort McMurray area, 144 kV networks connect load and behind-the-fence facilities.

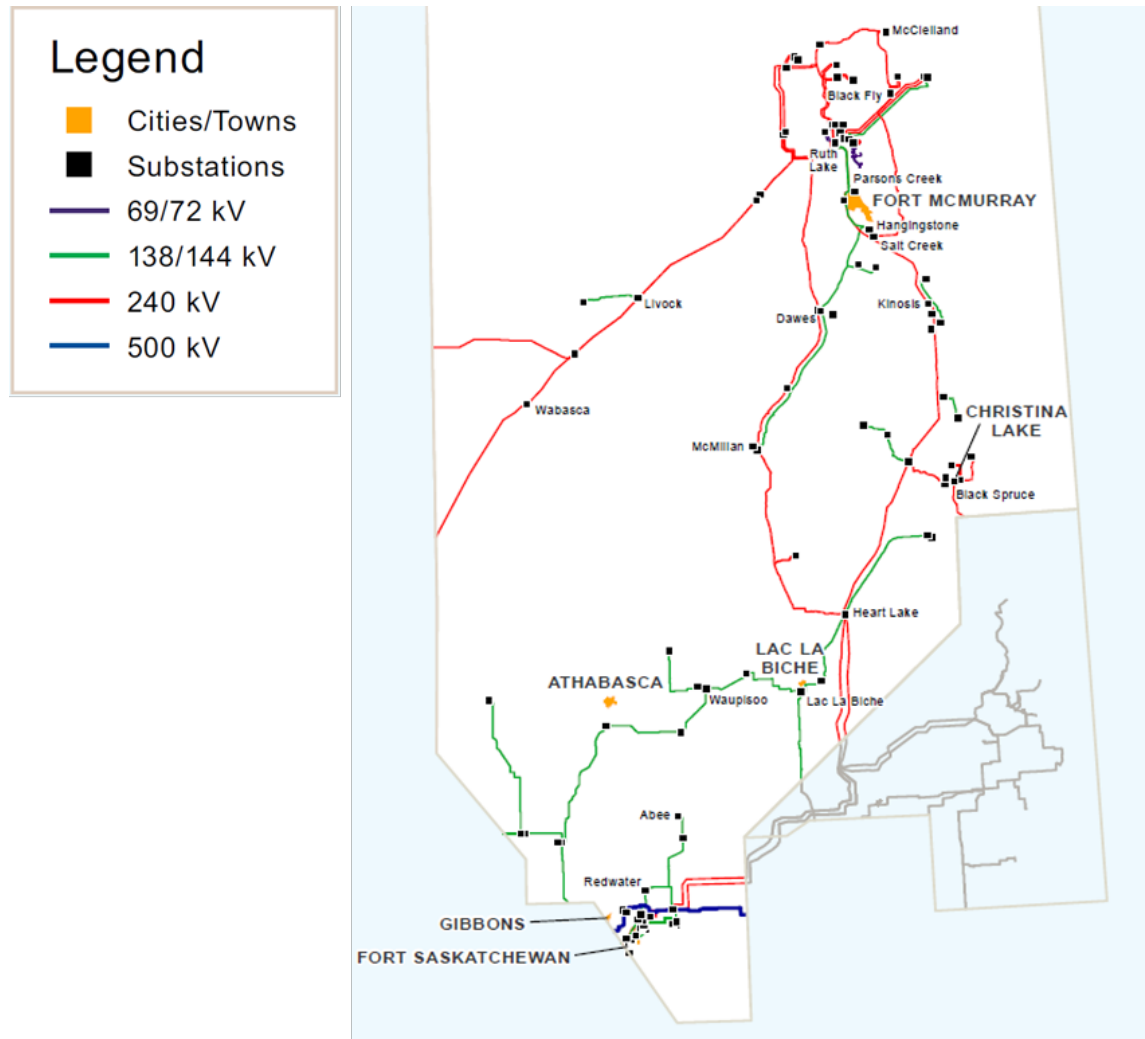


Figure 54 – Athabasca and Wood Buffalo regions – existing electricity transmission system.

Having received approval in January 2017, the construction of a major electricity transmission line, the Fort McMurray West 500 kV, is scheduled to begin in summer 2017. It is being built by Alberta PowerLine, a partnership between ATCO and Quanta Services. Construction will begin in the Fort McMurray area and end in the Wabamun area (a map of the route can be found in Appendix 16.9). Designed to address increased electricity demand in the Fort McMurray area, the facilities will be completed and operational by June 2019.<sup>102</sup>

<sup>101</sup> AESO 2015 Long-term Transmission Plan; AESO.

<sup>102</sup> Alberta PowerLine; 2017-03-24. [www.albertapowerline.com](http://www.albertapowerline.com).

Oilsands projects in the Fort McMurray could drive major 240 kV and 138 kV enhancements; however, given the economic uncertainty of these developments, timelines for some transmission projects remain uncertain.<sup>103</sup> In the medium term new 144 kV lines between Salt Creek and Parsons Creek and between Ruth Lake and Parsons Creek are proposed. Pipelines in the Athabasca area are likely to drive the need for 138 kV enhancements on the Athabasca-Lac La Biche network, including a new line between Abee and Waupisoo.

### Municipal Capital and Civil Works Projects

Leveraging civil infrastructure projects can reduce broadband deployment costs by 75%. Given civil infrastructure costs typically account for 70% of buried deployment costs, this is significant. Capital projects that involve trenching or erecting towers or poles such as during the development of new subdivisions, road construction, or the construction or rehabilitation of water or sewer lines are typical projects that can improve the economics of community broadband projects. Table 19 shows the capital and civil works projects that the municipalities self-reported.

Table 19 – Athabasca and Wood Buffalo Regions Municipal Capital & Civil Works Projects

Towns	
Athabasca	2, water/sewer projects (downtown and University area) Road extension – University area Edwin Parr Composite School New swimming pool (cost split with Athabasca County)
Villages	
Boyle	Did not respond to project inquiries and no information was available on the village’s website
Counties/RMs	
Athabasca	Athabasca Flats East shallow utilities New swimming pool (cost split with Town of Athabasca)
Wood Buffalo	Projects associated with the rebuild

### 7.6.3 Desired State

The Athabasca and Wood Buffalo regions shown in Figure 55 are not REDA members and do not fall within a REDAs’ boundaries. At the time of the writing of this report the town of Athabasca was in discussions with AxiaConnect to proceed with the building of a fibre network.

<sup>103</sup> AESO 2015 Long-term Transmission Plan; AESO.



Figure 55 – Athabasca and Wood Buffalo regions – communities with near-term broadband plans.

More information is provided in the Appendix about each community's issues and challenges; whether fibre/broadband is on their Council's agenda; the factors impacting their community's capability to pursue a fibre/broadband initiative; and their multi-year visions.

## 7.7 Town of Athabasca – A 1,341 Premise Community

### 7.7.1 Default Scenario

In the analysis below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in Section 6.5.

### 7.7.2 Deployment Capital

A pre-conceptual buried fibre design was completed for the Town of Athabasca and appears in Figure 56. Feeder routes are shown in magenta and distribution in cyan. From Table 21, the overall cost to deploy a network that passes every premise in Athabasca comes to about \$2.36M.

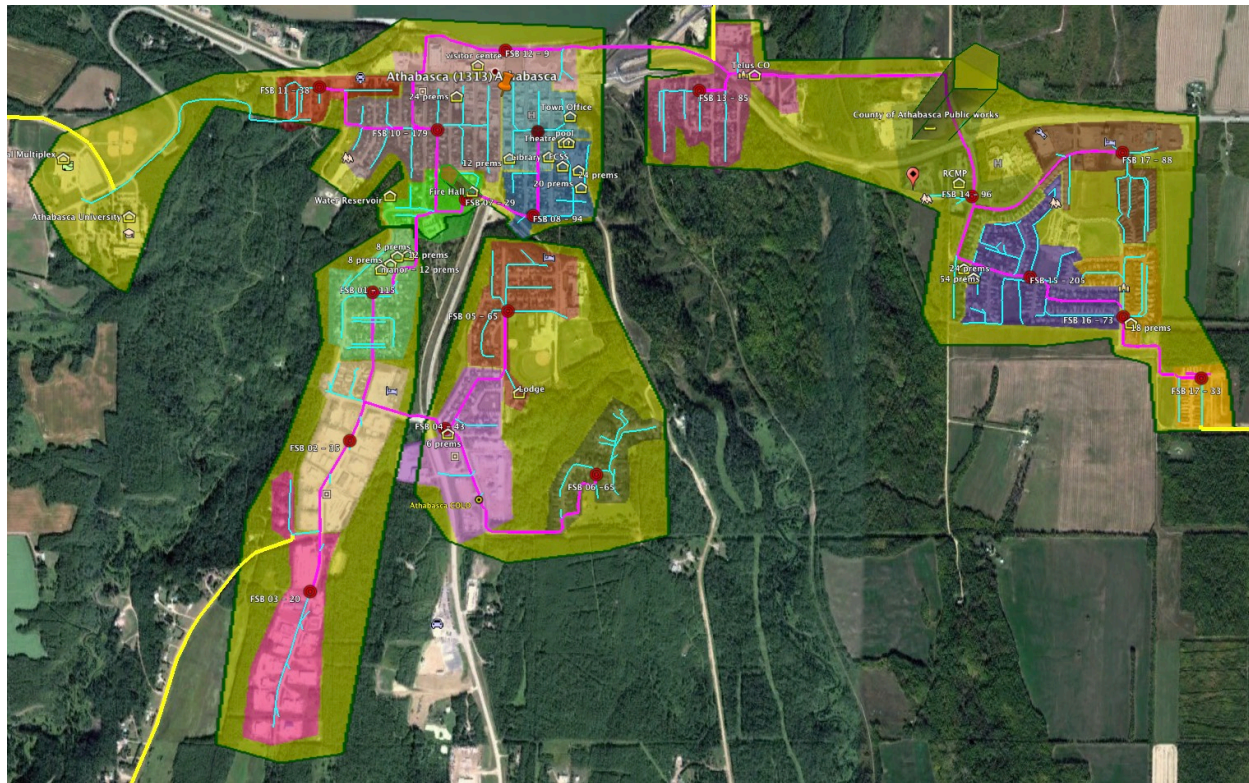


Figure 56 – Fibre layout for the Town of Athabasca.

### 7.7.3 Deployment Schedule

This business case assumes that the network would be deployed throughout the Town of Athabasca over the spring, summer, and fall of 2018.

### 7.7.4 Opto-electronics and Backhaul

Capital cost estimates over the first five years of operation for the proposed scenario come to \$4.14M. In Figure 57, the 69% or \$2.87M outside plant (OSP) deployment estimate includes the feeder and distribution plant required to pass every premise and provide drop connections to those premises that take service.

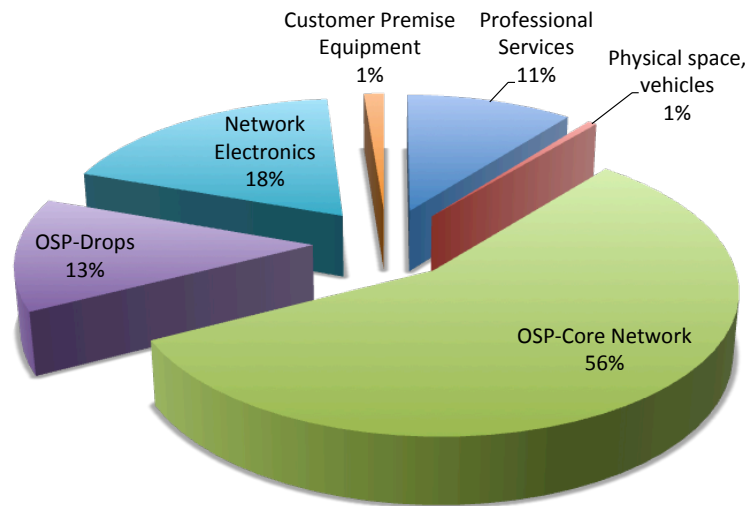


Figure 57 – Cumulative capital expenditures from 2018 to 2022.

### 7.7.5 Operations

The operational costs for wholesale network operation are straightforward as most are handled via outsourced contracts. Once the network build is completed in 2018 and the target penetration rates are realized, operational costs stabilize and a view of those calculated for 2022 are shown in Figure 58. In the chart, Admin, ops, and o-e refer to administration, operations, and opto-electronics, respectively. The numbers assume that the Town of Bruderheim provides both equipment and storage space at no charge.

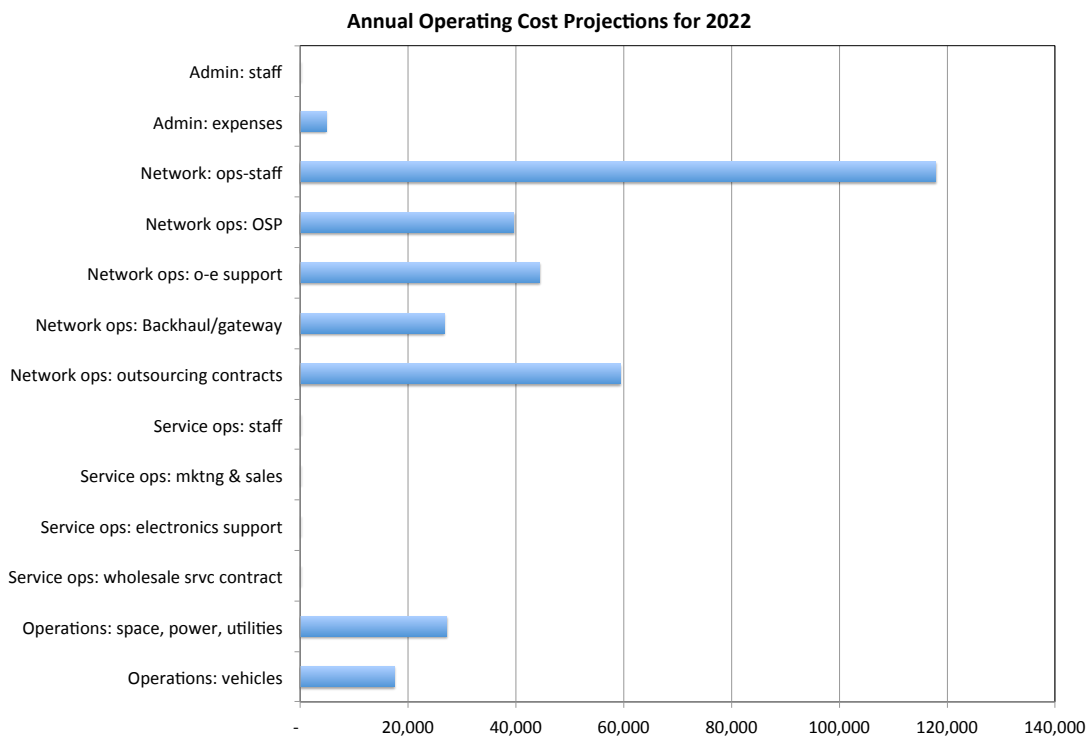


Figure 58 – Projected operational costs in 2022.

### 7.7.6 Financial Projections

Cashflow results for this scenario for TAt-Net are summarized in the left side of Table 20. Though the operation goes cashflow positive in year 4<sup>104</sup>, with debt servicing considered, the overall financials do not go cashflow positive until year 7. As the required capital must therefore be sufficient to cover a 6-year deficit, some \$4.36M in capital will be required to fund the operation. By year 15, approximately \$123,849 is being returned to the Town annually.

Table 20 – Utility Model Results Summary for Athabasca and Boyle

Town of Athabasca		Athabasca and Boyle	
	Results		Results
Years to positive cashflow		Years to positive cashflow	
Operating	3	Operating	3
With debt servicing (p&i)	6	With debt servicing (p&i)	4
Financing		Financing	
Start-up capital required	4,360,702	Start-up capital required	5,285,788
Net Cashflow - before debt servicing		Net Cashflow - before debt servicing	
Profit - annual at 10 yr	173,795	Profit - annual at 10 yr	353,357
Profit - annual at 15 yr	271,532	Profit - annual at 15 yr	480,453
Net Cashflow - after debt servicing		Net Cashflow - after debt servicing	
Profit - annual at 10 yr	28,862	Profit - annual at 10 yr	177,141
Profit - annual at 15 yr	123,849	Profit - annual at 15 yr	299,682

In graphical form, the non-discounted cashflow chart for the proposed utility appears in Figure 59. The capital (red) required to finance the project is shown to pretty much all be required upfront and the financing must be sufficient to maintain a net cashflow of at least zero. Operational sustainability is determined by the gap or difference between the revenue (blue) and operational expenditure (green) lines whereas overall sustainability, which includes principal repayment, is the difference between the revenue (blue) and the operational + principal repayment (dotted blue) lines. The bigger the gap, the better. The net overall cashflow line is the dotted orange line.

While technically these numbers work, operationally, the risk is high due to the small margins and resulting deficits. Given the small client base available and the importance of scale to operational sustainability, these initial results are typical for communities with small populations. To mitigate the scale issue, the Town of Athabasca might consider partnering with a neighbouring communities like Boyle.

A pre-conceptual design for the Village of Boyle appears in Figure 60. Deployment cost to pass every premise is about \$724,000. Summary financials for a combined Athabasca/Boyle operation are shown on the right hand side of Table 20. Required capital increases by about the cost of the Boyle deployment. Though Boyle is only a third the size of Athabasca, the margins increase 6 times by year 10 and level out at 2.5 times by year 15. The cashflow chart is shown in Figure 61.

<sup>104</sup> With 3 years to positive cashflow, the project goes cashflow positive in year 4.

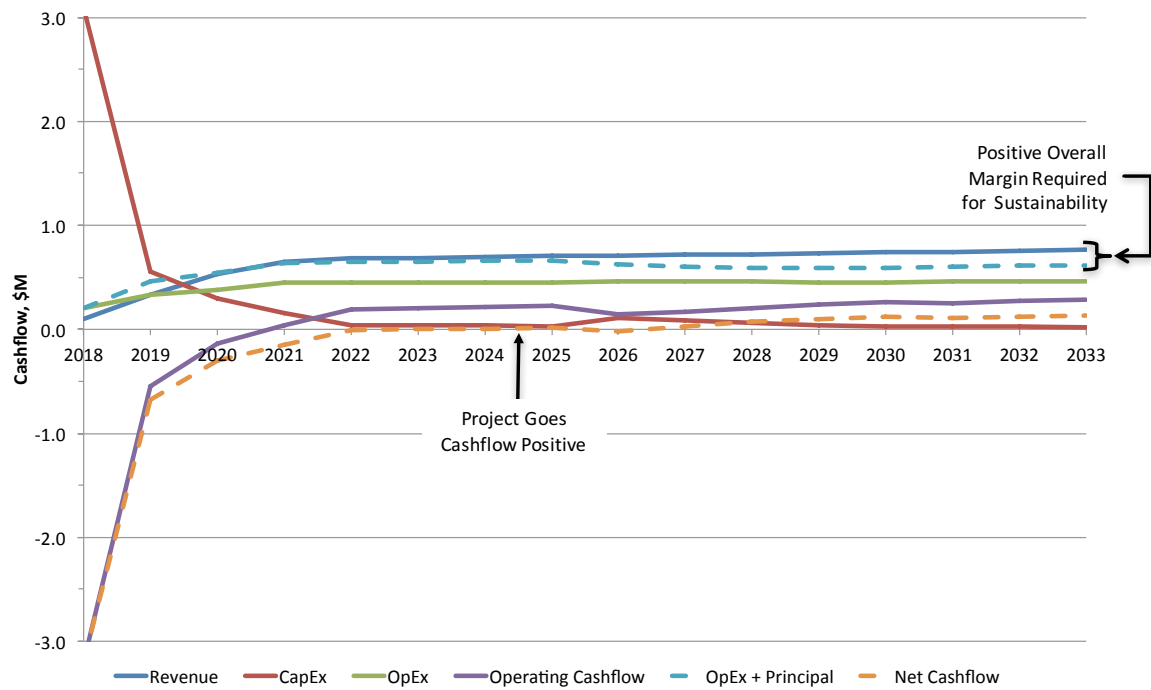


Figure 59 – Non-discounted cashflow projections for Bruderheim.

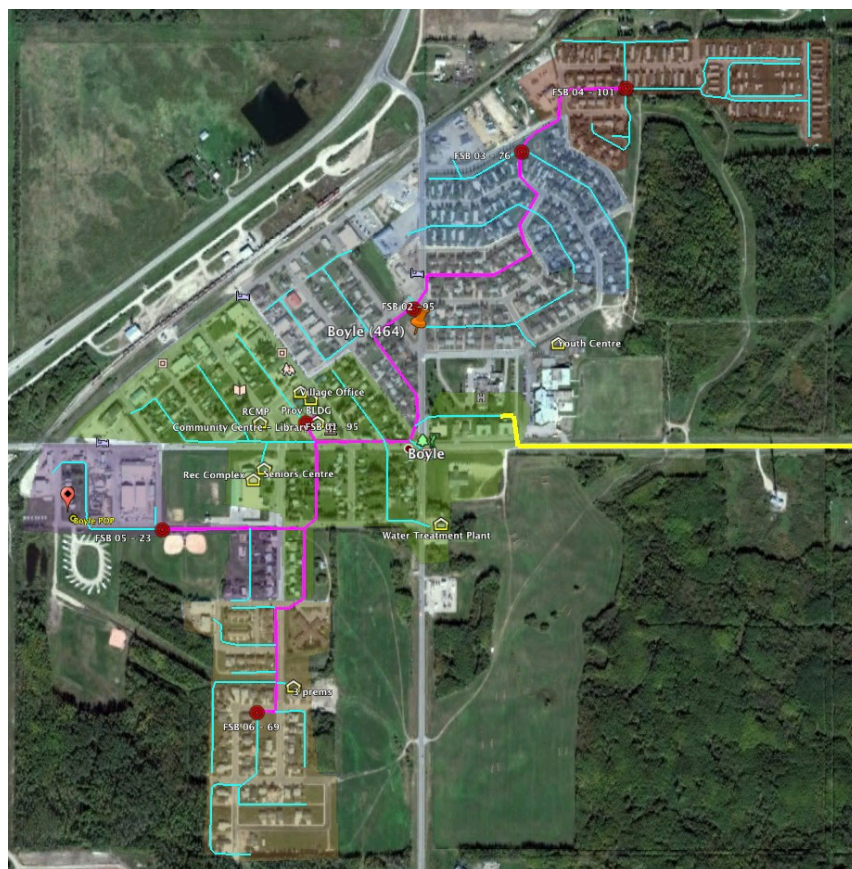


Figure 60 – Fibre layout for the Village of Boyle.



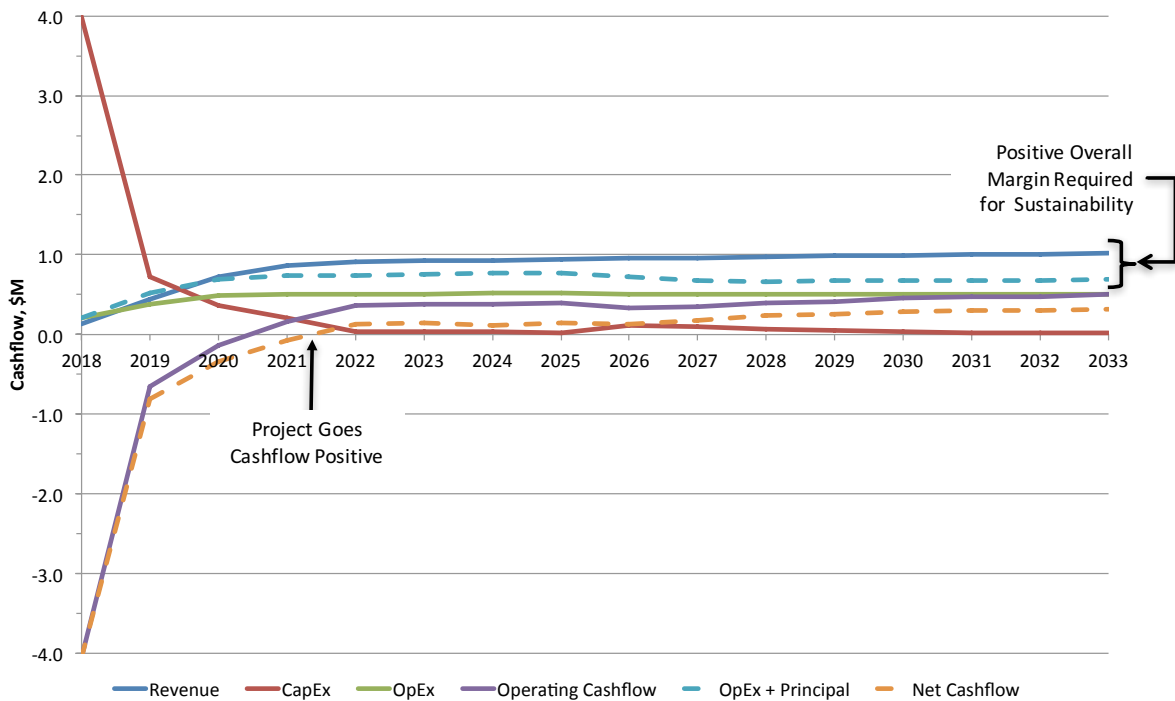


Figure 61 – Non-discounted cashflow projections for Athabasca and Boyle.

Additional options to be considered to improve margins are discussed in Sub-section 9.5.10.

## 7.8 Athabasca County – An Inclusive Regional Utility Network

### 7.8.1 Context

For guidance for the MDs and Counties throughout the NADC region, an inclusive regional network analysis for Athabasca County will be outlined below. From this and the regional analyses done for members of the REDAs, other NADC members should be able to get a realistic view of the options available to them.

A map of the County appears in Figure 62. Towns and hamlets are marked with orange and yellow pins. Key ISP tower sites are marked by red balloons. These are towers that the ISPs would like to upgrade should fibre access become available. SuperNet access sites are shown with yellow text and circles. SuperNet access sites enable connections back to Internet exchanges in Edmonton and Calgary without the need for additional fibre deployment. Each community network must at least indirectly connect back to an Internet Exchange.

### 7.8.2 Default Scenario

In the analysis below, the business structure, opto-electronics and backhaul, operations, drop capital, and markets and revenues assumed are those outlined in the default implementation scenario presented in Section 6.5. In this case, the local network entity established to house the local fibre operation will be referred to as Atha-Net.

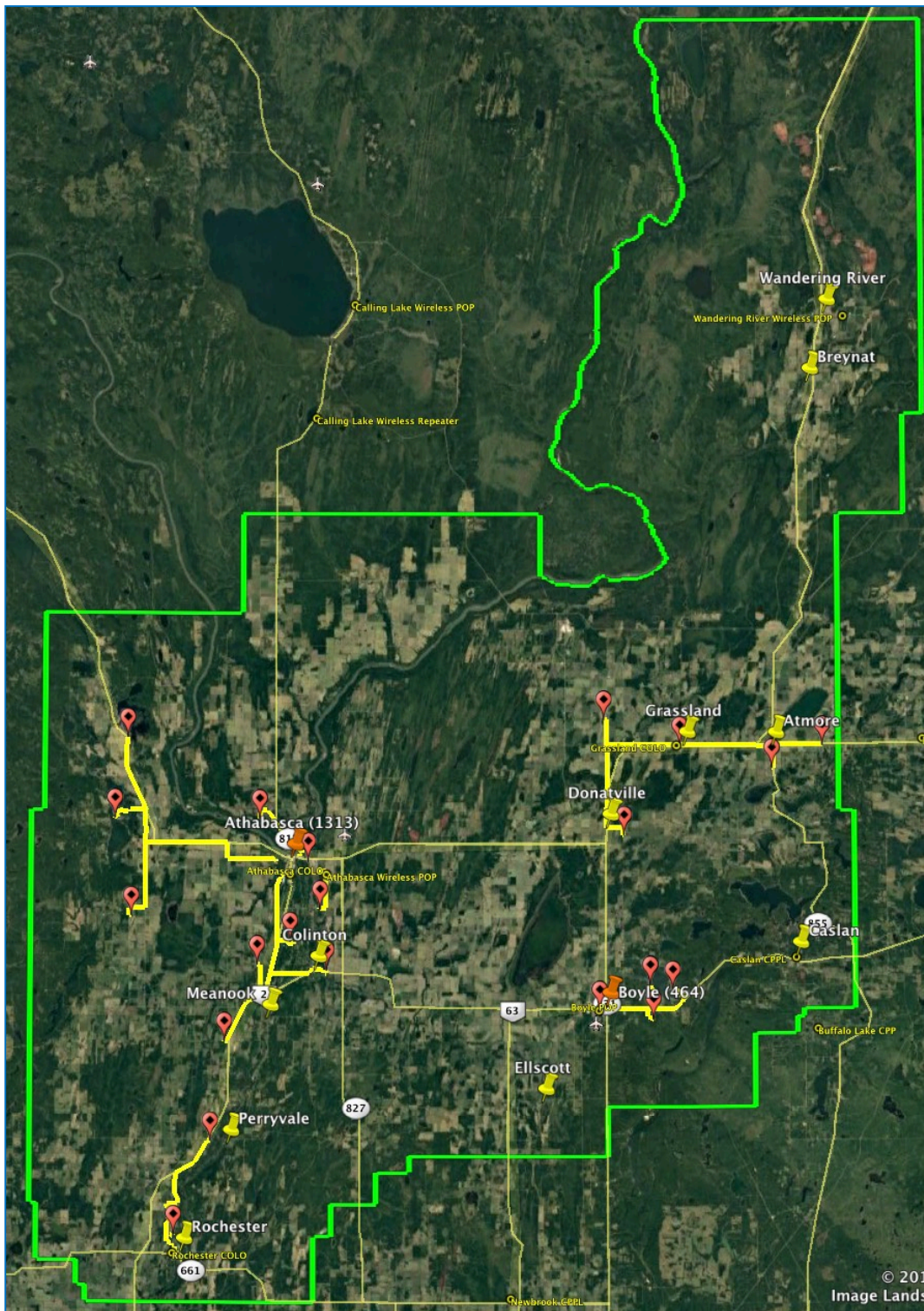


Figure 62 – Athabasca County.

### 7.8.3 Deployment Capital

Deploying an inclusive regional network involves both laying fibre to connect all communities and enable connections to key ISP towers as well as deploying access, fibre-to-the-premise networks in all towns,

villages, and hamlets. The intercommunity network is shown in yellow in Figure 62. For simplicity here, assume that the full intercommunity network and the fibre access networks are deployed in 2018.

The capital costs to deploy both the connection network and access networks in each community are shown in Table 21. In this context, access refers to laying fibre that passes every premise in a municipality. Later, when a premise orders service, a fibre drop connection from the premise to the fibre running past the premise will be needed. Overall cost, should the entire network be deployed, comes to about \$8.1M. In the financial projections which follow, the year of deployment for each community is shown in the tan coloured row. Overall, the network will be deployed over the two-year period from 2018 to 2019.

Table 21 – Deployment Cost Summary

Network Component	County Backbone Routes				Towns & Villages	
	From Rochester SN POP	From Boyle SN POP	From Grasslands SN POP	From Athabasca SN POP	Athabasca	Boyle
Year of Deployment	2018	2018	2018	2018	2018	2019
Feeder Distribution	270,948	425,377	766,075	1,807,681	671,833	134,876
	-	-	-	-	1,446,230	442,480
Subtotal - civil construction	270,948	425,377	766,075	1,807,681	2,118,063	577,356
Mobilization/De-mobilization	2,709	4,254	7,661	18,077	42,361	11,547
Engineering, Permitting, and Planning	27,095	42,538	76,608	180,768	37,971	99,878
Activation: Fibre Micro-cabling	138,888	127,521	336,825	739,719	162,045	35,190
Grand-total, deployment	439,640	599,689	1,187,168	2,746,245	2,360,441	723,971
				4,972,743		3,084,412

A breakdown of the capital expenditures over the first five years of operation appears in the pie chart in Figure 63. The chart represents expenditures of \$10.3M and assumes that the ISPs using the network obtain a collective market penetration of 50% of the residential and 70% of the business communities.

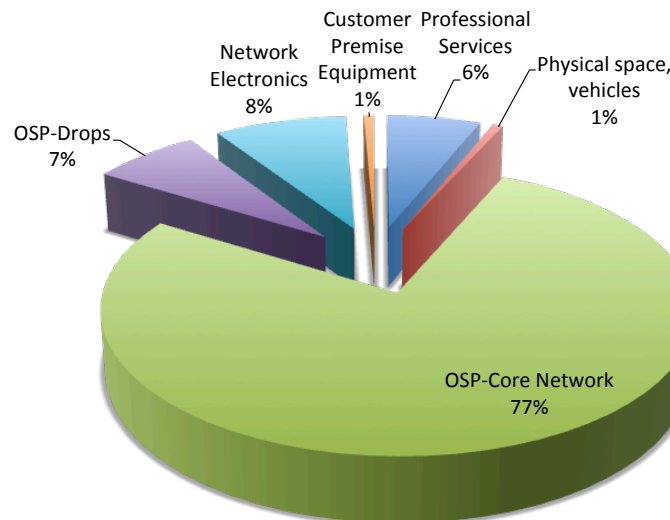


Figure 63 – Cumulative capital expenditures from 2018 to 2022.

### 7.8.4 Operations

Operational costs include payments to O-Net for network management and monitoring services and for local technical staff required to maintain the network. A breakdown of the expenses, as estimated for the 2022 operating year, appears in Figure 64 for the scenario proposed. In the chart, Admin, ops, o-e, and

mktng refer to administration, operations, opto-electronics, and marketing respectively. All service-related costs are zero as responsibility for those remains with the ISPs.

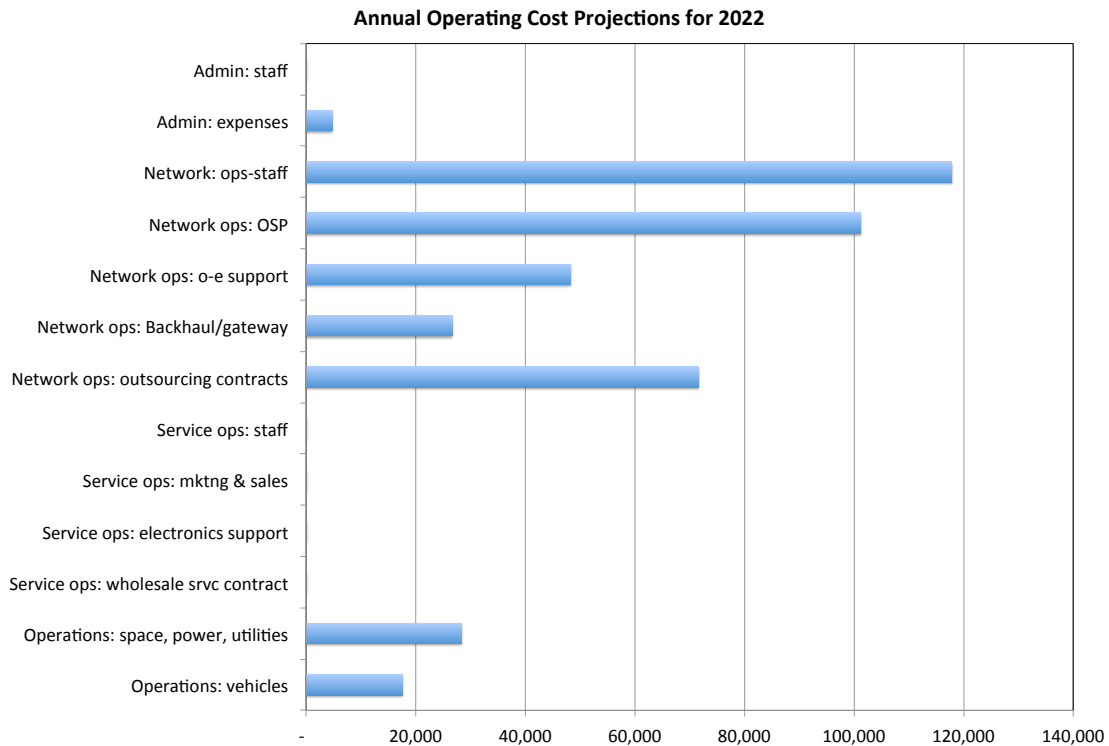


Figure 64 – Projected operational cost projections for the utility fibre network in 2022.

### 7.8.5 Financial Projections

Deploying intercommunity network is expensive and would be best done based on the availability of grant funding or in conjunction with other linear infrastructure builds (road rehabilitation, water line deployments, etc.) and staged in a way as to minimize impact on cashflow and required capital.

As can be seen in the summary results shown in Table 22, the wholesale network operation for the County goes cashflow positive in year 4, with debt servicing considered, the overall financials stay negative throughout the 16-life of the model, i.e., the operation incurs a deficit each year. Partly as a result of the ongoing deficit, the required capital increases with time and, by year 16, has reached \$14.7M. With grant funding to cover the \$5M intercommunity network, the financials would revert to those shown for Athabasca and Boyle. Other options to improve margins include staging the network deployment over a number of years and leveraging linear infrastructure builds as outlined in Sub-section 6.5.10.

Table 22 – Utility Model Results Summary for Athabasca County

	Results
Years to positive cashflow	
Operating	4
With debt servicing (p&i)	16
Financing	
Start-up capital required	14,671,385
Net Cashflow - before debt servicing	
Profit - annual at 10 yr	118,909
Profit - annual at 15 yr	248,881
Net Cashflow - after debt servicing	
Profit - annual at 10 yr	0
Profit - annual at 15 yr	0

## **7.9 Infrastructure Analysis for Five RMWB Communities**

In fall, 2013, the Sustainable Communities Working Group (SCWG) of the now defunct Oil Sands Leadership initiative had Taylor Warwick complete a planning level conceptual review the options available to improve broadband services within Anzac, Conklin, Fort Chipewyan, Fort MacKay, Gregoire Lake Estates, and Janvier. The options included infrastructure to support mesh WiFi, hybrid fibre/WiFi, and full fibre/WiFi. The detailed study<sup>105</sup> is available on the NADC website.

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<sup>105</sup> Dobson, C.; *Infrastructure Options for Rural Villages in the RMWB*; Oil Sands Leadership Initiative; 2013-09-14.